Table of Contents

2021-2022 Graduate Bulletin

The City College of New York • 160 Convent Avenue at 138th Street • New York, NY 10031

A Message from the President

Welcome to The City College of New York!

Whether you completed your undergraduate work here at City College or you come to us from another university or country, you are about to embark on a deeper, more committed and rewarding exploration of any one of more than 60 graduate programs. You will be taught by internationally renowned and accomplished faculty in diverse fields, ranging from science, engineering, and architecture to humanities and the arts, education, and social sciences. You will also take the unique experiences that you bring to our campus, and learn to apply them to solve real-world issues. You will learn to become experts and to share that expertise with others.

Today, we face, collectively, an entirely new set of challenges as we come slowly out of the COVID-19 pandemic and begin the task of rebuilding our society. CCNY, from its very inception, was based on the proposition that we would never be as strong, democratic or dynamic as we need to be unless we harness the talents of the whole people. Never is that vision more essential than in times of great national need. Our city, and our national and global societies, need the talent inherent in each of you and we're dedicated to developing those talents under whatever circumstances we will confront together.

To maximize your experience at CCNY, please use this bulletin to familiarize yourself with our graduate programs. Each program offers a rich academic foundation for future success and prepares you to become a leader in an increasingly complex and global world. Under the particular circumstances of the moment, we are working to provide your educational services and supports in both in-person and on-line formats, with as much flexibility and security as possible. In making these efforts, we will continue to be guided by the twin imperatives of delivering you an excellent college education and preserving the health and safety of the whole campus community.

College life outside of the classroom is just as varied and diverse as our student body. You will find endless opportunities to join with like-minded students to pursue your interests in more than 100 student clubs. In particular, I hope that you will bring your concerns and ideas to the graduate student government.

Use our valuable resources to maximize your City Experience. From innovation and entrepreneurship to cutting-edge research, scholarship and creativity, a City College education is a vital force for progress. As a CCNY, graduate you will join a rich tradition of excellence and achievement, shaping both your own future and the world in which we live.

I look forward to seeing you on the City College campus.

Sincerely,

Vince Boudreau, President

Courses

ANTHE - Secondary Education Anthropology Course Descriptions

ANTHE 2000E - Developmental Patterns in Different Cultures

Childrearing, training patterns. Cross-cultural comparisons. Effect of early training and later training on classroom behavior.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH - Architecture Course Descriptions

ARCH 61001 - Digital Techniques

Introduction to digital technology. Through lectures and laboratory assignments, students learn the basics of digital drawing, modeling, and rendering. Focus on software such as Rhino, AutoCAD, Adobe Illustrator, and Photoshop.

Credits: 3. Materials Fee: $50. Contact Hours: 4 hr./wk. Corequisite: ARCH 61100, ARCH 62301

ARCH 61003 - Independent Study

Repeatable 4 times.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61100 - Architectural Studio 1.1

The first in a sequence of four core design studios, this course is based around a series of skill-building exercises which train students in architectonics, spatial composition, diagramming techniques, architectural theory, passive solar design and principles of materials and fabrication. All exercises are designed to develop the student's abilities to translate spatial concepts into physical design proposals.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Corequisite: ARCH 61001, ARCH 62301

ARCH 61201 - Survey of World Architecture 1

This is the first of a four-semester sequence that examines the physical forms of world architecture and related arts. It analyzes the built environment in response to place, politics, culture, and the people who use it. This semester students will study architecture from the Neolithic period to the 14th century in Europe, Asia, Africa and the Americas. Two lectures and an advanced seminar are required weekly.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61301 - Materials/Construction L

An investigation into the systems, techniques, and materials employed in the making of architecture. Focus on case studies in concrete, steel and other construction materials.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: ARCH 62100, ARCH 62001

ARCH 61388 - Case Studies in Sustainability

Case Studies in Sustainability

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61510 - Topics in History of Architecture and Society

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61520 - Topics in Architecture and the City

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61530 - Topics in the History of Landscape, Infrastructure, and the Environment

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61540 - Topics in the History of World Architecture

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61550 - Topics in Design and Methods

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61560 - Topics in Technology

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61570 - Topics in Visual Studies

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61580 - Topics in Computational Studies

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61590 - Topics in Professional Studies

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 61600 - Topics in Sustainability

Course number should be repeatable up to 10 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 62100 - Architectural Studio 1.2

The second core studio builds upon the experience of the previous studio through a series of increasingly complex design problems. Using Manhattan as a laboratory, students are introduced to the urban context and explore a range of building types with nuanced and complex

programs. Through the rigorous study of building precedents and site visits, students address the role of architecture in the public realm.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: ARCH 61100Corequisite: ARCH 62001, ARCH 61301

ARCH 62201 - Survey of World Architecture 2

This is the second of a four-semester sequence that examines the physical forms of world architecture and related arts. It analyzes the built environment in response to place, politics, culture, and the people who use it. This semester students will study architecture from the 15th to the 18th centuries in Europe, Asia, Africa, and the Americas. Two lectures and an advanced seminar are required weekly.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ARCH 61201.

ARCH 62301 - Materials/Construction S

An investigation into the systems, techniques, and materials employed in the making of architecture. Focus on case studies in wood, masonry, and other construction materials.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: ARCH 61100, ARCH 61001

ARCH 62401 - Structures I Introduction to Structures

Basics of structures including Structural stability, statics of basic structural elements such as beams, columns, frames, and trusses. Rules-of-thumb for structural systems and elements. Introduction to strength of materials.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 71301 - Building Modeling

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 73100 - Architecture Studio 1.3

The third core studio focuses on sustainable housing. In turn, the emergent scales and patterns of sustainable housing become the operative means to address and examine larger urban design concerns. Students work in teams and consider socio-economic factors, urban density and morphology in the design of housing solutions in complex and multi-layered urban contexts. Emphasis is placed on the research of urban and building precedents as well as on the use of environmental modeling and visualization tools to measure and integrate complex data into housing solutions.

Credits: 9. Materials Fee: $50. Contact Hours: 12 hr./wk. Prerequisite: ARCH 62100

ARCH 73201 - Survey of World Architecture III

This is the third of a four-semester sequence that examines the physical forms of world architecture and related arts. It analyzes the built environment in response to place, politics, culture, and the people who use it. This semester, students will study architecture in the 19th and early 20th centuries in Europe, Asia, Africa, the Americas, and Oceania. Two lectures and an advanced seminar are required weekly.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ARCH 62201.

ARCH 73401 - Structures 2 – Design of Structural Elements

Introduction to structural materials including steel, concrete, and wood. Basic principles of analyses and design with respect to various materials.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ARCH 62401 Corequisite: ARCH 74100

ARCH 73500 - Site Design

The study of environmental context and the natural environment, including climate, geology, landform, soil, hydrology and vegetation create a basis for an extensive investigation of the relationship between building and site.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 74100 - Architecture Studio 1.4

The fourth and final studio in the four-semester core sequence focuses on building systems integration, structural systems, and technical documentation. In this integrative design studio students develop a building from schematic design through design development, and finally through the construction documents phase. With an emphasis on energy efficiency, this studio provides students with an opportunity to synthesize the knowledge they have acquired in their core studies with respect to program preparation, sustainable design and building technology.

Credits: 9. Materials Fee: $50. Contact Hours: 12 hr./wk. Prerequisite: ARCH 71301Corequisite: ARCH 73401

ARCH 74401 - Structures III Behavior of Structural Systems

Behavior of structural systems including gravity and lateral load paths in buildings; Seismic effects.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ARCH 62401

ARCH 74501 - Environmental Systems

This course will focus on the performance of buildings relative to environmental impact and operational response. Starting with the building's skin, systems will be understood as being in contact and in manipulated exchange with the thermal, luminous and acoustic environment surrounding them, to serve the ambience and comfort of the interior.
Basic knowledge of exchange, distribution and regulation will berelated to construction and mechanical systems. The goal is to integrate structural, mechanical andspatial requirements to make appropriate choices during the design phase, allowing students to understand the building as a holistic regulated environment.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 85101 - Advanced Studio

Students will be placed in one of an array of diverse advanced studio offerings, developed to provide students opportunity to deeply engage topics within the expansive discipline of architecture, and reflective of the expertise and interests of the full design faculty. Studio project sizes, types and sites will vary, along with pedagogical methods. Course is taken two times in sequence to meet third year M Arch program requirements. Repeatable two times.

Credits: 6. Contact Hours: 8 hr./wk. Prerequisite: ARCH 74501 and ARCH 85201

ARCH 85200 - Design Seminar

This required seminar course focuses on special topics of study that support and broaden the 3rd year M. Arch. design curriculum. Repeatable 2 times.

Credits: 3 . Contact Hours: 3 hr./wk. Prerequisite: ARCH 85201Corequisite: ARCH 85101

ARCH 85201 - Survey of World Architecture IV

This is the fourth in a four-semester sequence that examines the physical forms of world architecture and related arts. It analyzes the built environment in response to place, politics, culture, and the people who use it. This semester students will study architecture in the 20th and 21st centuries in Europe, Asia, Africa, the Americas, and Oceania. Two lectures and an advanced seminar are required weekly.

Credits: 3. Prerequisite: ARCH 73201.Contact Hours: 3 hr./wk..

ARCH 85300 - Advanced Computing

This new required fifth semester course builds upon the digital skills students have acquired over the 4 semesters of the core and introduces them to advanced topics in computing. Emphasis is on scripting,

parametric modeling, and data visualization and covers such software as Revit, Grasshopper, Solid Works, and Ecotect.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk. Prerequisite: ARCH 62001 and ARCH 71301.

ARCH 85600 - Professional Practice

This course introduces students to the professional practice of architecture with a special emphasis on the challenges facing architects that maintain a strong design emphasis This course covers the general organization of the profession and its relation to client, community, and the construction industry; new management techniques, information organization and retrieval, project delivery, construction and construction documents, cost control, legal surety, contracts, and financial management.

Credits: 3. Contact Hours: 3 hr./wk.

ARCH 91102 - Advanced Studio

Students will be placed in one of an array of diverse advanced studio offerings, developed to provide students opportunity to deeply engage topics within the expansive discipline of architecture, and reflective of the expertise and interests of the full design faculty. Studio project sizes, types and sites will vary, along with pedagogical methods. Students complete 3 Advanced Studios to meet program requirements.

Credits: 6. Contact Hours: 8 hr./wk. Corequisite: ARCH 91202

ARCH 91202 - Design Seminar I

This required seminar course focuses on special topics of study that support and broaden the Advanced Studio design curriculum. Students complete 2 Design Seminars to meet program requirements.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: ARCH 91102

ARCH 92102 - Advanced Studio

Students will be placed in one of an array of diverse advanced studio offerings, developed to provide students opportunity to deeply engage topics within the expansive discipline of architecture, and reflective of the expertise and interests of the full design faculty. Studio project sizes, types and sites will vary, along with pedagogical methods. Students complete 3 Advanced Studios to meet program requirements.

Credits: 6. Contact Hours: 8 hrs./wk. Corequisite: arch 92202

ARCH 92202 - Design Seminar II

This required seminar course focuses on special topics of study that support and broaden the Advanced Studio design curriculum. Students complete 2 Design Seminars to meet program requirements.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: ARCH 92102

ARCH 93103 - Advanced Studio

Students will be placed in one of an array of diverse advanced studio offerings, developed to provide students opportunity to deeply engage topics within the expansive discipline of architecture, and reflective of the expertise and interests of the full design faculty. Studio project sizes, types and sites will vary, along with pedagogical methods. Students complete 3 Advanced Studios to meet program requirements.

Credits: 6. Contact Hours: 8 hr./wk.

ART - Art Course Descriptions

A0000

ART A1000 - Research Methods of Art History

Working methods of the art historian. Techniques for obtaining primary and secondary source material, including use of traditional archival and bibliographical materials, electronic information systems, interviewing techniques, and photographic documentation. Introduction to different approaches to objects and their contexts. Development of a variety of writing modes. Field trips; class reports.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6000 - Egyptian Art and Architecture

Painting, sculpture, architecture, and decorative arts of Egypt from pre-dynastic times through the Ptolemaic period.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6020 - Greek and Roman Art

Art of the Classical civilizations: Greece from the Geometric period through the Hellenistic era; the Etruscan contribution; Rome from the Republican period through late Imperial times.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6100 - Romanesque and Gothic Art of Medieval Europe

Art of the later Middle Ages: architecture, sculpture, manuscripts, stained glass, emphasis on French cathedrals, regional schools in emerging national states, and Byzantine influence on the West.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6200 - Italian Renaissance Art and Architecture

An overview of the painting, sculpture, and architecture created in Italy during the fourteenth, fifteenth, and sixteenth centuries. Discussion will focus on the needs and ambitions of private, civic, and ecclesiastical patrons, as well as the creative responses of individual artists from Giotto to Michelangelo.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6220 - Northern Renaissance Art

An overview of painting, sculpture, and printmaking created in Northern Europe during the fourteenth, fifteenth, and sixteenth centuries. Trace the development of naturalism and humanism in France, Germany, and the Netherlands, as well as the dialogue between Northern Europe and Italy during the Renaissance. Discussion will explore the needs and ambitions of private, civic, and ecclesiastical patrons, as well as the creative responses of individual artists from Van Eyck to Bruegel.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6300 - Baroque and Rococo Art in Europe

Seventeenth and eighteenth century art in Italy, France, Spain, and Holland. Artists include Bernini, Poussin, Caravaggio, Gentileschi, Velazquez, Rubens, Rembrandt, and Vermeer.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6400 - Nineteenth Century Art in Europe

The art of western Europe, primarily France, including Romanticism, Realism, Impressionism, and Post-Impressionism.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6410 - American Art: 1776-1900

Art of the United States from colonial times to the late nineteenth century; consideration of European influences and regional contributions in the development of American architecture, sculpture, and painting.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6420 - History of Photography

The aesthetic, historical, and technical development of still photography viewed as a major medium of artistic expression in the nineteenth and twentieth centuries.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6430 - Early 20th-Century Art in Europe and the U.S

The development of early modern art styles in France, Germany, Italy, Russia, and the U.S. including Fauvism, Cubism, Futurism, Constructivism, Expressionism, Dada, and Surrealism.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6440 - Postwar Art in the U.S. and Europe

Art from 1945 through 1980 in the U.S. and Europe, including Abstract Expressionism, Pop Art, Minimal Art, Conceptual Art, the development of earthworks and public art, and feminist and other issue-based art.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6450 - Modern Art in Latin America

An overview of the various currents of modernism that developed in Latin America from 1900 to 1945. Emphasis will be placed on the artistic production of certain countries, such as Mexico, Brazil, Argentina, Cuba, and Uruguay.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6452 - Modern Mexican Art

This graduate course is an in-depth look at the period known as the "Mexican Renaissance" when numerous artists, intellectuals, and government institutions responded to the goals, proposals, and failures of the Mexican Revolution (1910-1920), the first social uprising of the twentieth century. Structured as the combination of a lecture and seminar course, students will investigate issues such as cultural nationalism, gender, class, and race as they pertain to Mexican muralism and diverse media. Lectures will be complemented by focused discussions and presentations on numerous weekly readings. Selected from the advanced literature of the field, readings will offer students a variety of perspectives and methodologies utilized in the discipline. Students will engage in primary and secondary research for their final research paper. A field trip to the Orozco mural at the New School University and/or a local museum and/or gallery will provide students with first-hand knowledge of the art under discussion.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6500 - Art since 1980

Art since 1980 taught from a global perspective. Includes visits to galleries and conversations with artists.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6510 - Contemporary Art in Latin America

Artistic manifestations in post-World War II Latin America, including the work of diaspora artists and Latino/a artists in the United States.

Credits: 3. Contact Hours: 3 hr./wk

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6600 - Ancient Art of Meso-America, the Andes, and the Caribbean

A survey of sculpture, architecture, the town plan, and crafts in select pre-European cultures of the Caribbean Basin, the Andes, and Meso-America including the Taino, the Inca, and the Aztecs.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6700 - Art of West Africa: From the Bissagos to the Cameroon Grasslands

A survey of traditions that generate the interface of visual and performance arts, place and architecture among the Akan, Bamana, Bamilike, Baule, Dan, Dogon, Edo, Fon, Moshi, Senufo, Yoruba, and their neighbors. The archeology of the "Valleys of the Niger" is included.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6710 - Art of Central Africa: Central, East, and Southern Africa from Gabon to Mozambique

Arts of chiefdoms and kingdoms of the equatorial forests and savannas from Equatorial Guinea to Mozambique. An interdisciplinary survey of traditions that generate the interface of visual and performance arts, place and architecture. Arts of the Chokwe, Fan, Konde, Kongo, Kuba, Kwele, Luba/Hemba, Nyamwezi, Mangbetu, Ndebele, Pende, Saremo, Songye, Tabwa, Zula, and their neighbors. The archeology of Zimbabwe and the East African coast.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6800 - Islamic Art

Architecture and decorative arts of the Islamic world including Syria, Egypt, Persia, Turkey, Spain, and northern India.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6810 - Art of India, Southeast Asia, and Indonesia

Buddhist, Jain, and Hindu art in India; Buddhist and Hindu art in Southeast Asia and Indonesia.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6820 - Art of China, Japan, and Korea

The art and architecture of China, Japan, and Korea from prehistoric times to the nineteenth century.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6830 - The Artist in Society: South Asian Perspectives

This course challenges students to think about how concepts of the artist develop in historically and culturally specific ways, and to consider how such concepts influence visual traditions. It focuses on the painters, sculptors, architects and craftspeople of South Asia. Major themes include concepts of art, artist/patron relationships, workshop practices, techniques and materials, tradition and innovation, and differing historical and cultural perceptions of artists. All periods of South Asian art history are covered, but the emphasis is on the 16th to 19th centuries.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6840 - Asian Art Since 1850: Tradition and Nation

This course looks at ideas of tradition and nation in modern and contemporary Asian arts, at rejections of these ideas and at the struggle of individuals to escape the confines of nationalist thinking and East/West dichotomies. The course will focus primarily on India and Japan, respectively colonized and colonizing nations, but Pakistan, Korea and China are also discussed.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

ART A6900 - Art Criticism

Problems of description, analysis, interpretation, and evaluation of the art object as an aesthetic and cultural phenomenon in the context of historical approaches and styles; various systems and premises of critical analysis that have emerged from ancient to contemporary times.

Credits: 3. Contact Hours: 3 hr./wk.

These courses may be taken by M.F.A. and Graduate Art Education students.

B0000

ART B0051 - Graduate Critique Studio I

This is an interdisciplinary/non-discipline-specific studio course for M.F.A. students. First-year students take ART B0051 and ART B0052 to develop first-year projects under the direction of a faculty member.

Credits: 3. Contact Hours: 4 hr./wk.

ART B0052 - Graduate Critique Studio II

This is an interdisciplinary/non-discipline-specific studio course for M.F.A. students. First-year students take ART B0051 and ART B0052 to develop first-year projects under the direction of a faculty member.

Credits: 3. Contact Hours: 4 hr./wk. Prerequisite: ART B0051.

ART B0053 - Graduate Critique Studio III

This is an interdisciplinary/non-discipline-specific studio course for M.F.A. students. Second-year students take ART B0053 and ART B0054 to develop thesis work under the direction of a faculty member.

Credits: 3. Contact Hours: 4 hr./wk. Prerequisite: ART B0052.

ART B0054 - Graduate Critique Studio IV

This is an interdisciplinary/non-discipline-specific studio course for M.F.A. students. Second-year students take ART B0053 and ART B0054 to develop thesis work under the direction of a faculty member.

Credits: 3. Contact Hours: 4 hr./wk. Prerequisite: ART B0053.

ART B0100 - Projects in Drawing

Investigation of various drawing media and techniques for the purpose of enlarging the student's conceptual scope and professional skills. This course may be taken four times for credit.

Credits: 3. Contact Hours: 4 hr./wk.

ART B0200 - Projects in Drawing II

Investigation of various drawing media and techniques for the purpose of enlarging the student's conceptual scope and professional skills. This course may be taken four times for credit.

Credits: 3. Contact Hours: 4 hr./wk.

ART B0300 - Studio Art MFA Seminar I

Analysis of the components of traditional styles and movements. Student reports, papers, and discussion. Open to M.A. candidates by permission of the graduate advisor.

Credits: 3. Contact Hours: 3 hr./wk.

ART B0400 - Studio Art MFA Seminar II

Investigation of the conceptual implications of contemporary movements in the visual arts. Student reports, papers, and discussion. Open to M.A. candidates by permission of the graduate advisor.

Credits: 3. Contact Hours: 3 hr./wk.

ART B0500 - Professional Development

This course is designed to introduce the student to the practices in studio art.

Credits: 3. Contact Hours: 3 hr./wk.

ART B0600 - M.F.A. Thesis Preparation

This course guides students in their preparation of both written theses and thesis exhibitions. Readings and analysis of writings about art by artists and others. Writing about artwork and documentation of the experience of making the work. This class must be taken during the last two semesters of the student's residence in the M.F.A. program.

Credits: 3. Contact Hours: 3 hr./wk.

ART B0800 - Teaching Practicum

Theory and practice in college-level teaching of studio art, including course design, learning objectives, and pedagogical approaches to teaching fine art. Students have the opportunity to plan lessons, lead demonstrations, and develop syllabi. During this semester, students are assigned to a full-time faculty member in the Art Department for supervised practice teaching.

Credits: 3. Contact Hours: 3 hr./wk.

ART B1100 - Individual Projects in Painting

Intensive work under faculty supervision. Individual and group critiques. This course may be taken five times for credit.

Credits: 3. Contact Hours: 4 hr./wk.

ART B1200 - Individual Projects in Sculpture

Intensive work under faculty supervision. This course may be taken five times for credit. Materials Fee: $25.

Credits: 3. Contact Hours: 4 hr./wk.

ART B1300 - Individual Projects in Printmaking

Intensive work under faculty supervision. This course may be taken five times for credit.

Credits: 3. Materials Fee: $40. Contact Hours: 4 hr./wk.

ART B1400 - Individual Projects in Electronic Design and Multimedia

Intensive work under faculty supervision, a part of which will be scheduled class hours. This course may be taken five times for credit.

Credits: 3. Contact Hours: 4 hr./wk.

ART B1500 - Individual Projects in Photography

Intensive work under faculty supervision. This course may be taken five times for credit.

Credits: 3. Materials Fee: $40. Contact Hours: 4 hr./wk.

ART B1600 - Individual Projects in Ceramic Design

Intensive work under faculty supervision. This course may be taken five times for credit.

Credits: 3. Contact Hours: 4 hr./wk.

ART B2010-2040 - Workshop: Theme

A subject-focused course that consists of research, discussions, independent (or collaborative) project development and technical workshops. Themed workshops have a specific semester that is subject-based, and will include practice-based assignments in students' area of study. (This course can be taken up to four times.)

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B2050-2080 - Workshop: Medium

A medium-focused course that consists of technical workshops, medium-related exercises, research, discussions, and independent and/or collaborative project development. Medium workshops would have a specific semester long medium-based topic, and will include practice-based assignments in students' area of study. Medium-based topics will be designed to allow "cross-pollination" and experimental multi-media approaches. (This course can be taken up to four times.)

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B2210 - Working Critique I

This digital and interdisciplinary studio course focuses on weekly individual and group critiques of student work. In addition to research, discussion, and art practice in digital and new media, students will propose and develop a thesis project under the advisement of a faculty member.
This course can be taken up to three times for a total of 9 credits.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B2220 - Working Critique II

This digital and interdisciplinary studio course for MFA students focuses on weekly individual and group critiques. In addition to research, discussion and art practice, first year students will continue the development of a thesis project under the advisement of a faculty member. Student thesis proposals and progress will be reviewed by MFA faculty members at the end of the first year for entrance into the second year.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B2410 - Project Research Seminar

A seminar to introduce students to a research-focused approach to practice in digital, lens-based, and experimental media art and design. Research techniques are introduced as part of a working method and practice and applied towards first year projects and thesis project proposals.

Credits: 3. Materials Fee: $15. Contact Hours: 3 hr./wk.

ART B2420 - Research-based Art Practice

Engages works of art, architecture, design, film, writing, digital media, and contemporary critical theory. Includes internet culture, economies of artistic practice, aesthetics, cybernetics, and how these cultural phenomena have shaped conceptions of culture and identity. Readings and discussions center on cultural producers who are researchers or use a research-based approach in their practice. Provides the historical backdrop for contextualizing important contemporary issues and their multiple trajectories.

Credits: 3 . Contact Hours: 3 hr./wk.

ART B2600 - First-Year Project

Under the guidance of a full-time faculty member, an independent or collaborative project that is intended as the practice based outcome of the first year experience. While a thesis project may grow out of the experience of developing this project, they are intended to be distinct projects.

Credits: 6. Materials Fee: $50. Contact Hours: 6 hr./wk.

ART B3210 - Working Critique III

This digital and interdisciplinary studio course for MFA students focuses on weekly individual and group critiques. In addition to research, discussion and art practice, second year students will continue the development of a thesis project under the advisement of a faculty member.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B3220 - Critique Conferences

This digital and interdisciplinary studio course for MFA students focuses on weekly individual conferences with a faculty member and thesis committee members. In addition to research, discussion and art practice in digital and new media, second year students will finalize a thesis project, an exhibition and a written thesis.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B3410 - Theory in Practice

Continuation of Research-based Art History seminar. It explores in depth specific examples in art, architecture, design, digital media, film and writing that use theory as a critical foundation for artistic output. Readings and discussions will be centered around specific historical and contemporary examples of artists using theory in practice and the set of contexts, methods, and critical issues surrounding these examples.

Credits: 3. Materials Fee: $15. Contact Hours: 3 hr./wk.

ART B3610 - Thesis Project Development: Research

This course, to be taken in the fall semester of the second year, serves as the focused research and written work on thesis projects.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk.

ART B3620 - Thesis Project Development: Exhibition

This course, to be taken in the spring semester of the second year, serves as the focused work on thesis projects and exhibition.

Credits: 6. Materials Fee: $50. Contact Hours: 6 hr./wk.

ART B7000 - Museology

Introduction to history of museums and current issues. Four sessions taught by museum professionals in local institutions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A.

candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7100 - Museum Apprenticeship I

Supervised internships at local museums, galleries or other art institutions.

Credits: 3. Contact Hours: Two days work per week each course.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7200 - Museum Apprenticeship II

Supervised internships at local museums, galleries or other art institutions.

Credits: 3. Contact Hours: Two days work per week each course

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7400 - Museum Exhibition Analysis Seminar

Discussion of approximately six current museum exhibitions, chosen to provide a unifying theme, such as reevaluating the retrospective. Each student will present a class lecture and museum tour evaluating the content and installation of a major exhibition.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate standing or permission of the instructor.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7500 - Museum Education I

Techniques and methods of museum education. Regular meeting in museums with working professionals.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate standing or permission of the instructor.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B7505 - Museum Education II

Techniques and methods of museum education. Regular meeting in museums with working professionals.

Credits: 3. Contact Hours: 3 hr./wk.

ART B7502 - Art Museum Education II

A seminar focused on effective teaching strategies for art museum settings. This course will prepare students to teach from objects, critically analyze research in museum education, and create developmentally appropriate programs for multiple audiences.

Credits: 3. Contact Hours: 3 hr./wk.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B8000 - Art Museum Studies Colloquium

This course serves as the capstone course for the Art Museum Studies concentration, providing a forum for students to discuss recent trends in art museum studies and complete their final art museum studies qualifying paper. The format for the course will be that of a seminar.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ART A1000 and ART B7000.Corequisite: ART B7100, ART B7200,and ART B7400.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B8000-B8050 - Selected Topics in Art History

Advanced study in selected subjects outside of the regular curriculum. Course announcements to be made in the preceding semester.

Credits: 3. Contact Hours: 3 hr./wk.

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B8051-B8099 - Selected Topics in Studio Art

Advanced study in selected subjects outside of the regular curriculum. Course announcements will be made in the preceding semester.

Credits: 3. Contact Hours: 4 hr./wk.

ART B8400-B8700 - Independent Study in Studio Art

Enrollment with permission of the graduate advisor.

Credits: 3. Contact Hours: Hrs. to be arranged

ART B9000 - Master's Thesis Research

Enrollment by permission of the graduate advisor.

Credits: 3. Contact Hours: Hrs. to be arranged

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B9800 - Independent Study in Art History

Enrollment by permission of the graduate advisor.

Credits: 3. Contact Hours: Hrs. to be arranged

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ART B9900 - Independent Study in Art History

Enrollment by permission of the graduate advisor.

Credits: 3. Contact Hours: Hrs. to be arranged

ART B7000, ART B7100, ART B7200, and ART B7400 are required of all Museum Studies students. They may be taken by M.F.A. and other M.A. candidates, with permission of the Graduate Advisor and Director of Museum Studies.

ARTE - Secondary Education Art Course Descriptions

ARTE 1000E - Contemporary Art Criticism

Problems of description, analysis, interpretation, and evaluation of the art object as an aesthetic and cultural phenomenon. Perceptual patterns of aesthetic response and their relationships to education.

Credits: 2. Contact Hours: 2 hr./wk., plus gallery visits

ARTE 1000F - Ceramics

Clay modeling and ceramics; pottery forms produced by pinch, slab, and coil methods; glazing use of the kiln.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1000G - Ceramics: Advanced

Design workshop, including use of potter's wheel, casting, and glazing.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1100G - Design in Metal: Advanced Workshop

Techniques and practices in creative design in a variety of metals.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1200G - Design in Wood: Advanced

Design workshop in furniture.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1300F - Design in Wood and Metal

Craft methods and processes; experiences with hand tools and power equipment.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1400G - Compositional Aspects of Photography

Fundamental phases of photography, advancing to the art of enlarging, cropping, dodging, burning, and composing; all the means by which a story-telling photograph is created.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 1500G - Costume Design

Principles and practices of costume design, including a survey of periods and styles.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Special permission.

ARTE 3100A - Critical Perspectives in Art Education

This course provides an introduction into historical and current debates in the field of visual art education. Students will analyze topics such as arts integration, social justice art education, contemporary art, and advocacy as they learn to conduct research in art education to become reflective practitioners.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 3100C - Community-Based Art Education

This course introduces the theories and practices of teaching visual art in community settings such as museums, community centers, after school programs, and informal spaces. Students analyze current community arts projects, develop teaching strategies, and design their own community arts program based on research in the field.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 4100F - Advanced Design

Design workshop in decorative and applied arts; techniques and practices of the craftsman designer. Open to majors in Industrial and Fine Arts.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 5100F - Painting Mediums I

Study and preparation of colors, medium, and grounds for painting in oils and emulsions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: 6 credits in painting.Corequisite: ARTE 6100F.

ARTE 5200F - Painting Mediums II

Study and preparation of colors for water and emulsion medium: egg tempera, gouache, distemper, casein, fresco, and transparent color. Preparation of paper and grounds.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: 6 credits in painting.Corequisite: ARTE 6200F.

ARTE 5300C - New York as an Art Center

Study of the development of the arts, their integration into the pattern of metropolitan culture.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE 6100E - Techniques of Oil Painting: Advanced

Credits: 3. Contact Hours: 30 hr., plus conf. 3 hr./wk. Prerequisite: ARTE 5100F.

ARTE 6100F - Painting Techniques I

Methods of painting in transparent body color and related water mediums.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: ARTE 5200F.

ARTE 6200E - Water Color, Advanced

Methods of painting in transparent body color and related water mediums

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ARTE 5200F.

ARTE 7000C - History of Design

Historical and cultural influences and technical developments in the design of objects for use.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Art and Art Education majors require advisor's permission.

A0000

ARTE A6501 - Early Modern Art in Europe and the U.S.

The development of early modern art styles in France, Germany, Italy, Russia, and the U.S. including fauvism, cubism, futurism, constructivism, expressionism, dada, and surrealism.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE A6603 - Meso-American Art

A survey of sculpture, architecture, the town plan, and crafts in selected pre-European cultures of the Caribbean Basin, the Andes, and Meso-America.

Credits: 3. Contact Hours: 3 hr./wk.

B0000

ARTE B0100 - Projects in Drawing I

Investigation of various drawing media and techniques for the purpose of enlarging the student's conceptual scope and professional skills.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B0200 - Projects in Drawing II

Investigation of various drawing media and techniques for the purpose of enlarging the student's conceptual scope and professional skills.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B1101 - Projects in Painting I

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B1102 - Projects in Painting II

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B1801 - Projects in Ceramic Design I

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B1802 - Projects in Ceramic Design II

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B2301 - Projects in Printmaking I

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

ARTE B2302 - Projects in Printmaking II

Intensive work under faculty supervision.

Credits: 3. Contact Hours: 3 hr./wk.

BIO - Biology Course Descriptions

A0000

BIO A1404 - Brain Plasticity and Disease

The course will use primary research articles to introduce biology majors to mechanisms of plasticity and disease in the brain. The focus of the course is specifically development and critical periods, mechanisms of synaptic plasticity, learning and injury induced plasticity, and neurodegenerative and neurodevelopmental disorders.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Instructor permission

BIO A2000 - Virology

Introductory survey of diverse genera of animal viruses and bacteriophages and methods used in the classification, detection, and quantification of viruses. The course emphasizes an understanding of the mechanisms of DNA/RNA replication, expression, and macro-molecular assembly into functional, infectious units (virions) in different viruses. Selected examples are presented in detail, including oncogenic RNA/DNA viruses and HIV/AIDS.

Credits: 3. Contact Hours: 3 hr./wk.

BIO A4250 - Cancer Biology

Introduction to the fundamental principles of the cellular and molecular biology underlying cancer. Lectures will include principles of cell division and growth, and role of growth factors, oncogenes, tumor suppressor genes, and angiogenesis on the development of cancer. Discussions will include cancer epidemiology, health disparities, cancer prevention, and cancer treatment.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Cell Biology Course.

BIO A4430 - Insect Ecology

Introduction to the diversity and biology of major insect groups, focusing on the role of insects and other arthropods in natural ecosystems and their role in human affairs.

Credits: 4. Contact Hours: 6 hr./wk. Prerequisite: BIO 22800 or permission of instructor.

BIO A4510 - Movement and Muscle: The Neuroscience of Motor Control

The function and organization of motor systems. Topics include biomechanics, muscle organization and physiology, the neural activation of muscle, spinal and brainstem reflexes, locomotion, the control of arm and eye movements, motor planning, and motor learning. Not open to students who have taken BIO 40000 or BIO 31311.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIO 35400 or BIO 20700 or permission of instructor.

BIO A4540 - Sensory Perception

Different types of sensory systems with their functional modalities will be presented. The biological bases for how these functions are generated and modified will then be described. As vision is the principal means of perception, we will focus in this course most on visual processing. Scientific data will be integrated into the lectures, such that students develop critical skills in analyzing data and proposing hypotheses.

Credits: 3. Contact Hours: 3 hr./wk.

BIO A4580 - Biogeography

Introduction to biogeography, the study of spatial patterns of biological diversity. The course addresses the study of geographic variation in nature at all levels from genes to communities to ecosystems, with both ecological and evolutionary perspectives. It includes analyses of real data regarding biogeographic problems relevant to conservation biology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIO 22800 or permission of instructor.Offered: Spring semester only..

BIO A4810 - Introduction to Epigenetics

The course will use primary research articles to introduce graduate students to epigenetic mechanisms that regulate gene expression, how epigenetic modifications are propagated, and the phenotypic consequences of normal vs. abnormal epigenetic regulation in disease, development and evolution.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIO 20600

BIO A4880 - Tropical Ecology and Conservation

Intensive field biology course focusing on observation, scientific inquiry, and hypothesis testing. Students will become familiar with the biology of several terrestrial taxa and will study ecology, behavior, and conservation in a tropical forest. The course will explore ecosystem function in natural habitats and investigate how they are perturbed by human activities.

Credits: 5. Contact Hours: 5 hr./wk. Prerequisite: BIO 22800 or permission of instructor.

BIO A6000 - Animal Behavior

The biological bases of behavior, with emphasis on such topics as the development, evolution, genetics and ecology of behavior; sensory physiology; social behavior and communication.

Credits: 3. Materials Fee: $25. Contact Hours: 3 hr./wk.

BIO A8000 - Current Topics in Microbiology

This course explores the history and pathology of infectious diseases caused by bacteria, the development of antibiotics, their modes of action, and the rise of multidrug resistant superbugs. Students will read and evaluate primary research articles and become familiar with molecular methodologies used to solve important research questions in well-studied bacterial pathogens. Typically there will be two exams, weekly quizzes, an oral presentation, and additional written assignments for graduate students only.

Credits: 3. Contact Hours: 3 hr./wk.

BIO A8300 - Laboratory in Biotechnology

Introduction to modern molecular biological techniques in the context of solving biological questions. The techniques to be taught include DNA isolation, restriction enzyme mapping, subcloning of DNA fragments into plasmids, polymerase chain reaction, and other techniques of gene manipulation. Emphasis will be on the application of recombinant DNA technology.

Credits: 5. Materials Fee: Material fee: $30. Contact Hours: 2 lect. hr./wk., 6 lab hr./wk.

BIO A8500 - Evolution

Historical development and current understanding of the principles of evolution.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIO 22800 or permission of instructor.

B0000

BIO B4540 - Sensory Perception

Different types of sensory systems with their functional modalities will be presented. The biological bases for how these functions are generated and modified will then be described. As vision is the principal means of perception, we will focus in this course most on visual processing. Scientific data will be integrated into the lectures, such that students develop critical skills in analyzing data and proposing hypotheses.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Intro neurobiology course.

BIO B4640 - Laboratory in Neurobiology

Laboratory course in which techniques used in cellular and systems neurobiology are taught in the context of solving biological problems. Techniques to be covered include basic histological, molecular biological, electrophysiological, and behavioral techniques used in modern neurobiology.

Credits: 3. Contact Hours: 6 hr./wk. Prerequisite: Cell Biology Course.

BIO B9700 - Special Topics

Credits: 3. Contact Hours: 3 lect. hr./wk., 6 lab hr./wk.

BIO B9901 - Thesis Research

Credits: 3.

C0000

BIO C0300 - Molecular Biology

Molecular Biology

Credits: 4. Contact Hours: 4 lect. hr./wk.

V0000

BIO V0005 - Genetics

Prokaryotic and eukaryotic genetics; organization of DNA, replication, repair, mutagenesis, recombination, control of gene expression, genetic engineering and molecular techniques.

Credits: 4. Contact Hours: 4 lect. hr./wk. Prerequisite: Undergraduate genetics and molecular biology or biochemistry.

BIO V0103 - Microbial Genetics

Microbial genetic systems will be examined with respect to their contributions to the understanding of molecular mechanisms of recombination, repair of genetic material, and regulation of gene expression. Emphasis will be placed on the procedures and the role of the new biotechnology.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: BIO V0005 or equivalent.

BIO V0503 - Evolution

Study of the mechanism and processes of evolution. Theory, laboratory experimental results and the phenomena found in natural populations are described and discussed in relation to population genetics, speciation and megaevolution.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: Course in genetics, vertebrate or invertebrate zoology, botany or permission of instructor.

BIO V0603 - Principles of Systematics

Lecture and discussion sections involving general principles of biological systematics, including fundamentals of nomenclature, phylogenetic theory, character analysis, and their use of relevant computer algorithms. Readings from the primary literature as well as text sources will be emphasized.

Credits: 4. Contact Hours: 3 lect. hr/wk., plus conf.

BIO V0606 - Population Ecology Lab

Lecture, laboratory. An analysis of the structure and dynamics of plant and animal populations. Topics include density, growth, regulation, fluctuation of numbers, niche, dispersal systems, dispersion patterns, demographic techniques, and interactions between populations.

Credits: 3. Contact Hours: 3 hr./wk.

BIO V0611 - Systematics and Evolution of Insects and Spiders

Lectures emphasize basic knowledge and recent advances in the systematics, biogeography, morphology, behavior, and paleontology of these arthropods. Major Families of the world will be emphasized. Labs involve fieldwork, personal collections, identifications, techniques, and small research projects.

Credits: 2. Contact Hours: 2 lect. hr./wk.

BIO V0612 - Systematics and Evolution of Insects and Spiders Lab

Lectures emphasize basic knowledge and recent advances in the systematics, biogeography, morphology, behavior, and paleontology of these arthropods. Major Families of the world will be emphasized. Labs involve fieldwork, personal collections, identifications, techniques, and small research projects.

Credits: 2. Contact Hours: 4 lab hr./wk.

BIO V0733 - Zoology and Phylogeny of Chordata (Mammals)

Lecture, laboratory. Origin, adaptive radiation, morphology, ecology and systematics of mammals. Discussion of the reptile-mammal transition emphasizing the fundamental characters of teeth, ear structure and tarsal bones. Survey of mammalian orders and practical work in laboratory on living families and local species, including field methods and preparation of specimens for study. Lecture and laboratory are integrated; the course cannot be taken in separate parts.

Credits: 2. Contact Hours: 2 lect. hr./wk. Prerequisite: Course in vertebrate comparative anatomy.

BIO V0734 - Zoology and Phylogeny of Chordata (Mammals) Lab

Lecture, laboratory. Origin, adaptive radiation, morphology, ecology and systematics of mammals. Discussion of the reptile-mammal transition emphasizing the fundamental characters of teeth, ear structure and tarsal bones. Survey of mammalian orders and practical work in laboratory on living families and local species, including field methods and preparation of specimens for study. Lecture and laboratory are integrated; the course cannot be taken in separate parts.

Credits: 2. Contact Hours: 5 lab hr./wk. Prerequisite: Course in vertebrate comparative anatomy.Offered: Fall semester only..

BIO V0743 - Zoology and Phylogeny of Chordata (Birds)

Lecture, laboratory, special topics in the evolution of birds.

Credits: 2. Contact Hours: 2 lect. hr./wk. Prerequisite: Permission of the instructor.Offered: Spring semester only..

BIO V0744 - Zoology and Phylogeny of Chordata (Birds) Lab

Lecture, laboratory, special topics in the evolution of birds.

Credits: 2. Contact Hours: 4 lab hr./wk. Prerequisite: Permission of the instructor.

BIO V0803 - Molecular Evolution

Principles of evolution at the level of DNA and proteins; gene families, concerted evolution of genes, codon bias, and other genetic processes will be discussed.

Credits: 3. Contact Hours: 3 lect. hr./wk.

BIO V0901 - Population Genetics

Lecture, laboratory. The Hardy-Weinberg law, gene pools, gene frequencies, and gene migration.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: A course in genetics, a course in organic chemistry.

BIO V0902 - Population Genetics Lab

Lecture, laboratory. The Hardy-Weinberg law, gene pools, gene frequencies, and gene migration.

Credits: 3. Contact Hours: 6 lab hr./wk. Prerequisite: A course in genetics, a course in organic chemistry.

BIO V1401 - Cell Biology

Cells will be studied with special emphasis placed on organization, molecular structure/function relationships of organelles, and energetics and metabolism.

Credits: 4. Contact Hours: 4 lect. hr./wk. Prerequisite: A course in organic chemistry and a course in biochemistry or permission of the instructor.

BIO V1800 - Immunology

Introduction to the basic concepts in immunology including innate and adaptive immunity, development and function of the cells of the immune system, antigen receptor diversity and the basic methods used to induce and measure immune responses. Selected research topics in immunology with an emphasis on current primary literature will also be covered.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: Cell and Molecular Biology & undergraduate genetics.

BIO V2301 - Neuroscience I

This course and V2302 comprise an introduction to the neurosciences. The first semester covers neuronal cell biology (structure and trophic functions), cellular neurophysiology (membrane physiology, action potentials), synapses (neurotransmitters and physiology), neuroendocrine mechanisms, local neuronal circuits (integrative anatomical organization of the vertebrate nervous system). The second semester will cover the sensory and motor systems, as well as neurochemical pathways. Receptor physiology and information processing are discussed in brief for the somatosensory system and in detail for the visual and auditory systems. The vertebrate motor systems are discussed with respect to spinal, supraspinal and cortical mechanisms.

Credits: 4. Contact Hours: 4 lect. hr./wk. Prerequisite: Students with no background in physiology must meet instructor before course begins.

BIO V2302 - Neuroscience II

Building upon materials covered in Neuroscience I, this course provides an introduction to sensory processing for several sensory systems, outlines the important developmental processes with a specific focus on the functional differentiation of the brain.

Credits: 4. Contact Hours: 4 hr./wk.

BIO V2403 - Animal Behavior I

Lectures and discussions of selected major areas in modern animal behavior research. Included among the topics are conceptual issues in methodology, orientation and navigation, and development of behavior. A modern eclectic approach is emphasized. Students read and lead discussion of papers from the original literature.

Credits: 3. Materials Fee: $25.. Contact Hours: 3 lect. hr./wk. Prerequisite: An undergraduate course in animal behavior/comparative psychology or permission of the instructor.

BIO V2407 - Animal Behavior II

Lecture and discussion of the selected major areas in modern behavioral research. Topics include behavioral genetics, the evolution of behavior, and behavioral ecology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: An undergraduate course in animal behavior, evolution or ecology.

BIO V5003 - Developmental Biology

Principles of evolution at the level of DNA and proteins; gene families, concerted evolution of genes, codon bias, and other genetic processes will be discussed.

Credits: 3. Contact Hours: 3 lect. hr./wk.

BIO V6003 - Community Ecology

Lecture, laboratory. Structural attributes, growth, and regulation of plant and animal communities.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: A course in either ecology or field biology.

BIO V6004 - Community Ecology Lab

Lecture, laboratory. Structural attributes, growth, and regulation of plant and animal communities.

Credits: 3. Contact Hours: 6 lab hr./wk. Prerequisite: A course in either ecology or field biology.

BIO V6005 - Population Ecology

Lecture, laboratory. An analysis of the structure and dynamics of plant and animal populations. Topics include density, growth, regulation, fluctuation of numbers, niche, dispersal systems, dispersion patterns, demographic techniques, and interactions between populations.

Credits: 3. Contact Hours: 3 lect. hr./wk.

BIO V6006 - Population Ecology

Lecture, laboratory. An analysis of the structure and dynamics of plant and animal populations. Topics include density, growth, regulation, fluctuation of numbers, niche, dispersal systems, dispersion patterns, demographic techniques, and interactions between populations.

Credits: 3. Contact Hours: 6 lab hr./wk.

BIO V7200 - Biological Electron Microscopy

Preparation of materials and their examination by means of Transmission and Scanning electron microscopes. Techniques include methods of fixation and embedment for TEM; thin sectioning, staining, critical point drying, sputter coating, microscope operation, photography, and dark room procedures. Students will complete a project of their choosing to demonstrate their ability to use their new skills.

Credits: 4. Contact Hours: 2 lect., 4 lab hr./wk. plus 3 hr. TBA

BIO V8101 - Mathematical Biology

Credits: 3. Contact Hours: 3 lect. hr./wk.

BIO V8201 - Biostatistics I

Univariate statistics of biological systems (theory and application). Topics include: probability, descriptive statistics, correlation, analysis of variance, and regression.

Credits: 6. Contact Hours: 3 lect., 6 lab hr./wk. Prerequisite: Permission of instructor.

BIO V9001 - Seminar in Evolution

Topics relating to the general subject of evolution.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

BIO V9006 - Seminar in Ecology

The conservation ecology seminar will focus on genetic problems and implications of wildlife management programs.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Permission of the instructor.

BIO V9012 - Seminar in Zoogeography

Special topics are discussed and reviewed.

Credits: 3. Contact Hours: 2 hr./wk., plus conf. Prerequisite: Permission of the instructor.

BIO V9030 - Seminar in Ecology, Evolution, and Behavior

AMNH (Alternate weeks).

Credits: 1. Contact Hours: 2 hr./wk.

BIO V9100 - Colloquium

Recent developments and trends in the field of biology. Required of all candidates for the M.S. degree. Repeatable with a maximum of 4 credits with dept permission.

Credits: 1. Contact Hours: 2 hr./wk.

Colloquium must be taken twice.

BIO V9101 - Colloquium in Ecology, Evolution and Behavior

AMNH (Alternate weeks).

Credits: 1. Contact Hours: 2 lect. hr./wk.

BIO V9200 - Tutorial

BIO V9201– V9204 - Advanced Study

Study in an area where formal course work is not given. Subject matter may vary from assigned current readings in a specialized area with reports to special laboratory or field work. This set of courses is repeatable to a maximum of 12 credits total with dept. permission. The topics vary with each professor and each of-fering, and are customized to each student

Credits: 1-4. Prerequisite: Permission of instructor.

BIO V9302 - Molecular Biology Journal Club

Credits: 1.

BIO V9303 - Seminar Special Topics

Specialized seminars in diverse fields, depending upon the needs of specific students.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

BIO B9902 - Thesis Research

Credits: 3.

BIOE - Secondary Education Biology Course Descriptions

BIOE 1500E - Field Biology

Study of local plants and animals, their environmental relationships, and the use of the resources of the out-of-doors in teaching science in New York City.

Credits: 4. Contact Hours: 4 hr./wk.

BIOE 1600E - Environmental Field Studies

Study of the biotechnosphere of the Greater New York area; included are field visits, sampling, laboratory analysis, and research. Open to those teaching environmental sciences at the elementary or secondary level.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 1900E - Environmental Conservation

Contribution of modern ecological knowledge to local, national, and international problems of conservation of natural resources. Field visits are included.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 2000E - Genetics

A study of the mechanisms of heredity, both Mendelian and modern, with application to plant and animal variation.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 3000E - Human Biology

An analysis of both the structure and function of the human organism. Topics include respiration, nutrition, digestion, circulation, excretion, metabolism, and reproduction.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 3200F - Independent Study and Research in Biology

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

BIOE 6000E - Basic Ecology

Designed to analyze the biotic and abiotic relationship of plants and animals. Population and community ecology discussed. Model ecosystems analyzed.

Credits: 3. Contact Hours: Field visits are included. 3 hr./wk.

BIOE 6100E - Ecology Disrupted: Sustainability and Human Environmental Impact

This course examines the intersection of daily life with the environment to understand how people impact ecosystems and to understand ways to reduce that impact.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 7100E - Modern Concepts in Biology I

A seminar designed for majors in science education to explore developments and their applications. Topics include physiology, endocrinology, and pathology.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 7200E - Modern Concepts in Biology II

A seminar designed for majors in science education to explore recent developments in biology and their applications. Topics include genetic engineering, evolution, and marine study. May be taken independently of BIOE 7100E.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 7500E - The Biological Foundations of Social Behavior

To broaden the student's understanding of the nature of social behavior by a comparative study of such behavior in animals and humans. An analysis of both neural and endocrine systems of vertebrates will be undertaken.

Credits: 3. Contact Hours: 3 hr./wk.

BIOE 7600E - Experimental Studies of Social Behavior in Animals

Analysis of experimental studies of the role of physiological and experimental factors in the development of social behavioral responses in animals. May be taken independently of BIOE 7500E.

Credits: 3. Contact Hours: 3 hr./wk.

BME - Biomedical Engineering Course Descriptions

G0000

BME G6600 - Biodesign 2: Conceptual Innovation

The second course of a three course sequence in which a yearlong group project will be undertaken to design and construct a biomedical engineering device or system. This second course focuses on the development of a conceptual solution to the pharmaceutical, biotechnological or medical device need identified in Capstone 1 course, taking advantage of the creative group process and the power of computer design and prototyping to evaluate innovative conceptual solutions. The content of this course will include Ideation and Brainstorming, Concept Screening, Prototyping, and Final Concept Selection

Credits: 3. Contact Hours: 1 hour lecture and 2 hour lab/week Prerequisite: BME G6500

BME G6700 - Biodesign 3: Translational Solutions

The third course of a three course sequence in which a yearlong group project will be undertaken to design and construct a biomedical engineering device or system. This third course focuses on the implementation of the conceptual design solution defined in Capstone 2 course. The conceptual design and prototype will be transformed into a product that can be marketed and used at the bedside to treat patients. The content of this course will focus on final product development, testing and clinical validation methods as well as preparation of documents for regulatory submission. Students will learn to develop a translational solution to a biomedical need within the constraints of a real world problem including quality and process management, reimbursement strategy, marketing and stakeholder strategy, sales and distribution strategy, competitive advantage and business strategy, operating plan and financial model, business plan development, funding sources, and licensing and alternate pathways.

Credits: 3. Contact Hours: 1 hour lecture and 2 hour lab/week Prerequisite: BME G6600.

I0000

BME I0000 - Biomedical Engineering Seminar

Research seminar with invited speakers.

Credits: 1, repeatable up to 3 times. Contact Hours: 1 hr./wk.

BME I2000 - Cell and Tissue Engineering

The course covers the underlying mechanisms of cell/tissue fate processes and their interaction with biomaterials as well as how to study them quantitatively using engineering methods. Students will gain knowledge of current products of bioartificial organs in research, clinical trials and industry, their limitations and prospects. The course will prepare students with the ability to identify challenges in the field of tissue engineering and provide feasible solutions through the writing of term papers in the format of a research proposal.

Credits: 3. Contact Hours: 3 hr./wk

BME I2200 - Cell and Tissue Transport

The course will start with an analysis of water, solute, gas, and heat exchange in the microcirculation and the relationship between structure and function. Active transport across membranes will be considered and applied to the kidney and secretory organs. Transport in biological porous media will be examined and applied to bone, cartilage, and arterial wall. An introduction to receptors and their role in transport, cell adhesion, and intracellular signaling will be presented. The course will conclude with student presentations on topics of current interest.

Credits: 3. Contact Hours: 3 hr./wk.

BME I3000 - Neural Engineering and Applied Bioelectricity

An overview of the field of neural engineering including neuronal biophysics, synaptic and non-synaptic communication, electrophysiological techniques, field potential and current source density analysis. The course introduces fundamentals of applied bioelectricity/electrical prosthetic (FES) including electric field-neuronal interactions and electrocution hazards.

Credits: 3. Contact Hours: 3 hr./wk.

BME I3110 - Biofluid Mechanics

The basic principles of fluid mechanics will be developed and applied to biological systems. Major topics include: Navier-Stokes flows, non-Newtonian flows, unsteady flows, boundary layers, lubrication theory, fluid-solid coupling /wave propagation, interstitial flow, electroosmosis (all with biomedical applications).

Credits: 3. Contact Hours: 2.5hr./wk. Prerequisite: Undergraduate course in fluid mechanics or the equivalent

BME I4200 - Organ Transport and Pharmacokinetics

Application of basic transport principles (conservation of mass and momentum equations) to major animal and human organ systems. Topics include mechanisms of regulation and homeostasis, anatomical, physiological, and pathological features of the cerebral, respiratory, renal, cutaneous and gastrointestinal systems. Basic concepts in pharmacokinetic analysis for drug administration are also discussed. Related and recent research articles will be discussed. Students will be guided to write up a proposal regarding a current topic.

Credits: 3. Contact Hours: 3 hr./wk.

BME I4300 - Physiology for Biomedical Engineers

This course is designed to provide biomedical engineering students with a comprehensive understanding of the principles of human physiology. It covers a broad range of topics, from cellular physiology to the physiology of organs and organ systems. The course includes units devoted to the study of membrane solute transport, nerve and muscle functions, functions of the autonomic nervous system, cardiovascular system as well as renal, respiratory, gastrointestinal and endocrine systems. Instructional activities include lectures, case presentations, laboratories and special conferences.

Credits: 6. Contact Hours: 7 hr./wk.

BME I5000 - Medical Imaging and Image Processing

This course introduces basic medical imaging methods such as computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET). Students will gain understanding in the basic physics of image acquisition and the algorithms required for image generation. Basic image enhancement, and image analysis will be presented in the context of X-ray imaging and microscopy. The course will include linear systems, random variables, and estimation theory. Students will gain hands-on experience in image processing through MATLAB programming in class and in assignments.

Credits: 3. Contact Hours: 3 hr./ wk.

BME I5100 - Biomedical Signal Processing

This course introduces two fundamental concepts of signal processing: linear systems and stochastic processes. Various estimation, detection and filtering methods are developed and demonstrated on biomedical signals. The methods include harmonic analysis, auto-regressive model, Wiener and Matched filters, linear discriminates, and independent components. All methods will be developed to answer concrete questions on specific data sets such as electro-cardiograms, eletro-

encephalography, acoustic signals, or neural spike trains. The lectures will be accompanied by data analysis assignments using MATLAB.

Credits: 3. Contact Hours: 3 hr./wk.

BME I5600 - Cell Mechanotransduction

The course covers the basic principles and latest developments in the transduction of mechanical forces into cellular biochemical responses (mechanotransduction). The principles are presented in the context of specific cell types and tissues including: cardiovascular, bone, kidney, cartilage, intervertebral disk and others. A team of academic experts presents lectures on specific tissues emphasizing the general principles of mechanotransduction as they apply to specific cell types. Key papers will be assigned to students for class presentation and discussion. A final literature review will be required.

Credits: 3. Contact Hours: 2.5 hr./wk. Prerequisite: Undergraduate course in cell and molecular biology and biomechanics or the equivalent

BME I6000 - Advanced Biomaterials

This course is concerned with the design and fabrication of advanced biomaterials for clinical applications. The major classes of materials and characterization methods are presented to provide a foundation for more specialized topics focusing on novel materials with tailored structural and biological properties to facilitate interactions with living tissue. Topics to be discussed include surface modification to engineer cell-instructive materials, self-assembled and nanostructured materials, hybrid composite materials, environmentally responsive "smart" biomaterials, and decellularized natural matrices.

Credits: 3. Contact Hours: 2.5 hr./wk. Prerequisite: BME 50300 / BME I7300 or equivalent

BME I6100 - Intellectual Property, Regulation and Quality Assurance

This course comprises the study of fundamental topics of intellectual property (IP), such as copyright and related rights, trademarks, and patents. Contemporary issues of the IP field, including unfair competition, enforcement of IP rights and emerging issues in IP are also discussed. Regulation of pharmaceutical drugs and medical devices will cover applicable laws and regulations in the strategic planning, development, manufacture and commercialization of health care products. These topics will be analyzed with a focus on safety, surveillance, business, law, and international procedures surrounding the regulations in the health care industry. Students will be prepared to work within regulatory and quality assurance constrains necessary for development of medical products, drug manufacturing, and clinical investigations.

Credits: 3. Contact Hours: 3 hr./wk.

BME I6200 - Cost Analysis and the business of translation

This course focuses on business fundamentals inherent to translational product development, including R&D, market analysis, and business model projections. Selected devices will be used as case studies to illustrate the areas of cost considerations in the translational process and cost impact of new products and reimbursement strategies in context to the health care market and business environments.

Credits: 1. Contact Hours: 1 hr./wk.

BME I6300 - Engineering, Entrepreneurship and Business Leadership

This course will compare the "Lean Start-up Method" that has come to dominate the high-tech and start-up worlds versus traditional business planning approaches for launching new ventures. The Lean Start-up Method favors experimentation, customer feedback and iterative design over traditional business approaches that rely on big design and planning and big design up front. Students will learn how to use a combination of business-hypothesis-driven experimentation, feedback and iterative product releases to speed product development cycles, understand capital market and risk, and strategies for product launches. Students will participate in comparison studies of start-up approaches versus traditional business planning models.

Credits: 3. Contact Hours: 3 hr./wk.

BME I6400 - Translational Challenges in Diagnostics, Devices and Therapeutics

This course covers a broad range of topics in the development and operation of medical diagnostics, devices, and therapeutics and combines lectures, readings, case studies, and class discussion. Biomedical Engineering and clinical faculty will discuss the challenges they encounter in their practice, and opportunities for advancing their fields by new inventions, and discoveries. Focus will be on existing and emerging biomedical technologies, in terms of their core physiology and engineering, and their societal and economic costs. Students will actively participate in organizing the lectures and discussing potential experimental solutions to these problems.

Credits: 3. Contact Hours: 3 hr./wk.

BME I6500 - Capstone Design I: Identifying the Problem

The first course of a three course sequence in which a yearlong group project will be undertaken to design and construct a biomedical engineering device or system. This first course emphasizes the identification of a need for a biomedical device/system/drug. Students will learn to perform a high-level assessment of the characteristics of the medical area in which a biomedical need should be identified. The course will include topics such as strategic focus, observation and problem identification, need statement development, disease state fundamentals and treatment options.

Credits: 2. Contact Hours: 3

BME I6600 - Capstone design 2: Conceptual Innovation

The second course of a three course sequence in which a yearlong group project will be undertaken to design and construct a biomedical engineering device or system. This second course focuses on the development of a conceptual solution to the pharmaceutical, biotechnological or medical device need identified in Capstone 1 course, taking advantage of the creative group process and the power of computer design and prototyping to evaluate innovative conceptual solutions. The content of this course will include Ideation and Brainstorming, Concept Screening, Prototyping, and Final Concept Selection.

Credits: 3. Contact Hours: 1h lecture and 2h lab/wk.

BME I6700 - Capstone Design 3: Translational solutions

The third course of a three course sequence in which a yearlong group project will be undertaken to design and construct a biomedical engineering device or system. This third course focuses on the implementation of the conceptual design solution defined in Capstone 2 course. The conceptual design and prototype will be transformed into a product that can be marketed and used at the bedside to treat patients. The content of this course will focus on final product development, testing and clinical validation methods as well as preparation of documents for regulatory submission. Students will learn to develop a translational solution to a biomedical need within the constraints of a real world problem including quality and process management, reimbursement strategy, marketing and stakeholder strategy, sales and distribution strategy, competitive advantage and business strategy, operating plan and financial model, business plan development, funding sources, and licensing and alternate pathways.

Credits: 3. Contact Hours: 1h lecture and 2h lab/wk.

BME I7000 - Laboratory in Cellular and Molecular Engineering

The course covers current biotechnologies used in molecular, cell and tissue engineering research labs as well as biotech industries through lectures and hands-on labs. There are four modules: (1) cell processing, basic microscopy & tissue engineering, (2) gene manipulation and genetic engineering, (3) advanced microscopy and fluorescent probes, and (4) probing biocomplexity and protein analysis. The students are required to design their own experimental methods to solve the given

biomedical problems according to the basic protocols in manuals/books/papers provided by the instructor.

Credits: 3. Contact Hours: 4 hr./wk. Prerequisite: BIO 22900 and BME 31000, or equivalent.

BME I7100 - Cell and Tissue Mechanics

Mechanical properties of hard and soft tissue are presented with emphasis on the stress adaptive processes that enable cells to adapt the mechanical/structural properties of tissue in which they live to the environment they experience. Topics to be covered include whole body biomechanics, occupational and sports injury, impact biomechanics, and tissue level biomechanics. The biomechanics of implants and cell biomechanics will be described briefly and their interrelationship explored. The mechanical properties of tissues will be reviewed, with an emphasis on the structure-function relationship. The stress adaptive mechanisms of tissues will be noted, with special emphasis on the stress adaptation observed in bone (Wolff's law) and in the arterial wall (Murray's law). The structural properties of cells, including their strength, deformability, and adhesive properties, will be covered, as well as the adaptation of cell structural properties. Cell receptors and cell signaling mechanisms will be described.

Credits: 3. Contact Hours: 3 hr./wk.

BME I7300 - Cell and Tissue-Biomaterial Interactions

This course is concerned with the reaction and interaction of both inert and bioactive foreign materials placed in the living human body. Topics to be discussed include atomic structure and bulk properties of the major classes of implantable materials; biocompatibility; characterization of non-living biomaterials; reaction of biological molecules with biomaterial surfaces; host response to implants; hemocompatibility; effects of degradation on implant materials; bioactive surfaces; resorbable implant materials; standardization, sterilization and regulation of implant materials; in vitro and in vivo biomaterial testing methods; and introduction to tissue engineering. Case studies and presentations of current literature focusing on novel materials and new clinical applications will also be included to identify future directions in biomaterials research.

Credits: 3. Contact Hours: 3 hr./wk.

BME I7700 - Microfluidic Devices in Biotechnology

Fundamentals of modern microfluidic devices with applications to biomedical measurements, e.g., electrophoretic systems, flow cytometers, and immunoassays. Review of fundamental properties of microfluidic systems including the effects of fluid mechanics, heat transfer, and electromagnetic phenomena on biological systems. Theory of Navier-Stokes, Nerst-Planck and convection transfer equations will be discussed. Critical overview of design, manufacture, and operation of micrometer scale systems that use photolithographic and surface treatment techniques for device development. Special projects will also be used to analyze biomedical inventions on the horizon.

Credits: 3. Contact Hours: 3 hr./wk.

BME I8000 - Bone Physiology and Biomechanics

This course is concerned with the normal mechanical and biological functions of bone, as well as the clinical problems in metabolic bone disease and orthopaedic treatment. Specific topics will examine how bone cells produce matrix material and structure, restructure it during life to optimize bone mechanical function, and then maintain the material vs. structural properties throughout life. Bone organ, tissue and cellular-molecular level processes will be examined as integrated hierarchical systems contributing to mechanical function, presented from lectures, case studies and presentations of critical literature identifying central principles in bone biomechanics. Discussions will seek to identify fundamental questions and directions for future research.

Credits: 3. Contact Hours: 3 hr./ wk.

BME I9000 - Skeletal Soft Tissue Physiology and Biomechanics

This course is concerned with the physiology and biomechanics of the skeletal soft tissues (cartilage, tendon, ligament, intervertebral disc). The course will examine how specialized connective tissue cells produce their matrices and organize them hierarchically into tissues with unique mechanical properties. How tissue and biomechanical properties of the various skeletal soft tissues are maintained in life or fail in skeletal disease will also be examined. Case studies and presentations of critical literature will be used to identify fundamental questions and directions for future research.

Credits: 3. Contact Hours: 3 hr./wk.

BME I9300 - Scientific Ethics

This ethics course will introduce integrity in scientific research. The topics include scientific misconduct (fabrication, falsification, plagiarism), authorship, writing lab notes, writing research articles, obtaining funding, developing intellectual property, job hunting, and professionalism. It will also discuss the societal impact of biotechnology, nanotechnology, and information technology.

Credits: 1. Contact Hours: 1 hr./wk.

BME I9400 - Special Topics in Machine Learning

This course provides a broad overview of machine learning and pattern recognition, with an emphasis on techniques that are commonly used in practice to make inferences from biomedical data sets. The course begins with a review of probability theory and random variables. We will then survey a variety of supervised and unsupervised architectures, beginning with linear and logistic regression and ending up at modern-day techniques such as convolutional neural networks. Throughout the course, students acquire hands-on experience with the presented concepts via application to real-world data sets from a variety of domains. The course assumes a basic knowledge of linear algebra and probability theory.

Credits: 3. Contact Hours: 2.5hr./wk. Prerequisite: Undergraduate course in probability and statistics. Basic understanding of linear algebra.

BME I9500 - Entrepreneurship and Financial Economics

Technological innovation has led to the development of an extraordinary number of new and emerging growth companies. The purpose of this course is to provide a practical exposure to the methods used, for students of all backgrounds. Strengths upon leaving this course arise from the diverse student interaction and content presented by an instructor with real-world, decision-making experience in all topics covered. Creative problem solvers for economic development and recovery are in high demand, and success will require innovation, not only in new products and services, but in the development of new business models themselves. Class participation and projects using real funds are implemented.

Credits: 2. Contact Hours: 2 hr./wk.

BME I9700 - Report

In-depth analysis of a specific biomedical engineering topic by means of a written report that utilizes a number of technical sources. Topics to be chosen by the student in consultation with a supervising faculty member.

Credits: 0.

BME I9800 - Project

A research project performed under the supervision of a faculty mentor. A final written report is required.

Credits: 3. Materials Fee: 3 hr./wk.. Contact Hours: 3

BME I9900 - Research for Master's Thesis

Credits: 3-6. Prerequisite: Approval of the departmental advisor.

J0000

BME J9900 - Research for Doctoral Dissertation

Credits: Variable cr. (Up to 12 cr.). Prerequisite: Approval of the departmental Ph.D. advisor.

K0000

BME K9000 - Doctoral Dissertation Supervision

1 credit repeatable up to 6 credits.

Credits: 1. Prerequisite: Approval of the departmental Ph.D. advisor.

CE - Civil Engineering Course Descriptions

G0000

CE G0000 - Selected Topics in Civil Engineering

Advanced topics chosen for their current interest to graduate students.

CE G0200: High-Rise Building Design and Analysis

CE G0800: Graphical Information Systems for Water Resources

CE G4900: Transportation Network Analysis

CE G7300: Surface Water Quality Modeling

CE G7800: Solid Waste Reuse and Recycling

CE G8100: Macro-Scale Hydrology

CE G9500: Remote Sensing in Water Resources and Environmental Engineering

CE G9800: Sustainability in Engineering

Credits: 3. Contact Hours: 3 hr./wk.

CE G0800 - Geogrph Info Sys Ce

GEOGRPH INFO SYS CE

Credits: 3. Contact Hours: 3 hr./wk.

CE G0801 - GIS Water Resources

Gis Water Resources

Credits: 3. Contact Hours: 3 hr./wk.

CE G1101 - Advanced Data Analysis

Exploratory data analysis including locating hot spots, quantiles and proportions. Analysis and modeling of engineering data that includes detecting trends, seasonality and distributional properties, Spatio-temporal variability in data, Dependence measures, Building generalized linear and non-linear cross-validated predictive, Introductory hierarchical Bayesian modeling.

Credits: 3. Contact Hours: 3 hr./wk.

CE G1300 - Wind Effects on Structures

Credits: 3.

CE G2500 - Construction Engineering

Credits: 3.

CE G3500 - Transportation Safety

Credits: 3.

CE G4200 - GIS Transportation Data Modeling

Credits: 3.

CE G4900 - Transportation Network Analysis

Credits: 3.

CE G7400 - Remediation Technologies for Hazardous Wastes and Sites

Credits: 3.

CE G8100 - Macro-Scale Hydrology

Macro-Scale Hydrology

Credits: 3. Contact Hours: 3 hr./wk.

H0000

CE H0200 - Transportation Economics

The basic economics of transportation and the tools of economic analysis used to analyze transportation activities, firms and government policies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate courses in economics and calculus.

CE H0700 - Advanced Hydraulics

Open channel hydraulics of artificial and natural water-courses, including roughness and shape characteristics; surface curve calculation by step methods and by integration methods. Delivery of canals. Hydraulics of spillways and stilling basins, including chute spillways, drop structures, gate and side channel spillways.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 36500.

CE H0800 - Applied Hydraulics in Engineering

Hydraulic principles utilized in design of structures, such as spillways, dams, drop structures, gate and side channel spillways, and water transport systems. Studies of erosion, sediments, their transport and deposition. Similarity, dimensional analysis, and modeling techniques as applied to hydraulic systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 36500.

CE H1000 - Analytical Methods in Civil Engineering

Survey of analytical methods encountered in Civil Engineering: ordinary differential equations (first and second order), linear algebra (inverse matrices, eigenvectors), differential equations systems, partial differential equations, Laplace transforms, Fourier Analysis, vector analysis (line and surface integrals, Green, Stokes and Gauss theorems), probability and statistics (probability distributions, sampling distributions of mean and standard deviation), and optimization (gradient search, simplex method). Applications in Structural, Geotechnical, Environmental, Water Resources, and Transportation Engineering.

Credits: 3. Contact Hours: 3 hr./wk.

CE H1100 - Advanced Data Analysis

Exploratory data analysis including locating hot spots, quantiles and proportions. Analysis and modeling of engineering data that includes detecting trends, seasonality and distributional properties, Spatio-temporal variability in data, Dependence measures, Building generalized linear and non-linear cross-validated predictive, Introductory hierarchical Bayesian modeling.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 26400

CE H2000 - Traffic Engineering

Traffic flow theory, including fundamental diagram, microscopic models, and macroscopic models. Analysis of traffic data, including capacity and performance assessment. Network models and simulation. Advanced technology applications for data collection, traffic control, and real-time system management. This course is crosslisted with CE 52000 Highway Engineering, and therefore is not available to students who have already completed CE 52000.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32700Corequisite: CE 32600, CE 31600

CE H2100 - Flex & Rigid Pvmnts

Flex & Rigid Pvmnts

Credits: 3. Contact Hours: 3 hr./wk.

CE H2400 - Airport Design and Planning

Planning of individual airports and statewide airport systems. Functional design of air and landscape facilities. Orientation, number, and length of runways. Concepts of airport capacity. Passenger and freight terminal facility requirements. Airport access systems. FAA operating requirements. Financial, safety, and security issues. Design and planning for maintenance, rehabilitation and upgrading.

Credits: 3. Contact Hours: 3 hr./wk.

CE H2600 - Rail System Design

Design of light and heavy rail facilities for passenger and freight operations. Track structure. Alternative technologies for construction, guidance and communications. Maintenance of way. This course is cross listed with CE 52600 Rail System Design, and therefore is not available to students who have already completed CE 52600.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32700

CE H3000 - Advanced Strength of Materials

Introduction to elasticity including basic ideas of stress, strain, and constitutive relations. Theories of failure and fracture. Analysis of unsymmetrical bending. Shear center and shear flow. Torsion. Twisting of thin-walled sections. Buckling criteria. This course is crosslisted with CE 53000 Advanced Strength of Materials, and therefore is not available to students who have already completed CE 53000.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 33200, CE 31500, MATH 34600

CE H4000 - Highway Engineering

The design of highway alignment and route location. Basic elements of highway design, including pavement type, earth¬work and drainage. Importance and consequences of maintenance and engineering economics; life-cycle cost analysis. This course is cross listed with CE 54000 Highway Engineering, and therefore is not available to students who have already completed CE 54000.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32700Corequisite: CE 32600

CE H4100 - Highway and Airport Construction

Overview of highway and airport engineering and construction; highways vs. airports; urban vs. rural highways. Construction planning, organization and cost estimating; construction scheduling using computer packages, e.g., Primavera; construction tracking. Construction operations: mobilization, removal, disposal, placement; management of equipment, material, labor, money; cash flow accounting. Construction specifications: quality assurance/quality control (QA/QC); investigation of environmental impacts and mitigation measures. Site investigation and project preparation. This course is crosslisted with CE 54100 Highway and Airport Construction, and therefore is not available to students who have already completed CE 54100.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32700.Corequisite: CE 32600.

CE H4500 - Urban Transportation

Historical development of urban surface transportation systems. Stakeholders, user and operating characteristics, and infrastructure elements for passenger motor vehicle, transit, bicycle, pedestrian, and freight modes. Safety, environmental, and financial considerations. Regulations and technology applications. This course is crosslisted with CE 54500 Urban Transportation, and therefore is not available to students who have already completed CE 54500.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32600

CE H4600 - Environmental Issues in Transportation

Survey of transportation-related environmental issues. The pollutants and their impacts on human health and welfare. Environmental law and regulations. Air pollution, water pollution, noise. Environmental impact statement.

Credits: 3. Contact Hours: 3 hr./wk.

CE H4700 - Urban Freight and City Logistics

Core concepts, challenges and methods of urban freight and city logistics. Fundamentals of urban spatial structure, drivers of urban changes. Freight distribution methods and stakeholders. Externalities of freight operations. Urban freight data sources and data collection strategies. Policies and mitigation strategies, and analytical methodologies supporting decision-making. Illustrative case studies. This course is cross listed with CE 54700 Urban Freight and City Logistics, and therefore is not available to students who have already completed CE 54700.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32600

CE H4800 - Transit Systems: Planning and Operations

Basic techniques of service area analysis, route development, scheduling, revenue estimation, and service improvements for fixed route bus and rail transit. Integration of fixed route transit with paratransit, matching mode with service area, relationship of transportation department with other departments, budgeting, and policy setting also will be discussed. This course is crosslisted with CE 54800 Transit Systems: Planning and Operation, and therefore is not available to students who have already completed CE 54800.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 32600

CE H5000 - Advanced Reinforced Concrete

Mechanical properties of reinforced concrete materials including shrinkage, and creep. Ultimate load theory and ultimate strength design. Moment-curvature and load-deflection relationships. Columns subjected to biaxial bending. Combined shear and torsion. Design of flat plates and two-way slabs. Yield line theory. This course is crosslisted with CE 55000 Advanced Reinforced Concrete, and therefore is not available to students who have already completed CE 55000.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 31500, CE 44100

CE H5100 - Prestressed Concrete

Properties of prestressed concrete materials. Simple, composite and continuous prestressed beams. Prestressed rigid frames, buildings and bridges.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 31500, CE 44100

CE H5200 - Bridge Engineering

General considerations for design and load capacity evaluation of highway bridges. Introduction to Load and Resistance Factor Design (LRFD) philosophy. Bridge loads. Influence lines. Grillage analysis of bridges. Reinforced and prestressed concrete bridges. Composite steel bridges. Bridge substructures. Load rating. Introduction to seismic analysis and design.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 44000, CE 44100, CE 44200.

CE H5300 - Advanced Structural Design

Structural loads. Behavior of structural steel members. Simple shear and moment connections. Plate girders. Composite construction. Fatigue and fracture of structural materials. Braced and unbraced frames. Plastic analysis and design.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 44200, CE 31500

CE H5500 - Concrete Sustainability

Concepts, knowledge and methods for producing environmentally-friendly concrete. Concept of sustainable development. Properties of

concrete. Environmental impact of cement production. Types of aggregates and their effect on durability and performance of concrete. Use of waste materials and industrial byproducts in concrete. Enhancement of short-term and long-term properties of concrete. Life Cycle Assessment (LCA) of concretes with alternative compositions. This course is crosslisted with CE 55500 Concrete Sustainability, and therefore is not available to students who have already completed CE 55500.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 44100

CE H5700 - Condition Assessment and Rehabilitation of Structures

Mechanics of damage and deterioration of structural materials. Nondestructive techniques. Condition assessment of structures. Service life prediction, rating and load capacity evaluation of structural systems. Structural repair and strengthening methods.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 34000, CE 44100, CE 44200.

CE H6200 - Numerical Methods and Simulations in Fluid Flows

Fundamental principles for numerical simulation and modeling of fluids. Basic concepts, including potential flow equation, convection equations, diffusion equations, and Navier-Stokes equations. Numerical discretization and related concepts; basic and advanced numerical methods for fluid flows. Practical programming and software applications.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 31500, CE 35000

CE H6100 - Water and Environmental Resources Systems Analysis

Integrated water management and systems analysis. Design of regulatory system for water allocation, Tools for conservation incentives and insurance system design. Planning and operation for competing objectives. Benefit-cost analysis for water projects. Climate variability and change analysis for infrastructure planning. Probabilistic risk assessment.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 26400

CE H6300 - Groundwater Hydrology and Contamination

Course provides introduction to governing equations of flow and transport in groundwater. Topics include Darcy's Law, the flow equation, piezometric contours, confined and unconfined flow in aquifers, radial flow towards wells, flow through leaky layers and transient flow due to compressibility effects. Flow and retention in the unsaturated zone, soil-water characteristic curves and the Richards equation are examined. Course also covers material on contaminant transport in groundwater including the advection-dispersion equation, transport through heterogeneous media and the transformation and retardation of solutes.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 35000.

CE H6400 - Environmental Engineering Analysis

Study of microorganisms and biochemical reactions involved in the purification of wastewaters by both aerobic and anaerobic treatment systems. Metabolic reactions, growth patterns and population dynamics. Review of chemical reactions as they relate to the analysis and purification of water. Data collection and interpretation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 47400 or departmental approval.

CE H6500 - Statistical Methods in Water Resources

Application of statistics to water resources and environmental pollution studies/monitoring. Sampling environmental population, sampling design, simple random sampling, stratified random sampling, systematic sampling, locating hot spots, quantiles, proportions, means. Topics include analysis of trends, seasonality, outlier detection, normal and log normal distribution, and time series.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate standing.

CE H6600 - Engineering Hydrology

Elements of hydrometeorology. Analyzing precipitation and using statistical methods. Design storm determination. Basin characteristics, runoffs and losses. Stream flow data, extension of data, overland flow, and design floods. Unit hydrograph method. Sediments, their transport and deposition. Application of hydrologic design.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 36500.

CE H6700 - Surface Water Quality Modeling

Basic techniques for modeling motions of contaminates in surface water problems. Fundamental physical phenomena such as diffusion, advection, and chemical reaction kinetics and related analytical approaches. Numerical models for surface flow and pollution problems. Modeling and computer program applications.

Credits: 3. Prerequisite: CE 35000, CE 31500

CE H7100 - Water Quality Analysis

Acid-base titration curves and acid-base indicators, alkalinity and the carbonate system, buffer intensity and design, optical methods of analysis, the spectrophotometer and Beer's law, colorimetric analysis of phosphate, colorimetric analysis of ammonia, chelation analysis of iron, calcium carbonate equilibria, solubility product determination, Chemical Oxygen Demand, determination of forms of aqueous chlorine, reactions of aqueous chlorine with ammonia, adsorption on activated carbon, kinetics of ferrous iron oxidation. This course is crosslisted with CE 57100 Water Quality Analysis, and therefore is not available to students who have already completed CE 57100.

Credits: 3. Contact Hours: 5 Prerequisite: CE 47400

CE H7200 - Principles of Water and Waste Water Quality

Credits: 3.

CE H7400 - Industrial Wastewater Treatment

Sources, volumes, and characteristics of industrial wastewaters. Federal and local pretreatment regulations, including categorical standards. Uses of applicable biological, absorption, stripping, precipitation, chemical oxidation, reverse osmosis, ultrafiltration processes. Recovery methods and sludge handling and disposal.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 57100.

CE H7500 - Principles of Drinking Water Treatment

Physical-chemical unit operations in drinking water and wastewater purification. Process kinetics, ideal/nonideal reactor design, mixing, coagulation/flocculation, discrete/flocculant settling, filtration, air stripping, disinfection, adsorption, ion exchange and membrane technologies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 47400

CE H7600 - Principles of Biological Wastewater Treatment

Biological processes used to treat municipal wastewaters for BOD and nutrient removal: Activated sludge, trickling filters, rotating biological contactors, secondary settling and sludge thickening. Sludge stabilization processes, chemical and biological both aerobic and anaerobic.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 47400

CE H7700 - Biological Systems in Environmental Engineering

Procaryotic and eukaryotic cell structure, origin and evolution of modern eukaryotes, microbial diversity and classification. Energy sources, chemolithotrophs, photolithotrophs, chemoorganotrophs, fermentation, respiration. Culture of microorganisms, types of culture media, enumeration of microbes in natural populations. Effects of environmental factors on growth. Virus structure, quantification, replication lysogeny, microbial genetics, mutations, recombinations, transformations, eukaryotic microbial genetics. Biogeochemical mineral cycling, detritus, wastewater microbiology, eutrophication.

Credits: 3. Contact Hours: 3 hr./wk.

CE H8200 - Air Pollutant Measurement

Air pollutants and their properties that dictate how they can be measured. Principles of operation, and strengths and weaknesses of approaches used to measure air pollutants, with a focus on approaches to measure criteria pollutants and their precursors. Design of air pollution measurement campaigns per EPA guidelines, including measurement siting and placement, maintenance, quality assurance, record keeping, and data validation and reporting.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 37200

CE H8300 - Air Pollution and Control

Effects of air pollution on humans and on the environment. Clean Air Act and its Amendments. Mobile and industrial sources of air pollution and emission inventories of pollutants across the US and in NY. Pollution prevention vs. pollution control. Air pollution control from industrial, mobile and area sources, to meet needed removal efficiency, with an emphasis on control of gaseous and particulate air pollution from industrial sources. This course is cross listed with CE 58300 Air Pollution and Control, and therefore is not available to students who have already completed CE 58300.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Math 39100 (C min)Corequisite: CE 47400

CE H8400 - Ambient Air Quality Modeling

Air pollutants, their sources, and their properties that dictate how they can be modeled. Atmospheric diffusion equation, and key mechanisms for pollutant transport and transformation, including radiation, gas and aqueous phase chemical reactions, convection, dispersion, and wet and dry deposition. Mathematical derivation and computer modeling of the transport and transformation of pollutants using specific receptor (CMB, PMF, HYSPLIT), dispersion (AERMOD, CALQ3HC) and transport (CMAQ, UAM/CAMx) models.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE H1000, CE 37200

CE H9000 - Foundation Engineering

Soil exploration and sampling. Engineering properties of soils. Bearing capacity and settlement of foundations. Beams on elastic foundation. Design of footings and mats. Bearing capacity and settlement of piles and pile groups. Analysis of pile-raft foundations. Design of retaining structures. Slope stability. This course is crosslisted with CE 59000 Foundation Engineering, and therefore is not available to students who have already completed CE 59000.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 31500, CE 34500

I0000

CE I0000 - Seminars

Recent developments in civil engineering; students report on assigned subjects. Topics to be announced.

Credits: Variable cr..

CE I1700 - Finite Element Methods in Engineering

Equilibrium and variational formulations of finite element methods. Plane, axisymmetric, and shell elements. Isoparametric elements. Static and transient response of structures. Applications in potential flow, electrostatic thermal conduction field problems, and diffusion equations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 44000 and CE 53000; Pre/coreq: CE H1000.

CE I1900 - Advanced Finite Elements

Finite Element formulation and discretization for transient problems. Explicit and implicit time integration methods. Stability and convergence. Computational techniques for fracture mechanics. Singularity elements. Numerical evaluation of J-integral. Material nonlinear analysis. Plasticity models. Iterative methods.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I1700.

CE I2000 - Travel Demand Forecasting

Consumer demand theory. Travel demand functions. Transportation cost and supply functions. Disaggregate and aggregate travel destination, route and modal choice models. Illustrations in practical situations for various modes.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I2400 or approval of the instructor.

CE I2200 - Transportation Asset Management

Definition of asset and asset management systems: definition, attributes, components, goals and objectives, benefits; consequences of poor asset management. Transportation assets: physical plant, equipment, real estate, employees, customer goodwill, investments, funding sources. Valuation and preservation of value: replacement asset value vs. depreciated asset value; minimizing real depreciation, maintaining asset value. Direct vs. indirect revenues; balance sheets: assets and liabilities, revenues and expenditures, return on investment; cash flow and income statements; depreciation schedules. Life-cycle cost analysis. Application to road, rail, airport, port, bridges, buses, trains, utilities, human resources, etc., with student projects and presentations.

Credits: 3. Contact Hours: 3 hr./wk.

CE I2300 - Pavement Management Systems

Planning, budgeting, funding, designing, constructing, monitoring, maintaining and rehabilitating a paved road network. Project vs. network Pavement Management Systems. Life cycle investment analysis and asset valuation. Pavement evaluation and performance. Structural capacity and safety. Design of alternatives and selection of optimal strategies. Pavement monitoring techniques. Implementation of PMS in highway agencies.

Credits: 3. Contact Hours: 3 hr./wk.

CE I2400 - Analytical Techniques in Transportation

A survey of quantitative methods useful in transportation and traffic engineering. Network analysis. Decision theory. Data analysis and statistical inference. Computer simulation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Basic probability and statistics (e.g. CE 26400).

CE I2600 - Urban Transportation Planning

Transportation planning in context of federal policy, and legislative planning mandates. The structure of the transportation planning process. Travel behavior, accessibility, mobility and land use. Role of demand and supply models. Evaluation of alternatives. Air quality and congestion and their impacts. Role of revenue and funding. Regional examples.

Credits: 3. Contact Hours: 3 hr./wk.

CE I2700 - Transportation Policy

Role of policy and policy makers. Legislation and its impact on transportation systems, system performance, and land use. Transportation institutions and their responsibilities. Models of policy formulation and policy analysis. Regional examples.

Credits: 3. Contact Hours: 3 hr./wk.

CE I2800 - Transit Systems: Planning and Operations

Basic techniques of service area analysis, route development, scheduling, revenue estimation, and service improvements for fixed route bus and rail transit. Integration of fixed route transit with paratransit, matching mode with service area, relationship of transportation department with other departments, budgeting, and policy setting also will be discussed.

Credits: 3. Contact Hours: 3 hr./wk.

CE I2900 - Transportation Project Evaluation

Methods of evaluating proposed projects including cost benefit analysis and alternative methods. How to value non-monetary impacts, e.g., time, life, clean air. Role of project evaluation within the planning process; evaluation criteria. Monitoring and evaluation of existing projects.

Credits: 3. Contact Hours: 3 hr./wk.

CE I3000 - Structural Dynamics

Vibrations of elastic structures: Single degree and multi-degree-of-freedom systems; free and forced vibration; harmonic, impulsive and arbitrary loading; lumped parameter models. Analysis of dynamic response: Modal superposition; Numerical integration: introduction to inelastic behavior. Structural response to earthquake and wind loads. Damping characteristics of structures: Viscous, Viscoelastic and Friction Damping. Tuned mass dampers, passive energy dissipation systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 43500 and CE 44000; Pre/coreq: CE H1000.

CE I3500 - Applied Elasticity and Plasticity

States of stress at a point. Constituitive equations. Formulation of equilibrium problems. Two-dimensional problems in rectangular and polar coordinates. Axisymmetrically loaded members. Plastic behavior of materials. True stress and true strain. Yielding criteria. Plastic stress-strain relations. Plastic analysis of structures. Elastic-plastic stresses in thick-walled cylinders and rotating disks.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 53000; Pre/coreq: CE H1000.

CE I3600 - Fracture Mechanics

Review of fracture patterns in solids. Griffith-Irwin crack theory; stress analysis and crack tip stress-intensity factors; fracture toughness; crack extension force. Surface flows; plate thickness, and temperature effects; fatigue-crack propagation and stress-corrosion cracking. Application to structural analysis and design to avoid failures; fracture control plans.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I3500.

CE I3800 - Plates and Shells

Exact and approximate methods of solution for various types of supports and various shapes of plates in polar and rectangular coordinates. Effect of large deflections. Cylindrical and spherical shells; elastic and inelastic buckling of shells. Thermal stresses in plates and shells.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Or corequisite(s): CE H1000.

CE I4000 - Traffic Control

Traffic laws and ordinances; regulatory measures; traffic control devices; markings, signs and signals; timing of isolated signals; timing and coordination of arterial signal systems; operational controls; flow, speed, parking; principles of Transportation System Management/Administration; highway lighting. State-of-the-art surveillance and detection devices and techniques.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 52000 or CE H2000.

CE I4100 - Intelligent Transportation Systems (ITS): Fundamentals and Applications

Historical background of ITS, ITS functional areas and interrelationships: Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), etc. ITS system architecture requirements. ITS technology and operational and implementation issues. Due to the cutting edge nature of the course, it is taught in a collaborative manner with outside speakers giving presentations on ITS implementation and technology and students presenting papers.

Credits: 3. Contact Hours: 3 hr./wk.

CE I4500 - Advanced Transportation Planning

Current techniques of planning will be applied to a regional case study. Survey techniques, travel behavior, travel demand management strategies, project evaluation and ISTEA/CAAA constraints will be reviewed for the study.

Credits: 3. Contact Hours: 3 hr./wk.

CE I4700 - Planning and Design of Passenger Terminals

Passenger terminal as modal interface. Concepts of passenger levels of service. Simulation and queuing theory. Issues of security, access, location, and role in community.

Credits: 3. Contact Hours: 3 hr./wk.

CE I5400 - Linear and Nonlinear Analysis of Structures

Overview of the theory of structures including energy methods. Review of stiffness matrix and finite element analysis of structures. Structural modeling of large and complex systems. Computer implementation. Static condensation and substructuring. Semi-Rigid connections. Material non-linearity. Plastic Hinge Method. Geometric nonlinearity. Flexible members and theory of large deformations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 44000.

CE I5500 - Stability of Structures

Fundamentals of structural stability theory. Classical buckling of columns, trusses, frames, rings, arches, thin plates and shells. Energy methods and approximate methods of analysis. Torsional and lateral buckling. Design formulas. Dynamic instability.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 53000, CE 44000; Pre/coreq: CE H1000.

CE I5600 - Earthquake Engineering

Seismological background. Characteristics and measurement of strong earthquake motions. Elastic response of simple oscillators to earthquakes. Response spectra. Inelastic response of SDOF systems. Ductility capacity and demand. Response of multi-degree-of-freedom systems. Seismic wave propagation. Soil amplification. Soil liquefaction. Seismic hazard and risk analysis. Seismic regulations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I3000.

CE I5800 - Structural Reliability

Sources and treatment of uncertainties in structural engineering. Probabilistic modeling of structural loads and resistance variables. Structural reliability methods. Safety assessment of structural members and systems. Introduction to stochastic processes. Application to load modeling. Load combinations. Seismic risk analysis. Introduction to random vibration. Calibration of structural design codes.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 26400, CE 44000.

CE I6300 - Water Resources Modeling

Finite-difference modeling and its application to groundwater flow problems. Topics include classification of second order partial differential equations, boundary and initial conditions, method of characteristics, Taylor series and control volume approaches to discretization, truncation and roundoff errors, and numerical stability, convergence and consistency. Numerical schemes are principally applied to the groundwater flow and advection-dispersion equations. Methods of integrating physical and hydrogeologic data into groundwater flow models are examined. Course also provides introduction to commercial groundwater flow software.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 45100, CE H1000; knowledge of a programming language.

CE I7000 - Wastewater Treatment Plant Design

Codes, regulations, and current practices used in design of municipal wastewater treatment facilities. Total facility planning and component

design layout on typical site. Hydraulic profile, site grading, outline specifications, and preliminary report preparation. Field trips required.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE H6400.

CE I9100 - Soil Dynamics

Behavior of soils under dynamic loading. Measurement of dynamic soil properties. Soil liquefaction. Two and three-dimensional wave propagation. Analysis of foundations under dynamic loads. Impedance functions. Vibration of piles and pile groups. Seismic soil-structure interaction. Applications to geotechnical earthquake engineering.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I3000.

CE I9200 - Advanced Soil Mechanics

Elasticity, plasticity, and yielding of soils. Conduction phenomena in soils. Electrokinetic, electro-osmosis, and electrochemical effects. Elastoplastic constituitive models. Critical-state theories. Cam clay model. Peak and residual soil strength. Stress paths. Application to finite-element analysis. Geotechnical centrifuge modeling.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 34500, CE 44000, CE 53000; Pre/coreq: CE H1000.

CE I9700 - Report

Examinations, exploration, analysis, and chronicle of an engineering design, project, or system, from its inception through its development, consummation and consequent impacts. Written final report.

Credits: 0. Prerequisite: Completion of nine CE credits applicable to master's degree.

CE I9800 - Project

Analytical or experimental project, preferably of student's own choice. Under direction of a faculty advisor, student submits written proposal, performs the required task, and submits a written final report.

Credits: 3. Prerequisite: Completion of nine CE credits applicable to master's degree.

CE I9900 - Research for the Master's Thesis

Credits: 6.

Jooo0

CE J9900 - Research for the Doctoral Dissertation

Credits: Variable cr..

Kooo0

CE K9000 - Doctoral Dissertation Supervision

1 credit repeatable up to 6 credits.

Credits: 1. Prerequisite: Approval of the departmental Ph.D. advisor.

ChE - Chemical Engineering Course Descriptions

Fooo0

ChE F6700 - Polymer Science and Engineering

The chemistry and physics of polymeric materials. The kinetics and control of polymerization reactions. Analysis of the mechanical, thermal and flow behavior of polymeric solids and melts.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHEM 26300, CHE 22800, CHE 33000, CHE 34200, CHE 43200. This course is not open to students who have taken CHE 46700 or its equivalent.

Gooo0

ChE G0000 - Selected Topics in Chemical Engineering

Advanced topics selected for their current interest to graduate students.

Credits: 3. Contact Hours: 3 hr./wk.

ChE G2400 - Viscous Flow I

ChE G2500 - Viscous Flow II

ChE G2900 - Dynamics and Stability of Chemically Reacting Systems

ChE G3600 - Catalyst Design and Catalytic Reaction Engineering

ChE G5300 - Bioprocess Engineering: Principles and Applications

Future advances in bioprocess engineering will extend the leading edge of biotechnology and spur crucial developments in biomedicine, chemical reaction engineering and materials science. This course covers the basic biochemical engineering concepts underlying the behavior of bioprocesses. Topics include enzyme kinetics and biocatalysis, microbial growth and product formation, bioreactor design, transport in bioreactors, and bioproduct recovery. In the final part of the course we examine recent applications in industrial enzyme catalysis, immobilized enzymes and cells, and production of therapeutic proteins.

Credits: 3. Contact Hours: 3 hr./wk.

Iooo0

ChE I0000 - Seminar

Invited speakers and reports of graduate student research.

Credits: 1. Contact Hours: 1 hr./wk.

ChE I2200 - Biofluid Mechanics

ChE I2300 - Non-Newtonian Fluid Mechanics

Review of the general concepts of continuum mechanics and tensor analysis. The rheology of non-Newtonian fluids. Viscometric flows. Linear viscoelasticity. Constitutive equation theory and codeforming and corrotating formalisms. Applications include the treatment of particle motions in non-Newtonian fluids.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I0800.

ChE I2800 - Advanced Chemical Thermodynamics

Classical thermodynamics; batch and flow systems; homogeneous and heterogeneous systems, physical and chemical equilibria, energy effects. Correlation and approximation methods.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHE 33000 or ENGR 23000.

ChE I3000 - Chemical Process Simulation

Steady-state simulation using ASPEN Plus for flow sheet calculations and economic evaluations. Dynamic simulation for process control studies, hazard analyses and batch process scheduling. Special purpose simulations of reactors and separation systems. Emphasis on the underlying numerical methods and sensitivity to modeling errors.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I3200 - Statistical Mechanics I

Introduction to equilibrium statistical mechanics: Liouville's Theorem, ergodic hypothesis, ensembles, connection to classical thermodynamics. Distinguishable and indistinguishable particles, Boltzmann statistics, quantum gases, semi-classical limit. Real gases: cluster and virial expansions. Graphical methods.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I2800.

ChE I3300 - Advanced Chemical Reaction Engineering

The analysis of non-ideal chemical reactor systems. Both homogeneous and heterogeneous reactor systems. Industrial catalytic reactor design and troubleshooting.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHE 43200.

ChE I3500 - Statistical Mechanics II

The liquid state and non-equilibrium statistical mechanics: distribution function theories, integral equation methods, hierarchies. Perturbation theories of liquids. Phase transition: mean field theory, scaling. Time dependent phenomena: dynamic light scattering, fluctuation-dissipation theorem, linear response theory, Green-Kubo relations. Boltzmann equation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I3200 or PHYS 55300.

ChE I3800 - Radiation Heat Transfer

ChE I4100 - Chemical Process Economics

Basic principles; break-even and shut-down studies; profitability criteria; plant location; market research; project analysis and optimization.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I5200 - Powder Science and Technology

Powder metrology: Characterization of particles and particle assemblies; packing of granular solids; interparticle forces and tribology in particulate systems; continuum powder mechanics; design of hoppers; population balance modeling of mixing, segregation, agglomeration and comminution. Bulk Powder handling: conveying and storing.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I5500 - Interfacial Phenomena

Interfacial thermodynamics. The theory of the electrical double layer. Interfacial statics and the Young-Laplace equation. Interfacial fluid mechanics and stability. Applications such as surface waves and Marangoni flows are included.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I5700 - Advanced Materials Engineering

Microscopic level interactions in solid materials. The geometric structure of materials: metals, semiconductors, ceramics, and polymers. Structure determination. The thermodynamic foundation of phase diagrams. Material properties: thermal, electrical, and optical. Surface properties. Synthesis and characterization of "high tech" materials with emphasis on nanoscale technology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE 31000 or permission of instructor.

ChE I5800 - Molecular Simulation

Theory and practice of numerical techniques for the simulation ofAo material properties and transport phenomena at the molecular level. Introduction to ab initio and empirical force fields, theoretical background on MonteAoCarlo, molecular dynamics, and related methods.Ao Introduction to biased and accelerated methods, simulation of fluid flows, long-range interactions, phase equilibriums and other topics of current interest.AoExercises will emphasize computational practice, writing code for particular applications, and the analysis of numerical results.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I3200 or permission of the instructor.

ChE I6100 - Polymer Science and Engineering

Statistical mechanics of polymer chains. Polymer rheology. Scaling concepts in polymer solutions. Behavior of polymer blends, interpenetrating polymer networks, and polymer/mixed solvent systems. Polymer/particle interactions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE 46700 or permission of instructor.

ChE I6200 - Polymer Surfaces and Interfaces

This course introduces the students to surface phenomena related to polymers. Topics covered are: Statistical Nature of Polymers, Polydispersity & Branching; Molecular Weight and its Distribution; Flexibility; Global versus Local Properties; Average Dimensions of Polymer; Polymer Structure and Physical Properties; Diffusion Modes-Reconfiguration and Center of Mass Transport; Interfacial Thermodynamics; Molecular Interactions in Polymers (Van der Waals Forces, Additivity and Fractional Contributions of Various Types of Molecular Forces, Introduction to Mean-field and Monte Carlo approximation to polymer molecular configurations); Surface Energetics of Polymers (Measurement of Surface Tension, Calculation of Surface tension, Measurement of Solubility, Calculation of Solubility); Polymer-Liquid Interactions (Equilibrium Spreading Pressure, Polarity of Liquids, Contact Angle, Measurement and Prediction); Polymer-Polymer Interactions (Solubility of Polymers, Measurement of Solubility, Calculation of Solubility, Prediction of Interfacial Tension of Polymers, in the melt and solid state); Applications (Adhesion, Blending, Adsorption, Permeation).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree in engineering, or permission of the instructor.

ChE I6300 - Thin Organic Films and Their Analysis

This courses introduces the students to the concepts of supported thin organic films and their analysis: Langmuir-Blodgett Films; Self-Assembled Monolayers; Polymer Films; Homopolymers; Block Copolymers; Polyelectrolytes (Layer by Layer); Optical Techniques (Ellispometry, Second Harmonic Generation); Electroanalytical Techniques (Surface Potential); Physocochemical Techniques (Wetting); Spectroscopic Techniques (Infrared Spectroscopy (FT-IR), Raman Spectroscopy, X-Ray Photoelectron Spectroscopy (XPS), Secondary Ion Mass Spectroscopy (SIMS)); Scanning Probe Microscopy (Atomic Force, Scanning Tunneling); Scattering Techniques (Neutron Scattering, X-Ray Scattering, X-Ray Diffraction, Light Scattering).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree in engineering, or permission of the instructor.

ChE I6400 - Rheology of Soft Materials

Rheological measurement. Linear and nonlinear viscoelasticity. Rheology of polymers, liquid crystals, emulsions, gels, and other complex fluids and soft solids. Continuum and molecular theories of viscoelasticity.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree in a physical science or engineering discipline, or permission of instructor.

ChE I6500 - Mechanics of Polymer Melt Processing

Fluid mechanics and heat transfer principles underlying the mechanics of polymer melt processing. Conservation principles. Non-Newtonian fluids. Coupled flow and heat transfer in extrusion. Pressure effects. Solution multiplicity. Lubrication theory for polymer processing. Injection and compression molding. Fiber spinning. Numerical simulation. Effects of viscoelasticity on processing. Stability and sensitivity.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree in engineering, or permission of the instructor.

ChE I7700 - Process Dynamics and Control

Dynamic Behavior and control of process equipment and flow systems. Behavior and stability of linear and non-linear systems with examples from chemical reactors, distillation columns and heat transfer equipment.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHE 47900.

ChE I8100 - Fluid Particle Systems

Course covers equilibrium and flow properties of mixtures containing solid particles in viscous fluids, providing an overview of basic analytical, theoretical and modeling concepts, with an introduction to certain simulational and experimental methods. Recent scientific understanding in the field is reviewed. Topics include: general conservation laws and constitutive descriptions for continuous materials; microhydrodynamics, i.e. flow and interaction at the particle scale; mixing, diffusion and dispersion; two-phase mixture conservation equations, their general features, consequences and solution methods; statistical mechanical approaches applied to low-Reynolds-number suspensions: microstructure, rheology and bulk flow; inertial effects including weak inertia, inertial particle hydrodynamics, turbulence in mixture flows; experimental and simulational tools; mixture flow applications in industry.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I8600 - Equilibrium Staged Separations

Analysis, design and simulation of the major separation operations of distillation, absorption and extraction. Both staged and continuous countercurrent modes of operation are covered. Choice of vapor-liquid and liquid-liquid equilibria models, data regression and prediction methods. Process synthesis of sequences of separation operations; heat integration for efficient energy utilization. Introduction to column dynamics and control strategies.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I8800 - Bioseparations

Modeling and simulation of the dynamic behavior of staged and plug flow separation operations. Batch distillation. Adsorption techniques including chromatographic separations and pressure swing adsorption. Membrane technologies such as reverse osmosis and gas separation. Separations involving solids including filtration and crystallization. Separations for biotechnology.

Credits: 3. Contact Hours: 3 hr./wk.

ChE I8900 - Nanotechnology

Introduction to nanotechnology and its applications in the development and synthesis of soft materials.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I2800 and ENGR I9100.

ChE I9000 - Bioprocess Engineering: Mammalian Cell Biotechnology

Basics of biochemistry and cell structure with emphasis on eucaryotic cells. Introduction to recombinant DNA technology and protein engineering. Introduction to cell culture bioreactors. Production of glycosylated proteins. Biochemical engineering aspects of stem cells.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I2800 and ENGR I9100.

ChE I9100 - Mass Transfer

Definitions of concentrations, velocities and mass fluxes. Conservation of species equation; multicomponent diffusion; Stefan-Maxwell equations. Transient diffusion in semi-infinite media. Definition of transfer coefficients with mass addition. Application of film, penetration and boundary layer theory. Diffusion with homogeneous and heterogeneous chemical reaction. Interphase transport.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I0800.

ChE I9200 - Soft Materials Lab

The course provides students with exposure to some surface modification chemistry and the standard techniques used for the characterization of surface properties. In addition to use of instrumentation, students will familiarize themselves with surface preparation and modification techniques, including self-assembly, evaporation, spin coating, and Langmuir-Blodgett techniques. There are seven experimental modules: contact angle goniometry; air-liquid and liquid-liquid interfacial tension measurement; fluorescence imaging and Brewster Angle Microscopy; reflection infrared spectroscopic determination of surface coverage; ellipsometric measurement of thin films; atomic force microscopy (AFM) characterization of surfaces; and colloidal particle size distribution measurement and particle stability using light backscattering. Written and verbal reports are required.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree in engineering, or permission of the instructor.

ChE I9700 - Report

In-depth analysis by means of written reports of a number of technical papers, reports or articles on a specific topic of interest to chemical engineers. Topics to be chosen by the student after consultation with a professor in the department. An oral presentation of the written report may be required at the departmental seminar.

Credits: 0. Prerequisite: Completion of 12 credits toward the master's degree in ChE. Not applicable for credit toward the Ph.D.

ChE I9800 - Master's Project

Theoretical or experimental project under the supervision of a faculty advisor. Student submits a written proposal, performs the required work, and submits a written final report.

Credits: 3. Prerequisite: Written departmental approval.

ChE I9900 - Research for the Master's Thesis

Credits: Variable cr., up to 6 cr..

Joooo

ChE J9600 - Introduction to Research Fundamentals

Credits: 3.

ChE J9900 - Research for the Doctoral Dissertation

Credits: Variable cr., up to 12 cr..

ChE K9000

ChE K9000 - Doctoral Supervision

1 credit repeatable up to 6 credits.

Credits: 1. Prerequisite: Approval of the departmental Ph.D. advisor

CHEM - Chemistry Course Descriptions

Aoooo

CHEM A1100 - Environmental Chemistry

Intended to broaden the student's understanding of chemical processes taking place in our environment. The relationship between atmospheric, soil and water chemistry will be underlined. This course draws upon general, analytical and organic chemistry experience.

Credits: 3. Contact Hours: 3 hr./wk.

CHEM A1101 - Environmental Chemistry Lab

Introduction to environmental analysis. Samples of water, air, soil, food, etc. will be obtained and analyzed both qualitatively and quantitatively for pollutants. The effects of these pollutants on the environment will be discussed and linked to urban problems. Analytical techniques will include titrations, separations (GC, HPLC, GC/MS) and polarography.

Credits: 2. Contact Hours: 3 hr./wk.

CHEM A1200 - Environmental Organic Chemistry

Examination of processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Chemical properties influencing transfers between hydrophobic organic

chemicals, air, water, and sediments, based on a fundamental understanding of intermolecular interactions, will be studied. Mechanisms of important thermochemical and photochemical transformation reactions will also be briefly investigated.

Credits: 3. Contact Hours: 3 hr./wk.

CHEM A1400 - Chemical Information Sources

An introduction to the retrieval of chemical information. Topics covered: primary, secondary and tertiary literature, including the major abstract journals, data sources, compendia, patents, current awareness, and computer readable sources.

Credits: 1. Contact Hours: 3 hr./wk. Offered: Spring semester only.

CHEM A4000 - Journey to the Center of the Cell

A semester long journey that follows the path taken by two extra-cellular signals as they reach a cell, traverse the plasma membrane, navigate the cytoplasm, and finally manifest their effects on the genome. Through reading and discussion of primary research literature, this course highlights how structural biology has helped develop a detailed picture of each step in the pathway.

A portion of this course will be taught in so-called 'flipped' course mode. Prior to each class meeting, students will review reading material, listen to lecture podcasts, or view videos. Class time will be devoted to discussion/questions about the lecture, review of selected portions of the lecture, problems sets. Quizzes and other types of assessments will be used to evaluate students.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Grade of C or better in Chem. 26300 [or placement by the department] and Grade of C or better in Bio 10100 (Biological Foundations I)

CHEM CHEM A5900:Biochemistry II - Biochemistry I

The course covers the cellular biochemistry of amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Prereq.: Organic chemistry. 3 hr./wk.; 3 cr.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Organic chemistry.

CHEM A8000-A8999 - Special Topics in Chemistry

Special topics not covered in the usual department offerings. Topics will vary from semester to semester depending on student and instructor interest. Each course will have a designated list of prerequisites. These depend on the central topic of the course and will be decided by the instructor. Credits and hours will be determined by the instructor and the department.

Credits: 1-5. Contact Hours: 1-5 hr./wk.

CHEM A8005 - Biochemistry II

Molecular basis of enzyme action, membranes (transport and signal transduction), protein structure, signal transduction, virology, bioinformatics, genomics, proteomics, molecular basis of replication, transcription of genetic information, immunology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A one semester undergraduate biochemistry course.Offered: Spring semester only..

CHEM A8200 - Chemistry-Physics-Engineering Seminar I

Topics in physical chemistry, inorganic chemistry and organic chemistry.

Credits: 1. Offered: Fall semester only.

CHEM A4200 - RNA Biochemistry and Molecular Biology

Chemistry, structure and function of the ribonucleic acids (RNA), and the increasingly important role this ancient biopolymer is recognized to play in Biochemistry and other life sciences, including medicine. Theoretical and methodological concepts will be explored in lectures and in class discussion of classic and contemporary RNA research papers.

Credits: 4. Contact Hours: 3 hr./wk. Prerequisite: Admission into the chemistry MS program and CHEM A8005 (Advanced Biochemistry), or equivalent.

CHEM A8300 - Chemistry-Physics-Engineering Seminar II

Topics in physical chemistry, inorganic chemistry and organic chemistry.

Credits: 1. Offered: Spring semester only.

Boooo

CHEM B1000 - Inorganic Chemistry

Theories of chemical bonding and molecular structure applied to inorganic compounds; stereochemistry; compounds of the non-transition elements; transition metal complexes.

Credits: 5. Contact Hours: 5 hr./wk. Offered: Spring semester only.

CHEM B3000 - Polymer Chemistry

Fundamentals of polymer science; polymerization, solution properties, and solid state properties.

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B5000 - Organic Mechanisms

The basic methods of studying organic reaction mechanisms and their application to specific reactions.

Credits: 5. Contact Hours: 5 hr./wk. Offered: Fall semester only.

CHEM B5100 - Organic Synthesis

A critical and mechanistic evaluation of methods and concepts in organic synthesis.

Credits: 5. Contact Hours: 5 hr./wk. Prerequisite: CHEM B5000.Offered: Spring semester only.

CHEM B5200 - Spectroscopy and Structural Proof in Organic Chemistry

Principles and concepts in spectroscopic methods such as infrared and ultraviolet-visible spectrophotometry, proton and carbon nuclear magnetic resonance spectroscopy including techniques such as decoupling, 2-dimensional correlated spectroscopy, mass spectrometry and elemental analyses.

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B5300 - Organometallics

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B6000 - Quantum Chemistry

An introduction to quantum chemistry. A mathematical development of the theories which explain atomic and molecular behavior with applications to chemical bonding and spectroscopy.

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B7200 - Surface Chemistry and Colloids

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B7300 - Computers in Chemistry

Credits: 5. Contact Hours: 5 hr./wk.

CHEM B8000 - Special Topics in Chemistry

Credits: 5. Contact Hours: 4 hr./wk.

CHEM B8001 - Special Topics in Inorganic Chemistry

CHEM B8002 - Special Topics in Analytical Chemistry

CHEM B8003 - Special Topics in Organic Chemistry

CHEM B8004 - Special Topics in Physical Chemistry

CHEM B8900 - Introduction to Research Methodology

An introduction to methods of doing research; students are required to submit a research notebook and a short paper. With approval, may be converted to the first half of thesis research.

Credits: 5. Contact Hours: Hrs. TBA

CHEM B8905 - Research Methods in Biochemistry

Students gain experience in current laboratory and/or computational Biochemistry research techniques under the supervision of a faculty mentor. Requirements include 3 hours of research exercises per credit each week; a final progress report in oral or written format is also required. This course can be taken twice for a maximum of 10 credits; eligible for SP designation that converts to a letter grade upon completion.

Credits: 1-5 (variable); letter grades. Contact Hours: 3-15 per week Prerequisite: Permission of the MS/4+1 Biochemistry Coordinator; consent of a faculty supervisor in Chemistry & Biochemistry or a cognate department.

CHEM B9100 - Basic Laboratory Techniques for Research in Physical, Analytical and Inorganic Chemistry

Electronics, principles of instrumentation, application of some modern instruments, and instrumental techniques.

Credits: 5. Contact Hours: 2 lect., 6 lab hr./wk. Offered: Spring semester only.

CHEM B9800 - Seminar in Biochemistry

Presentation and discussion of current problems in biochemistry. Includes presentations of recent research findings by invited speakers and requires registered students to make at least one presentation based on published work or their own research results.

Credits: 1. Contact Hours: 1 hr./wk.

CHEM B9901 - Thesis Research

Credits: 3.

CHEM B9901-B9905 - Thesis Research

Students choosing thesis research will prepare a thesis under the personal guidance of a faculty advisor. The research must be completed in two years from the initial date of registration for the thesis course, continuing registration until completed.

Credits: 10.

CHEM B9902 - Thesis Research

Credits: 3.

V0000

CHEM V9100 - Colloquium

Recent developments and trends in the field of biology. Required of all candidates for the M.S. degree.

Credits: 1. Contact Hours: 2 hr./wk.

Colloquium must be taken twice.

CHEME - Secondary Education Chemistry Course Descriptions

CHEME 3200F - Independent Study and Research in Chemistry

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

CHEME 7100E - Modern Concepts in Chemistry I

Chemistry approached from the basis of more recently developed theoretical concepts, with selected applications. Topics include biochemistry, physical chemistry.

Credits: 3. Contact Hours: 3 hr./wk.

CHEME 7200E - Modern Concepts in Chemistry II

A seminar designed for majors in science education to explore recent developments in chemistry and their application. Topics include chemical nutrition, industrial chemistry.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: One year of college chemistry.

CHEME 7600E - Principles of Physical Chemistry

Introduction of the basic principles and concepts of kinetic molecular theory, thermodynamics, solutions, solids and phase equilibria.

Credits: 3. Contact Hours: 3 hr./wk.

CHEME 7700E - Introduction to Modern Organic Chemistry

Introduction to the chemistry of compounds based upon the modern concepts of physical organic theory. Includes a presentation of major organic reactions and their application to synthesis.

Credits: 3. Contact Hours: 3 hr./wk.

CHEME 7800E - Elements of Biochemistry

Applications of chemical principles to the study of the living cell. Study of chemical compounds of biological importance and their metabolic interrelationships.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHEME 0200E or one semester of organic chemistry.

CSc - Computer Science Course Descriptions

I0000

CSc I0400 - Operating Systems

Underlying theoretical structure of operating systems; input-output and storage systems, data management and processing; assembly and executive systems, monitors; multiprogramming.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 33200 or an equivalent undergraduate course.

CSc I0500 - Computer Graphics

An intensive introduction to computer graphics hardware, design of graphics packages, geometric transformations, 3D viewing and projections, raster scan conversion, visible surface determination, lighting and shading, 3D shape representation, and splines. Emphasis is on implementation of important graphics algorithms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 32200 and MATH 34600 or equivalent.

CSc I0600 - Fundamental Algorithms

An intensive study of advanced non-numerical programming techniques. Data representation; list, tree and string manipulation algorithms. Recursive programming. Introduction to searching and sorting. Storage management algorithms. Comparative efficiency of algorithms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or equivalent.

CSc I0700 - Compiler Construction

Techniques involved in analysis of source languages and generation of efficient object code. Parsing methods, storage allocation, programming language semantics, optimization techniques, interpreters, study of existing compilers and their special features.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 30400 or equivalent.

CSc I0800 - Topics in Software Systems

Selected topics of current interest. Recent offerings have included computer games, concurrent and distributed processing, search technologies, internet programming and information management.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 33200 or equivalent.

CSc I0802 - Web/Geograph Info Sys

Credits: 3. Contact Hours: 3 hr./wk.

CSc I0807 - Image Processing

An intensive introduction to imaging intended for graduate students and advanced undergraduates. Topics include digital filtering theory, image enhancement, image reconstruction, anti-aliasing, warping, and state-of-the-art special effects. These topics form the basis of high quality rendering in computer graphics, as well as low-level processing for computer vision, remote sensing, and medical imaging. Emphasizes computational techniques for implementing useful image processing functions. Programming assignments will reinforce material covered in class.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 32200 or equivalent.

CSc I0900 - Graph Theory and Algorithms

Extremal graph theory. Drawing planar graphs. Elementary graph algorithms (breadth-first search, depth-first search, topological sort). Minimum spanning trees. Single-source shortest paths. Maximum bipartite matching. Connectivity of graphs. Random graphs.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or equivalent.

CSc I1000 - Database Systems I

An introduction to database architecture. Levels of abstraction in a database system, physical data organization, abstract data models, relational database systems, and their query language.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 33200 or equivalent.

CSc I1100 - Database Systems II

Logical models for database management systems, especially relational, hierarchical and network. Case studies illustrating their implications for applications system development. Physical implementation of advanced data and storage structures.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSc I1000 or equivalent.

CSc I1200 - Topics in Algorithms

Current developments in the design, analysis and implementation of algorithms and their applications. Recent offerings have included packing and covering, randomized algorithms, geometric graphs, computational geometry, combinatorics, and algorithms in bioinformatics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 30400 or equivalent.

CSc I1400 - Parallel Algorithms

Techniques of efficient program design. Analysis of parallel algorithms chosen from information storage and retrieval, graph theory, pattern matching, matrix operations, etc. as to their time, space, and other resource requirements. Lower bounds for the intrinsic computational difficulty of some of these programs.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 30400 or equivalent.

CSc I1500 - Artificial Intelligence

The study of how to make the computer behave intelligently. State-space methods of problem solving, heuristic search techniques, representation and use of knowledge, mechanical theorem proving, psychological implications. Examples of game playing, problem solving, or other systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 30400 or equivalent.

CSc I1600 - Natural Language Processing

Methods for processing English texts and dialogues on the computer. Parsing, transformational analysis, semantic analysis, interfacing; examples of natural language systems for carrying on dialogues and performing tests.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 44800, or CSc I1500 or equivalent.

CSc I1800 - Topics in Artificial Intelligence

Selected topics from expert systems, automated systems and robotics; automated reasoning; computer vision.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 44800 or CSc I1500 or equivalent.

CSc I1896 - Computer Vision

A survey of the techniques used in computer vision, which recovers information from images. Topics include: the geometry of image formation; multiple 2D techniques for feature detection, image segmentation, object recognition, and texture; 3D shape from shading, stereo and motion. Some mathematical maturity is assumed, including familiarity with linear algebra, multidimensional calculus and simple statistics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000, CSC 22100 and MATH 34600 or equivalent.

CSc I1900 - Pattern Recognition and Machine Learning

Generalization and classification; pattern recognition and perception; concept formation; remembering and forgetting; learning and hypothesis formation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 44800 or CSc I1500 or equivalent, and knowledge of Linear Algebra.

CSc I2000 - Introduction to Theoretical Computer Science

Fundamental concepts from logic, models of computation, and complexity theory. Scope and limitations of various formalisms. The Chomsky hierarchy of languages and machines. Basic ideas for recursive functions. Impact on programming systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 or equivalent.

CSc I2100 - Finite Automata and Models of Computation

A review of the basic definitions, concepts and results concerning finite automata (e.g. Myhill-Nerode Theorem). Applications of finite state automata in the modeling of circuits for fast arithmetic computation, exploring graphs and robotic computations, pseudorandom number generators for internet protocols, recent physical and biological applications (e.g. Watson-Crick finite automata).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 or CSc I2000 or equivalent.

CSc I2200 - Theory of Computability

Formulations of effective computability: Post machines. Turing-type models, recursive functions, and semi-Thue systems. The equivalence of the various formulations. Church's Thesis. Fundamental theorems of computability: universal machines, S-M-N, and recursion theorem. Unsolvable problems. Recursive and recursively enumerable sets.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 or CSc I2000 or equivalent.

CSc I2300 - Symbolic Computation

A comparative study of the structure and use of various functional, logical and sequential languages used in symbolic computation and artificial intelligence. Choice of appropriate programming tools for specific applications. Comparison of user/machine interfaces.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 or CSc I2000, or equivalent.

CSc I2400 - Formal Language Theory

Classification of languages by grammars and automata. The Chomsky hierarchy: regular, context free, context sensitive and recursively enumerable languages and their associated grammars and automata. Closure properties for families of languages. Decision problems for grammars and automata.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 or CSc I2000 or equivalent.

CSc I2600 - Computational Complexity

Complexity measures for algorithmic systems, determinism vs. non-determinism, time vs. space, complexity hierarchies, aspects of the P-NP question, inherent complexity of specific algorithmic problems, recent applications to cryptography.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 and CSc I2000 or CSc I0600.

CSc I2800 - Topics in the Theory of Computing

Topics of current interest, such as quantum computing, biological computing, automated reasoning , parallel computation, advanced topics in complexity, algebraic and symbolic computation, historical issues and open problems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSc I2000 or departmental approval.

CSc I3100 - Seminar in Information Systems

Topics of current interest in computer-based information systems. Possible topics include computer-human interaction, virtual organization, decision support systems, knowledge management, and systems analysis. Students are required to complete a project on an approved topic in the course.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSc I1000.

CSc I3110 - The Information Marketplace

All aspects of the market for computer-based information products and services. Course objectives are to define and characterize the information marketplace, to present concepts and methods for analyzing behavior within the marketplace, and review public and private policy implications of the information marketplace.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Strong background in Economics and permission of the instructor.

CSc I4200 - Computer Architecture

Quantitative principles of computer design. Instruction -level parallelism (ILP).Exploiting ILP using Dynamic Scheduling, multiple issue, and speculation. Issues in thread-level parallelism using ILP. Multiprocessors and thread-level parallelism. Symmetric shared memory architectures. Distributed shared memory multiprocessors. Memory hierarchy design. Virtual machines. Advanced topics in storage systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 34200/CSC 34300 or equivalent.

CSc I4300 - Computer Communications

Data transmission concepts: electro-magnetic energy propagation, bit-serial transmissions, synchronization, modulation. Data communication principles: packet switching, multiplexing, logical connections, protocols, layering. Network protocols: window-based schemes, flow & error control (TCP, X.25). Distributed MAC layer control: CSMA/CD, token-passing, wireless channels, spread-spectrum techniques (CDMA, DSM). Basic network security: encryption, authentication. Upper layer protocols: transport, session, and application layers.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 34200/CSC 34300 and CSC 32200 or equivalent.

CSc I4330 - Advanced Topics in Internet Programming

The first part of the course will deal with platform independent software and data for Internet programming. The second part will address Web Services-messaging over standard web protocols. Students will be exposed to current technologies and standards. Topics discussed may include: distributed objects and remote invocation, messaging, name services, security.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22100 or equivalent.

CSc I4600 - Topics in Computer Architecture

Selected topics from the current literature in computer architecture.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 34200/CSC 34300 or CSc I4200 or equivalent.

CSc I4633 - Multimedia

Algorithms and software that handle and manipulate interactively digital sound, image, animation and video. Topics covered include digital sound formats and conversion factors affecting sound quality, digital image formats and conversion, image compression and factors affecting image quality, digital video formats and standards, video compression methods, videoconferencing and interactive media.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 32200 and good programming knowledge.

CSc I4700 - Topics in Computer Communications

Selected topics from the current literature in computer communications.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSc I4300 or equivalent.

CSc I4800 - Codes, Cryptography, and Secure Communication

Concepts from probability and information theory entropy, codes for compression, error-correcting codes, secrecy codes, block ciphers and public key cryptosystems, cryptographic protocols for secure communication, introduction to quantum cryptography.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 and CSC 34200 or equivalent.

CSc I4900 - Computer Security

An introduction to the principles and practices of computer security in various computing environments. Conventional encryption systems and classical cryptography. Confidentiality using conventional encryption. Public key encryption and protocols for authentication and digital signatures. Recent cryptanalytic attacks on conventional and public key systems. Intruders, viruses, and trusted systems. Firewalls and internetwork security. A survey of applications and problems arising in contemporary computer security.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 30400 and CSC 22000 or equivalent.

CSc I4920 - Web Security

The Web Security course focuses on teaching students the fundamentals of web application security with the aim of providing a foundational level of knowledge matched with offensive and defensive skills developed through hands-on experience. Students will learn the basics of cybersecurity and common vulnerabilities and attacks, receiving hands-on practice in both exploitation techniques and strategies for protecting and hardening applications. The course introduces a wide range of topics via a combination of sessions, videos, projects, and labs, giving students both a thorough grounding in the details of cybersecurity and an introduction to the broader landscape of information security.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 22100 or equivalent.

CSc I6000 - Mathematics for the Analysis of Algorithms

Those areas of mathematics necessary for the advanced analysis of algorithms: manipulation of sums, solving recurrences, number theory, binomial coefficients, special sequences, generating functions, and asymptotics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or CSc I0600.

CSc I6100 - Mathematical Programming I

The simplex method. Duality theory and related methods. The revised simplex method, decomposition, and partitioning methods for large structural problems. Network flow problems: max-flow, min-cut theorem, special algorithms for transportation, shortest route, and assignment problems. Aspects of computer implementation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or CSc I0600, and MATH 34600 or equivalent.

CSc I6200 - Mathematical Programming II

Convex functions and convex sets. Gradient, conjugant gradient, and variable metric methods. Kuhn-Tucker and duality theory. Nonlinear programming algorithms. Integer programming, branch and bound methods. Dynamic programming.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSc I6100.

CSc I6300 - Decision Analysis

An introduction to decision-making under uncertainty. Bayes and minimax criteria. Utility theory, treatment of risk, and the value of information. Two-person and n-person games, stochastic linear programming models, policy improvement algorithm. Markovian decision processes. Application to system design, management, and production.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or CSc I0600, and an undergraduate course in probability.

CSc I6400 - Topics in System Simulation

Simulation methodology, design, and analysis of simulation experiments. Generation and testing of random variates. Variance reduction techniques. Simulation languages. Analysis of queuing models on computer systems simulation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 and CSC 21700 or equivalent.

CSc I6600 - Probabilistic Models in Computer Science

Introduction to queuing theory. Birth and death processes. Single server and multiple server queuing systems. Priority disciplines. Time sharing and multiprogramming models. Selected topics in system reliability theory.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or CSc I0600.

CSc I6700 - Topics in Scientific and Statistical Computing

Selected topics from computer algebra, advanced numerical methods, advanced numerical computation, advanced operations research, combinatorial computing, graph algorithms, cryptography. Recent offerings have included computer vision, cluster computing, digital libraries, pattern recognition and satellite image processing.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 22000 or CSc I0600.

CSc I6730 - Data Reduction in the Physical Sciences

A course in the reduction of data sets gathered by government agencies (NOAA and NASA). Data comes from satellite remote sensing and other atmospheric and oceanographic measuring systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Permission of the instructor.

CSc I6744 - Neural Computing

An introduction to neural networks and their applications. Material to be covered includes: models of a neuron, network architectures, visualization processes and artificial intelligence in neural networks, learning processes, the perceptron, multilayer perceptrons.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 20300, MATH 34600 and a working knowledge of C or Fortran.

CSc I9600 - Special Topics in Contemporary Computer Science

A research seminar course, focusing on a specialized and contemporary topical areas of computer science. The course will present research articles and technology papers to students in the chosen topic, actively engaging them in the presented materials through their interactive discussions, writing of short summary reports, team projects, literature search and/or exams.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Advanced graduate standing and permission of the instructor.

CSc I9700 - Report

satisfies non-course requirement.

Credits: 0. Corequisite: CSc I96XX

CSc I9800 - Project

Experimental or theoretical project under the direction of a faculty advisor. Student submits proposal, performs the required studies, submits a written final report, and gives a comprehensive oral presentation to the department or an approved forum. satisfies non-course requirement.

Credits: 3. Prerequisite: Departmental approval.

CSc I9900 - Research for Master's Thesis

satisfies non-course requirement.

Credits: 6. Prerequisite: Departmental approval required.

DSE - Data Science Engineering Course Descriptions

DSE I1020 - Introduction to Data Science

This course will present a survey to Data Science and introduce some of the core data science tools. While some programming experience is required for the course, the course will include a rapid introduction to Data Science programming and the stack of tools needed to process, visualize and analyze data stack with a language such as R or Python. Students will be given a high-level survey of data engineering, visual analytics, applied statistics, machine learning, and big data. The course will illustrate this bringing them through real data sets and case studies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 10200/CSC10300

DSE I1030 - Applied Statistics

This course will examine real data sets from a variety of domains, examine multiple models for these data sets, assess the validity of modeling assumptions, and determine the strength of conclusions that can be drawn. Topics to be covered include: 1) inferential statistics (such as hypothesis testing and estimation in parametric and nonparametric settings, conditional inference, resampling methods, cross-validation, and multiple hypothesis testing); 2) experimental design (analysis of variance) 3) Bayesian statistics (such as prior distributions, posterior and predictive inference, and Bayesian model comparison); 4) Regression and prediction (such as elements of linear and nonparametric regression, assessment of variable importance, introduction to causal inference). The course will include project-based learning and use a statistical programming language such as R or python. A strong emphasis will be placed on the critical analysis of modeling assumptions in real-world settings.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 10200/CSC10300

DSE I2100 - Applied Machine Learning and Data Mining

Introduction to machine learning, data mining, and statistical pattern recognition. Topics include: 1) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks, deep learning), 2) Unsupervised learning (clustering, non-parametric techniques, dimensionality reduction); 3) Best practices in machine learning (bias/variance theory, model selection and evaluation, resampling). In this class, you will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work for yourself. More importantly, you'll learn about not only the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020 and DSE I1030, or equivalents.

DSE I2400 - Data Engineering: Infrastructure and Applications

This course will train students in the handling of big data sources derived from various environments including traditional business activities, web-based transactions and social media. The course will also discuss the range of data formats, application types and emerging approaches in data integration. As part of this it will introduce the range of research topics and mentors participating in the Data Science and Engineering Program and offering capstone project opportunities. The course will begin with a discussion of high-end traditional database systems focusing on query processing, crash recovery, and transaction and concurrency control. This will be followed by a detailed look at object-relational databases, distributed and federated databases, and cloud-based data-warehousing. NoSql databases (e.g., Cassandra and Neo4) and parallel data analysis tools (e.g., Hadoop, Spark) will be introduced. The main emphasis of the course is hands-on training in state-of-the-art software development environments. Project based system development work will be an essential component of the course. Prereq. DSE I1020, Intro to Data Science and DSE I1030, Applied Statistics, or equivalents. 3 hr./wk.; 3 cr.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020 and DSE I1030, or equivalents

DSE I2450 - Big Data and Scalable Computation

The course aims to provide a broad understanding of big data and current technologies in managing and processing them with a focus on the urban environment. With storage and networking getting significant cheaper and faster, big data sets could easily reach the hands of data enthusiasts with just a few mouse clicks. These enthusiasts could be policy makers, government employees or managers, who would like to draw insights and (business) value from big data. Thus, it is crucial for big data to be made available to the non-expert users in such a way that they can process the data without the need of a supercomputing expert. One such approach is to build big data programming frameworks that can deal with big data in as close a paradigm as the way it deals with "small data." Also, such a framework should be as simple as possible, even if not as efficient as custom-designed parallel solutions. Users should expect that if their code works within these frameworks for small data, it will also work for big data. General topics of this course include: big data ecosystems, parallel and streaming programming model, MapReduce, Hadoop, Spark, Pig, and NoSQL solutions. Hands-on labs and exercises will be offered throughout to bolster the knowledge learned in each module.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020 and DSE I1030, or equivalents.

DSE I2700 - Visual Analytics

This course will give an overview of visual analytics as well as the overlapping fields of information and scientific visualization. Students will learn to programmatically process and analyze data with Python libraries widely used in statistics, engineering, science and finance. We will cover the design of effective visualizations. Students will learn to build data visualizations directly using a variety of data visualization libraries such as matplotlib, seaborn, and bokeh (Python) and interactive web-based visual analytics using JavaScript and D3. Project groups of students will each propose, design and build a visualization of a data set. The goals of the course are for students to: (1) Recognize the appropriate applications and value of visualizations; (2) Critically evaluate visualizations and suggest improvements and refinements; (3) Apply a structured design process to create effective visualizations; (4) Use programmatic tools to scrape, clean, and process data; (5) Use principles of human perception and cognition in visual analytics design; (6) Use visual analytics and statistics tools to explore data; and (7) Create web-based interactive visualizations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020 and DSE I1030 or equivalents. This course also requires students have programming experience such as CSC 10200/ CSC 10300 or equivalent.

DSE I9800 - Capstone Project

A capstone project is experimental project under the direction of a faculty advisor. All students will register and submit a project report after one semester to receive a grade. Students may work together on the same data sets and challenges but must establish separate subprojects, and submit individual reports/thesis. These independent study projects should involve an analysis of a data set in an application field using statistical learning/data mining techniques such as non-linear regression, supervised/unsupervised learning, dimension reduction, reinforcement learning, collaborative filtering or big-data methodology such as map-reduce/spark.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020, and DSE I1030, DSE I2400.

DSE I9900 - Capstone Thesis

Students, with approval from their mentor, and the program, may register for a two-semester independent study (capstone thesis) with similar specifications to DSE I9800 Capstone Project but of substantially larger scope. Students will be required to submit a project report to the program at the end of the first semester in addition to the Thesis at the end of the course.

Credits: 6. Contact Hours: 3 hr./wk. Prerequisite: DSE I1020 and DSE I1030, DSE I2400, and DSE I9800

EAS - Earth and Atmospheric Science Course Descriptions

A0000

EAS A1300 - Environmental Geochemistry

Shallow earth interactions in ESS emphasizing: groundwater geochemistry; elemental cycles linked to biological activity in the oceans; geochemistry and global climate cycles; geo-bioremediation;

and applied analytical techniques including x-ray diffraction, potentiometric titrations, and aspects of UV/visible spectroscopy.

Credits: 3. Contact Hours: 3 lect., 1 lab hr./wk.

EAS A2300 - Subsurface Remediation

Application of scientific and engineering principles in the remediation of contaminated soils and groundwater. Topics include environmental regulations and toxicology, soil-vapor extraction and bioventing, air sparging, pump and treat, bioremediation, surfactant-enhanced extraction, and permeable reactive barriers. Class project involves design of remediation systems for a hypothetical site.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EAS 41300 and EAS 44600 or equivalent or permission of instructor.

EAS A4170 - Satellite Meteorology

This class teaches the use of satellite techniques in meteorology and climate research.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PHYS 20700, PHYS 20800; MATH 20100, MATH 20200, MATH 20300.

EAS A4190 - Introduction to Scientific Computing

This course is intended to teach graduate-level students how to write computer algorithms for scientific analysis. Subjects that will be covered include: programming basics (e.g. variable types and algorithm structure), numerical differentiation and integration, downloading and input/output with big data, solving coupled differential equations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Math 20100 or 20500. or equivalent

EAS A4100 - Process geomorphology

This course offers a quantitative examination of the processes that shape landscapes. Topics include glacial, fluvial, and aeolian erosion;physical and chemical weathering;mass wasting;runoff; hill slopes and rivers; and surface processes on other planets.Weekly quizzes, midterm and final exam. Lab reports and problem.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EAS 10600, Math 20100, or equivalent, or permission of instructor

EAS A4200 - Quantitative Data Analysis in Earth and Atmospheric Sciences

This course is intended to teach graduate-level students quantitative data analysis skills.Subjects include probability and statistics fundamentals, hypothesis testing, linear regression,time series analysis, Fourier transform and analysis, principal component analysis, and cluster analysis. An independent class project will be required.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Math 20300 or equivalent, EAS 30800 or equivalent

EAS A6700 - Weather Analysis

Synoptic analysis of surface and upper-air meteorological observations, including satellite, radar, and aircraft measurements. Diagnostic calculations of vorticity, divergence and vertical motions in mesoscale, synoptic scale, and large scale weather systems.

Credits: 4. Contact Hours: 5 hr./wk.

EAS A7200 - Environmental Project

Advanced-level project utilizes field data to solve an urban environmental problem. Can be taken in the spring semester or in the summer. Also open to postgraduates in environmental fields, by permission. Can be applied to thesis credit.

Credits: 4. Contact Hours: 4 weeks in field plus lab. analyses

Boooo

EAS B1000 - Structural Geology

Physical properties of rocks in different tectonic environments; deformation; petrofabric analysis. Geotectonics; orogenesis, earthquakes, interpretation of geologic maps and mapping techniques.

Credits: 4. Contact Hours: 3 lect., 2 lab. hr./wk.

EAS B1100 - Geotectonics

Detailed discussions of the concepts of mantle convection, continental drift, seafloor spreading, and subduction. Applications of these concepts to selected areas around the globe. The relationship of plate tectonics to earth history and to the global distributions of geologic hazards and mineral deposits. Implications of plate tectonics for other parts of the earth system.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: An introductory course in physical geology or earth science.

EAS B1300 - Earth and Environmental Science Seminar

Presentations and discussions by faculty and guest speakers on current topics in the area of earth and environmental science; can be taken twice for credit.

Credits: 1. Contact Hours: 1 hr./wk.

EAS B1400 - Geophysics

This course covers the physical principles that govern the behavior and techniques used to infer the earth's internal structure, composition, and mineral resources. It provides earth scientists and engineers with the techniques to determine earth structures, locate environmental pollutants, and prospect for natural resources from remote locations. Topics include: Seismology, geodesy, gravity, magnetic, and thermal properties of the earth.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: Two semesters of college physics and an introductory course in earth science.

EAS B2400 - Igneous Petrology

Minerals in Earth Systems Science; principles of mineral stability and mineral associations; identification and recovery of earth resources. Mineral issues on human terms: toxic waste sites, climatology, and slope stability. Course introduces mineral optics and x-ray diffraction.

Credits: 4. Contact Hours: 2 lect., 4 lab hr./wk.

EAS B3090 - Fundamentals of Atmospheric Science

This course is an introductory survey to the field of Atmospheric Science, with special attention given to atmospheric thermodynamic, dynamics, and weather systems. Atmospheric science is a complex field of study that builds on physics, chemistry, and math, hence the prerequisites. This course is intended to provide a solid foundation for masters students studying earth sciences and/or environmental remote sensing.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: Vector Calculus, CHEM 10401 (or equivalent), and PHYS 20700 (or equivalent) or instructor`s permission.

EAS B3300 - Phase I Environmental Site Assessments

The purpose of this course is to introduce students to good commercial and customary practices in the US for conducting Phase I environmental site assessments (ESA) of commercial or residential properties with respect to hazardous substances and petroleum products. A Phase I ESA is the process for determining the presence of an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into the ground, ground water, surface water of the property, or into structures on the property. Graduate students receive extensive training on mainstream quality review and assessment methods of completed Phase I ESAs in preparation to enter the workforce in upper level management positions in the environmental engineering consulting industry.

Credits: 3. Contact Hours: 3 hr./wk.

EAS B3400 - Phase II Environmental Site Assessments

The purpose of this course is to introduce students to good commercial and customary practices in the United States of America for conducting Phase II environmental site assessments (ESA). A Phase II ESA is an evaluation process for confirming and quantifying the presence of hazardous substances or petroleum products in environmental media (i.e., soil, rock, groundwater, surface water, air, soil gas, sediment) throughout a contaminated site. A Phase II ESA typically includes a determination through field screening and chemical testing of the geological, hydrogeological, hydrological, and engineered aspects of the site that influence the presence of hazardous substances or petroleum products (e.g., migration pathways, exposure points) and the existence of receptors and mechanisms of exposure. Students are automatically enrolled in the 40-hour OSHA HAZWOPER (Hazardous Waste Operations and Emergency Response Standard) certification program which applies to employees who are engaged in clean-up operations that are conducted at uncontrolled hazardous waste sites.

Graduate students receive extensive training on mainstream quality review and assessment methods of completed Phase I ESAs in preparation to enter the workforce in upper level management positions in the environmental engineering consulting industry.

Students are automatically enrolled in the 40-hour OSHA HAZWOPER (Hazardous Waste Operations and Emergency Response Standard) certification program which applies to employees who are engaged in clean-up operations that are conducted at uncontrolled hazardous waste sites.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EAS B3300 or permission of instructor.

EAS B4400 - Global Environmental Hazards

Study of important, naturally-occurring destructive phenomena, such as earthquakes, volcanic eruptions, landslides, and coastal flooding. Long-term causes and remediation of these problems. Topics will focus on consequences to urban environments.

Credits: 3. Contact Hours: 3 hr./wk.

EAS B4500 - Hydrology

Introduction to hydrological data, the hydrologic cycle. Precipitation, streamflow, evaporation, and runoff. Emphasis is on their interactions and processes.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: Two semesters of Calculus, and two semesters of general physics or permission of the instructor.

EAS B4600 - Groundwater Hydrology

Occurrence of ground water. Basic equations and concepts of ground water flow. Flow nets. Methods of ground water investigation.

Credits: 3. Contact Hours: 3 lect., hr./wk. Prerequisite: Two semesters of general chemistry, and two semesters of entry level earth science, or permission of instructor.

EAS B4800 - Sustainability of Terrestrial, Aquatic and Atmospheric Systems

Overview of critical Earth systems and their interrelationships with emphasis in sustainability; Lecture component places environmental issues in an ecological framework; Hands-on laboratory component introduces concepts and methods used in Earth system analysis with emphasis in sustainable management of aquatic, terrestrial and atmospheric systems. Data set analysis tasks are assigned and student presentations are given throughout this class.

Credits: 4. Contact Hours: 3 lect. 3 lab hr./wk. Prerequisite: An introductory course in Earth Science, or permission of instructor.

EAS B5100 - Remote Sensing of Ocean Processes

A comprehensive introduction to ocean remote sensing, covering aspects of both physical and biological oceanography, ocean dynamics, mesoscale phenomena, biogeochemical processes, marine ecosystem resources, human impacts, climate change, and coastal hazards. The course focuses on development of skills in underwater radiative transfer modeling and ocean remote-sensing data analysis and visualization.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: An introductory course in Earth Science, or one semester of college biology, or one semester of introductory Remote Sensing, or permission of instructor.

EAS B6500 - Environmental Geophysics

The application of geophysics to environmental and engineering problems. Hands-on work and demonstrations of seismic, electrical, electromagnetic, and magnetic instruments and techniques. Survey design and execution. Computer analysis of survey results

Credits: 3. Contact Hours: 3 hrs./wk. Prerequisite: A two - semester introductory course sequence in physics and at least one semester of calculus.

EAS B6800 - Physical Oceanography

Principles governing the atmosphere-coast-ocean interactions. The course utilizes the department's Weather Station and Geosciences Computer Laboratory where oceanographic and atmospheric data are remotely sensed from space. The role of the world's oceans to current global warming/cooling models will be examined. Topics also include: bathymetric features, origin of the hydrosphere, sea-level change, wave formation, temperature, salinity, and density of the ocean water.

Credits: 3. Contact Hours: 3 lect. hr./wk.

EAS B7500 - Sedimentology

Composition, texture, classification, depositional setting, provenance and correlation of sediments and sedimentary rocks. Study of global and local formations to explore stratigraphic nomenclature, facies relationships and correlation of sedimentary sequences. Course includes a field trip to local outcrops to observe sedimentary rocks and facies and identify depositional paleoenvironments. Four partial exams, one comprehensive final exam and one 15-page term paper.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Permission of instructor.

EAS B8800 - Climate and Climate Change

This course links processes and interactions of the atmosphere, ocean and solid earth and their impact on climate and climate change. Topics include the physical principles of climate; climates of the past and present; Ice Age theories; the Greenhouse Effect; and human impact on climate.

Credits: 3. Contact Hours: 3 lect. hr./wk. Prerequisite: One semester of calculus, and one semester of physics, and one semester of introductory earth science, or permission of instructor.

EAS B9001 - Selected Topics in Earth Systems Science

Current topics and problems with emphasis on aspects not treated in regular courses. Department permission required.

Credits: 1-3 cr./sem.. Contact Hours: 1-2 lect. and/or lab. hr./wk.

EAS B9002 - Selected Topics in Earth Systems Science

Current topics and problems with emphasis on aspects not treated in regular courses. Department permission required.

Credits: 1-3 cr./sem.. Contact Hours: 1-2 lect. and/or lab. hr./wk.

EAS B9003 - Selected Topics in Earth Systems Science

Current topics and problems with emphasis on aspects not treated in regular courses. Department permission required.

Credits: 1-3 cr./sem.. Contact Hours: 1-2 lect. and/or lab. hr./wk.

EAS B9036 - Statistics in Earth and Env

Statistics in Earth and Env

Credits: 3. Contact Hours: 3 hr./wk.

EAS B9039 - Introduction to Scientific Computing

This course will serve as an introduction to using computer programming for data analysis. Starting from the basics, this course will work through concepts on the fundamentals of programming, statistical analysis, numerical analysis, Students will learn best practices for programs,methodologies for developing codes for large-scope analysis.

Credits: 3. Contact Hours: 3 hr./wk.

EAS B9103 - Special Topics in Meteorology I

Review and critical analysis of selected research publications in meteorology. Students are expected to prepare and participate in discussions on topics of current interest.

Credits: 1-3 cr./sem.. Contact Hours: 1-3 hr./wk.

EAS B9105 - Fund Atmospheric Sci

Env Rem Sen Fie W/P

Credits: 3. Contact Hours: 0 hr./wk.

EAS B9205 - Special Topics in Oceanography I

Reviews and critical analysis of selected research publications in oceanography. Students are expected to prepare and participate in discussions on topics of current interest.

Credits: 1-3 cr./sem.. Contact Hours: 1-3 hr./wk.

EAS B9500 - Thesis Research

Preparation of a thesis under the guidance of a faculty mentor. May be taken for total of 6 cr.; Cr. applied on completion of the thesis option.

Credits: 1-3 cr./sem.. Contact Hours: Hrs. to be arranged

EAS B9503 - Thesis Research

Thesis Research

Credits: 3. Contact Hours: 3 hr./wk.

EAS B9600 - Independent Study

Individual laboratory, field, or library investigation of a problem in Earth Systems Science. Up to 6 cr. can be applied to master's degree.

Credits: 1-3 cr./sem.. Prerequisite: Approval of instructor required.

EASE - Secondary Education Earth and Atmospheric Science Course Descriptions

EASE 1500E - Meteorology

Principles of meteorology applied to weather analysis, and structure composition. Properties of the atmosphere with simple forecasting theory.

Credits: 3. Contact Hours: Lab included. 3 hr./wk.

EASE 1600E - Physical Climatology

Physical principles of climates of the past and present, the earth-sun relationships, heat transfer, and classification of climates. Statistical laboratory analysis of climate data.

Credits: 4. Contact Hours: 4 hr./wk.

EASE 1800E - Weather Prediction

Weather forecasting theory and practice; classical, objective, and long range methods. Weather control, numerical prediction, automatic weather station recording, radar, rocket and satellite meteorology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EASE 1500E.

EASE 3200F - Independent Study and Research in Earth and Atmospheric Science

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

EASE 5200E - Introduction to Meteorology

Principles and phenomena of weather and climate. Discussion of snow storms, hurricanes, rainbows, Ice Ages. Weather analysis and forecasting.

Credits: 4. Contact Hours: 3 lect., 3 lab. hr./wk.

EASE 6200E - The Ocean Environment

Explores oceans and ocean basins, submarine topography; properties of sea water; oceanographic instruments and research vessels. Water masses and currents; tides, waves, and wave action; marine sediments.

Credits: 4. Contact Hours: Lab/field trips included. 4 hr./wk.

EASE 7000E - Physical Geology

Comprehensive treatment of physical and chemical processes responsible for the development and behavior of the earth. Study of minerals, rocks, and maps supplemented by labs and field trips in the Greater New York area.

Credits: 3. Contact Hours: 3 hr./wk., plus field trips.

ECO - Economics Course Descriptions

B0000

ECO B0000 - Microeconomic Analysis

Supply and demand; economics of households and firms; determination of product and factor prices under varying market structures.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B0100 - Advanced Microeconomic Theory

General equilibrium theory, capital theory, welfare economics, mathematical models in microeconomics, game theory.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B0200 - Behavioral Economics

The course offers an introduction to the insights gained from incorporating psychology into economic modeling and analysis, an approach referred to as behavioral economics. We will gain an overview over the topics in this new and fast-growing field by sampling original contributions. Thus, the course is expected to involve a lot of reading, complemented by exams, presentations, and problem sets intended to drill students' abilities to digest and communicate the content of the journal articles involved. Interested students may also be given the option to develop an original piece of research in behavioral economics.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B1000 - Macroeconomic Analysis

Factors determining level of national income, output and employment, business cycle theories and policies to stabilize employment and price level.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B1100 - Advanced Macroeconomic and Monetary Theory

Monetary theory, macroeconomic models, growth theory, capital markets, business cycle theory.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B2000 - Statistics and Introduction to Econometrics

Applications of statistical methods to economic research; description and inference; variance analysis and correlation; statistical induction and testing of hypotheses; time series; index numbers, simple regression analysis.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B2100 - Foundations of Empirical Research

Econometrics and regression analysis, use of computers in empirical research in economics. Basic knowledge of computer language, operations research methods.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B3100 - Public Finance

Sources of metropolitan area finance, desirable distribution of public services among different governments, revenue sharing, taxation effects on land use, cost-benefit analysis. Changing economic significance of government expenditures, taxation, and debt management. Macro- and micro-criteria for financial operations. Administrative problems and intergovernmental relations.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B3500 - Social Innovation

This graduate seminar equips students with strategies, concepts, and ideas for solving social problems such as inequality, environmental pollution, crime, and health care disparities through individual, corporate, and institutional action.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B3600 - Data Analytics for Decision Making

This course equips students to make decisions through an enriched understanding of data sources with application to professional roles in risk management, finance, customer and competitive analysis, and business strategy.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B3700 - Managing Business Complexity

This course equips students to make decisions through an enriched understanding of data sources with application to professional roles in risk management, finance, customer and competitive analysis, and business strategy.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B4000 - Labor Economics

Problems and issues in wages, hours and working conditions; wage policy; relation of labor organizations to management decisions and economic change.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B0000 and ECO B2000.

ECO B4100 - Health Policy

An introduction to the field of health policy with an emphasis on the economics of health. Health is arguably one of the most important areas of public policy where economic and political issues interact. The course can be divided into three broad parts – a) developing toolkit b) economic analysis of healthcare issues and c) policy implications of academic research. Having completed this course, students should be able to analyze some core economic issues of health like production and consumption of health, insurance and public health.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B4300 - Economic Policies of Trade Unions

Evolution of trade unionism in the U.S. Analysis of union government, strategy, economic objectives and political action.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B5000 - Industrial Organization and Control

Structure of the American economy; governmental policies aiming at preservation of competition in industrial markets and regulation of trade practices.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B5500 - Administrative and Managerial Policy

The general management function. Organizational objectives and long-range forecasting. Implementation of organizational strategy for operations, control, expansion, recovery. Social responsibility of corporations. Term project required.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9514.

ECO B6000 - Introduction to Economic Development

Theories, models, and strategic factors of development, domestic and international policy.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B6100 - Theories and Models of Economic Growth

Theories and models of economic growth under varying structural and behavioral assumptions.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B6400 - American Business Law

Studies the legal business environment, regulations on intellectual property rights and product safety related to international business, and the dispute settlement mechanism under the WTO trading framework.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B7100 - International Economics

Gains from trade; theory and practice of protection; nature, disturbance, and adjustment of the balance of payments; development of international economic institutions and the world economy.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B7700 - Banking and the Financial Services Industry

Contemporary practices, policies and issues involving commercial banks, other depository institutions and non-deposit financial intermediaries.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9511.

ECO B7900 - Advanced Financial Economics

Expected utility maximizing, state preference theory, mean-variance analysis, capital asset pricing model, arbitrage pricing theory, pricing contingent claims and option pricing theory. Applications of agency theory and asymmetric information and game theory to finance.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9510 and ECO B2200.

ECO B8000 - Advanced Options and Futures

Theoretical and practical aspects of futures, forwards, and options; role of these instruments in the economy; determination of pricing.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9510 and ECO B9512.

ECO B8100 - International Finance

Macroeconomic theory and policy in the open economy. Issues associated with balance of payments disequilibrium, fluctuating currency values, international factor flows and international capital mobility. Extensions of the Keynesian model; monetary and fiscal policy for internal and external balance; macro policy coordination.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B1000.

ECO B8200 - International Financial Management

Studies the markets of foreign exchange and currency derivatives, risk management of foreign exchange exposure, international financial assets and the financial management practice for the multinational firm.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO 10000 or ECO 10100 or ECO 10300 or ECO 10400.

ECO B8400 - International Business Economic Policy

Theories and institutional background of current interdependent world economies. Foreign exchange markets, balance of payments problems, multinational enterprise and international trade and investment.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B8600 - Chinese Political Economy I

This is the first course of a sequence that provides a complete introduction to the Chinese political system, economy, and geography. Topics include the governance structure of the contemporary Chinese political system, China's transition to a market economy, recent developments in China's economy, and the geographic setting of China.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B8700 - Chinese Culture and Society

ECO B8800 - Commercial Chinese Language

Focusing not only on denotation but also connotation of Chinese business, this course prepares students for Chinese business environments and promotes their understanding of Sino-Western socio-cultural/political differences, including dining etiquette in Chinese business meals, Chinese copyright policy, Chinese product safety scandals, Shanghai stock market, Beijing real estate, communist governmental propaganda, Hong Kong as an international financial center, etc.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B8900 - Entrepreneurship

Emphasis on the identification and analysis of competencies to launch new ventures.Topics include: the study of entrepreneurial behavior, characteristics of successful entrepreneurs, scanning for unique ideas, methods and techniques for analyzing the competitive environment, writing a business plan, and understanding the challenges of managing a startup organization through various stages of growth.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9300 - Area Seminar in Development

A research seminar for candidates specializing in development, with particular reference to a specific region or area.

Credits: 3. Contact Hours: 2 hr./wk., plus conf. Prerequisite: Permission of instructor.

ECO B9400 - Chin Political Econ 2

It is the second course of a courses' sequence that provides complete introduction to Chinese political system, economy and geography. The course features seminars given by outside business leaders covering current topics on doing business with China.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9501 - Economic Development and Economic History

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9501-B9522 - Seminars

Oral reports and written exercises will be required.

ECO B9502 - Urban Economics

Covers basic economic theories covering the existence and nature of cities. Examines urban issues related to housing, transportation, crime, segregation, rent control, and zoning. Course focuses on issues relevant to the New York region.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9503 - Labor (Seminar)

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B4000.

ECO B9504 - Statistics and Mathematical Economics

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9505 - Geography

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9506 - Economic Thought

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9507 - International Economics

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9508 - Microeconomic Analysis

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9509 - Macroeconomic Analysis

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9510 - Corporate Finance

Overview of managerial finance: Capital budgeting techniques; capital structure and cost of capital; dividend policy; long and short term financing; working capital management, financial analysis, planning, and control; and mergers and acquisitions.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9511 - Money and Banking

Analysis of organization and operation of U.S. financial system: money and capital markets, commercial banking; relationship between financial and economic activity, including monetary and fiscal policy.

Credits: 3. Contact Hours: 3 hrs. wk. Prerequisite: ECO B1000.

ECO B9512 - Investments

Meaning, measurements and relationship of risk. Portfolio analysis, alternative approaches to valuation, determination of asset values in open market, internal and external rates of return, objectives of investment decision.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9510.

ECO B9513 - Managerial Economics

Integration of microeconomics and quantitative methods so as to make sound managerial decisions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B0000.

ECO B9514 - Organization and Management

The modern corporation and its historic development: principal functions of management and its social role; structure of the management decision process; choice of management tools for analyzing decisions and coping with outcome uncertainty.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9516 - Operations and Production

Investigation of production systems; application of analytical techniques to product and process design, optimal plant location, efficient plant design, inventory and production systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B0000.

ECO B9517 - Marketing

Distribution and sale of goods and services from production to final consumption; changing buying behavior; institutional structures; marketing channels; product life cycle; and merchandising.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO Boooo.

ECO B9518 - Government Regulation and Executive Decision Making

Business influence and response to government regulation. Process models and analytical methods. Advisability of (proactive) corporate social responsibility.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ECO B9514.

ECO B9519 - Introduction to SAS Statistical Package

Drill applications to economic problems.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9520 - Accounting

Concepts and techniques of accounting for business transactions and preparation of financial statements.

Credits: 3. Contact Hours: 3 hr./wk.

ECO B9521 - International Business

ECO B9800 - Independent Study

The student will pursue a program under the direction of a member of the Department with approval of the Chair. Credit may be from 1-4 credits, determined before the approval of the Department Chair. Students may repeat course up to 6 credits.

Contact Hours: 3 hr./wk.

ECO B9900 - Thesis Preparatory Course

In order to take this course, the student must have completed at least 27 MA level credits. (These must include the four core courses for the MA.) The student must meet with a faculty mentor and complete a form similar to the one required for Independent Study courses. The form must be signed off by the mentor, and reviewed and signed by the MA Program Director and the Department Chair. The faculty mentor will decide the minimal requirements that must be attained and completed before a grade may be granted for this course. These requirements will be explicitly stated in the form mentioned above. At a minimum, the requirements must include a clear statement of the title of the proposed thesis.

The following must be provided:

1. A clear statement of hypothesis.
2. A clear statement of a methodology. Typically, this will include an explicitly articulated model.
3. A clear explanation of how inferences will be drawn from the model.
4. A clear statement of the data that will be used, including the source.

C0000

ECO C0011 - Organizational Behavior

Organizational Behvr

Credits: 3. Contact Hours: 3 hr./wk.

ECO C0012 - Economics of the Environment and Natural Resources

Examines human effects on the environment and the use of natural resources from an economic perspective, including how such effects may be moderated or managed.

Credits: 3. Contact Hours: 3 hr./wk.

ECO C0013 - Law & Economics

Law & Economics

Credits: 3. Contact Hours: 3 hr./wk.

ECO C0014 - Transportation Economics

Tnsptn Invstmnt Anly

Credits: 3. Contact Hours: 3 hr./wk.

ECO C0016 - Strategic Management

Strategic Management

Credits: 3. Contact Hours: 3 hr./wk.

ECO C0019 - Public Investment Analysis

Pub Invstmt Analysis

Credits: 3. Contact Hours: 3 hr./wk.

ECOE - Secondary Education Economics Course Descriptions

ECOE 3200F - Independent Study and Research in Economics

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

ECOE 6500C - Comparative Economic Systems

Principal types of economic organizations, i.e., liberal capitalism, the mixed systems, and authoritarian socialist systems. Critical examination of socioeconomic conceptions, theories and ideologies, blueprints, plans, and typical problems.

Credits: 3. Contact Hours: 3 hr./wk.

ECOE 7200C - Modern Concepts in Economics

Designed for those teaching or preparing to teach high school economics. Only those analytical tools and refinements useful in high school teaching will be included.

Credits: 3. Contact Hours: 3 hr./wk.

ECOE 7200D - Modern Concepts in Economics

Designed for those teaching or preparing to teach high school economics. Only those analytical tools and refinements useful in high school teaching will be included.

Credits: 3. Contact Hours: 3 hr./wk.

ECOE 7300C - The Operation of the American Economy

Analysis of operation of the American economy and its efficiency, in the light of basic economic objectives. Designed for those with a limited background in economics or those who wish a review of essentials before taking further work in the field.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE - Teaching, Learning, and Culture Course Descriptions

EDCE 0601A - Artistic Lab 2

This course is an opportunity for seasoned candidates in the program to collaborate artistically with new candidates. All candidates will facilitate their peers in an artistic experience as they reconnect to their artistry.

Corequisite: EDCE 7204G

EDCE 1300E - Negotiating Curriculum Standards, Children's Inquiries and Appropriate Multicultural Materials for Children from Birth to Grade 6

This course provides foundations for understanding the complexities of teachers' relationships with curriculum for Birth to Grade 6. Candidates will expand their knowledge of the multiple dimensions of curriculum including assessment, literacy content, educational structures, notions of the hidden curriculum, and children's perspectives. Candidates will examine the New York State English Language Arts and Content Area Standards to inform their understandings of what is possible and necessary in developing literacy curriculum and activities. Candidates will investigate multiple resources to enrich their curricula revisions, address these dimensions, and incorporate into their teaching the diversity of their class and the world. Candidates will explore aspects of social justice, critical literacies, and multiculturalism while producing standard-driven activities. Candidates will increase their knowledge of multicultural literature, technology, music, websites, and museums. This class includes 20 hours of fieldwork required to implement curriculum planning and activities.

Credits: 3. Contact Hours: Includes 20 hours of fieldwork. 3 hr./wk.

EDCE 1301E - Negotiating Curriculum Standards, Children's Inquiries, and Appropriate Multicultural Materials for 5th to 12th Grade

This course provides foundations for understanding the complexities of teachers' relationships with curriculum for 5th to 12th Grade. Candidates will expand their knowledge of the multiple dimensions of curriculum including assessment, literacy content, educational structures, notions of the hidden curriculum and children's perspectives. Candidates will examine the New York State English Language Arts and Content Area Standards to inform their understandings of what is possible and necessary in developing literacy curriculum and activities. Candidates will investigate multiple resources to enrich their curricula revisions, address these dimensions, and incorporate into their teaching the diversity of their class and the world. Candidates will explore aspects of social justice, critical literacies, and multiculturalism while producing standard-driven activities. Candidates will increase their knowledge of multicultural literature, technology, music, websites, and museums. This class includes 20 hours of fieldwork required to implement curriculum planning and activities.

Credits: 3. Contact Hours: Includes 20 hours of fieldwork. 3 hr./wk.

EDCE 1400E - Writing for Teachers

This course is designed to support teachers in focusing on their own writing and its relationship to their development as learners, teachers, researchers, and human beings. Candidates will construct positive identities as writers, discover multiple authentic purposes for writing, and develop their craft as writers within several basic genres (stories, poetry, descriptive and persuasive writing). During this course they will explore the writing process and learn about key dimensions of writing including textuality, intertexuality, figurative language and writing as rewriting culture. Candidates will build on their strengths, address their challenges, and identify implications for their role as writing instructors and the role of writing in their classes.

Credits: 2. Contact Hours: 2 hr./wk.

EDCE 1500C - Linking Literacy, Assessment, Instruction and Learning-Birth to 6th Grade

This course is designed to support candidates in constructing a wider definition of assessment and in understanding the complex relationship between assessment and instruction in Birth-6th Grade. Candidates will investigate theoretical underpinnings for multiple literacy assessments including miscue analysis, backward designs, journals, conferencing, writing sample analysis, portfolios, observation, and note taking. Candidates will investigate a range of informal and formal literacy assessments and theorize the potential of these assessments for supporting literacy learning. Candidates will determine instructional implications, resources, structures, and strategies as aspects of their assessments. Candidates will take an active part in their own assessment practices with an inquiry-based assessment investigation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Or Corequisites: EDCE 1600C or EDCE 1600E

EDCE 1501C - Linking Literacy, Assessment, Instruction and Learning-5th to 12th Grade

This course is designed to support candidates in constructing a wider definition of assessment and understanding the complex relationship between assessment and instruction in 5th-12th Grade. Candidates will investigate theoretical underpinnings for multiple literacy assessments including miscue analysis, backward designs, journals, conferencing, writing sample analysis, portfolios, observation, and note-taking. Candidates will investigate a range of informal and formal literacy assessments and theorize the potential of these assessments for supporting literacy learning. Candidates will determine instructional implications, resources, structures, and strategies as aspects of their assessments. Candidates will take an active part in their own assessment practices with an inquiry-based assessment investigation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Or Corequisite: EDCE 1601C or EDCE 1601E

EDCE 1600C - Literacy Inquiry Practicum-Birth to 6th Grade

This course supports candidates in learning the premises of inquiry-based learning and transformative practices within the field of literacy for Birth to 6th Grade. While working in a one-on-one relationship with a child, candidates will learn how to investigate curriculum, literacy development, planning, resources, and issues of social justice. Candidates are expected to organize effective learning contexts, explore content area literacies, understand the child's individual development in the context of social interactions, and diversify the range of genres and materials available for their child. This class focuses on building candidates' strengths in utilizing multiple sign systems, exploring a range of literacies practices, connecting the word and the world, and building family/community relationships. Candidates are required to use a variety of assessment tools learned in other courses such as miscue analysis, writing sample analysis, observation, and note taking to record a child's literacy abilities, inform an instructional plan, analyze, and support child's literacy practices.

Credits: 3. Contact Hours: Includes 18 hours practicum. 3 hr./wk. Prerequisite: Or coreq: EDCE 1500C

EDCE 1600E - Small Group Literacy Inquiry Practicum - Birth to 6th Grade

This course supports candidates in learning the premises of inquiry-based learning and transformative practices within the field of literacy for Birth to 6th grade. While working with a small group of children, candidates will learn how to investigate curriculum, literacy development, planning, resources, and issues of social justice. Candidates are expected to think about peer relationships, work on collaborative teaching and learning processes, and foster children's abilities to help and support each other's literacy learning. Candidates are responsible for organizing effective learning contexts, differentiating instruction, exploring content area literacies, understanding the children's individual development in the context of social interactions, and diversifying the range of genres and materials available for each child. This class focuses on building candidates' strengths in utilizing multiple sign systems, exploring a range of literacies practices, connecting the word and the world, and building family/community relationships. Candidates are required to use a variety of assessment tools learned in other courses such as miscue analysis, writing sample analysis, observation, and note taking to record children's literacy abilities, inform an instructional plan, analyze, and support children's literacy practices.

Credits: 3. Contact Hours: Includes 18 hours practicum. 3 hr./wk. Prerequisite: Or coreq: EDCE 1500C

EDCE 1601C - Literacy Inquiry Practicum - 5th to 12th Grade

This course supports candidates in learning the premises of inquiry-based learning and transformative practices within the field of literacy for 5th to 12th Grade. While working in a one-on-one relationship with a child, candidates will learn how to investigate curriculum, literacy development, planning, resources, and issues of social justice. Candidates are expected to organize effective learning contexts, explore content area literacies, understand the child's individual development in the context of social interactions, and diversify the range of genres and materials available for their child. This class focuses on building candidates' strengths in utilizing multiple sign systems, exploring a range of literacies practices, connecting the word and the world, and building family/community relationships. Candidates are required to use a variety of assessment tools learned in other courses such as miscue analysis, writing sample analysis, observation, and note taking to record a child's literacy abilities, inform an instructional plan, analyze, and support child's literacy practices.

Credits: 3. Contact Hours: Includes 18 hours practicum. 3 hr./wk. Prerequisite: Or coreq: EDCE 1501C

EDCE 1601E - Small Group Literacy Inquiry Practicum - 5th to 12th Grade

This course is designed to support candidates in learning the premises of inquiry-based learning and transformative practices within the field of literacy for 5th-12th Grade. While working with a small group of children, candidates will learn how to investigate curriculum, literacy development, planning, resources, and issues of social justice. Candidates are expected to think about peer relationships, work on collaborative teaching and learning processes, and foster children's abilities to help and support each other's literacy learning. Candidates are responsible for organizing effective learning contexts, differentiating instruction, exploring content area literacies, understanding the children's individual development in the context of social interactions, and diversifying the range of genres and materials available for their child. This class focuses on building candidates' strengths in utilizing multiple sign systems, exploring a range of literacies practices, connecting the word and the world, and building family/community relationships. Candidates are required to use a variety of assessment tools learned in other courses such as miscue analysis, writing sample analysis, observation, and note taking to record children's literacy abilities, inform an instructional plan, analyze, and support children's literacy practices.

Credits: 3. Contact Hours: Includes 18 hours practicum. 3 hr./wk. Prerequisite: Or coreq: EDCE 1501C

EDCE 1700E - Critical Use of Technology for Literacy Instructors of Children Birth to 6th Grade

In this course, candidates develop competencies and skills in the critical and appropriate use of information technologies for the teaching of literacy at the Pre-K to 6th grade level. Candidates examine new, relevant, and appropriate information technology resources on literacy, apply research findings to the appropriate application of information technologies to literacy instruction, learn how new information technologies impact language and culture, expand competencies in using information technologies to develop literacy skills (reading, writing, listening, and speaking), and examine strategies to use information technologies to address literacy curricula for New York State English Language Arts and Content Area Standards. In addition, candidates engage in fieldwork where they utilize strategies for using new information technologies in classroom settings.

Credits: 2. Contact Hours: Includes 8 hours of fieldwork. 2 hr./wk.

EDCE 1700G - Home-School Partnerships for Literacy Development

This course is designed to support candidates in fostering strong relationships between home and school communities, and helping children negotiate the differing contexts of their learning. Candidates learn how to operate from non-deficit models of evaluation in investigating the child's cultural and family background. Candidates learn how to build constructive relationships between all the partners that help educate the child and how to build on local funds of knowledge in developing curriculum. Candidates explore the shifting intersections between community-based and school-based literacies in supporting the child's learning and literacy growth.

Credits: 3. Contact Hours: Includes 8 hours of fieldwork. 3 hr/wk.

EDCE 1701E - Critical Use of Technology for Literacy Instructors of Students 5th to 12th Grade

In this course, candidates develop competencies and skills in the critical and appropriate use of information technologies for the teaching of literacy at the 5th to 12th grade level. Candidates examine new, relevant, and appropriate information technology resources on literacy, apply research findings to the appropriate application of information technologies to literacy instruction, learn how new information technologies impact language and culture, expand competencies in using information technologies to develop literacy skills (reading, writing, listening, and speaking), and examine strategies to use information technologies to address literacy curricula for New York State English Language Arts and Content Area Standards. In addition, candidates engage in fieldwork where they utilize strategies for using new information technologies in classroom settings.

Credits: 2. Contact Hours: Includes 8 hours of fieldwork. 2 hr./wk.

EDCE 1800K - Family, Child and School

A study of the contexts for learning that affect teachers, children, and their families. Topics explored include: multicultural communities and differing family structures, conferencing with parents, children with special needs, indications of child abuse, educators' legal and ethical responsibilities. Required for initial certification.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork. 3 hr./wk.

EDCE 1900C - Language and Literacy Development in Young Children

This course focuses on language and literacy development from birth to age 6 and on how to develop a well-balanced literacy program for young children. Special emphasis is placed on an exploration of research in the field, a study and critical analysis of children's literature, the art of storytelling, and effective strategies for learning to read.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 2000C - First and Second Language and Literacy Acquisition

This course offers an in-depth look at current research and practical applications of first and second language/dialect acquisition and literacy learning, developmental stages of both, connections between oral and print literacies, and the strengths of first language/dialect literacy. The course also explores the integration of the many languages individuals use to communicate and make meaning. The readings and discussions address strategies to assess and support first and second language and literacy development, and include effective classroom activities and resources.

Credits: 3. Contact Hours: Includes 8 hours of fieldwork. 3 hr./wk.

EDCE 2100C - Teaching Social Studies in Childhood Education

Integrated unit planning centered on a study of the community, cultural diversity and historical sequence; focuses on inquiry learning strategies and multicultural approaches to instruction. Includes introduction to Internet resources and software for classroom instruction in geography.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at either 1-3 or 4-6 grade levels. 3 hr./wk.

EDCE 2100K - Development Issues in Early Childhood/Childhood Education

In-depth study of the developmental progression and the active nature of children's learning (birth through the childhood years). Major developmental and learning theories are critically examined and illuminated through candidates' experiences with children of diverse needs from varying backgrounds. Implications for program planning,

classroom organization, and differentiating curriculum to meet special needs are continually drawn. Required.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 2101C - Social Studies in the Early Childhood Curriculum

How to develop and carry out experiences that help children inquire about the world, their history, and their backgrounds and integrate their understandings; how to utilize students' diverse ethno-cultural backgrounds and information technology as learning resources. Emphasis placed on the classroom as a democratic learning community. Required for initial certification.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork. 3 hr./wk.

EDCE 2202I - Content Research Seminar in Early Childhood Education

Culminating experience of the graduate education program. Students identify a problem or issue about which to inquire, review the research literature related to that problem (including on-line sources), and design a study to carry out in the following semester. Required of all graduate students in Early Childhood Education. By permission only.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: EDCE 2100K or equivalent.

EDCE 2203I - Content Research Seminar in Bilingual Education

A critical review of the research literature in the candidate's major field, as well as research methodology and instrumentation appropriate to the field. This first semester covers the basic concepts and procedures needed to evaluate research critically. Each student will identify a problem in his or her major area, review the literature related to that problem, and design a project to study the problem. This project will be carried out during the second semester. Matriculants only. This course is followed by EDUC 2900I. This course should be taken no later than the semester prior to the one in which the student expects to complete the requirements for the degree. Students who expect to write a thesis should take this course no later than two semesters prior to the one in which they expect to complete the requirements for their degree.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: See individual programs.

EDCE 2204I - Content Research Seminar in Childhood Education

Culminating experience in the graduate program in childhood education. Students identify a problem or issue about which to inquire, review the research literature related to that problem, and design a study to carry out the following semester. By permission only.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: Matriculation, 15 cr. and EDUC 2900F.

EDCE 2205I - Research Seminar in Teaching Multilingual Learners

Candidates will complete a capstone masters project guided by a research question related to their teaching practices that extends their understanding and application of content in the program. Candidates will review the literature, create a small-scale study which they will conduct, and present their findings and implications. Matriculants only.

Credits: 3. Contact Hours: 3 hr./wk. Includes 10 hours of fieldwork. Prerequisite: Completion of 9 credits

EDCE 2206I - Content Research Seminar in Educational Theatre

Culminating experience in the graduate program in Educational Theatre. Students identify a problem or issue about which to inquire, review the research literature related to that problem, and design a study to carry out the following semester. By permission only.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: Matriculation, 15 cr. and EDUC 2900F.

EDCE 2207I - Research into Teaching: Bilingual Education

This course supports bilingual childhood education candidates in completing a culminating project that involves collecting classroom data, developing and implementing learning plans, reviewing bilingual education research, analyzing their teaching, and assessing their students' learning. Candidates will consider the implications of their findings for their future teaching with multilingual learners.

Credits: 2. Contact Hours: 2 hr./wk. Includes 10 hours of fieldwork.

EDCE 2208I - Research into Teaching: TESOL

This course supports TESOL candidates in completing a culminating project that involves collecting data in their classrooms, developing and implementing learning plans, reviewing TESOL research, analyzing their teaching, and assessing their students' learning. Candidates will consider the implications of their findings for their future teaching with multilingual learners.

Credits: 2. Contact Hours: 2 hr./wk. Includes 10 hours of fieldwork. This is a Pass/Fail course.

EDCE 2300C - Social Studies Inquiry for Pre-K to 6 Teachers

Focuses on two national and state social studies learning standards: geography and the history of New York State and the United States. Students experience an inquiry approach to social studies that will increase their content knowledge and model inquiry methods. Students plan learning experiences for children. Includes an instructional technology component. Required for professional certification.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 2100C or equivalent.

EDCE 2400C - Development & Evaluation of Materials in Bilingual Education

Production and evaluation of bilingual instructional materials using various media. Integration of instructional materials in a bilingual curriculum.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 5300C.

EDCE 2600C - Linguistics for Teachers

An introduction to basic concepts in linguistics, including phonology, lexicon, and grammar; language contact, variation, and prescriptivism; linguistic experience of bilingual and second-language communities and individuals.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 2700C - Literacy for Struggling Readers and Writers

Candidates will examine the multiple dimensions that contribute to students' literacy struggles. They will explore and critique theories and research regarding literacy practices and identify practical applications based on these insights. A significant aspect of this work will involve practice with methods to assess and support readers' and writers' competencies with cuing systems and engagement with texts. Candidates will explore how multimodal literacies can be used as a source of strength, confidence, and growth with print literacy. Throughout the course, candidates reflect on how they can support all students' literacy growth through effective lesson design as well as advocacy for curricular and structural change.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDCE 2900F - Inclusive Practices for the General Education Classroom (Grades 1-6)

This course prepares candidates to teach in inclusive classroom settings grades 1-6. Topics of study include: special education law, disability categories, differentiation, strategies for instruction and assessment (curriculum design), co-teaching models, and classroom management. Drawing upon an understanding of disability as natural human variation, candidates develop a case study of a struggling learner in the classroom context.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDCE 2900I - Seminar in Educational Research II

Second semester of the research sequence. Students carry out their study designed in the Content Research Seminar and learn how to

analyze, write about, and present the data collected. By permission only.

Credits: 2. Contact Hours: 2 hr./wk.

EDCE 2905I - Research Seminar II in Teaching Linguistically and Culturally Diverse Students

Second semester of the research sequence. Students carry out their designed in the previous semester and learn how to analyze, write about, and present the data collected.

EDCE 3000C - Development of Laboratory Materials for Elementary Science

Construction and use of laboratory equipment and materials which implement the critical thinking and problem solving approach to the teaching of the new curricula in science in the elementary school.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Or coreq: EDCE 3100C.

EDCE 3000F - Curriculum Development in Childhood Education

An examination of principles that underlie curriculum development; planning appropriate goals, sequencing content, and implementing teaching/learning strategies. An important goal of the course is to help students develop skills in developing and offering differentiated instruction and integrating technology into learning experiences.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at the 1-3 or 4-6 grade levels. 3 hr./wk.

EDCE 3100C - Elementary Science & Engineering Teaching Methods

An elementary science and engineering teaching methods course, where students develop skills and knowledge about science and engineering teaching and learning. Candidates learn by doing inquiry and design activities that are hands-on and computer-based, and aligned with city, state and national science standards. Students learn to use research-based teaching strategies and assessment techniques that provide evidence of student learning for subsequent analysis and reflection. Fifteen (15) hours of fieldwork are required for this course.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 hr./wk. Prerequisite: Department Permission Required

EDCE 3100F - Curriculum Development in Educational Theatre

This course will help students develop a framework for analyzing and assessing learners, curriculum design, and teaching strategies based on readings and observation of children in a classroom setting. Open only to matriculated students.

Contact Hours: 10-15 hours of field experience required in grades pre K-12.

EDCE 3200C - Science Inquiry for Pre-K to 6 Teachers

Develops teachers' knowledge of the teaching and learning of science in childhood education. Focuses on three New York State science standards: scientific inquiry, application of scientific concepts and theories, and the historical development of ideas in science and common themes that connect mathematics, science and technology. First-hand experiences developing and analyzing knowledge gained through inquiry. Required for professional certification.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 3100C or equivalent.

EDCE 3300C - How Young Children Learn Science: Implications for Teaching

Workshop designed to deepen understanding of the active, investigative nature of science learning. Participants' own explorations and experiences parallel the child's inquiring approach. Materials and resources (including information technology) appropriate for the diverse learning needs of young children are examined. Required for initial certification.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork. 3 hr./wk.

EDCE 3400C - Focus on Inquiry in Education

Study of background literature and developmental theory; observing and recording children's growth; teacher's role.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Special permission required.

EDCE 3500C - Education in the Early Years: Infants, Toddlers, and Preschoolers

How knowledge develops from infancy through the preschool years; with a focus on how to support learners' growth and development and how to structure appropriate learning environments for infants, toddlers, and preschoolers with diverse needs. Theoretical perspectives on learning are explored. Required for initial certification. Ancillary requirement for professional certificate (on advisement).

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork. 3 hr./wk. Prerequisite: Child Development.

EDCE 3600C - Theatre/Performance For Young Audiences K - 12

This course aims to develop insight into artistic and practical decisions in producing work for young people. Through an exploration of techniques of acting, devising, directing, and production repertoire students will achieve an understanding of the practices of Theatre in Education (TIE) and Youth Theatre. Contemporary plays which have been produced for theatre for young audiences will also be studied. Additionally, learning how to use the city as a cultural resource will be discussed, in order to make a connection between theatre making and theatre performance.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 3700C - Fundamentals of Teaching Theatre

This course investigates methods and materials for exploring the process of teaching students about the elements of theatre, i.e., acting, directing, improvisation, and technical theatre, as well as how to guide students through the production process. There will be exploration of the application of drama structures and activities as tools for enlivening any curriculum, by building motivation, classroom community, and collaborative exchange. Participants will learn how to integrate and adapt strategies and activities for different age ranges, and investigate how drama can be scaffolded effectively in lesson planning, thus aiding in classroom management.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 3800C - Materials for a Flexible and Individualized Curriculum

The development, use, and evaluation of materials for individuals and small group instruction.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 4000F - Arts Integration: Theatre and Related Arts in the Curriculum (Grades 7-12)

This course explores theories and practices of integrating drama into the general curriculum, grades 6-12. Participants will learn how to teach content through the use of various dramatic activities, techniques and strategies including teacher-in-role, process drama and the use of still images/tableaux, music. The course will also discuss how theatre practitioners can use non-arts content as source material in their theatre curriculum while strengthening the learning in core subject areas.

Credits: 3. Contact Hours: 15 hours of fieldwork required. 3 hr./wk.

EDCE 4100C - Teaching Arts and Crafts in Childhood Education

Art principles, practices, and materials appropriate to the teaching of arts and crafts in childhood education; integrating arts and crafts into the content areas of the elementary curriculum.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 hr./wk.

EDCE 4100F - Dvlpng Art Crrclm Ntrd Sttngs

Developing Arts Curriculum in Nontraditional Settings.

Credits: 3. Contact Hours: 3 hr./wk. Fifteen hours of field work is required.

EDCE 4200C - Educating Young Children with Special Needs

This course provides early childhood educators with a theoretical framework and practical applications for developing curriculum to support children with special needs. Information, guidance and resources will be presented to assist teachers in developing and differentiating curriculum, using adaptive technology, assessing students holistically, working with their classroom/administrative team as well as with children's home/family/community in situations where a child may require an evaluation and/or additional support services. Special attention will be paid to issues of diversity, helping teachers to frame differences in a respectful, non-biased way.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 4300C - Art and Expressive Activities in Early Childhood Education

Interpretation and use of creative activities for the diverse learning needs of young children as they explore and develop personal skills and interests in various art media. Required for initial certification.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork. 3 hr./wk.

EDCE 4400C - Arts Integration: Theatre and Related Arts in the Curriculum

This course explores how teachers can use dramatic activities and dramatic play to help P-12 students engage in the learning process and develop their cognitive and social skills. It covers theories and practices of educational drama and theatre. Candidates will explore both the curriculum (including but not limited to social studies, literacy, English as a second language, math, and science), as well as opportunities to build group dynamics and positive social skills. The relationship of classroom drama to curricular subject matter (including but not limited to Social Studies; Literacy, English Language Learners, Math/Science) will also be examined. They will build knowledge of various dramatic activities, techniques, and strategies including teacher-in-role, process or role drama, and the use of still images/tableaux. The main concepts, structures, and conventions of the field of dramatic activities and related arts will be investigated. In addition, practical work in design, implementation, and evaluation of dramatic experiences for students of different age ranges will be examined.

Credits: 3. Contact Hours: 3 hr./wk. 15 hours of fieldwork required.

EDCE 4500A - Teaching English to Adult Speakers of Other Languages

This course focuses on the needs of educators who teach English to adult speakers of other languages. Topics to be addressed include principles of adult learning, teaching in multilingual and monolingual classroom settings, differences between English as a Second Language (ESL) and English as a Foreign Language (EFL) contexts, and program design.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 4500C - Fundamentals of Teaching Technical Theatre

This class aims to develop basic understandings of resources, techniques and elements of a theatre production including: scenic work, costumes, props, lighting, sound, and stage and production management. Candidates will explore the teaching of each of these aspects of technical theatre for classes Pre K-12 with particular focus on urban schools, and will have hands-on experiences in these areas.

EDCE 4500K - Inclusive Practices for the Arts

The potential of theatre arts as a powerful vehicle for positive disability representation is explored. Topics of study include: special education law, disability categories, differentiation, collaborative teaching, and classroom management. Candidates draw upon the narrative work of disabled artists to (re)conceptualize disability as natural human variation and an essential feature of diversity in a multicultural society.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDCE 4600A - Foundations in Early Childhood Special Education

This course provides an introduction to the foundations of early intervention and early childhood special education, including developmental, educational, family systems, and health perspectives and theories. Specific attention is paid to the process of early intervention and early childhood special education within the least restrictive environment, as delineated in state and federal legislation. .

Credits: 3. Contact Hours: 3 hrs./wk.; Includes 10-15 hours of fieldwork.

EDCE 4600C - Applied Theatre

This course explores how theatre can be used and applied to various areas of interest. The course will offer techniques on applying theatre to the student's particular area of interest or population (i.e., health care, childcare, prisons, museums, professional development). The main concepts, structures, and conventions of applied theatre will be investigated. Guidelines for devising and structuring applied drama/theatre programs and curricula will be explored.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 4700K - Early Intervention for Infants and Toddlers with Special Needs

Provides knowledge and skills to meet the needs of infants, toddlers, and young children who demonstrate mild to profound disabilities. Includes how to use developmentally-appropriate/culturally-responsive practices to work with health care professionals, health and safety, emergency care, management of chronic health impairments, and management of neurodevelopmental and motor disabilities.

Credits: 3. Contact Hours: 3 hrs./wk.; Includes 10-15 hours of fieldwork.

EDCE 4800K - Managing the Environment for Young Children with Special Needs

This course explores how to manage the environment to support learning and development for young children with diverse needs. Participants will learn how to identify and support behavior challenges in a variety of early learning environments - individual, small group, and large group settings; home, center-based, and integrated classrooms.

Credits: 3. Contact Hours: 3 hrs./wk.; Includes 10-15 hours of fieldwork.

EDCE 4900K - Assessment of Young Children with Special Needs: B-2nd grade

This course explores the role of assessment in understanding young children's learning and development. It conceptualizes assessment as an ongoing, collaborative process of gathering and interpreting evidence about children's behaviors and the social/physical environment to make decisions regarding services and supports for young children with disabilities or developmental delays.

Credits: 3. Contact Hours: 3 hrs./wk.; 10-15 hours of fieldwork.

EDCE 5100C - Teaching Foreign Languages in Elementary Education

Objectives, principles, and methods of teaching modern languages in the elementary school. Problems of organizing foreign language teaching. Study and evaluation of curricula, syllabi, textbooks, language tests, audio-visual aids, and the language laboratory and area-study materials.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 5201C - Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)

This course is designed to help participants develop instructional experiences that provide for the acquisition of literacy in a second language (English) to non-native speakers (pre-K - 6) whose cultural

background differs from that of the majority culture. While focusing primarily on practical approaches to teaching literacy, the course will also address theoretical issues that underlie the development and implementation of effective strategies to support English language learners.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 5202C - Teaching Language Arts in Spanish to Multilingual Students

Methods and practices for teaching language arts in Spanish as well as the identification and development of relevant materials for multilingual students.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork.

EDCE 5203C - Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)

Methods and materials for the teaching of reading and language in Haitian/Creole to Haitian/Creole-dominant and English-dominant children.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk. Prerequisite: EDCE 5300C.

EDCE 5204C - Teaching Language Arts in Chinese to Multilingual Students

Methods and practices for teaching language arts in Chinese as well as the identification and development of relevant materials for multilingual students.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork.

EDCE 5300C - Theories, Policies, and Programs for Emergent Bilingual Students

This course explores the historical background, policies, approaches and theoretical foundations of P-12 bilingual education and ESL programs for emergent bilingual students in the U.S. It also considers the social, cultural, political and economic context that surrounds the education of students in urban schools.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 5400C - Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)

Methods and materials for teaching English to non-native speakers grades pre-K - 6, with a focus on communicative and content-based instruction; appropriateness of various techniques, resources, and assessments for different learning styles, language and cultural backgrounds, age and proficiency levels, including gifted and talented students and those with special developmental needs; history of ESOL teaching, and the links between teaching practice and theories of language and language learning. The course includes attention to theories and practices involved in the teaching of ESOL by means of instruction in the content areas of mathematics, science and technology, social studies, and the arts.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 5401C - Methods of Teaching English to Speakers of Other Languages

This intensive introductory course provides practical information and experiences for teaching ESOL, with particular attention to urban schools, language minority students, and the NYC school system. Part I focuses on introductory issues in education and instructional models. Open to first-semester TESOL Teaching Fellows only.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 5500C - Children of the Caribbean Cultures & Curriculum

The cultural background of these children and their parents, and the problems of adjustment to a complex urban society. Attention to learning behavior affected by the difficulty of communication and new school environments.

Credits: 3. Contact Hours: 3 hr./wk

EDCE 5700C - Education That Is Multicultural

Analyzes the various components of a desirable education in a pluralistic society; provides opportunities for developing curriculum and strategies which reflect respect and dignity for all people; examines students' needs within a humanistic framework; critically examines instructional materials for bias.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 5701G - Practicum Teaching Bilingual Special Education

Assessing and developing skills for teaching language minority students with disabilities. Field supervision, integrative seminar, individual conferences. Approval required one semester in advance; open only to matriculants.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Completion of 15 credits.

EDCE 5800C - Theories of Second Language Acquisition

Designed to develop the students' understanding of the different theories that have been developed to explain the process of acquisition of second languages and of the interaction between such theories and strategies for maintaining and developing bilingualism.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 5900C - Development and Evaluation of Materials for Teaching Second Languages: English

Designed to familiarize students with commercial materials used in teaching second languages, and to increase their capacity to develop materials of their own.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 5901G - Curriculum and Instructional Approaches in Bilingual Special Education

Examination and development of curriculum and material for teaching language minority students with disabilities in English and non-English. Special emphasis will be given to NYS learning standards for science and social studies.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 5950C - Mathematics Knowledge for Teachers (Birth to Grade 6)

Focuses on the mathematics content knowledge needed to teach mathematics from birth to Grade 6, and the development of children's numerical and logical reasoning. Includes topics such as problem solving, sets, operations with sets, functions, numerical systems with different bases, and topics in number theory. All topics are connected to children's developing mathematics understandings. Reasoning and proof, problem solving, connections, communication, and representation are threaded through all instruction.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDCE 6000C - How Children Learn Mathematics: Birth - Grade 2

Development of young children's spatial, numerical, and logical reasoning as the basis for instructional decision-making in mathematics teaching. Teaching materials, developmentally-appropriate investigations, and pedagogical techniques that facilitate children's different ways of constructing ideas, strategies, and models in mathematics.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: MATH 18000 and either MATH 18500 or EDCE 5950C, or equivalent courses (6 cr.)

EDCE 6000K - Introduction to the Education of Emergent Bilingual Students with Disabilities

Course content focuses upon the needs of learners with disabilities who are in the process of acquiring skills in English, culturally responsive

practices, and collaboration with culturally and linguistically diverse families. Topics of study include: special education law, disability categories, differentiation, strategies for instruction and assessment, co-teaching models, and classroom management. This course presents disability as natural human variation and an essential feature of diversity in a multicultural society.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDCE 6100C - How Children Learn Mathematics: Grades 1-6

Mathematical development of children from primary to upper elementary grades through their action and exploration. Candidates plan for differentiated instruction and assessment of students with diverse abilities.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: EDCE 5950C.

EDCE 6100K - Assessing the Educational Needs of Language Minority Students with Disabilities

This course examines the impact of second language, cultural variables, and bilingualism on academic test performance. Participants will learn to assess educational environments, previous educational experiences, administer norm-referenced tests and criterion-referenced tests in English and in the non-English language. Both formal and informal assessment techniques will be studied.

Credits: 3. Contact Hours: Includes 20 hours practicum. 3 hr./wk. Prerequisite: EDUC 6000K.

EDCE 6200C - Mathematics Inquiry for Pre-K to 6 Teachers

Includes mathematics content and pedagogy; focuses on selected topics in number, geometry, algebra and probability; attention to National Council of Teachers of Mathematics content and process standards, analysis of students' work; and analysis, design and assessment of mathematics curriculum. Technology used throughout to study grade-appropriate classrooms. For professional certification candidates only.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 6000C or the equivalent.

EDCE 6200K - Language Minority Families and the Special Education System

This course examines current and historical perspectives on parent involvement in the special education of children and youth with disabilities. Emphasis on understanding the views of exceptionalities and family involvement held by language minority families. Focuses on strategies, activities, and materials that will facilitate school and family collaboration.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDUC 6000K.

EDCE 6400C - Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language

This course is designed to develop an interdisciplinary approach to teaching Math, Science and Social Studies using both English and an additional language. Candidates will explore interdisciplinary content methodologies and approaches to supporting language learning. The course will also focus on materials and resources for planning and integrating content-area learning experiences.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 6500C - Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)

This course is designed to help participants develop instructional experiences that provide for the acquisition of second-language literacy (English) in literary and content area texts for students (Grade 7-Adult) whose cultural background differs from that of the majority culture. While focusing primarily on practical approaches to teaching literacy, the course will also address theoretical issues that underlie the development and implementation of effective strategies to support English language learners.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 6600C - Assessment for Multilingual Learners

This course explores issues of assessment with multilingual learners in US schools. It equips teacher candidates with the skills needed to develop and implement effective assessment instruments, assess student learning, and analyze student work to inform future instruction. The course also provides a critical understanding of the larger policy context.

Credits: 3. Contact Hours: 3 hr. /wk. Includes 10 hours of fieldwork.

EDCE 6601C - Practicum I in TESOL

Teacher candidates investigate how theoretical foundations of teaching English as an additional language are implemented in classrooms. Under field supervision, candidates will plan and teach in either P-6 or 7-12 classrooms. In the accompanying seminar, candidates critically analyze the teaching practices in their learning environments.: Pass/Fail course.

Credits: 3. Contact Hours: 3 hr. /wk. Fieldwork requirement: 15 days

EDCE 6602C - Practicum II in TESOL

Teacher candidates investigate how theoretical foundations of teaching English as an additional language are implemented in classrooms. Under field supervision, candidates will plan and teach in either P-6 or 7-12 classrooms. Pass/Fail Course

Credits: 1. Contact Hours: 1 hr./wk. Fieldwork Requirement: 5 days

EDCE 6604C - Practicum in Adult TESOL

Teacher candidates investigate how theoretical foundations of teaching English as an additional language are implemented in classrooms. Under field supervision, candidates will plan and teach in adult ESL settings. In the accompanying seminar, candidates critically analyze the teaching practices in their learning environments. Pass/ Fail course.

Credits: 3. Contact Hours: 3 hr./wk. Fieldwork requirement 10 days

EDCE 6700C - Contrastive Phonology of English and Other Languages for Teachers

Advanced study of the phonology of English and its contrasts with other languages. Areas of difficulty for second-language learners. Pedagogical strategies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 2600C.

EDCE 6800C - Grammar and its Pedagogy: English and Other Languages

Advanced study of the grammar of English, with strategies for application in bilingual and second-language classrooms. Students will be given the opportunity to contrast aspects of grammar of English with that of other languages.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk. Prerequisite: EDCE 2600C.

EDCE 6900C - Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)

Methods and materials for teaching English to non-native speakers grades 7-Adult, with a focus on communicative and content-based instruction; appropriateness of various techniques, resources, and assessments for different learning styles, language and cultural backgrounds, age and proficiency levels, including gifted and talented students and those with special developmental needs; history of ESOL teaching, and the links between teaching practice and theories of language and language learning. The course includes attention to the specific discourse and text formats in the content areas of mathematics, science and technology, social studies, and the arts.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 7000I - Language and Learning

The course examines learning theories and their application to language learning with an emphasis on the student as both teacher and learner. Special emphasis is given to talking to learn and writing to learn.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7100A - Urban Schools in a Diverse Society

EDCE 7100C - Creative Movement and Music in Childhood Education

Integrating the expressive arts into all areas of the curriculum. Focus on creative expression as an effective modality for teaching. Strategies that allow teachers to model creativity for their students in a supportive learning environment. Students should come prepared for moderate physical activity.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork at the 1-3 or 4-6 grade levels. 3 hr./wk.

EDCE 7150C - Fundamentals of Teaching and Learning in Early Childhood Contexts

This course will offer a practical overview of the fundamentals of teaching and learning in early childhood contexts. Linking research and theory about how young children develop and learn, the course will present insights about how to create developmentally appropriate/culturally responsive learning environments, curriculum, instruction, assessment strategies, and teaching attitudes that support young children's optimal development through the collection of direct evidence of children's behaviors and work and how to use these data to inform and guide teaching. Ongoing studies of children will be required throughout the course.

Credits: 3. Contact Hours: 10-15 hours of fieldwork. 3 hr./wk.

EDCE 7200C - Field-based Inquiry: TESOL

Through supervised field-based investigations of the Teaching of English to Speakers of Other Languages (TESOL) in grades pre-K through 12, teacher candidates will investigate how theoretical and empirical foundations of the teaching of English as a second language (ESL) are implemented in actual classrooms, linking theory and practice. The course will involve focused classroom observations and the creation of lesson plans and units of study as teacher candidates apply and adapt methodologies and assist the cooperating ESL teacher in instruction. Students will spend 7 weeks in grade pre-K through 6 and 7 weeks in grades 7-12 (3-4 hours per week). The course will meet in a weekly seminar. Required of all students in the graduate initial certification program in TESOL.

Credits: 3. Contact Hours: Includes 45 hrs in-school experience and bi-weekly seminar. Prerequisite: EDUC 7200A, either EDUC 7300A or EDUC 7500A, EDCE 5400C.

EDCE 7200F - Contemporary Problems in Bilingual Education

Workshop to assist teachers in bilingual education in solving, through action research, problems they encounter in their teaching and in the development and use of materials.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDUC 7500G or present full-time service as a teacher. This course must be taken before EDUC 2200I.

EDCE 7201G - Student/Supervised Teaching in the Arts P-6

Students will complete their student teaching in grades PreK-6 and attend a weekly seminar. Permission of the program director required.

Credits: 2. Contact Hours: 10-25 hr./wk. (150 total) Corequisite: EDCE 7204G.

EDCE 7202G - Student/Supervised Teaching in the Arts 7-12

Students will complete their student teaching in grades 7-12 and attend a weekly seminar. Permission of the program head is required.

Credits: 2. Contact Hours: 10-25 hrs./wk. (150 total) Corequisite: EDCE 7205G

EDCE 7203G - Capstone Field Experience in Educational Theatre

Students will work closely to create a final teaching experience that coincides with their professional goals. Students must attend seminar.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: EDCE 7204G.

EDCE 7204G - Seminar in Teaching in the Arts P-6

Seminar provides student teachers an opportunity to meet, reflect and generate ideas for their current P-6 student teaching placements. Weekly discussions focus on preparing student teachers for the job search as well as for a career in education.

Credits: 1. Contact Hours: 1 hr./wk. Corequisite: EDCE 7201G.

EDCE 7205G - Seminar in Teaching in the Arts 7-12

Seminar provides student teachers an opportunity to meet, reflect, and generate ideas for their current 7-12 student teaching placements. Weekly discussions focus on preparing student teachers for the job search as well as for a career in education.

Credits: 1. Contact Hours: 1 hr./wk. Corequisite: EDCE 7202G.

EDCE 7250C - Curriculum Development in ECE

Critical examination of principles underlying curriculum development and program planning for young children. How to prepare the environment, integrate the day, differentiate instruction for students with varying needs, discipline effectively, and use technology. To be taken with or after student teaching. Required for initial certification. Ancillary requirement for professional certificate (on advisement).

Credits: 3. Contact Hours: 10-15 hours of fieldwork. 3 hr./wk.

EDCE 7300C - Young Children's Education in Diverse Non-School Settings

This course explores the processes of teaching and learning as they occur for young children in non-school settings in culturally diverse contexts. The course will lead participants through a series of visits to institutions that facilitate children's learning (such as libraries, museums, hospital settings, playgrounds, cultural education programs, etc.). Candidates will compare these to comparable institutions in their own or other countries.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7300F - Contemporary Problems and Issues in Early Childhood Education

The identification and study of classroom and school problems educators encounter in their teaching, including effective instruction for children with a range of special needs. Serves as an introduction to action research and as preparation for the research sequence of courses the student will complete at the final stage of the program. Required for professional certification in Early Childhood.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A minimum of 18 credits or special permission of advisor.

EDCE 7301G - Student Teaching and Seminar in Early Childhood Education I

Full time supervised student teaching for 20 - 50 days in one developmental level of early childhood (as part of 70 days total in student/supervised teaching). Accompanying weekly seminar integrates the teaching experience with course work. Required for those in the initial certification program. To be completed at the end of the program sequence.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Advance approval necessary.Corequisite: EDUC 1900G.

EDCE 7302G - Student Teaching and Seminar in Early Childhood Education II

Full time supervised student teaching for 20 - 50 days in a second developmental level of early childhood (as part of 70 days total in student/supervised teaching). Accompanying weekly seminar integrates the teaching experience with course work. Required for those in the initial certification program. To be completed at the end of the program sequence.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Advance approval necessary.Corequisite: EDUC 1900G.

EDCE 7303G - Supervised Teaching and Seminar in Early Childhood Education

Full time supervised student teaching for a semester in their own classroom for those who teach full-time. Accompanying weekly seminar integrates the teaching experience with course work. Option for those in the initial certification program. To be completed at the end of the program sequence.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Advance approval necessary.

EDCE 7304G - Student Teaching in Early Childhood Education and Seminar

Supervised student teaching for 100 hours in pre-K, or grades 1-2 and a weekly seminar. Includes special seminars on school violence prevention and intervention, safety education and fire and arson prevention. Required of students in the Teaching Fellows program that provides supervision of student teaching.

Credits: 0. Prerequisite: Advance approval required.

EDCE 7305G - Supervised Teaching in Early Childhood Education and Seminar

Supervised teaching for one semester in the student's own classroom in pre-K, K, or grades 1-2 (the level being different from that in EDUC 0304G) and a weekly seminar. Required of students in the Teaching Fellows program that provides supervision of teaching.

Credits: 0. Prerequisite: Advance approval required.

EDCE 7306G - Supervised Practicum and Seminar in Early Childhood Special Education

Supervised Teaching is an opportunity to further develop the essential skills, dispositions, and self-reflection necessary to be an effective and successful early childhood special education educator. Seminar discussions will offer the opportunity to integrate theory learned in coursework with experiences teaching in the field. Candidates have the opportunity to choose a concentration in Early Intervention service (Birth-3), Special Education Itinerant Teacher service preschool age (3-5) or school age early childhood (K-2).

Credits: 3. Contact Hours: 3 hrs./wk. Prerequisite: Completion of 12 credits in the Advanced Certificate in Early Childhood Special Education Program; advisor approval

EDCE 7400C - Teaching Literacy Through Drama

This course explores how teachers can help students develop literacy skills in order to better articulate ideas and create a base for further learning in a broad range of subjects. The course will also discuss strategies to support English Language Learners (ELL). The main concepts, structures, and conventions of the field of literacy and language acquisition through drama will also be investigated.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7400F - Contemporary Problems and Issues in Childhood Education

The identification and study of classroom and school problems educators encounter in their teaching, including effective instruction for children with a range of special needs. Serves as an introduction to action research and as preparation for the research sequence of courses the student will complete at the final stage of the program. Required for professional certification in Childhood Education.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A minimum of 18 credits or special permission of advisor.

EDCE 7401A - Introduction to Urban Schools for Teachers of English to Speakers of Other Languages

This intensive introductory course provides practical information and experiences for teaching ESOL, with particular attention to urban schools, language minority students, and the NYC school system. Part I focuses on introductory issues in education and instructional models.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7401G - Student Teaching in Childhood Education I and Seminar

Supervised teaching full time for seven weeks in grades 1-3 and weekly seminar. Required of all students in the initial certification program in childhood education who are not currently holding a full-time teaching position.

Credits: 3. Prerequisite: Advance approval required. 21 cr. of initial certification courses and CST examination (Advanced Certificate students: See advisor or program head for necessary prerequisites);Corequisite: EDUC 1900G.

EDCE 7402A - Introduction to Teaching English to Speakers of Other Languages

This intensive introductory course provides practical information and experiences for teaching ESOL, including an overview of current language acquisition theories, NYS learning standards, and culturally relevant pedagogy. Participants use their fieldwork placements in combination with class readings and discussions as the basis for course assignments and teaching preparation. Practice teaching is an integral part of this course.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDCE 7401A.Corequisite: Instructional assignment in ESL summer school program.

EDCE 7402G - Student Teaching in Childhood Education II and Seminar

Supervised teaching full time for seven weeks in grades 4-6 and weekly seminar. Required of all students in the graduate initial certification program in childhood education who are not currently holding a full-time teaching position.

Credits: 3. Prerequisite: Advance approval required. 21 cr. of initial certification courses and CST examination. Advanced Certificate students: See advisor or program head for necessary prerequisites.

EDCE 7403G - Supervised Teaching in Childhood Education I and Seminar

Supervised teaching for one semester in the students' own classroom in grades 1-3 or 4-6 and weekly seminar. Required of all students in the initial certification program who are presently teaching full time.

Credits: 3. Prerequisite: 21 cr. of initial certification courses and CST examination. Advance approval required.Corequisite: EDCE 1900Q.

EDCE 7404G - Supervised Teaching in Childhood Education II and Seminar

Supervised student teaching for 120 hours at the grade level (1-3 or 4-6) that the student did not complete in Supervised Teaching I, and weekly seminar.

Credits: 3. Prerequisite: 21 cr. of initial certification courses and CST examination. Advance approval required.

EDCE 7405G - Student Teaching in Childhood Education and Seminar

Supervised student teaching for 100 hours at grade level (1-3 or 4-6) and weekly seminar. Includes special seminars on school violence prevention and intervention, safety education, and fire and arson prevention.

Required of students in the Teaching Fellows program and similar programs that provide supervision of student teaching.

Credits: 0. Prerequisite: Advance approval required.

EDCE 7406G - Supervised Student Teaching in Childhood Education Seminar

Supervised student teaching for one semester in the student's own classroom in grades 1 to 3 or 4 to 6 (the level being different from that in EDUC 0405G) and weekly seminar. Required of students in the Teaching Fellows program and similar programs that provide supervision of student teaching.

Credits: 0. Prerequisite: Advance approval required.

EDCE 7500C - Emergent to Fluent Literacy

(Prereq. for Graduate Program in Literacy Acquisition and Development) Emergent to fluent literacy acquisition for students with diverse cultural and linguistic backgrounds and students with special needs; assessment of semantic, syntactic, phonic, and phonemic awareness; strategies for children having difficulties in acquisition of speaking, listening, reading, and writing competencies; organizing shared, guided, and independent reading and writing instruction; use of technology.

Credits: 3. Contact Hours: 15 hours of fieldwork in exemplary setting. 3 hr./wk.

EDCE 7500F - Special Topics in Educational Theatre

This course will offer students an opportunity to explore a current topic in Educational Theatre in depth over a weekend of intensive study. The topic will vary each semester.

Credits: 1. Contact Hours: 1 hr./wk.;

EDCE 7501G - Seminar in Bilingual Education

This weekly seminar addresses applications of the principles of teaching to all aspects of the curriculum; understandings and skills to plan a coherent and integrated curriculum; assessment systems that inform teaching and support student learning; developing classroom structures, routings, teaching strategies, and skills that build community and maintain discipline with a range of learners. Special emphasis is given to match instructional approaches with the needs and interests of diverse learners as well as how to build a respectful and productive classroom environment and effective home-school relations.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: 100 hours of fieldwork.Corequisite: EDCE 7502G, EDUC 1900G.

EDCE 7502G - Student Teaching in Bilingual Education

The student teaching experience is designed to provide prospective childhood teachers with opportunities to teach and critically analyze teaching practices in monolingual and bilingual classrooms. Students will: develop and improve teaching practices and organizational skills; practice the use two languages to meet the academic, cognitive and emotional needs of all students; practice formal and informal assessment techniques; examine special features of classroom management in the bilingual classroom; develop awareness of the many ways in which the classroom, home and community environment are supportive of the learner. 300 hrs.

Credits: 4. Corequisite: EDCE 7501G, EDUC 1900G.

EDCE 7503G - Student Teaching in TESOL (Grades Pre-K - 12)

Candidates will spend 15 weeks of supervised student teaching in grades Pre-K through 12, apportioned between elementary (P-6) and secondary (P-12) classroom settings. The supervised student teaching experience is designed to provide prospective English as a Second Language (ESL) teachers with opportunities to teach and critically analyze teaching practices in classroom for English language learners. Candidates will: develop and improve teaching strategies and organizational skills to meet the needs of all students; practice formal and informal assessment techniques; examine special features of classroom management; and develop awareness of learning environments, including home and community. Required of all students in the graduate initial certification program in TESOL.

Credits: 4. Prerequisite: EDCE 2600C, EDCE 5201C, EDCE 5400C, EDCE 5700C, EDCE 5800C, EDCE 6000K, EDCE 6800C, EDCE 6900C, and EDCE 7200C; 300 Hours of in-school experience and weekly seminarCorequisite: EDCE 7504G, EDUC 1900G.

EDCE 7504G - Seminar in TESOL

This weekly seminar addresses applications of the principles of teaching to all aspects of the curriculum: understandings and skills to plan a coherent and integrated curriculum; assessment systems that inform teaching and support student learning; developing classroom structures, routines, teaching strategies, and skills that build community and maintain discipline with a range of learners. Special emphasis is given to match instructional approaches with the needs and interests of diverse learners as well as how to build a respectful and productive classroom environment and effective home-school relations.

Credits: 2. Prerequisite: EDCE 2600C, EDCE 5201C, EDCE 5400C, EDCE 5700C, EDCE 5800C, EDCE 6000K, EDCE 6800C, EDCE 6900C, and EDCE 7200C; 300 Hours of in-school experience and weekly seminarCorequisite: EDCE 7503G, EDUC 1900G.

EDCE 7510C - Literacy Strategies: From Birth to 6th grade

This course will address children's literature, resources, content area literacies, texts, instructional texts, instructional strategies, differentiated instruction, and activities. We will also cover multiple literacies, multiple sign systems, and multimodal responses. Thus, this class will also consider literacies beyond school literacies and modalities beyond print modalities, and will expose people to a broad range of media technology that complement the developmental spectrum. Readings in this course will inform about literacy development for learners of diverse cultural and linguistic backgrounds as well as the students with special needs. Strategies for helping and assessing learners informally and formally with reading, listening, viewing, writing, and speaking will be discussed and developed. Practical applications of theoretical underpinnings of literacy development will be contextualized through organizing reading assignments, hands-on class activities, written assignments, and projects. The texts and discussions will explore the current philosophies of literacy instruction.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 7600A - Artistic Lab I

This course is an opportunity for new candidates in the program to collaborate artistically with veteran candidates. All candidates will facilitate their peers in an artistic experience as they reconnect to their artistry.

Credits: 0. Contact Hours: 15 hr./wk.

EDCE 7600C - Fluent to Experienced Literacy

(Prereq. for Graduate Program in Literacy Acquisition and Development) Balanced literacy instruction for fluent readers and writers from a diversity of cultural and linguistic backgrounds and needs; becoming experienced in a variety of genres; literacy assessment, instructional implications, and curriculum design for inferential/deep structure comprehension; content area literacies; word work; selection of appropriate materials; use of technology.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork in exemplary setting. 3 hr./wk.

EDCE 7600F - Conflict Resolution Through Theatre

This course explores how drama can provide a format for young people to discuss conflict resolution, peer pressure, bullying and other issues that affect them. The course will enable candidates to discover how to create a safe environment and empower children to develop problem solving skills and assume personal responsibility as well as understand perspective on a situation. This course includes creating lesson plans

(learning experiences) and generating strategies to use in the classroom to navigate through these topics.

EDCE 7601A - Artistic Lab II

This course is an opportunity for seasoned candidates in the program to collaborate artistically with new candidates. All candidates will facilitate their peers in an artistic experience as they reconnect to their artistry.

Credits: 0. Contact Hours: 1 hr./wk.

EDCE 7603N - Practicum in Childhood Education (grades 1-6)

EDCE 7610C - Literacy Strategies and Resources in the Content Areas (5th-12th)

This course will explore literacy practices in the different content areas, and support teachers in developing instructional strategies and learning activities for literacy learning across the curriculum. Special areas of concentration will be: crafting a culturally responsive curriculum; content area literacies; interdisciplinary and cross curricular connections; different dimensions of reading comprehension with different text types and disciplinary contexts; writing to learn strategies; the use of popular and multimodal texts to support academic literacies; and an analysis of the Regents exams. There will be a special emphasis on specific strategies to support literacy learning and growth, particularly learners of diverse cultural and linguistic backgrounds as well as the students with special needs. Candidates will explore how different identities around age, gender, class, race, language, ethnicity, physical ability, sexual orientation, etc. are constructed through different literacy practices and cultural lenses.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDCE 7700A - Drama in Education

This course explores how drama and theatre facilitate learning in educational, cultural, and community settings. Includes an examination of key aspects of the field's historical development through the work of prominent leaders, the relationships between theories of dramatic art and general education principles and the main concepts, pedagogies, and conventions of the field of Educational Theatre.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7703G - Internship in Bilingual Special Education

Students will be assigned to a school and will spend half a semester teaching in a regular class and half a semester student teaching in a special class for exceptional bilingual children.

Credits: 4. Contact Hours: 4 hr./wk.

EDCE 7800A - Exploring the History of Theatre

This course explores dramatic texts from the historical and dramaturgical perspective. Different genres, styles and movements will be investigated, offering different perspectives and a comprehensive view of the role of theatre history in educational theatre. Beginning with the origins of theatre in ritual and play in ancient cultures, Roman and Byzantine theatre, western theatre from the Middle Ages to modernity, theatre of Asia, Africa, and Latin America, as well as dramatic theory and criticism. Contemporary plays will also be studied. This course offers students the tools to analyze text, theatrical periods, and geographic and cultural areas. Dramaturgical studies will be investigated, as well as practical implementation of how to teach theatre history in the classroom.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 7800C - Critical Examination of Current Original Research in Literacy

Designed to help candidates explore the current research in literacy learning and teaching, this course combines theory and practice in an effort to integrate what we do in the classroom with what we understand about research, literacy, teaching, and learning. Candidates explore major literacy theorists, a range of theoretical frameworks, and a variety of research contexts and learn to locate, critique, annotate, and synthesize research. In raising and addressing issues and themes relevant to literacy and literacy research, the course emphasizes the range of literacy research, its purposes, rationales, significance, and implications.

Credits: 3. Contact Hours: Includes 8 hours of fieldwork in certificate area. 3 hr./wk.

EDCE 7801C - Beginning Literacy Research Seminar

The first of a four semester course sequence designed to support candidates in conceptualizing a research project around literacy learning and teaching. In this first course, the focus is on the teacher as researcher and writer who discovers different ways of looking at literacy learning, formulates significant research questions, and pursues a line of inquiry. Candidates will investigate the ways in which their cultural backgrounds are connected to their research questions. Candidates will learn a variety of data collection tools for conducting teacher research and engage hands-on research techniques to further these theoretical understandings.

Credits: 2. Contact Hours: Includes 8 hours of fieldwork. 2 hr./wk.

EDCE 7802C - Literacy Research Seminar II

The second of a four semester course designed to support candidates in conceptualizing a research project around literacy learning and teaching. In this second semester, the focus is on the teacher as researcher and writer who develops expertise in a certain area of the literature, discovers the silences and gaps in the present literature, and who chooses a theoretical framework. Candidates will develop further skills in critiquing and analyzing research and will design a literature review in which they bring together major voices, concepts, and contributions in their chosen literacy area.

Credits: 2. Contact Hours: Includes 8 hours of fieldwork. 2 hr./wk. Prerequisite: EDCE 0801C.

EDCE 7803C - Literacy Research Seminar III

The third of a four semester course designed to support candidates in conceptualizing a research project around literacy learning and teaching. In this semester the focus is on the teacher as researcher and writer who develops expertise in choosing research methods, creating a specific research design, and implementing this research design. Candidates will develop further skills in articulating the construction, purposes, rationales, and specific formats of a variety of research methods. Candidates will design a methodology chapter where they bring all of these knowledges and skills together. Candidates will begin to implement data collection and learn some techniques for data analysis.

Credits: 2. Contact Hours: Includes 8 hours of fieldwork. 2 hr./wk. Prerequisite: EDCE 7801C and EDCE 7802C.

EDCE 7804C - Literacy Research Seminar IV

This course is the final of four research seminars. Work will focus on the completion, publication, and public presentation of research findings. Students will view their work in the context of the professional literacy organizations and journals and prepare to present their question, research design for collecting data, conclusions, and new emerging questions in a public forum for all students in the Graduate Literacy Acquisition and Development Program.

Credits: 1. Contact Hours: 1 hr./wk. Prerequisite: EDCE 7801C, EDCE 7802C, and EDCE 7803C.

EDCE 7900A - Devising Theatre K-12

This course explores how the creation of original material fosters empowerment through participation and discovery. Inherent in the aesthetic approach to devising theatre is the development of personal understanding, decision-making, and collaborative tools, thus fostering communication skills and social exchange. The main concepts,

structures and conventions of devising theatre will be investigated. Guidelines for devising and structuring drama/theatre programs and curricula will be explored.

Credits: 3. Contact Hours: 3 hr./wk.

EDCE 9602G - Guidance Services

EDCE 9604G - Literacy Programs

EDLS - Educational Leadership Course Descriptions

EDLS 2500I - Content Research Seminar in Educational Administration

A critical review of the research literature in the candidate's major field, as well as research methodology and instrumentation appropriate to the field. This first semester covers the basic concepts and procedures needed to evaluate research critically. Each student will identify a problem in his or her major area, review the literature related to that problem, and design a project to study the problem. This project will be carried out during the second semester. Matriculants only. This course is followed by EDUC 8100I. This course should be taken no later than the semester prior to the one in which the student expects to complete the requirements for the degree. Students who expect to write a thesis should take this course no later than two semesters prior to the one in which they expect to complete the requirements for their degree.

Credits: 2. Prerequisite: See individual programs.

EDLS 2501I - Research and Assessment Seminar in Educational Leadership

Examination of the basic concepts and procedures necessary for identifying and using strategies, analyzing performance data, and understanding and using research within classroom and school contexts for the improvement of instruction. Each candidate will identify a school-based research problem and design a project to study the problem.

Credits: 2. Contact Hours: 2 hr./wk.

EDLS 5607G - Leadership at the District Level: Roles and Responsibilities

Roles and responsibilities of the superintendent, deputy superintendent, and central headquarters personnel for curriculum and instruction, business, pupil support programs, school safety, and school-community and parent involvement to increase student achievement and attain the goals specified in the current legislation. Knowledge and skills necessary to build the capacities of central staff and school leaders through support, mentoring, coaching, and succession planning are developed. Strategies for effective communication and interaction with school board members, community leaders, and school leaders are developed. Restructuring and school reform and effective implementation of policies and state and federal statutes are to be studied and analyzed.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 6701G - School Management

An examination of the leader's role in managing the organization's operations required to deliver an effective school program. Emphasis is placed on data gathering and analysis in the management of human, fiscal, facility, and technology resources. Candidates will learn strategies that will prepare them to plan and utilize resources comprehensively from federal, state, and city sources to enhance, supplement, and achieve goals and objectives.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7000G - Educational Policy and School Administration

Policy formulations and basic issues examined with a view to identifying underlying assumptions. Attempts to analyze and assess consequences of alternative courses of action, including consequences in terms of major issues, with emphasis on the controversies of our time.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7001G - Foundations of Educational Policy-Making

Introduction to the process by which policy is formulated, analyzed, implemented, and evaluated. The roles of the educational leader, educational interest groups, school boards, professional educators, parents and other citizens in the formulation and execution of educational policy are explored. Contemporary policy issues are examined and critiqued. Critical examination of ethical issues confronting education leaders and policymakers in a liberal-democratic society.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7100G - Leadership in Education I

Introduction to organizational development. Tested concepts and theoretical formulations concerning organizational behavior, participative management, and systematic school improvement. Application of organizational development concepts to leadership behavior, with particular focus on group dynamics and human relations.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7101G - Dynamics of Educational Organizations

Candidates explore the foundations and philosophies of education, systems theory, the principles of organizational development, and the change process for systems, organizations, schools, and individuals. Candidates learn to develop and sustain an educational vision for all students informed by multiple data sources, to lead comprehensive long-range strategic planning projects and to utilize effective communication, consensus-building, and negotiation skills.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7200G - Leadership in Education II

Organizational behavior. Situational analysis of administrative problems through the application of behavioral science theories in role communication, decision-making, leadership, and organizational change, using a series of elementary, secondary, and central office case studies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SPED 7100G.

EDLS 7201G - Moral Dimensions of Leadership

Candidates explore leadership theories, develop a leadership philosophy, a professional code of ethics, and a personal growth plan. An examination of issues related to personal and professional accountability is conducted. Preparation is provided in the leadership skills (i.e., motivation, conflict management, decision-making, etc.) needed to influence individual and group behavior and to shape school culture and values in the context of highly diverse schools and student and staff needs.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7300G - Curriculum Development and Supervision I

Current and developing curriculum patterns, technological innovations, and strategies for effecting curriculum change. Role of the principal supervisor considered within the context of formulations for innovations in organization.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7301G - Curriculum Development

The principles of curriculum development, implementation, evaluation, and instructional programming are examined. Emphasis is placed on understanding learners, the learning environment and developing

instructional support services for diverse and special school populations. Best practices in curriculum and instruction and standards based teaching and learning are addressed. Strategies for developing and implementing curriculum improvement plans for improved student achievement are stressed. Candidates are expected to develop an eclectic approach to the curriculum improvement process.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7400G - Curriculum Development and Supervision II

Theory of supervisory functions. Wide range of techniques that provide for in-service education and staff development, emphasizing clinical supervision and interactional analyses. Guidelines and procedures for the effective evaluation of both learning and teaching.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SPED 7300G.

EDLS 7401G - Instructional Leadership

Purpose, theory, and nature of instructional leadership are examined. This course focuses on the supervisor's human relations skills as a group leader, classroom visitations and conferences, supervisory techniques, teacher assessment, student learning and development, and curriculum review. Candidates explore the role of entry level leaders in the improvement and evolvement of teaching and learning, assessing supervision and teaching, and exploring strategies that promote the transformation of districts and schools into effective learning communities.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 7800G - Advanced Seminar in Educational Organizational Development

In-depth analysis of O.D. models and processes for improving schools, ranging from individual to system-wide interventions. Providing and refining organizational development skills for those seeking organizational leadership roles within schools, human service, and other related institutions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SPED 7100G, SPED 7100G.

EDLS 7903G - District Leader Internship & Seminar

The internship is a supervised learning experience in a district setting that provides an opportunity to apply the theories and concepts learned and skills acquired during the candidates' graduate program. Candidates for the internship identify areas they need to strengthen and develop a plan to enhance their skills in the identified areas. During the internship, candidates work under the guidelines of a college facilitator and the supervision of a district administrator. Problem-solving seminars that focus on internship activities are conducted on a regular basis.

Credits: 3. Contact Hours: 3 hr./ wk.

EDLS 7904G - Internship and Seminar

The internship is a supervised learning experience in a school setting that provides an opportunity to apply the theories and concepts learned and skills acquired during the candidates' graduate program. EDLS 7905G is required if the 450-hour internship and six NYS leadership standards are not completed in EDLS 7904G.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Completion of at least 15 credits in the school building leader program.

EDLS 7905G - Internship and Seminar II

This course is designed for students who have not completed the required internship hours for certification as a school building leader. During the internship, candidates work under the guidelines of a college facilitator and the supervision of a school-site administrator. This course may be repeated once.

Credits: 1. Contact Hours: 2 hr./wk. Prerequisite: EDLS 7904G

EDLS 8000G - Survey of Problems in Educational Administration and Supervision

A foundations course designed to set forth systematically the problems of educational administration and supervision. May be credited toward a master's degree only with permission of student's major field advisor. Open to non-degree students.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8101G - School Finances and the Economics of Public Education

An overview of school finance and educational economics. Topics include: property taxation, assessed valuation, school finance court decisions, federal aid to education, and school finance alternatives. Although New York State aid formulas are emphasized, data from California, New Jersey, Hawaii, and Washington, D.C. are also utilized.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8102G - School Business Management and Budgeting

Budgetary processes and tools, critique of PPBS zero-based budgeting, and other control techniques. Use of cost-effectiveness measures. Federal, state, and local support patterns. Categorical aid, special funding, and their budgetary implications. Open to non-degree students, with permission.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8103G - Management and Organizational Leadership at the District Level

This course provides models, strategies, and applications in use of information sources, data collection and analysis in designing and executing strategic plans for district-wide systems. Management and operational functions of a school district leader including human resources administration, budgeting, and financial operations at the school and district levels, obtaining and using resources comprehensively from a variety of public and private sources, training schools in prioritizing the use of resources, and planning for and utilizing school plants and facilities to support the instructional program. Exploration of safety and security issues and concerns; model plans are developed. Operational plans to implement the district's mission and vision and maximize student achievement.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8200G - Education Planning and Systems Problem-Solving

The role of educational administrators and supervisors in short and long-range program planning, resource allocation, and physical planning. The relationship between educational planning and human resources, utilizing organizational development strategies, application of general systems theory, systems analysis, and the techniques of PERT, MBO, PPBS and CPM, etc. to educational and human service institutions. Open to non-matriculants.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8301G - School Personnel I

Personnel administration and staff development. Practices and processes in educational leadership. Developing programs; organizing staff and facilities; defining roles of professional and non-professional personnel; personnel administration and guidance; application of techniques for evaluating the effectiveness of the organization. Open to non-degree students.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8302G - School Personnel II

Collective bargaining, contract administration, and grievance arbitration. The meaning and impact of collective negotiations on public education. Topics include: the background of collective bargaining in public education; the legal and political framework; organizational approaches to, and organizational issues in negotiations; administering the agreement; and grievance machinery. Strategy, tactics, and special

issues in relation to educational administration will be studied. Open to non-degree students.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8501I - Field Problem Seminar in Educational Leadership

Candidates carry out the school-based research projects designed in EDUC 25001 and participate in seminars to review, critique, and apply current research in Educational Leadership. Critical examinations are conducted of the candidates' school-based research projects.

Credits: 2. Contact Hours: 2 hr./ wk.

EDLS 8600G - School Law and the Administrator

Legal responsibilities of administrators. Requirements of local Boards, including contracts, state and federal laws affecting local operation of schools. May be credited toward a master's degree only with permission of the student's major field advisor. Open to non-degree students, with permission.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8601G - School Law

Candidates will examine the constitutional and statutory provisions and principles of representative governance that are the foundations of the American public school system. A comprehensive overview of the origin and legal status of the local school unit, legal responsibilities of administrators, requirements of school boards, rights of students and teachers, evolution of legal provisions for school support; and the importance of diversity and equity in a democratic political system provides the basis for candidate discussion, analysis and application. Contemporary legal and ethical issues confronting education leaders and policymakers in a liberal-democratic society are critically examined, as are the dynamics of policy development and advocacy under our democratic political system. Issues are examined for common legal pitfalls affecting all school personnel contracts and labor relations.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8604I - Social Responsibility, Politics, and Education

Rooted in educational foundations, educational philosophy, and current social and economic dynamics, this course provides an in-depth analysis of issues of special significance for urban central office educational leaders impacting the quality, equity, and excellence of education for all students and includes best practices for communicating, understanding, valuing, and working effectively with district leaders, state leaders, community leaders, and other community members from diverse backgrounds. Candidates develop an understanding of the implications of political strategies and involvement in education.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8800G - School-Public Relations

A study of concepts, organizational and administrative processes. Functions of school personnel, media designed to promote school-community understanding and cooperation. May be credited toward master's degree only with permission of student's major field advisor.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 8801G - School-Community Building

Utilizing the values, emerging issues and trends, conditions, and dynamics impacting the school community and educational programs. This course provides best practices in communication, marketing strategies, media use, and partnerships with higher education, social agencies, businesses, and other stakeholders to build support and garner community resources for improving student achievement.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 9600G - Administration and Supervision of Specialized Programs/Departments

The chair's or special area supervisor's responsibilities in such areas as program making, staff development, pupil/personnel, and program/department management. Cases and problems examined in laboratory settings, taught by joint administration and specialized area faculty.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Special permission of particular program advisor required.

EDLS 9601G - Adult Education

Problems involving administrative routine, discipline, classification of pupils, experimental programs, standards of promotion, and human relationships in administration. May be credited toward a master's degree only with permission of student's major field advisor.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 9602G - Administration and Supervision of Early Childhood Education

The supervisor's responsibilities in such areas as program making, staff development, pupil/personnel, and program/department management. Cases and problems examined in laboratory settings, taught by joint administration and specialized area faculty.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Special permission required.

EDLS 9605G - Administration of Special Education

Problems involving administrative routine, discipline, classification of pupils, experimental programs, standards of promotion, and human relationships in administration. May be credited toward a master's degree only with permission of student's major field advisor.

Credits: 3. Contact Hours: 3 hr./wk.

EDLS 9800G - Educational Leadership in Day Care

Role of the director in setting priorities for the center and its early childhood program. Supervision and development of staff. Relations with governmental agencies, sponsoring agency, board and community. Open only to matriculants in the Day Care Leadership Program or by special permission.

Credits: 3. Contact Hours: 3hr./wk

EDSE - Secondary Education Course Descriptions

EDSE 1100E - Methods of Teaching English in Secondary Schools

This course explores the pedagogical theories, teaching practices, and curricular trends confronting English teachers in order to provide an understanding of the complex interactions between reading, writing, listening, and speaking. The acquisition of methodological knowledge and the development of self-awareness are primary goals. How teaching methods affect what really happens in the classroom.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk. Offered: Fall only.

EDSE 1101E - English Methods (Teaching Fellows)

The purpose of this course is to introduce you to a variety of approaches, routines, materials, and issues that concern English teachers in secondary school settings, and to help you develop a set of lessons, assessments, and materials to use during your first few weeks of teaching. The course will provide time for you to practice and experiment with methods introduced in class readings and discussions. This course will also provide a controlled and supportive environment for trying out strategies and techniques that may be somewhat different from your previous experiences in English classrooms. At the same time, you will be asked to share what you observe in your morning in-school sessions of the everyday realities of teaching and learning in authentic classroom settings. These observations will further inform your emerging conception of effective approaches and practices in the field of English education.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 1104E - Methods of Teaching Spanish in Secondary Schools

This course is intended to provide prospective teachers of Spanish and/or other foreign languages with the background and strategies needed to teach Spanish at the secondary level. It is designed specifically for candidates without initial certification. Major topics include: second language acquisition and language development in adolescents; comprehension-based teaching strategies; standards-based planning and instruction; content-based instruction; and teaching and assessing listening, speaking, reading, and writing skills as well as cultural competency.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 1105E - Methods of Teaching World Languages

This course provides prospective teachers of world languages with the strategies needed to teach at the secondary level. Major topics include: second language acquisition and language development in adolescents; comprehension-based teaching strategies; standards-based planning and instruction; content-based instruction; and teaching and assessing cultural competency and interpretive, interpersonal, and presentational skills. Includes 30 hours of fieldwork.

Credits: 3. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 1200E - Reading and Writing across the Curriculum

Explore how reading and writing can be modes of learning across the curriculum. Current research and theory will be discussed and methods of using reading and writing to learn will be developed. Not open to students who have completed EDSE 41200.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk.

EDSE 1201E - Middle School Literacy

This course will support candidates to learn how to: identify strengths of literacy learners in content classrooms; individualize instruction based on these assessments; and assess textual difficulty and guide students to develop reading and writing strategies and study skills.

Credits: 4. Contact Hours: Includes 20 hours of fieldwork. 4 hr./wk.

EDSE 1202E - Teaching Reading in the Secondary School English Classroom

This course is designed to prepare graduate secondary English Language Arts candidates with theoretical and practical guidance for teaching reading and literature. There will be an overview of reading processes (including those of English language learners), the fundamentals of reading instruction, factors that influence the ability to read text effectively, strategies and materials for identifying and reducing reading problems, school resources, and different programs for proficient and struggling readers, including Ramp Up and SSR. During the semester ELA candidates will describe, compare, and contrast theories, models, approaches, and methods of teaching reading. The emphasis of our inquiry will be on the teaching of critical reading skills in various genres of literature, including contemporary adolescent literature. Candidates will discuss and investigate the different types of readings, assessments, reading skills, reading instruction, learning strategies, and possible motivations for reading. Throughout the course candidates will read, share, discuss, adopt multiple perspectives, and critique a wide range of literature taught in the secondary English classroom, as well as investigate the needs of diverse student populations, including ELLs and students with special needs.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk. Offered: Spring only.

EDSE 1203E - Mid Schl Literacy Tf

Mid Schl Literacy Tf

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 1204E - The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools

The course is designed to explore methods for the teaching of reading and writing in Spanish to non-native speakers of the language and how these skills relate to listening and speaking across the curriculum. Prospective or current teachers will be provided knowledge of theory and best practices related to literacy in Spanish. They will also develop instructional materials and their own "voices" as writers.

Credits: 3. Contact Hours: Includes 20 hours of fieldwork. 3 hr./wk.

EDSE 1300E - Assessment and Testing for the Language Arts

This course is designed to introduce you to the fundamental principles of English Language Arts assessment and testing. It is both theoretical and practical in nature. The course will cover types of assessments, planning instruction and assessment, diversity and gender, formal and informal assessment, construction, administration, and grading.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 1304E - The Teaching of Spanish to Heritage Language Learners in Secondary Schools

Current theories and methods of teaching Spanish to heritage language learners. Emphasis is placed on the teaching of multi-modal literacies and oral communication patterns, and sociolinguistic competency.

Credits: 3. Contact Hours: Includes 20 hours of fieldwork. 2.5 hr./wk.

EDSE 1500E - Teaching Writing in Secondary Schools

Students taking this course will write as a way to engage in the best practices of writing instruction while reflecting on this practice by examining the theoretical lens that informs its use.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork. 3 hr./wk. Offered: Fall only.

EDSE 2100E - Teaching Social Studies in Secondary Schools

Lesson planning, classroom management, co-operative learning, questioning, assessment, reading, writing, and note taking in social studies are emphasized. Students study the secondary school curriculum, uses of technology, differentiated instruction for students with special needs, and the needs of English language learners.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 2200E - Study and Teaching of History

Designed for teachers of advanced placement courses in secondary schools. Examination of relevant source materials and examples of historical scholarship.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 2201E - Teaching of American History

The purpose of this course is to prepare pre-service teachers to increase their knowledge of American History, to demonstrate best practices in the teaching of American history at the secondary level, to improve teacher's use of primary sources and to integrate the arts in the teaching of American History. This course explores American history, beginning with the settlement of the Puritans and ending with contemporary American society. The underlying framework for the course is to foster teaching American history in ways that will both engage and excite students as well as expand social studies teachers' knowledge of American history. Effective instructional strategies for teaching American history will be examined and developed. Students will examine New York State standards for American History as well as the standards for our specialty interest association, the National Council for Social Studies.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 2300E - Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary Schools

Examination of selected social studies projects and application of their methods and materials to students' present teaching situations.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk. Prerequisite: Open only to matriculants or by special permission.

EDSE 2700E - Middle and Secondary School Mathematics: Teaching Developmentally

This course is designed to help teachers better understand the types of mathematical misconceptions students may have developed by the time they reach middle and high school. It will identify a variety of research-based strategies for developing a better understanding of the mathematical procedures and concepts related to those misconceptions. In addition, students will learn to differentiate instruction to help all learners meet and exceed appropriate New York State Learning Standards.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 3100E - Methods of Teaching Science

Topics include: designing effective learning experiences, cooperative learning, questioning, enrichment, motivation, assessment, problem solving, an overview of the middle and secondary school curriculum in science, the use of technology in the teaching and learning of science, teaching methodology for students with special needs and students learning English as a second language. Includes 30 hours of fieldwork in a variety of educational settings.

Credits: 4. Contact Hours: 45 hr./wk.

EDSE 3101E - Teaching Science in Middle Schools

Lesson planning, classroom management, cooperative learning, questioning, remediation, enrichment, motivation, homework, testing and assessment, reading, writing in science. Problem solving, the middle school curriculum, technology, methodology for students with special needs, learning English as a second language, literacy in the science classroom.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 3102E - Teaching Science in Middle Schools (Teaching Fellows)

Participants in this course will explore perspectives, philosophies, theories, methods, and materials for teaching middle school science (grades 6-8). The course addresses four strands of professional practice that a teacher, to be successful, must not only master separately, but also learn to weave together seamlessly.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: EDSE 3105E.

EDSE 3105E - Adolescent Learning of Science

This course provides an opportunity for students enrolled in EDSE 3100E to link to and extend their fieldwork experiences as participant/observers and to connect these experiences to current research into the theories and practices of student learning. Students will conduct a lesson in their field placements as part of their fieldwork for EDSE 3100E and this class. This lesson will be videotaped and critiqued during the seminar, providing an opportunity for the students to address adolescent learning theory in the context of actual classroom practice. Weekly topics include: cognitive science, student understanding, models of teaching, social construction of knowledge, investigating student ideas, and multiple representations of ideas.

Credits: 1. Contact Hours: 1 hr./wk.

EDSE 3900I - Curriculum and Instruction in Science Education

A course designed to discuss present curriculum trends in science education from a local, state-wide, and national level with emphasis on the National Standards in Science and the process of selecting and evaluating curricular materials in science.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 3901I - Curriculum and Instruction in Science Education (Teaching Fellows)

A course designed to discuss present curriculum trends in science education from a local, state-wide, and national level with emphasis on the National Standards in Science and the process of selecting and evaluating curricular materials in science.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 4100E - Curriculum and Assessment in Art Education

This course introduces the historical, cultural, and social foundations of art education. Discussions about the nature of learning in the arts prepare students to develop their own arts curricula and embedded assessment strategies.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 4101E - Curriculum and Assessment in Art Education

Forty-five hours of fieldwork related to the study of teaching art in the classroom with particular emphasis on standard-bases curriculum design. Pass/Fail only.

Credits: 1. Contact Hours: 1 hr./wk. Corequisite: EDSE 4100E.

EDSE 4200E - Identity, Community and Culture in Art Education

This arts-integrated course explores the role of identity, culture, and community in multiple arts settings with an emphasis on identity development, community building, and culturally relevant pedagogy.

Credits: 3. Contact Hours: 3 hr./wk., plus 10 hr. fieldwork.

EDSE 4300F - Materials and Methods in Art Education

This studio-focused class introduces students to strategies for teaching creativity in multiple settings. Students merge explorations of contemporary art practices with educational theory to develop lessons in the arts.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 6100E - Teaching Mathematics in Middle and Secondary Schools

Lesson planning, classroom management, cooperative learning, questioning, remediation, enrichment, motivation, homework, testing and assessment, reading, writing, and note taking in mathematics. Problem solving, the middle and secondary school curriculum, technology, methodology for students with special needs, learning English as a second language, literacy in the mathematics classroom.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 6101E - Teaching Mathematics in New York City

This course focuses on the Beginning level of practice and knowledge as defined by The New Teacher Center at UCSC's Continuum of Teacher Development. Topics include planning and instruction for diverse classrooms, using NYCDOE curricula, aligning instruction and assessment with learning standards, promoting school community relationships in urban settings, classroom management, and understanding the culture of urban schools. Students will learn how to teach mathematics and prepare their students to meet New York State Learning Standards for Mathematics. Students will participate in a field experience as part of the course.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6102E - Teaching & Learning Secondary School Mathematics

This capstone methods course will help teachers use their flexible and comprehensive knowledge of mathematics, their understanding of adolescent learning and development, and their ability to plan and implement instructional units to maximize the learning of all students. Candidates will focus on research-based instructional strategies found to support mathematics achievement of students in diverse urban secondary school classrooms. They will learn to create instructional environments where all students will develop confidence in their ability

to do mathematics and are challenged to think critically about the discipline. In addition candidates will identify a problem of interest and draft a literature review that will serve as a basis for their action research project. This project will be completed during the following semester.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDSE 6401E. on approval of instructor.

EDSE 6103E - Teaching & Learning Middle School Mathematics

This capstone methods course will help teachers use their flexible and comprehensive knowledge of mathematics, their understanding of adolescent learning and development, and their ability to plan and implement instructional units to maximize the learning of all students. Candidates will focus on research-based instructional strategies found to support mathematics achievement of students in diverse urban middle school classrooms. They will learn to create instructional environments where all students will develop confidence in their ability to do mathematics and are challenged to think critically about the discipline. In addition candidates will review the literature related to teaching mathematics at the middle school level. They will identify a problem of interest and draft a literature review that will serve as a basis for their action research project. This project will be completed during the following semester.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDSE 6401E.

EDSE 6200E - Teaching Problem-Solving Strategies in Mathematics

This course is designed to expose and train mathematics teachers to a wide range of problem-solving strategies applicable to all parts of the secondary school curriculum. The goal of the course is to enable teachers to integrate this knowledge into the existing mathematics classroom.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6300E - Enriching the Teaching of Secondary School Mathematics

How the teaching of secondary school mathematics can be enriched by presenting non-traditional topics. Methods of implementation as well as source material to be provided.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6400D - Educational Applications of Group Dynamics

Concepts and methods of group dynamics and social group work, and their application to school situations; use of group processes in meeting children's needs for activity, socialization, and emotional security; diagnostic and therapeutic implications.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6400E - Curriculum, Instruction, and Assessment in Middle and Secondary School Mathematics

Theory of curriculum development; alternatives in teaching laboratory programmed instruction; multimedia materials and procedures; learning theories designed to help the teacher develop criteria and knowledge for implementing curriculum in schools.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 6401E - Curriculum, Instruction, and Assessment in Mathematics Education

In this course candidates will design, implement, and reflect on instructional units that are aligned with long-term and short-term goals. They will use multiple sources of information to assess student learning, including data provided by NYC DOE assessment databases; involve and guide students in assessing their own learning; and use the results of assessment to inform instruction. Candidates will learn how to develop a classroom culture where mathematical learning and assessment are woven into the fabric of the classroom in a manner that supports the learning of all students. The course will require candidates to complete classroom-based activities.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDSE 0504A.

EDSE 6600E - Strategies for Using Computers in the Mathematics Classroom

Curriculum strategies and materials for introducing computer programming in the secondary school curriculum. Activities involve various levels of skills and techniques to solve mathematics problems using the computer.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6800E - Teaching Mathematics Using Graphing Utilities

This course is designed to familiarize students with the latest in graphing calculator technology and software, which can be used to improve the understanding of mathematical concepts. Applications of this technology for all secondary school levels will be explored. The goal of the course is to enable students to better understand mathematical concepts with the aid of the newest technology.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6804E - Spanish Grammar and its Pedagogy

Designed to provide an intensive review of key aspects of Spanish grammar. Emphasis is placed on the role grammar plays in oral and written communication. The course also provides strategies for the teaching and assessment of grammatical knowledge in the target language.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 6900E - The Teaching of Calculus

The aim of this course is to provide in-service and prospective mathematics teachers with deeper insight into elementary differential and integral calculus concepts. Since the use of graphing calculators is a vital part of the Advanced Placement program, how to use them to teach calculus is emphasized.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7001I - Introduction to Educational Research in Secondary Schools

The purpose of this course is to give you an overview of educational research models, and for you to begin designing a research project that you will conduct in the spring. We will look at models of quantitative and qualitative research, literature reviews, and descriptions of methodology, and discuss ethical issues involved in conducting educational research. By the end of the course, you will have completed: 1) A problem statement or research question, with context; 2) a literature review; 3) a methodology; and 4) a plan for completing the project next semester.

Credits: 2. Contact Hours: 2 hr./wk.

EDSE 7101I - Independent Study in Secondary School Research

In this course, a continuation of EDSE 7001I, you will carry out and write up the classroom inquiry project you designed last semester. You will continue working in the inquiry groups organized last semester; monthly conferences with the course instructor are also required. The class will meet only three times during the semester, and will end with a mini-conference, at which you will present the findings of your project.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: EDSE 7001I.

EDSE 7200I - Master's Project

The objective of this course is to have students do a critical analysis of their evolving understanding of learning and teaching, and how these views influence what occurs in their own classrooms. This critical analysis will be the basis for their own extended written piece, which will serve as the culminating experience of the program.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7201I - Action Research in Mathematics Education

This course will provide guidance and support for students as they complete an action research project in their classrooms. Candidates

must have an approved project and have completed a literature review prior to starting this course.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EDSE 6102E or EDSE 6103E.

EDSE 7202I - Master's Project in Science Education

The objective of this course is to have science education students do a critical analysis of their evolving understanding of learning and teaching of science and how these views influence what occurs in their own classrooms. This critical analysis will be the basis for their own extended written piece, which will serve as the culminating experience of the program.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Permission of science education advisor required.

EDSE 7300E - Curriculum Development in Secondary School English

The variables, both societal and institutional, influencing the practice of high school English curriculum design. Topics include the psychology of writing, adolescent psychology and youth culture, popular culture, state mandates, the literary cannon and the debates it raises. Students' final project is a self-designed high school English curriculum informed by the semester's inquiry.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk. Offered: Spring only.

EDSE 7301E - Curriculum Development in Secondary School English (Teaching Fellows)

This course surveys the critical trends in English curriculum and instruction and the role of planning in the practice of teaching secondary school English in order to provide a supportive and exploratory environment to further our understanding of the complex interactions between reading, writing, listening, speaking, and viewing taking place in high school English classrooms. The acquisition of knowledge in the field of English curriculum, the development of planning skills, and the development of reflective practice in these areas are our goals. Designed specifically for English Teaching Fellows who have completed one year of teaching, the course draws on the candidates' classroom experiences to help them design a curriculum project for their second year of teaching.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7304E - Curriculum Development in Secondary Spanish

This course explores the variables, both societal and institutional, influencing the practice of high school foreign language curriculum design. An overview of how language instruction has evolved will be studied. Topics include the alignment of standards and instructional goals, ACTFL's Standards for Foreign Language Learning, contextualized instruction, and how to design and implement a curriculum based on linguistic functions. Students' final project is a self-designed high school Spanish curriculum informed by the semester's inquiry.

Credits: 4. Contact Hours: Includes 30 hours of fieldwork. 3 hr./wk.

EDSE 7305E - Curriculum Design in World Language Teaching

This course explores the societal and institutional variables influencing the practice of world language curriculum design. Topics include the alignment of standards and instructional goals, contextualized instruction, and how to design and implement a curriculum based on linguistic functions. Students' final project is a self-designed unit plan informed by inquiry. Includes 30 hours of fieldwork.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7502A - Adolescent Learning in the Urban Context (Teaching Fellows)

This course is intended to help Teaching Fellows learn and apply modern theories of and research on developmental, educational, and cognitive psychology to their classroom instruction. Special emphasis is on theories that are relevant to adolescents, i.e., students in middle, intermediate, and high schools in the urban setting. It is also intended to help candidates a) become reflective practitioners who teach for and with metacognition; b) utilize the diversity in the classroom; c) create a caring community, and d) develop leadership skills.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7503A - Introduction to Teaching Humanities in Urban Secondary Schools

This course is co-designed by both the instructor and the participants. We will use problem-based learning to identify, research, and solve the issues which arise in your classrooms. The topics we will address include: assessing student learning and needs; classroom management; fostering a learning community; differentiating instruction; incorporating metacognition and the Principles of Learning; and setting long and short term goals.

Credits: 3. Contact Hours: 3 hr./wk.

EDSE 7600A - Issues for Secondary School Teachers: Second Language Acquisition and Literacy

This graduate level course is a core requirement of all secondary education candidates, providing you opportunities to consider essential issues in literacy development and second language acquisition, and to deliberate about tensions within each area. The course is designed to provide a general introduction to these areas, focusing on issues of particular concern to middle and secondary school teachers, from which you will begin to consider how to differentiate your instruction for a diverse population of students. In turn, the course design is intended to help you create the kinds of classrooms our students deserve, using methods to deliver instruction that are aligned to the needs of these learners.

Credits: 2. Contact Hours: Includes 10 hours of fieldwork. 2 hr./wk.

EDSE 7600G - Student Teaching in Middle and Secondary Education

Students will be assigned, under supervision, to a middle and/or secondary school as student teachers for a minimum of 300 hours. These hours subject to regulations currently in force in the school system. Open only to matriculants. Advanced approval by program director required.

Credits: 4. Prerequisite: Open only to matriculants. Advance approval by program director required.

EDSE 7602G - Supervised Teaching at the Middle and Secondary Level

Teacher candidates will teach in a supervised setting in middle and secondary schools. Candidates will be mentored by School of Education faculty and New York City teacher mentors. This course is designed to provide teacher candidates who are teaching as part of the New York City Teaching Fellows Program a supervised teaching designation on their transcript.

Credits: 0.

EDSE 7603G - Seminar on Student Teaching in Secondary Schools

This course provides an opportunity for graduate Secondary Education candidates to reflect about their student teaching experiences and a forum to discuss relevant issues in education. Weekly topics include: Literacy; Planning for Instruction, Differentiated Instruction and UDL; Classroom Management; Grading and Assessment (including assessment of teaching); and Home-School-Community Connections. Candidates will compile a portfolio that documents their growth as a teacher.

Credits: 2. Contact Hours: 1 hr./wk.

EDSE 7800G - Student Teaching in Arts Education

Students teaching at the pre-K to 6 and 7 to 12 levels with a minimum of 30 days, 150 hours, in each setting. These hours are subject to

regulations currently in force in the school system. Open only to matriculants. Advance approval by program director required.

Credits: 4. Contact Hours: 300 hours per semester Corequisite: EDSE 7603G and EDUC 1900G

EDUC - Teaching, Learning, and Culture Course Descriptions

EDUC 0502A - Adolescent Learning in the Urban Context (Teaching Fellows)

This course is intended to help Teaching Fellows learn and apply modern theories of and research on developmental, educational, and cognitive psychology to their classroom instruction. Special emphasis is on theories that are relevant to adolescents, i.e., students in middle, intermediate, and high schools in the urban setting. It is also intended to help candidates a) become reflective practitioners who teach for and with metacognition; b) utilize the diversity in the classroom; c) create a caring community; and d) develop leadership skills.

Credits: 3. Contact Hours: 3 hr./wk.

EDUC 1200N - Workshops on Use of Data and Technology

This workshop focuses on the use of data to inform instruction, improve student learning, and document student performance. It also explores the use of technology to enhance instruction and student learning.

Credits: 1. Contact Hours: 1 hr./wk.

EDUC 1300N - Workshops on Differentiated Instruction and Assessment

This workshop focuses on strategies to differentiate instruction to address the learning and socioemotional needs of all learners. It also focuses on the implementation of multiple forms of formative and summative assessments.

Credits: 1. Contact Hours: 1 hr./wk.

EDUC 1900G - Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics

This course has seven workshops that cover the following topics: Child Abuse Identification; School Violence Prevention; Dignity for All Students Act (DASA); NYCDoE's Teacher Application procedures and Career Development with our NYCDoE recruiter; Setting up your NYSED TEACH account; Resume Writing & Interviewing Skills with the Assistant Director of the CCNY Career and Professional Development Office; Presentation by the United Federation of Teacher's (UFT) Director of Appointments and Licensing.

Credits: 0. Contact Hours: 30 hr./sem. Corequisite: Student Teaching.

EDUC 2100K - Developmental Issues in Early Childhood Education

In-depth study of the developmental progression and the active nature of young childrenÆs learning. Major developmental theories are critically examined and illuminated through candidatesÆ experiences with children of diverse needs from varying backgrounds. Implications for program planning, classroom organization, and differentiating curriculum to meet special needs are continually drawn. Required for professional certification.

Credits: 3. Contact Hours: 3 hr./wk.

EDUC 3100N - Independent Study and Research in Education

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member.

EDUC 7000I - Introduction to Educational Research

The first semester of the research sequence covers the basic concepts needed to evaluate research critically and plan it effectively. Each student will identify a problem in his or her major area, review the literature related to that problem, and design a project to study the problem. The study will be carried out during the second semester. This course should be taken no later than the semester prior to the one in which the student expects to complete the requirements for the degree.

Credits: 2. Contact Hours: 2 hr./wk.

EDUC 7100A - Urban Schools in a Diverse Society

Selected significant social, political, and economic forces which influence the school as an institution and which in turn are influenced by the school, especially in urban settings that educate students from diverse ethnic and cultural backgrounds. Includes history, philosophy, sociology and politics of education.

Credits: 3. Contact Hours: Includes 10 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 hr./wk.

EDUC 7100I - Individual Study in Educational Research

Second semester of research sequence. Consideration of research design, sampling, instrumentation, data collection, statistical or qualitative data presentation. Students will execute the study developed during the first semester and prepare a written report, in research form, of the complete study.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: EDUC 7000I.

EDUC 7200A - Psychology of Learning and Teaching

Theories and principles of learning and instruction pertinent to achievement, development, self-regulation, and behavior in children from culturally and ethnically-diverse backgrounds. Includes classroom applications, testing and evaluation.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 hr./wk.

EDUC 7300A - Child Development

Theories and principles of development pertinent to culturally and ethnically-diverse and inclusive classrooms with an emphasis on classroom applications and fieldwork.

Credits: 3. Contact Hours: Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 hr./wk.

EDUC 7400A - The School in American Society: Bilingual Education in the Urban School

Analysis of selected social, political, and economic forces that influence the school as an institution, and in turn are influenced by the school, especially in urban settings. Special attention to immigrant, bilingual, and language minority groups. Not open to students who have taken EDUC 22100, EDUC 22200, or equivalent.

Credits: 3. Contact Hours: 3 hr./wk.

EDUC 7500A - Adolescent Learning and Development

The evolution of how theories and research on learning and development manifest themselves in urban settings for teachers of adolescents. Teacher-centered and student-centered, human and technology-based approaches, emphasizing those promoting independent, self-regulated adolescent learners. Theories, their cultural implications and their classroom applications: learning, intelligence, motivation, affect, parenting styles, classroom communications, and classroom management strategies.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

EDUC 7502A - Adolescent Learning in the Urban Context (Teaching Fellows)

This course is intended to help Teaching Fellows learn and apply modern theories of and research on developmental, educational, and cognitive

psychology to their classroom instruction. Special emphasis is on theories that are relevant to adolescents, i.e., students in middle, intermediate, and high schools in the urban setting. It is also intended to help candidates a) become reflective practitioners who teach for and with metacognition; b) utilize the diversity in the classroom; c) create a caring community, and d) develop leadership skills.

Credits: 3. Contact Hours: 3 hr./wk.

EDUC 9602G - Administration and Supervision of Early Childhood Education

The supervisor's responsibilities in such areas as program making, staff development, pupil/personnel, and program/department management. Cases and problems examined in laboratory settings, taught by joint administration and specialized area faculty. Special permission required.

Credits: 3. Contact Hours: 3 hr./wk.

EDUC 9800G - Educational Leadership in Day Care

Role of the director in setting priorities for the center and its early childhood program. Supervision and development of staff. Relations with governmental agencies, sponsoring agency, board, and community. Open only to matriculants in the Day Care Leadership Program or by special permission.

Credits: 3. Contact Hours: 3 hr./wk.

SPED - Special Education Course Descriptions

SPED 2207I - Research into Teaching: Bilingual Education

This course supports bilingual childhood education candidates in completing a culminating project that involves collecting classroom data, developing and implementing learning plans, reviewing bilingual education research, analyzing their teaching, and assessing their students' learning. Candidates will consider the implications of their findings for their future teaching with multilingual learners. This is a Pass/Fail course.

Credits: 2. Contact Hours: 2 hr./wk. Includes 10 hours of fieldwork. Corequisite: EDCE 7501G / EDCE 7502G and EDUC 1900G

SPED 2208I - Research into Teaching: TESOL

This course supports TESOL candidates in completing a culminating project that involves collecting data in their classrooms, developing and implementing learning plans, reviewing TESOL research, analyzing their teaching, and assessing their students' learning. Candidates will consider the implications of their findings for their future teaching with multilingual learners. Includes 10 hours of fieldwork. This is a Pass/Fail course.

Credits: 2. Contact Hours: 2 hr./wk. Corequisite: EDCE 7503G/EDCE 7504G and EDUC 1900G

SPED 2600I - Content Research Seminar in Special Education

A critical review of the research literature in the candidate's major interest, as well as appropriate research methodology and instrumentation. The first semester covers the basic concepts needed to evaluate research critically. Each student will identify a research problem, review literature related to that problem, and design a project to study it. The study will be carried out during the second semester. This course should be taken no later than the semester prior to the one in which the student expects to complete the requirements for the degree.

Credits: 2. Contact Hours: 2 hr./wk.

SPED 2900I - Seminar in Educational Research

Second semester of the research sequence. Students carry out their study designed in the Content Research Seminar and learn how to analyze, write about, and present the data collected. By permission only.

Credits: 2. Contact Hours: 2 hr./wk.

SPED 3300K - Building Community in Inclusive Contexts

Children come to school as unique learners who negotiate the world within complex and ever-shifting intersectionalities of race, class, gender, and ability. This course prepares teacher candidates to conceptualize human diversity as a resource (rather than a liability) and to facilitate caring classroom communities within which all learners are viewed as valuable. Participants will acquire in-depth understanding of techniques that nurture the development of an interdependent learning community based upon trust, mutual respect, and acceptance. Issues specific to classroom dynamics and access are considered in the instance of physical setting, curriculum, and teaching strategies as each relates to building community in the classroom. In addition, community building in the larger school context (including strategies for initiating and sustaining school change) will be addressed as well as transition issues that bridge to the outside community (community-based inclusion). Attention will be given to language arts, mathematics, science, social studies, and technology as appropriate and consistent with the N.Y. State Learning Standards.

Credits: 3. Contact Hours: 3hr./ wk.

SPED 3600K - Reading and Writing Instruction for Students with Disabilities in Childhood Education I

This course is the first in a two-part sequence designed to assist participants to make informed choices about how to structure classroom routines and rituals that maximize opportunities for teaching reading and writing in an integrated fashion. Various frameworks for lesson planning to complement the IEP will be introduced as well as exceptionality specific assessment instruments. Course content will address the essential components of reading, including: phonemic awareness, phonics, fluency and expressiveness, vocabulary, and comprehension. In conjunction with reading skills, methodologies of writing through a process approach will also be introduced (i.e., pre-writing, organization, writing a primary draft, multiple revisions, and final editing).

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

SPED 3601K - Reading and Writing Instruction for Students with Disabilities in Adolescent Education I

This course is the first in a two-part sequence designed to assist participants to make informed choices about how to structure classroom routines and rituals that maximize opportunities for teaching reading and writing in an integrated fashion. Various frameworks for lesson planning to complement the IEP will be introduced as well as exceptionality specific assessment instruments. Course content will address the essential components of reading, including: phonemic awareness, phonics, fluency and expressiveness, vocabulary, and comprehension. In conjunction with reading skills, methodologies of writing through a process approach will also be introduced (i.e., pre-writing, organization, writing a primary draft, multiple revisions, and final editing). Matriculation in students with disabilities program required.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3hr./wk.

SPED 3700K - Reading and Writing Instruction for Students with Disabilities in Childhood Education II

This course (part II) is designed to extend the literacy components introduced in part I. Extended experiences will focus on maintaining a classroom structure that supports a reading-rich context in conjunction with writing-worthy opportunities for use in a variety of educational contexts. The course will feature strategies to teach habits of good readers, such as: activating schema, visualizing, questioning, determining importance, making inferences, monitoring for meaning, and synthesizing. In conjunction with explicit reading skills (part I), methodologies of writing will also be taught, focusing on the process of

writing through: pre-writing, organization, writing a primary draft, multiple revisions, and final editing. The art of *individual conferencing* with students will be featured at length.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: EDUC 3600K (except for those in the Advanced Certificate Program Students with Disabilities 7-12).

SPED 3701K - Reading and Writing Instruction for Students with Disabilities in Adolescent Education II

This course (part II) is designed to extend the literacy components introduced in part I. Extended experiences will focus on maintaining a classroom structure that supports a reading-rich context in conjunction with writing-worthy opportunities for use in a variety of educational contexts. The course will feature strategies to teach habits of good readers, such as: activating schema, visualizing, questioning, determining importance, making inferences, monitoring for meaning, and synthesizing. In conjunction with explicit reading skills (part I), methodologies of writing will also be taught, focusing on the process of writing through: pre-writing, organization, writing a primary draft, multiple revisions, and final editing. The art of individual conferencing with students will be featured at length.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: EDUC 3601K(except for those in the Advanced Certificate Program Students with Disabilities 7-12). Matriculation in students with disabilities program required.

SPED 3800K - Assessment for Students with Disabilities in Childhood Education I

This course is the first in a two-part sequence designed to foster creative approaches to assessing all children in a variety of educational settings, including students with disabilities. Participants will focus on understanding differences as a basis for planning; utilizing multiple forms of intelligence; and using a variety of assessments in an ongoing manner to design lesson plans that are more likely to address a learner's specific needs. Content specialists will inform the course activities in the areas of language arts, mathematics, science, social studies, and technology (teaching modules) as per the Part 100 Regulation of the Commissioner of Education and the New York State Standards. Participants will utilize content modules and apply their acquired knowledge of assessment to the content areas studied. Regulatory requirements (Part 100 and Part 200 Rules and Regulations of the NYS Commissioner of Education) that focus on curriculum content, due process, assessment, programs and services are correlated to each of the topics covered during this course.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

SPED 3801K - Assessment for Students with Disabilities in Adolescent Education I

This course is the first in a two-part sequence designed to foster creative approaches to assessing all children in a variety of educational settings, including students with disabilities. Participants will focus on understanding differences as a basis for planning; utilizing multiple forms of intelligence; and using a variety of assessments in an ongoing manner to design lesson plans that are more likely to address a learner's specific needs. Content specialists will inform the course activities in the areas of language arts, mathematics, science, social studies, and technology (teaching modules) as per the Part 100 Regulation of the Commissioner of Education and the New York State Standards. Participants will utilize content modules and apply their acquired knowledge of assessment to the content areas studied. Regulatory requirements (Part 100 and Part 200 Rules and Regulations of the NYS Commissioner of Education) that focus on curriculum content, due process, assessment, programs and services are correlated to each of the topics covered during this course.

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk.

SPED 3900K - Instructional Methods for Students with Disabilities in Childhood Education II

This course is the second part of a two-part sequence that extends the content addressed in Part I, linking multiple forms of assessment with instructional practices. Participants will develop the knowledge and skills needed to plan and implement universal, differentiated, and individualized lessons. Participants will also focus on developing pedagogical flexibility within three broad, interconnected strands: The information to be taught (content specific to: language arts, mathematics, science, social studies, technology), how students engage with that information (process), and the ways in which students demonstrate their knowledge and skills as a result of interacting with information (product). In this course, participants will learn how to design individualized multi-option assignments within varied classroom arrangements and to guide students in making appropriate interest-based choices, using students' readiness, interests, and individual learning profiles. Content areas are used to engage participants as per the Part 100 Regulation of the Commissioner of Education and the New York State Standards. Extending Part I of the course, participants will elaborate on content-based modules and apply their acquired knowledge of assessment and universal, differentiated, and individualized instructional designs to the content areas studied. In addition, regulatory requirements (Part 100 and Part 200 Rules and Regulations of the NYS Commissioner of Education) that focus on curriculum content, due process, assessment, programs and services are correlated to the topics covered during this course. Prereq: SPED 3800K (except for those in the Advanced Certificate Program, Students with Disabilities, Grades 1-6).

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: EDUC 3800K(except for those in the Advanced Certificate Program Students with Disabilities 1-6).

SPED 3901K - Instructional Methods for Students with Disabilities in Adolescent Education II

This course is the second part of a two-part sequence that extends the content addressed in Part I, linking multiple forms of assessment with instructional practices. Participants will develop the knowledge and skills needed to plan and implement universal, differentiated, and individualized lessons. Participants will also focus on developing pedagogical flexibility within three broad, interconnected strands: The information to be taught (content specific to: language arts, mathematics, science, social studies, technology), how students engage with that information (process), and the ways in which students demonstrate their knowledge and skills as a result of interacting with information (product). In this course, participants will learn how to design individualized multi-option assignments within varied classroom arrangements and to guide students in making appropriate interest-based choices, using students' readiness, interests, and individual learning profiles. Content areas are used to engage participants as per the Part 100 Regulation of the Commissioner of Education and the New York State Standards. Extending Part I of the course, participants will elaborate on content-based modules and apply their acquired knowledge of assessment and universal, differentiated, and individualized instructional designs to the content areas studied. In addition, regulatory requirements (Part 100 and Part 200 Rules and Regulations of the NYS Commissioner of Education) that focus on curriculum content, due process, assessment, programs and services are correlated to the topics covered during this course. Prereq: SPED 3801K (except for those in the Advanced Certificate Program, Students with Disabilities, Grades 7-12).

Credits: 3. Contact Hours: Includes 15 hours of fieldwork. 3 hr./wk. Prerequisite: EDUC 3801K(except for those in the Advanced Certificate Program Students with Disabilities 7-12). Matriculation in students with disabilities program required.

SPED 4400K - Disability, Schools, and Society

Participants will consider topics of critical importance to the intersection of disability, schools, and society. This course will be taught in a seminar format and address a wide range of topics that include, without

limitation: disability policy; disability law; disability and religion; international disability practices and policies; disability transition issues; the intersection of disability, race, ethnicity, class, gender, and sexual orientation; inclusion practices nationally and internationally; and, the World Bank and special education. As deemed appropriate, experts and scholars in the issues discussed will be invited to participate and present on their areas of specialty. The final project will require participants to apply this knowledge in an interactive project for the classroom, school, district or other community setting in which understanding disability through the lens of diversity.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 4600A - Foundations in Early Childhood Special Education

This course provides an introduction to the foundations of early intervention and early childhood special education, including developmental, educational, family systems, and health perspectives and theories. Specific attention is paid to the process of early intervention and early childhood special education within the least restrictive environment, as delineated in state and federal legislation. Includes 10-15 hours of fieldwork.

Credits: 3. Contact Hours: 3 hrs./wk.; 3 cr.

SPED 4700K - Early Intervention for Infants and Toddlers with Special Needs

Provides knowledge and skills to meet the needs of infants, toddlers, and young children who demonstrate mild to profound disabilities. Includes how to use developmentally-appropriate/culturally-responsive practices to work with health care professionals, health and safety, emergency care, management of chronic health impairments, and management of neurodevelopmental and motor disabilities. Includes 10-15 hours of fieldwork.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 4800K - Managing the Environment for Young Children with Special Needs

This course explores how to manage the environment to support learning and development for young children with diverse needs. Participants will learn how to identify and support behavior challenges in a variety of early learning environments - individual, small group, and large group settings; home, center-based, and integrated classrooms. Includes 10-15 hours of fieldwork.

Credits: 3. Contact Hours: 3 hrs./wk.; 3 cr.

SPED 4900K - Assessment of Young Children with Special Needs: B-2nd grade

This course explores the role of assessment in understanding young children's learning and development. It conceptualizes assessment as an ongoing, collaborative process of gathering and interpreting evidence about children's behaviors and the social/physical environment to make decisions regarding services and supports for young children with disabilities or developmental delays. Includes 10-15 hours of fieldwork.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 5000K - Introduction to Inclusive Education

An introduction to the multiple meanings of inclusive education as employed in both national and international contexts. Specific attention is paid to school structure, legislative mandates in support of inclusive education, collaborative problem-solving relationships among educators (general and special), students, and families in designing and modeling inclusive pedagogies and practices for diverse learners. We will examine historical contexts, shifting societal beliefs, and subsequent educational theories that have led to an increased emphasis on inclusion and the merits of collaborative education to serve students with disabilities in more integrated contexts. The course includes: an overview of inclusive education, student characteristics; diverse approaches to pedagogical practice; models of collaboration, including collaborative team teaching (CTT); classroom management; and assessment and utilization of assistive instructional technologies. Matriculation in School of Education program required.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 5300K - Positive Approaches to Challenging Behaviors

This course is designed to assist participants to make informed choices about how to analyze a "behavior issue" in the classroom and school context. Participants will learn how to develop multiple positive approaches for extinguishing difficult behaviors. Traditional as well as alternative behavioral interventions will be considered including an overview of the traditional (i.e., controlling) behavioral approaches and practices typically used with students with intellectual or emotional disabilities. Readings and activities will encourage examination of the conceptual foundations and underlying principles of such approaches for use in an inclusive society. The central feature of this course, however, will be on interactive intervention alternatives that alleviate frustrations for students with disabilities, focus on their needs and wishes, and support them in taking control of their lives. The final project will require participants to apply an approach to the management of difficult behaviors they find most suitable in their classrooms.

Credits: 3. Contact Hours: Includes 15-20 hours of fieldwork. 3 hr./wk.

SPED 5700G - Practicum in Teaching Special Education

An advanced course to assess and develop teaching skills in various special education settings under supervision in the field. Individual conferences to review teaching strategies, materials, and techniques. Department permission required.

Credits: 2. Contact Hours: 60 hrs. per semester Corequisite: SPED 5701G

SPED 5701G - Special Education Practicum Seminar

This course includes observation of candidates within the classroom setting as well as candidate participation in a weekly seminar. The seminar provides both an opportunity for candidates to reflect with one another about their teaching practices and a forum for discussion of relevant issues in special education.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: Department permission required.

SPED 6100I - Building Connections: Disabilities, Families, Schools, and Communities

Designed to link theories and practices associated with families, schools, and communities for children and youth with disabilities, the focus of this course emphasizes the use of strategies that develop positive and supportive relationships between families and staff while promoting student development and learning. Some topics include the legal and philosophical basis for family participation, transition requirements, and the professional issues educators and related-service personnel typically encounter. Family-centered services and parent education will be stressed, including identification of educators' roles with other disciplines to building partnerships that support families.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 6600C - Assessment for Multilingual Learners

This course explores issues of assessment with multilingual learners in US schools. It equips teacher candidates with the skills needed to develop and implement effective assessment instruments, assess student learning, and analyze student work to inform future instruction. The course also provides a critical understanding of the larger policy context.

Credits: 3. Contact Hours: 3 hr./wk. Includes 10 hours of fieldwork.

SPED 6700G - The Management of Schools - Operational Problems and Practices

Aspects of management such as scheduling, assignment, financial management, and reporting. Basic operational needs, procedures and administration for prospective building level principals.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 7306G - Supervised Practicum and Seminar in Early Childhood Special Education

Supervised Teaching is an opportunity to further develop the essential skills, dispositions, and self-reflection necessary to be an effective and successful early childhood special education educator. Seminar discussions will offer the opportunity to integrate theory learned in coursework with experiences teaching in the field. Candidates have the opportunity to choose a concentration in Early Intervention service (Birth -3), Special Education Itinerant Teacher service preschool age (3-5) or school age early childhood (K-2).

Credits: 3. Contact Hours: 3 hrs./wk.; 3 cr. Prerequisite: Completion of 12 credits in the Advanced Certificate in Early Childhood Special Education Program; advisor approval

SPED 7701G - Internship in Special Education

Candidates will be assigned a full time supervised student teaching experience in a special education or inclusion setting in accordance with his/her certification grade level (e.g., 1-6, 7-12) for a minimum of 300 hours. Accompanying weekly seminar integrates the teaching experience with course work. Required for those in the initial certification program. To be completed at the end of the program sequence.

Credits: 4. Contact Hours: 300 hours per semester Corequisite: SPED 7702G, EDUC 1900G

SPED 7702G - Special Education Student Teaching Seminar

This course includes observation of candidates within the classroom setting as well as candidate participation in a weekly seminar. The seminar provides both an opportunity for candidates to reflect with one another about their teaching practices and a forum for discussion of relevant issues in special education.

Credits: 2. Contact Hours: 2 hrs./wk. Prerequisite: Departmental ApprovalCorequisite: SPED 7701G and EDUC 1900G

SPED 8000I - Critique of Research in Educational Administration and Supervision

A review of the literature, and an analysis of the implications of this research for administrative performance.

Credits: 2. Contact Hours: 2 hr./wk. Prerequisite: Special permission required.

SPED 8100I - Individual Research in Educational Administration and Supervision

Advanced study of special problems in education sponsorship by staff member.

Credits: 2. Contact Hours: Hours to be arranged. 2 hr./ wk. Prerequisite: Special permission required.

SPED 8200I - Computer Applications and Use for School Administrators

Discussion of a variety of current topics related to computer applications and use in school administration and with particular emphasis on recent advancement and research in hardware/software development, and adaptation at the elementary and secondary school levels. Ample opportunity to participate in hands-on computer laboratory.

Credits: 3. Contact Hours: 3 hr./wk.

SPED 8500I - Field Problem Seminar in Educational Administration and Supervision

Analysis of problems arising in the experience of the group. Relation to perennial problems in this field. Directed self-study of pertinent bibliographic sources. Arrangements may be made for observations and conferences. Designed for those currently engaged in administration or supervision. Open only to matriculants in Administration. (This course is part of a specialized component in organizational development.)

Credits: 1-6. Contact Hours: Hr. to be arranged.

SPED 8601I - Advanced Problem Seminar in Urban Education and Administration

In-depth analysis of issues that have special significance for urban school administrators; the current status of decentralization, integration, minimum competency, school finance, and constituent participation. The local, state, and federal roles in policy formulation. Analysis of research findings; alternate models.

Credits: 3. Contact Hours: 3hr./ wk. Prerequisite: Open to non-matriculants; permission required.

SPED 8602I - Strategies for Organizational Development in Educational Administration

Simulated laboratory applications of organizational development and open systems theory to the field of educational administration, including time management, team building, force field analysis, and survey feedback. Course draws upon the works of Schmuck, Levinson, Argyris, et al. Open to non-matriculants.

Credits: 3. Contact Hours: 3hr. / wk.

SPED 8603I - Strategies for Instructional Change in Educational Administration

The role of the administrator in creating and supporting a climate for the adoption of educational change and instructional innovation. Application of various techniques to design and evaluate the effectiveness of various change strategies.

Credits: 3. Contact Hours: 3hr./wk

EE - Electrical Engineering Course Descriptions

Foooo

EE F5600 - Elements of Control Theory

Treatment of performance through indices such as integral square error, integral time absolute error, etc. State Variable Design. Continuous and discrete systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 37100.

Gooo0

EE G3301 - Power Systems

Credits: 3. Contact Hours: 3 hr./wk.

EE G3303 - Power Electronics

Credits: 3. Contact Hours: 3 hr./wk.

EE G3800 - VLSI Design for Testability Technology I

This course is to cover concepts such as Economics of IC Test, Methods of Test, Testability and Measurements, Fault Models and Simulation, Test Pattern Generation, LogicTest, Memory Test, the IBM Level Sensitive Scan Design (LSSD) methodology, General Scan Design (GDS) methodology, Partial-and Full Scan designs, the IEEE 1149 boundary scan standards. Along with lectures, homework assignments, and exams, students are required to conduct at least one DFT design project to demonstrate understanding of DFT principles and methods. The main outcome is the basic understanding of DFT concepts and methods.

Credits: 3. Contact Hours: 3 hr./wk.

EE G3900 - VLSI Design for Testability Technology II

This course is geared towards understanding of IC and SoC design methodologies such as IBM's and TSMC's ASIC sign-off processes, full-

and partial-scan insertions, boundary scan insertion, synthesis of BIST structures, robust delay testing, test resource management, the IEEE 1500 standard for SoC solutions, and other advanced topics such as low-pin count testing and mixed-signal testing. Students are required to perform design projects using CAD software systems such as Cadence Design System and SynTest Technologies' DEF solutions. The main outcome is the understanding of state-of-art technologies demonstrated through commercial CAD software systems, as well as learning and practicing industry solutions. Advanced students will be encouraged to explore new ideas in research projects.

Credits: 3. Contact Hours: 3 hr./wk.

EE G6400 - 5G Mobile Technologies and IoT

Credits: 3. Contact Hours: 3 hr./wk.

EE G6800 - Earth Surveillance

Earth Surveillance

Credits: 3. Contact Hours: 3 hr./wk.

EE G6902 - Optical Remote Sensing

Optical Remote Sensing

Credits: 3. Contact Hours: 3 hr./wk.

EE G6903 - Remote Sensing

Remote Sensing

Credits: 3. Contact Hours: 3 hr./wk.

EE G6904 - Adv Stat & Non Linr An

Adv Stat&Non Linr An

Credits: 3. Contact Hours: 3 hr./wk.

EE G6910 - Renewable Energy

Credits: 3. Contact Hours: 3 hr./wk.

I0000

EE I0000 - Seminar

Invited speakers and reports of graduate student research.

Credits: 1 (Repeatable).. Contact Hours: 1 hr./wk.

EE I0100 - Probability and Stochastic Processes

Probability space, outcomes and events, random variables, distribution and density functions, limit theorems, functions of random variables, discrete and continuous stochastic processes, mean square estimation and prediction problems.

Credits: 3. Contact Hours: 3 hr./wk.

EE I0300 - Electrodynamics

Maxwell's equations. Green's functions. Plan, spherical and cylindrical waves. Scattering. Diffraction. Special theory of relativity. Radiation moving charged particles. Bremsstahlung, Cerenkov, and synchrotron radiation.

Credits: 3. Contact Hours: 3 hr./wk.

EE I0500 - Theory of Linear Systems

Review of time and frequency domain analysis of continuous and discrete linear systems. Extension to time varying cases. States and state variables. Matrix formulation and general solutions. State transition matrix, adjoint systems; stability, observability, and controllability. Minimal realization.

Credits: 3. Contact Hours: 3 hr./wk.

EE I1600 - Digital Signal Processing Algorithms

The latest developments in Digital Signal Processing (DSP) algorithms and their implementation on various computers. A survey of basic algebra is given, the tensor product will be a recurring theme. The Cooley-Tukey FFT algorithm and its variants are unified under the banner of tensor product formulation. The Good-Thomas Prime Factor algorithm is also reformulated in this way. Various linear and cyclic convolution algorithms are described; results of the Cook-Toom and the Winograd are emphasized. Newly developed multiplicitive FFT algorithms will be introduced. Techniques of writing efficient FORTRAN code.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 30600 and EE I5300.

EE I2200 - Image Processing

Image acquisition and representation of monochromatic and color images. Data compression techniques for image transmission including predictive and transform coding. Practical compression techniques, including progressive transmission, JPEG and MPEG.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I5300 and EE I0100.

EE I2300 - Digital Computers I

The structure and design of digital computing systems; a subsystem's approach to the behavior and implementation of computer arithmetic and logic circuitry, storage systems, control circuitry, and input-output. Algorithms and flow charting; computer codes; utilization of combinational and sequential switching theory in design of computer logic circuits; organization of storage systems. A modular approach to computer construction and ultimate use in higher phases of the hierarchy of machine structures.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I5400.

EE I2400 - Digital Computers II

Study of complex processors, multiprocessors, time sharing systems, and real time systems. Case histories in system architecture and design; impact of future technologies on computing machinery; concepts and design of ultra-reliable, ultra-available digital computers.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I2300.

EE I2700 - Parallel Comp Arch

Parallel Comp Arch

Credits: 3. Contact Hours: 3 hr./wk.

EE I3200 - Analog Integrated Circuits

Design of analog integrated circuits. Modeling of integrated circuits components. Current mirrors; Differential amplifiers with active loads; Band gap references; operational amplifiers; Feedback; Noise in integrated circuits.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 34200.

EE I3600 - Mos Dvices & Circts

Mos Dvices & Circts

Credits: 3. Contact Hours: 3 hr./wk.

EE I4100 - Intro Modern Control Theory

Intro Modern Control Theory

Credits: 3. Contact Hours: 3 hr./wk.

EE I4500 - Direct Energy Conversion

Review of principles underlying modern development for energy conversion. Applications to energy storage, photovoltaic conversion, thermoelectricity, fuel cells, magnetohydrodynamic generation, thermionic generation. Economics of direct energy conversion systems.

Credits: 3. Contact Hours: 3 hr/wk. Prerequisite: EE 33300, EE 33900.

EE I4600 - Analysis and Design of Intelligent Systems

Analysis of intelligent systems, such as those that can solve differential equations in symbolic form, understand human speech, and recognize objects in a scene. Methods of solving problems in artificial intelligence areas will be discussed. Predicate calculus. Rule based deduction system. Expert systems.

Credits: 3. Contact Hours: 3 hr./wk.

EE I4700 - Introduction to Neural Networks

Overview of Neurocomputing, definition of neural network, motivation to use neural network, simple perceptron, its capability and limitations, learning laws in perceptron, linear, nonlinear and stochastic units, multilayer networks, concept of hidden units, learning rules, the delta rule, the generalized delta rule, feed-back neural networks, Grossberg, Kohonen and Hopfield models, specific applications in pattern recognition and image processing problems.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: EE I0100.

EE I5100 - Communication Electronics

Components of end-to-end communications systems. Noise of circuits and systems. Behavior of wide-band and tuned amplifiers; limits on small signal operation. Gain controlled amplifiers. Limiters, frequency multipliers, oscillators, coupling networks, non-linear elements; distortion, amplitude frequency and phase modulators, transmitters and low noise receivers.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 31200.

EE I5200 - Fiber Optic Communications I

An overview of the fundamental components of an optical fiber link. Degradation, attenuation, and distortion mechanisms in fibers. LED and laser sources. Detectors and receivers. Analog and digital modulation formats. Performance analysis.

Credits: 3. Contact Hours: 3 hr./wk.

EE I5300 - Digital Signal Processing

The finite Fourier transform, cyclic convolution, digital filters, Z-transform. Design of algorithms computing the finite Fourier transform and cyclic convolution, Cooley-Tukey and Winograd algorithms and other topics as appropriate.

Credits: 3. Contact Hours: 3 hr./wk.

EE I5400 - Physical Electronics I

Crystal Structures, reciprocal lattice, phonons, free electron model of metals, periodic potentials and energy bands, Fermi surface and conduction in metals, semiconductor materials.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 33300, EE 33900.

EE I5500 - Introduction to Robotics

Introduction: historical development of robotic systems, research perspectives; Robot Manipulators: Homogeneous representation, robot kinematics and dynamics models, path and trajectory planning, robot motion control; Mobile Robots: kinematics model and dynamic model of wheeled mobile robots, motion planning and trajectory generation, navigation and mapping; Robot Sensing: visual and non-visual sensors.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 37100.

EE I5600 - Advanced Mobile Robotics

This course is an in-depth study of state-of-the-art technologies and methods of mobile robotics. The course consists of two components: lectures on theory and course projects. Lectures will draw from textbooks and current research literature with several reading discussion classes. In the project component of this class, students will do computer simulations or implement algorithms on mobile robot platforms at the CCNY Robotics Lab. The primary topics include control architectures, motion planning, localization and mapping, navigation, adaptation and learning, and multi-robot systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I5500.

EE I5700 - Digital Integrated Circuits

Design of logic circuits; TTL, MOS, ECL. Design of flip-flops and memories at the transistor level. Design of analog to digital converters. Digital to analog converters. Simple and hold circuits, and timing circuits. Interconnecting logic gates using transmission lines.

Credits: 3. Contact Hours: 3 hr./wk.

EE I5800 - Introduction to Lasers

Review of Maxwell's equations, geometrical optics, stability of optical cavities, Gaussian beam propagation and Gaussian beams in optical cavities, properties of resonant optical cavities, classical and Einstein model of the interaction of light and matter, laser oscillation and amplification. Gas, semiconductor and solid state lasers.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 33300.

EE I5900 - Microprocessors

Introduction to stored program computers, microcomputers, and Pascal. Review of number systems, binary arithmetic, computer arithmetic algorithms, register transfer language and micro-operations. Digital computer and microcomputer functional elements, input-output devices, system organization and control. Accumulator-based processors, general register processors. Microcomputer case study.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 44400.

EE I6000 - Computer Communication Systems

Queueing theory, Markovian networks, message packet and circuit switching, assignment of link capacities and flows, routing algorithms, stability, flow control and error control. Introduction to data networks and internet, OSI/ISO model, data link layer protocols: HDLC, PPP, 802.3, TCP and flow control, queing systems M/M/1, M/G/1, Markovian Systems, principles of IP routing algorithms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I0100.

EE I6100 - Integrated Circuits: Design and Fabrication I

Introduction to physics of IC processing: epitaxial growth, diffusion, oxidation, ion implantation, evaporation, and sputtering. Bipolar IC processing function, oxide and air isolation, analog IC design, OP amps and other circuits. MOS processing: metal and poly gate and self aligned structure, CMOS. Digital IC design. Analysis of ECL, T2L, I2L and MOS logic design.

Credits: 3. Contact Hours: 3 hr./wk.

EE I6200 - Principles of Photonics Engineering

Principles and CAD tools for the design of photonics systems and devices. Topics from ray tracing, lens design, optical imaging systems design and analysis, interferometry, Fourier optics, fibers, and waveguides, optical detectors, videodiscs, spectroscopy.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 33300.

EE I6300 - Wireless Communications

Cellular systems: frequency reuse, co-channel and adjacent channel interference, capacity improvement. Wireless channel characteristics: long term fading, short term fading. Diversity techniques: space, frequency, time, polarization. Combining techniques. Digital modulation techniques: DPSK, QPSK, p/4QPSK, QAM, MSK, GMSK. Multiple Access Techniques for wireless communications: FDMA, TDMA, CDMA. Personal Communication Services. Current standards of PCS and cellular systems. Other topics may be added as appropriate.

Credits: 3. Contact Hours: 3 hr./wk.

EE I6400 - Computer-Aided Digital VLSI Circuits Design

This course presents a systematic approach to the design of full-custom, very and ultra large scale integration (VLSI and ULSI) circuits, utilizing state-of-the-art electronic design automation (EDA) commercial engineering software - the Cadence Design System. It is to cover three

major areas: CMOS Processing Technologies, High Performance Circuit Design techniques and Practices, Advanced EDA CAD Software Applications, coupled with relatively large scale (>one-million transistors) design projects.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 44100, EE 44400 and EE 45700 (or equivalent).

EE I6530 - Artificial Intelligence for Engineering Applications

This course introduces modern AI optimization techniques mimicking biological principles such as survival of the fittest, behavior of ants and flocks of birds. These AI techniques become especially relevant for problems when there is no known analytical solution. This course illustrates application of AI techniques to solve realistic engineering problems in many fields including telecommunication, transportation, robotics, biology, finance and others.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I0100 (knowledge of linear systems and basic programming skills)

EE I6600 - Communications Protocol Engineering

Open systems interconnection (OSI) reference model, modeling communication protocols using finite and extended finite state machines, formal languages for protocol specification, real-life protocol specifications, verification of communication protocols, conformance testing methods, synchronization issues in testing, test representation languages.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I6000 or EE 46000.

EE I6700 - IP Routing

Principles of IP routing protocols such as OSPF, RIP, and BGP are covered. Analysis of connection oriented networks protocols such as MPLS, and VLANs is provided. RSVP; Signaling protocol and Diffserv are analyzed. Finally methods of traffic engineering in IP networks are discussed. Familiarity with data networks protocols is desirable.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: None.

EE I6800 - Telecommunication Network Element Engineering

This course provides an introduction to a broad spectrum of network and element level management protocols, software entities, and information databases. Students will gain theoretical and practical knowledge of network management concepts. Topics include management network architectures, protocols, modeling, information databases, network management applications (such as Configuration, Fault, and Performance Management), and telecommunications management network fundamentals.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 46000.

EE I7000 - Network and Security

The course will cover multiple access schemes used to access various networks including WiFi networks, Internet of Things (IoT) and 5G mobile networks. This course will cover network security including cryptography, symmetric-key and public key-encryption, digital signatures, management of public keys and communications security. We will discuss network attacks such as TCP Session hijacking, man-in-the middle attack, attack on Domain servers, DDoS attacks, SYN flood attack. Detailed discussion of smart grid security and how intrusion detection systems are used. Under the topic of communications network security control we will discuss IPSEC, firewalls, VPN, and intrusion detection system.

Credits: 3. Contact Hours: 3 hr./wk.

EE I7100 - Statistical Communication Theory

Review of probability and stochastic processes, limit theorems, correlation function, power spectral density, vector channels, optimum decision regions, optimum receivers, probability of error; determination of bounds on error rates.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I0100.

EE I7200 - Spread Spectrum

Review of digital communication; comparison of digital modulation techniques such as PSK, DPSK, QPSK, MSK, and combined phase-amplitude data systems; autocorrelation and spectral characteristics of a spread spectrum signal. Response of a direct sequence spread spectrum signal to unwanted signals and to random noise. Pseudorandom codes, Gold codes, characteristics of codes used for spread spectrum; frequency-hopping. The phase locked loop; bit synchronization, Costas receiver; tracking using the Delay locked loop and the Taudither loop; acquisition techniques; applications of spread spectrum to TDMA, navigation, RPV; state-of-the-art in spread spectrum hardware.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I0100.

EE I7300 - Digital Communication I

Source coding. Characterization of communication signals and systems, optimum receivers for additive white Gausian noise channel, carrier and symbol synchronization, channel capacity and coding, block and convolutional channel codes.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 10100.

EE I7400 - Digital Data Communications II

Signal design for band-limited channels, communication through band-limited linear filter channels, adaptive equalization, multichannel and multicarrier systems, spread spectrum signals for digital communications, digital communications through fading multipath channels, multiuser communications.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE 17300.

EE I7500 - Advanced Wireless Networks

Advances in wireless communications, especially in the area of bandwidth and mobility, made it possible for users to communicate using multiple media, ranging from low rate applications as in wireless sensor networks, to high rate applications as in HDTV, to high mobility networks as in Vehicle to Vehicle (V2V) networks. This course emphasizes current and future advanced wireless networking technologies to support a wide range of applications, including WPAN, WLAN, WMAN, and WWAN like advanced LTE. It also presents the convergence of various networks and services. Discussion covers technical issues from Physical layer to Application Layer, as well as a few contemporary issues of wireless communication networks using recent papers from IEEE and ACM journals and conference papers. Normally, a computer project is required. Familiarity with certain background information is highly desirable including the subjects of wireless and computer communications networks such as modulation and detection, media access control, and network protocols.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: None.

EE I7600 - Secure Internet of Things Design Laboratory

A laboratory course on the introduction to the field of Information Security and the Internet of Things (IoT) in which large quantities of new devices are deployed throughout an organization or even within a system. Includes the need for information security, the definition of Life Cycle Security Controls for IoT devices, planning for security, and risk management, the function of firewalls, virtual private networks, intrusion detection systems, cryptography, and access control mechanisms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I7000Corequisite: EE I7000

EE I7700 - Penetration Testing & Ethical Hacking

This course covers fundamental topics in internet and information security. Students will perform penetration testing and ethical hacking using various setup. Attack strategies and penetration testing methodologies will be covered and students will learn Intrusion detection and prevention systems in addition to advanced mitigation strategies. As part of the course students will be

organized into groups to perform a security design project and will present the work at the end of the semester.

Credits: 3. Contact Hours: 3 hr./wk.

EE I8200 - Electro-Optics

Beam propagation in anisotropic media, Faraday rotation, birefringence, beam propagation in periodic media, Bragg scattering and Bragg filters, acousto-optic effect and devices, electro-optic effect and devices, photorefractive materials and other nonlinear effects, integrated optics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I6200.

EE I8300 - Fiber Optic Communications II

Basic building blocks of an all optical network with particular emphasis on optical amplifiers including both Semiconductor Optical Amplifiers (SOAs) and Erbium-Doped Fiber Amplifiers (EDFAs). System architecture for: I) the point-to-point link, II) the single station-to-multistation multipoint network, and III) the any-to-any connected network. Wavelength-Division Multi-Access (WDMA) and Time-division Multi-access networks (TDMA).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I5200.

EE I8500 - Optical Signal Processing

Signal Parameters. Review of geometric optics, wave optics, and aberrations. Fresnel transform. Fourier transform optics. Information capacity and maximum packing density. System coherence, spectral analysis, spatial filtering and filtering systems. Acousto-optic devices.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I6200.

EE I9400 - High Speed Networks

Fundamentals of high speed transport network (SONET) are discussed. Details of ATM transport networks are provided. Principles of IP optical networks including optical cross-connects are discussed. Case studies of next generation networks architecture and protocols are studied. Familiarity with data networks protocols is desirable.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: None.

EE I9600 - Report

In depth analysis by means of a written report using a number of technical papers, reports or articles on a specific topic. Topics to be chosen by the student after consultation with a professor. An oral presentation of the written report may be required at the departmental seminar.

Credits: 0. Prerequisite: Completion of 15 credits toward the master's degree in EE.

EE I9700 - Master's Project

Analytical or experimental project, preferably of student's own choice. Under direction of a faculty advisor, student submits written proposal, performs the required task, and submits a written final report. Credit will be granted for either EE I9700 or EE I9900, not both.

Credits: 3. Prerequisite: Departmental master's advisor's approval.

EE I9800 - Graduate Laboratory

Experimental project. Topic must be approved by a faculty member as well as the departmental master's advisor.

Credits: 3.

EE I9900 - Research for the Master's Thesis

Credit will be granted for either EE I9700 or EE I9900, not both.

Credits: 6. Prerequisite: Departmental master's advisor's approval.

Joooo

EE Joooo - Advanced Seminar

Advanced developments in electrical engineering. Students and instructor report on topics of interest.

Credits: Credit varies.. Prerequisite: Departmental Ph.D. advisor's approval.

EE J2700 - Multidimensional Signal Processing

Multidimensional signals and systems. DFT, FIR, IIR filters design. Stability.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: EE I5300 and ENGR I1200.

EE J9900 - Research for Doctoral Dissertation

Credits: Variable credit (12 cr. Maximum).

Koooo

EE K9000 - Doctoral Dissertation Supervision

1 credit repeatable up to 6 credits.

Credits: 1. Prerequisite: Approval of the departmental Ph.D. advisor.

Rooo

EE R0100 - Special Topics in Advanced Electrical Engineering.

Prerequisite: Third-level standing in the doctoral program.

ENGL - English Course Descriptions

Booo

ENGL B0000 - Chaucer: The Canterbury Tales

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0001 - Chaucer II

Troilus and other writings.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0100 - Shakespeare I

The comedies and history plays.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0200 - Shakespeare II

The tragedies and late romances.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0300 - Milton

Paradise Lost and Paradise Regained. A critical study of Milton's epics.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0500 - History of the English Language and Modern Linguistic Theory

The history of the language, together with an introduction to recent theoretical developments in linguistics.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0700 - The Sixteenth Century in England

Literary currents from the accession of Henry VII to the death of Elizabeth (1485-1603). Figures studied include Skelton, More, Wyatt, Surrey, Ascham, Elyot, Sidney, Marlowe, Nash, Lyly, Daniel, and Drayton.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B0900 - English Literature of the Restoration and Early Eighteenth Century

Studies in Defoe, Dryden, Pope, Swift and others.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1000 - English Romantic Poetry and Prose

Studies in Blake, Wordsworth and Coleridge; the Shelleys, Byron, Keats and DeQuincey.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1100 - English Literature of the Nineteenth Century

Studies in the Brontes, Hardy, Dickens, Eliot, Tennyson, Browning, etc.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1200 - Literature of the Twentieth Century

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1300 - Twentieth Century Irish Literature

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1400 - American Literature from its Beginnings to 1890

Literary documents of Puritanism and the Enlightenment including the works of the Mathers, Edwards, Franklin, Freneau, and Brown, as well as Irving, Bryant, Cooper, Longfellow and Poe. Attention will be given to the writings of African-Americans and women.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1500 - American Literature from 1890 to the Present

Textual analysis, with collateral study of the social, psychological and philosophical context.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1600 - The History of Ideas

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1700 - Literary Criticism

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1800 - Studies in Major Authors

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1900 - Literary Genres

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1920 - Short Story II--Critical Practice

A continuation of Short Story I, this course examines the contemporary short story through formal analysis of published work and writing in the genre. May be taken once for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1933 - Narrative Structure--Critical Practice

Formal analysis of published work and writing in the genre. This course examines writers' use of structure, form, perspective/point-of-view, time, and place in published fiction. Students produce both creative work and analysis utilizing the various topics covered. May be taken once for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1942 - Poetry--Critical Practice

This craft course examines the historical conversation between poets and other artistic genres, including visual art, music, as well as politics, the environment, and spirituality. The intent is to consider the source of poetic inspiration. May be taken once for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1948 - Children's Literature--Critical Practice

Formal analysis of published work and writing in the genre. This course explores the art and craft of writing for children. Both classic and contemporary works are examined for their approaches and the elements of the genre. May be taken twice for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B1955 - Writing for the Culture--Critical Practice

This course is intended to help student to establish themselves as professional poets or fiction writers and to enable them to contribute their writing to the cultural conversation. Students explore different types of writing, including personal essays, reviews, interviews, literary criticism, and journalism, in addition to work in their own genre. May be taken once for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B2000 - Studies in Literary and Historical Backgrounds

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B2100 - Studies in Themes and Motifs

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B2200 - Tutorials in English and American Literature

Students may take reading tutorials with the approval of the literature advisor if they find the ordinary rotation of seminars and lectures unsatisfactory for the needs of their programs of study.

Credits: 3.

ENGL B2800 - Thesis Research Tutorial

Independent research for the Master's thesis under the supervision of a mentor.

Credits: 3.

ENGL B3000 - Workshop in Fiction

Intensive work in the genre. *May be taken four times for credit.*

Credits: 3. Contact Hours: Minimum 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B3200 - Workshop in Poetry

Intensive work in the genre. *May be taken four times for credit.*

Credits: 3. Contact Hours: Minimum 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B3400 - Workshop in Drama

Intensive work in drama. *May be taken twice for credit.*

Credits: 3. Contact Hours: Minimum 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B3401 - Workshop in Fiction to Scripts

Intensive work in the genre. May be taken twice for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B3600 - Workshop in Nonfiction

Intensive work in the genre. *May be taken four times for credit.*

Credits: 3. Contact Hours: Minimum 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B3800 - Thesis Tutorial

Writing of a mature, substantial body of work (a collection of stories or poems, or a novel) under the supervision of a mentor. Required for the M.F.A.

Credits: 3.

Students may not register for more than one writing workshop per semester.

ENGL B3901 - Workshop in Translation

Intensive work in translation from other languages into English. *May be taken twice for credit.*

Credits: 3. Contact Hours: Minimum 2 hr./wk., plus individual conf.

Students may not register for more than one writing workshop per semester.

ENGL B5000 - Introduction to Teaching Writing and Literature

Explorations of pedagogical theories and practical strategies for classroom use.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B5100 - Supervised Team Teaching

Work with a master teacher of basic writing or ESL; auditing a basic writing course, teaching, preparing syllabi.

Credits: 3.

ENGL B5300 - Examining Reading and Writing Processes

Designed to make students more aware of reading and writing strategies.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B5500 - TESOL: Methods

Introduction to different methodologies in the field and the contribution of each to methods in second language instruction; focuses on reading, writing and speaking for second language students.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B6000 - Introduction to Language Studies

An introduction to various current language issues.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B6100 - Sociolinguistics

Variation in language from a social, linguistic and cultural orientation.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B6400 - Theories and Models of Literacy

Current theories and models of literacy in various linguistic communities and cultures, with particular emphasis on contrasts between orality and literacy in cognitive, linguistic and social dimensions.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B7300 - Studies in American Literature I

Trends and issues in American literature from its origins to the rise of realism and naturalism. The development of a national literary consciousness and the relationship of literature to American political, intellectual and social life.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B7400 - Studies in American Literature II

Trends and issues from the last decade of the nineteenth century to the present. How American writers reacted to the rise of industrialism, to the movement from a rural to an urban society, and to the emergence of new political, social and intellectual forces. The writers to be studied will include both creative figures and social and intellectual critics.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL B8000-8500 - Special Topics in Language and Literacy

Credits: Variable, 1-4.

ENGL B8100 - Second Language Acquisition

Studies in Blake, Wordsworth and Coleridge; the Shelleys, Byron, Keats and DeQuincey.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

ENGL B8200 - Studies in Literary and Historical Backgrounds

Tch Wrtng About Lit

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

C0000

ENGL C0825 - Short Story I--Critical Practice

Formal analysis of published work and writing in the genre from the mid-19th to the early-21st century. May be taken once for credit.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGL C0862 - The Teaching of Composition and Literature--Critical Practice

Study of the techniques, theory, and issues involved in the teaching of composition and literature. Designed for students currently teaching at City College for the first time. May be taken once for credit. Counts as a Critical Practice course for MFA students and as an elective for Language and Literacy and MA in Literature students. Only students who have been approved to teach for the English Department are eligible to take the course. Students are required to take the course in their first semester of teaching.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

ENGLE - Secondary Education English Course Descriptions

ENGLE 1100E - Creative Writing

One or more genres of creative writing, explored to develop the student's ability, learn about the process of teaching writing from the student's perspective, and develop further critical insight into literature.

Credits: 3. Contact Hours: 3 hr./wk.

ENGLE 1200E - Fundamentals of English

Intensive review of grammar, together with practice in writing.

Credits: 3. Contact Hours: 3 hr./wk.

ENGLE 1700C - The Technique of Poetry

A close reading of poetic texts with emphasis on the effect of poetic technique on the reader and interpretation.

Credits: 3. Contact Hours: 3 hr./wk.

ENGLE 1800C - Criticism and Appreciation of Poetry

Introduction of new critical devices which can be used in teaching poetry in the secondary schools.

Credits: 3. Contact Hours: 3 hr./wk.

ENGLE 4200C - Reading Nonfiction Texts

The purpose of this elective course is to study informational, nonfiction texts and the literacy practices that foster comprehension and critique of them. Students read multiple nonfiction texts on a variety of topics and respond to them through different writing and speaking projects. Students also craft instructional plans for how to support youth to read and respond to informational, nonfiction texts in secondary classrooms.

Credits: 3. Contact Hours: 3 hr./wk.

ENGLE 4400E - Structure and Growth of the English Language

Introductory course in philology; comparative study of English words and their use.

Credits: 3. Contact Hours: 3 hr./wk. Offered: Fall only.

ENGLE 4500C - The Child and Adolescent in American Fiction

The child as a major American literary theme.

Credits: 3. Contact Hours: 3 hr./wk. Offered: Spring only.

ENGLE 4600C - The Adolescent in Literature

The adolescent as a central figure in contemporary novels, biographies and plays, with emphasis on the literary treatment of adolescent problems.

Credits: 3. Contact Hours: 3 hr./wk. Offered: Spring only.

ENGLE 6300C - The Modern Short Story

Significant short stories of the twentieth century.

Credits: 3. Contact Hours: 3 hr./wk. Offered: Fall only.

ENGLE 6500C - The Short Novel

Analysis and explication of the novella in Western literature.

Credits: 3. Contact Hours: 3 hr./wk. Offered: Fall only.

ENGR - Engineering Graduate Courses

G0000

ENGR G0000 - Selected Topics in Engineering

Advanced topics in engineering chosen for their current interest to graduate students.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Departmental approval.

ENGR G5200 - Nuclear Reactor Physics and Engineering

ENGR G5300 - Nuclear Reactor Thermal Hydraulics

ENGR G5600 - Nuclear Reactor Design, Operation and Safety

ENGR G6601 - Environmental Modeling for Earth Systems Sciences and Engineering

Nature and purpose of environmental modeling; definition of fundamental concepts in environmental modeling; mathematical and numerical concepts involved in designing and building an environmental model; calibration, verification and validation of models; scale dependency; sensitivity analysis; characteristics, architecture and functioning of selected environmental models; practice by code development and use; contemporary applications to water resources, atmospheric processes, and climate dynamics processes.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate student standing in ESEST and a suitable GIS Introductory Course.

ENGR G6610 - Independent Study

Individual laboratory work,field work, or study in Earth Systems and Environmental Engineering under the supervision of a faculty mentor. Up to 3 cr. can be applied to Master's degree.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate student standing in ESEE. Permission of instructor.

H0000

ENGR H3800 - Management Concepts for Engineers

An analysis of the basic concepts of planning, leading, controlling and organizing in a high technology environment is presented. Topics include: developing team based organizations, improving communications and interpersonal relations, engineering ethics, decision-making techniques, handling conflicts and effective time management, motivating workforces and developing leadership style.

Credits: 3. Contact Hours: 3 hr./wk.

ENGR H7600 - Engineering and Business Law

Environmental law (E.L.) and Contract law (C.L.) are major components. The E.L. portion deals with salient features, particularly important to engineers, of the Clean Air Act, the Clean Water Act and the Resource Conservation and Recovery Act. The C.L. portion deals with engineers' liabilities, contracts and breaches thereof, bids, bonds, subcontracts, assignments, extra work disputes and arbitration.

Credits: 3. Contact Hours: 3 hr./wk.

ENGR H8000 - Decision and Planning Techniques for Engineering Management

Application of quantitative decision and planning tools to the problems of engineering management. Probability concepts. Decision making using probabilities. Inventory management and Just-In-Time tactics. Linear programming for optimal planning. Transportation and assignment problems. Job Shop scheduling. PERT/CPM and project management. Waiting lines. Statistical concepts with applications to quality control. Reliability analysis and maintenance strategy.

Credits: 3. Contact Hours: 3 hr./wk.

ENGR H8500 - Project Management

The practical aspects of total engineering project management are discussed and a functional approach for present and future project managers to assure project performance is presented. The course emphasizes the key role of project managers to assure project completion on time and within cost and quality requirements. Techniques of project planning, budgeting, contracting and control are emphasized.

Credits: 3. Contact Hours: 3 hr./wk.

ENGR H9300 - Economics and Investment Analysis of Engineering Projects

The practical aspects of economic analysis of engineering projects and their salient investment features. It includes relevant aspects of basic engineering economics and factors affecting project investment decisions. Value of money, present worth and rate of return concepts will be examined. Use of these concepts in project decisions and consideration of alternatives will be discussed. Examples will be taken from state-of-the-art electrical engineering industries.

Credits: 3. Contact Hours: 3 hr./wk.

I0000

ENGR I0000 - Seminars

Recent developments in engineering. The students report on assigned subjects.

Credits: Credit varies.. Prerequisite: Departmental approval.

ENGR I0600 - Applied Algebra

The fundamentals of topics from algebra that are important in system theory, control theory, network theory and computer science. The topics include set theory, rings, groups, finite-dimensional vector spaces, matrices, Boolean algebra and linear graphs.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39200.

ENGR I0800 - Foundations of Fluid Mechanics I

Extensive physical background; introduction to basic theorems and concepts. Application of vector calculus and tensor analysis to inviscid and viscous steady and unsteady flow. Navier-Stokes equations and Prandtl boundary layer theory; application to in-compressible fluid motions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 35600 or CHE 34200 or CE 35000.

ENGR I0900 - Foundations of Fluid Mechanics II

General theory of compressible, steady and unsteady flows, theory of characteristics. Linear and nonlinear wave propagation. Hypersonic flow.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I0800.

ENGR I1100 - Introduction to Engineering Analysis

Function of matrices, application to systems of ordinary differential and difference equations. Definitions and basic properties of Legendre, Bessel, and other special functions. Common problems in partial differential equations and solution by separation of variables. Eigenfunction expansions. Fourier integral. Applications of Laplace and Fourier transforms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39200.

ENGR I1200 - Functions of a Complex Variable

The elementary functions and their geometric representation. Cauchy integral theorems, Taylor and Laurent series. Classification of singularities. Analytic continuation, multivalued functions and their Riemann surfaces. Conformal mapping, Laplace and Fourier transforms and their inversion. Causality conditions, Nyquist criterion, Wiener-Hopf problems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39200.

ENGR I1300 - Transform Methods in Engineering

Elements of analytic function theory: contour integration, residue theorem. Laplace, Fourier, Mellin, Hankel, Hilbert and other common transforms. Properties, inversion formulas. Applications to the solution of ordinary differential equations, integral and dual integral equations and various problems in elasticity, vibrations, and fluid mechanics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100.

ENGR I1400 - Applied Partial Differential Equations

Inhomogeneous boundary value problems and solution by separation of variables. First order equations and their solution by characteristics. Higher order equations and systems, classification by characteristics. Hyperbolic equations and systems. The Riemann function, propagation of discontinuities and shocks. Boundary value problem for elliptic equations, maximum principle, Green's function. Potential theory, reduction of boundary value problem to an integral equation. Introduction to regular and singular perturbation solutions of non-linear equations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100.

ENGR I1500 - Introduction to Numerical Methods

Computation of roots of algebraic and transcendental equations. Solution of simultaneous equations. Determinations of eigenvalues. Interpolation. Approximation of functions by polynomials. Integration. Solution of ordinary differential equations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CSC 10200, MATH 39200.

ENGR I1600 - Advanced Numerical Analysis

Numerical solutions of problem in science and engineering. Linear and nonlinear systems of algebraic equations. Sparse matrix techniques. Eigenvalue-eigenvector problems. Error analysis. Nonlinear initial value problems and two-point boundary value problems for ordinary differential equations. Analysis of stability and accuracy. Least squares problems, approximation with sine functions, function minimization. Students are expected to use available work stations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1500.

ENGR I1700 - Finite Element Methods in Engineering

Equilibrium and variational formulations of finite element methods. Plane, axisymmetric, and shell elements. Isoparametric elements. Static and transient response of structures. Applications in potential flow, electrostatic, thermal conduction field problems, and diffusion equations. Students are expected to use available work stations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39200, CE I5400, or home department advisor's approval.

ENGR I2000 - Random Processes in Engineering Mechanics

Introduction to probability theory. Random processes: ergodic, stationary and non-stationary processes. Autocorrelation and cross-correlation functions, power and cross spectra, correlation coefficients. Input-output relationships for linear and nonlinear oscillators. Discrete and continuous systems. Zero-crossing and up-crossing problem. Stochastic characteristics of maximum response. Applications to vibrations, earthquake and wind engineering.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100 and CE 59802 or ME 54200 or equivalent.

ENGR I2400 - Turbulent Flows

Origins of turbulence and the qualitative features of turbulent flow. Prandtl's mixing length theory, von Karman's similarity hypothesis, and entrainment theories. Calculations of the behavior of free turbulent flows, including jets, wakes and plumes. Calculations of bounded turbulent flows, including pipe flow and boundary layers. Turbulent dispersion and diffusion.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 35600 or CHE 34100.

ENGR I3200 - Statistical Thermodynamics

An introduction to equilibrium statistical mechanics; ensembles, partition function, relation to classical thermodynamics. Evaluation of thermodynamic and transport properties of dense gases and liquids from molecular theory.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ChE I2800 or ME I3300.

ENGR I4200 - Continuum Mechanics

Continuum kinematics, formulation of physical principles in the continuum context, the formulation of constitutive equations, the theories of elastic solids, viscous fluids and viscoelastic solids. At the end of the course there will be an emphasis on either deformable porous media or finite deformation elasticity, depending on student interest.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Basic undergraduate courses in Mechanics of Materials, Fluid Mechanics and Linear Algebra (including vector field theory).

ENGR I5200 - Behavior of Inelastic Bodies and Structures

Linear theory of viscoelasticity with applications to vibrations and buckling. Introduction to the theory of plasticity. Physical basis, yield conditions. Perfectly plastic and strain hardening materials. Drucker's postulates, flow rule. Upper and lower bound theorems. Applications to torsion, indentation and plate theory. Numerical solutions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I3500.

ENGR I6400 - Wave Propagation in Fluids and Solids

Hyperbolic and dispersive, linear and non-linear waves. Hyperbolic waves: the wave equation, stationary waves, breaking waves, shock waves. Dispersive waves: dispersion relations, group and phase velocities. Non-linear waves and chaos in wave fields. Application to (1) water waves, (2) stress waves in solids (dilation and distortion waves, Rayleigh waves).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100 or equivalent.

ENGR I7500 - Poroelasticity

Incorporating elastic solid properties and Darcy's law, Biot poroelasticity is a model for interaction of stress and fluid flow in a porous medium. The Biot Model is used to solve quasistatic problems containing creep, stress relaxation and consolidation as well as wave propagation problems, including the "second sound" prediction and verification. The Biot model is then extended as a continuum mixture model suitable for a description of the mechano-electro-chemical behaviors associated with deformation and fluid flow in charged-hydrated porous materials. This mixture model provides a flexible and general basis that permits the development of a unified viewpoint for many diverse and perhaps simultaneously occurring phenomena.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1400: Applied partial differential equations and ENGR I4200: Continuum mechanics (or a course in elasticity and fluid mechanics that included viscous fluid theory).

ENGR I9100 - Mass Transfer

Definitions of concentrations, velocities and mass fluxes. Conservation of species equation; multicomponent diffusion; Stefan-Maxwell equations. Transient diffusion in semi-infinite media. Definition of transfer coefficients with mass addition. Application of film, penetration and boundary layer theory. Diffusion with homogeneous and heterogeneous chemical reaction. Interphase transport.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I0800.

ENGR I9500 - Professional Seminar and Special Topics in Earth Systems & Environmental Engineering

The Professional Seminar,which will be taught by a diverse group of faculty members, partners and other experts, will serve as a unifying foundation for the program by offering students a global perspective on environmental issues,introducing internship and research opportunities, and providing training in professional and personal skills.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Graduate student standing in ESEE. Permission of instructor

ENGR I9900 - Final Project in ESEE

The final project will consist of a research project with a faculty member. ESEE students will have the opportunity to work on real environmental science and engineering projects to gain practical experience and, in some cases, hands-on experience in the field or research lab. The faculty member will work with the student to prepare a research proposal and conduct a 3-credit research project. Research proposals and final projects will be presented orally.

Credits: 3. Contact Hours: 3 hr./wk.

J0000

ENGR J0100 - Fluid Dynamic Stability

Stability of two-dimensional incompressible boundary layer. Thermal instability. Stability of flow between rotating cylinders. Introduction to nonlinear instability. Applications to ionosphere and oceans.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1200.

ENGR J3100 - Irreversible Thermodynamics

An extension of classical thermodynamics to the treatment of irreversible processes. Entropy production. Forces and fluxes. Coupling of fluxes. Curie's principle. Reciprocal relations. Application to heat conduction, diffusion, momentum transfer, electrical conduction, chemical reaction, and their interaction.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I3200.

ENGR J4000 - Perturbation Techniques

The application of perturbation methods in the solution of solid mechanics, fluid mechanics and heat transfer problems. Formulation of the mathematical techniques in perturbation theory. Topics include: regular and singular problems, the method of strained coordinates, and matched asymptotic expansions. Applications to viscous flow at low and high Reynolds numbers, mechanical vibrations, and celestial mechanics problems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100 and ENGR I0800.

ENGR J5000 - Theory of Elasticity

Fundamental equations of the theory of elasticity. Uniqueness theorem. Formulation of torsion, flexure, plane stress and plane strain problems, and solution methods by means of complex variable and integral transforms. Three-dimensional problems. Displacement potentials and methods of Hankel transforms. Stress waves in solids.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE I3500 or ME I5400 and ENGR I1100.

HISTE - Secondary Education History Course Descriptions

HISTE 1700C - The Renaissance

Social and cultural development from the 14th to the early 16th centuries.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 1800C - European Social and Cultural History, 1789 to 1919

A survey of political, social, and ideological currents during the age of emerging and maturing capitalism from the Industrial Revolution to World War I.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 1900C - Recent European Social and Cultural History

A survey of social and cultural life in its political and economic contexts in the 20th century.

Credits: 3. Contact Hours: 3hr./wk.

HISTE 3200F - Independent Study and Research in History

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

HISTE 3400C - American Social and Cultural History to 1865

Institutional and structural developments in social and cultural life, including the family, religion, ethnic patterns, recreation, working conditions, and ideologies from the earliest settlements to the emerging capitalism of the 19th century.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3400E - The United States in World Affairs

The evolution of United States foreign policy and relations from colonial dealings with native Americans to military, economic and political involvement on a global scale.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3500C - American Social and Cultural History Since 1865

Concentrates on urbanization, industrialization, the new immigration, and the emergence of the modern corporate state.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3500E - Problems in American History, 1900 to Present

Traces the development of the American people since 1890. Analysis of factors, domestic and foreign, that led to the emergence of the United States as a world power.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3600E - Ethnic Patterns and the Old Immigration in American History

Immigration and ethnic interchange from the relations between Africans, the English, and native Americans in the 17th century through the Irish migration of the 19th century. Emphasis will be on cultural adaptations to and retentions in America.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3700E - Ethnic Patterns and the New Immigration in American History

Ethnic cultures and migratory movements, including the northward migration of Blacks, since the 1870s. Topics will include the similarities and differences among ethnic experiences in America, cultural adaptations to and retentions in a rapidly industrializing society.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 3900C - Modern Latin America

History, politics, and culture of Hispanic America; colonial and Indian background fused through independence movements into the history of modern Latin America.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 6000E - History of China and Japan

Survey of development of Chinese and Japanese civilizations from ancient times to the 17th century. Emphasis on political and social institutions and culture.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 6100E - The Modern Far East

Development of China and Japan from the 17th century to present; contact and conflict of occidental and oriental civilization; influence of Europe and America.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 6900C - African-American History to 1865

The history of African-Americans in the United States, including West African backgrounds, a comparative study of hemispheric slavery, early Black institutional life, and efforts to resist slavery.

Credits: 3. Contact Hours: 3 hr/wk.

HISTE 7000C - African-American History since 1865

Beginning with Reconstruction, African-American political, economic, cultural, and ideological evolution will be traced to the present.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 7100F - Historical Method

Evaluation of primary and secondary sources, with emphasis on internal criticism. A survey of American historiography.

Credits: 3. Contact Hours: 3 hr./wk.

HISTE 7500E - President and Congress

The nature of executive and legislative power in American national government, with particular focus upon the constitutional bases, politics, and contemporary operation of the elective branches.

Credits: 3. Contact Hours: 3 hr./wk.

B0000

HISTE B0100 - Historical Methods and Historiography

Focus on the rise of social history in contemporary historiography. Approaches to the subject include the contributions of the British Marxists, the French Annales school, social-scientific historians, and women's historians. Readings will cover United States, Latin America, Africa, Asia, and Europe.

Credits: 3. Contact Hours: 3 hr./wk.

HIST - History Course Descriptions

B0000

HIST B0000 - Historical Methods and Historiography

Focus on the methods that have shaped the conceptualization and writing of professional history over the past few decades. Methods studied may include those of the Marxists, the French Annales school, social-scientific history, anthropological history, historical sociology, the history of material culture and consumption, the history of nationalism and cosmopolitanism, global and transnational history, environmental history. Area readings will vary with instructor.

Credits: 3. Contact Hours: 2 hr./wk.

HIST B0101 - The Ancient Near East and Greece

The cultural legacy of the Egyptian, Mesopotamian, Hebrew and Hellenic civilizations in classical antiquity.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0102 - The Hellenistic World and Rome

Classical antiquity from the conquests of Alexander the Great to the fall of the Roman Empire in the West.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0301 - Life, Art and Learning in the Renaissance

Using original works (in translation), the course examines early modern European conceptions of love, culture, politics and destiny in the context of major social, intellectual and artistic developments of the period; humanism and the formation of the state; individualism in life, letters and arts.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0302 - Europe in the Revolutionary Era: 1760-1815

The rapid transformation of political, legal and social institutions, as well as of attitudes and ideas under the pressure of war, revolution and economic change. The crisis of the Old Regime; development and spread of the Revolution; the Napoleonic system and its legacy.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0303 - Europe, 1815-1914

The political triumphs of the middle classes and their troubled hegemony; the factory system, free trade parliamentarians; the transformation of 1848; the Second Empire; Italian and German unifications; movements of reform; democratic currents; socialism; the new imperialism.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0304 - 20th Century Europe

Political, social, economic, and intellectual developments in fin de siécle Europe, the coming of the First World War, the War and Peace, the Russian Revolution, Italian Fascism, the Weimar Republic and Nazism, the Democracies between the wars, the diplomacy of appeasement, the Second World War, the Cold War and Détente, and the emergence of East and West Europe as vital forces in the world today.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0401 - The Colonial and Revolutionary Period to 1783

European discovery and exploration of America; origins and peopling of the English colonies; colonial life; imperial innovations and American protest; the Revolution.

Credits: 3. Contact Hours: 3hr./wk.

HIST B0402 - The New Nation, Slave and Free, 1783 to 1840

Republicanism and the democratization of politics, industrialization of an American working class, social reform and the making of the middle class, westward expansion and the removal of the Native Americans, sectional conflict and slave culture.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0403 - The Era of Civil War and Reconstruction, 1840-1877

The causes and consequences of the American Civil War, focusing especially on the reasons for sectional conflict, emancipation, the role of Abraham Lincoln, the conflict over Reconstruction and the new status of emancipated slaves.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0404 - The Response to Industrialization to 1900

The political, economic and social phases of the development of the United States from Reconstruction to the First World War. Populism and Progressivism; the industrialization of society and the emergence of the labor movement.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0405 - The United States in the Twentieth Century

America and World War I, the roaring twenties, the Depression and New Deal, Roosevelt's leadership, World War II, and the beginnings of the Cold War.

Credits: 3. Contact Hours: 3hr./wk.

HIST B0406 - Immigration and Ethnicity in American Life

Topical and chronological treatment of the American immigration experience, with emphasis on the ghetto, culture and community, patterns of work, social mobility, assimilation, the relation of class and ethnicity, and America's reception of immigrants. Comparative analysis of different ethnic groups.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0408 - African-American History from Emancipation to the Present

The post-slavery experience of African-Americans: the creation and destruction of a black peasantry, the growth of a black working class, and the resulting change in black politics and culture.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0412 - The American Legal Tradition

Examines the basic features of English Common Law, then shifts to America to explore how our nation (1) dealt with this inheritance and (2) formed its own legal structure. A broad range of topics, with emphasis upon eighteenth and nineteenth century legal developments.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0415 - History of New York City

Several problems in the history and culture of New York City: slavery and the city's origins as a multi-ethnic mercantile community, post-revolutionary commercial port; rise of working class; the Harlem Renaissance; social welfare and planning in the twentieth century. Emphasis on reading in original sources.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0501 - Colonial Latin America

A study of the impact and meaning of colonial rule in Latin America and the Caribbean, focusing on the interaction between European goals and institutions, and indigenous American and African strategies of socio-cultural survival.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0502 - Modern and Contemporary Latin America

Contemporary economic, social and political problems of Latin America and the Caribbean studied in historical perspective. Themes include: foreign economic and political intervention; labor systems and patterns of land ownership; class, ethnic and racial relations; the politics of reform, revolution and authoritarianism.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0601 - Traditional Civilization of China

The early formation of the Chinese State, the intellectual foundation that has sustained its long history, the shaping of the Confucian way of life, and the cultural sophistication and its decline on the eve of the modern world.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0602 - Modern China

Change and continuity in the Chinese tradition across the nineteenth and twentieth centuries. The encounter with the West, social and political disruptions, efforts to industrialize, and especially the evolution and outcome of the Chinese revolution will be stressed.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0604 - Traditional Civilization of Japan

Japanese history from its origins to the nineteenth century, i.e., the "classic" Heian period, "medieval" Kamakura to Sengoku periods and the "early modern" Tokugawa world. Topics: Japan's contacts and borrowings from other civilizations, especially China; Shinto and Buddhism; women and the family; the rise and transformation of bushi or warriors; artistic traditions.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0605 - Modern Japan

Survey of the building of the modern Japanese state, society and economy from 1868 to the present, with focus on continuity and change, the social costs of rapid industrialization and the emergence of Japan in the global economy.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0606 - Traditional Civilization of India

The history and culture of Indian civilization before modern times; major emphasis will be on its formation and classical age, its continuity and change, and the coming of Islam.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0607 - History of Modern India

Surveys the elements which have shaped the characteristic institutions of India; the disintegration of the Mogul empire and the rise of the British to dominance; political, economic, cultural, and social developments during the British period and the changes wrought by the republic.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0703 - Africa and the Modern World

A social history of Africa from the nineteenth century to the present, with emphasis on state formation, impact of the slave trade, and resistance to colonialism.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0801 - The Middle East Under Islam

The rise of Islam and Arab conquests of the Middle East and North Africa through the Crusades and Mongol invasion. Covers the period 600 to 1500, focusing on politics, culture, and society.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0901 - Comparative History of Revolutions

A study of major modern revolutions, stressing the literature and problems of each, for the purpose of learning to what extent they follow similar patterns. New and unusual insights for historical inquiry, prompted by a comparative approach.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0903 - Nationalism in the Modern World

The meaning, origin, development, and growing significance of nationalism in the nineteenth and twentieth centuries. Nationalism discussed as (1) a stabilizing and destabilizing factor, (2) a challenge to multi-national empires, and (3) a major factor in the anti-colonial movements.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0904 - Modern Imperialism

The building of empires during the nineteenth and twentieth centuries in the name of national and international principles as well as economic and political interests. The extension of power over weaker regions by England and France, the U.S.A., the U.S.S.R. and China. Rivalries among imperial powers.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B0905 - The Theory and Practice of Genocide in the Twentieth Century

Comparison of several instances of systematic mass killings, including Armenians, European Jews, Kurds, American Indians, and Hereros and Hutus in Africa. Emphasis on historical circumstances, national sentiment, the state apparatus, and the contemporary implications of genocide.

Credits: 3. Contact Hours: 3 hr./wk.

HIST B2302 - The Age of Enlightenment

The eighteenth century's project of applying reason to experience and to the improvement of social existence. Main topics: retrieval of exotic cultures; meditation on happiness and pleasure; problem of luxury; discovery of the market; secular society and its history; the French Revolution; reform and violence.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2303 - Major Developments in Western European History Since 1918

Emphasis on overall trends as well as specific national developments in Western Europe. After considering the Versailles Peace Conference, attention directed to Western Europe between the two World Wars: the Weimar Republic, France, British economic and imperial problems, Fascist Italy, Nazi Germany, and the small states. The remote and immediate causes, events and results of World War II are treated, as well as developments since 1945.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2304 - The Third Reich

Hitler, Nazism and Nazi Germany. Topics include: social, political and economic preconditions to the Nazi takeover; anti-Semitism; cultural and artistic policies of Nazi Germany; the churches; the film industry; varieties of resistance; concentration camps; the conquest of Europe; mass murder; fall of the Third Reich.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2404 - Markets and Mansions: the Material World of Nineteenth Century Americans

The commercialization of culture in Nineteenth century U.S. through an examination of historical artifacts. These objects, such as silk portraits, popular prints and books, and vernacular houses. Studies in the context of historical change, using theories of material culture.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2502 - Seminar: Latin America in World Affairs

Treats the growth of Latin America's world contacts, with special emphasis on the twentieth century and the Latin American viewpoint. Economic, political, religious, social, and diplomatic matters considered.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2701 - A Social History of Modern South Africa

From the mineral revolution, 1871 to the present. Focus on the special forces that created modern South Africa, with special attention to the creation of the Black working class, the decline/collapse of the Black peasantry, the evolution of the privileged white working class and Afrikaner ideology, the introduction of East Indian and Chinese labor, and the evolution of social movements of women, workers, squatters, and peasants to resist the apartheid system.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B2906 - Seminar: Imperialism in World Affairs

Research in selected case studies of imperialist contacts and conflicts; patterns of control; native acquiescence and discontent; achievements and failures.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B4100-5900 - Independent Studies

Sequence of directed readings and tutorials, available only with the Chair's permission. Interested students should inquire, usually after having completed 15 credits.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

HIST B9900 - Thesis Research

Students electing to complete the thesis option will prepare it under the guidance of a faculty advisor. Completion of the comprehensive exam and the foreign language requirement is advisable prior to starting work on the thesis.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IAS - Study of the Americas Course Descriptions

IAS 51000 - The Dominican People from Pre-Columbian Time to the 1844 Independence

Study the formation of the Dominican people from pre-Columbian times to 1844. It examines the main demographic, economic, social, political and ethno-cultural processes of the former Spanish colony of La Española / Santo Domingo as it evolved into a new nation state named Dominican Republic. Informed classroom discussions of reading assignments, oral presentation of summary of final research project, and final research paper.

Credits: 3. Contact Hours: 3

IAS 51004 - Dominican Society: From African Black Slavery to the Advent of Trujillo

This course addresses relevant issues pertaining to the socioeconomic development of Dominican society. It looks at the formation of the first European colony in the New World, the creation of the Dominican Republic, and the formation of the Dominican people. The course ends in 1930, with the arrival of Trujillo.

Credits: 3. Contact Hours: 3

IAS 52000 - The Dominican People from the 1844 Independence to the Present

Survey of the construction of the Dominican Republic as a new nation state from its proclamation of independence in 1844 to the present. It examines, among others, the internal struggles between reformers-liberals and conservatives for political power around the independence-colonialism dilemma and the social classes and/or groups associated with them; the post-abolition social dynamics of race and class within the new nation; the efforts to construct a Dominican democracy and how they reflected in constitutional changes; the growing interactions of of the Dominican Republic with the United States as the predominant power in the continent and how it has affected Dominican politics, economy and population. Informed classroom discussions of reading assignments, oral presentation of summary of final research project, and final research paper.

Credits: 3. Contact Hours: 3

IAS 52004 - The Dominican People in the United States: From Migrants to Rooted People

This course examines the migration process of Dominicans to the U.S. and their transformation from migrants to settled, rooted people.

Credits: 3. Contact Hours: 3 Prerequisite: IAS 51004 or SOC 51004

A0000

IAS A5000 - Inventing the Americas

This course offers an interdisciplinary introduction to the study of the Americas. Whether defined by geography, culture, language, ethnicity, history, politics, or literature, the Americas have been a contested space for hundreds of years. We will examine some of the ways in which the Americas have been constructed, defined, and redefined since the time of Columbus (and before). We will pay particular attention to the ways in which the Americas served as both a terminus and a turning point for what is generally know as 'the western tradition'; in other words, we will examine the residues of the old world in the new world, as well as the importation of the new world into the old. Touching upon some of the topics that have come to define the history of the Americas, we will discuss the science(s) of exploration; the imaginaries of the new world and the old; the politics and economics of empire and colonialism; the cruelties of invasion, conquest, and slavery; the transformations of ecology and biology; the contours of nationalism and transnationalism; as well as the more recent phenomenon of globalization. As a foundational course in the study of the Americas, this course highlights some of the more important topics in the history of the Americas, but it also offers a serious introduction to interdisciplinary learning at the masters-level. Requirements include seminar participation, scholarly response papers, and the execution of an extended research assignment.

Credits: 3.

IAS A5010 - Graduate Research Methodology

The course's focus is to explore the process of interdisciplinary, comparative research. More specifically, the class will introduce students to the field of "New American Studies" and teach them how scholars working in an interdisciplinary and transnational context think, argue, research, and write. First, students will trace the changing definition of American Studies: Originating as a field of study with a focus primarily on the United States, the field has expanded to encompass research spanning all of the Americas, which include the disparate and often marginalized cultural zones within. Second, they will study the field's relationship to twentieth-century social movements and related theoretical models and contemporary approaches to research, including Marxist theory, cultural studies, feminist theory, disciplines. In the final assignment, students will implement the research methodologies discussed over the course of the semester: They will choose a topic, develop a research agenda, conduct interdisciplinary research, and write a final research proposal, with an annotated bibliography.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A5020 - Society and Culture of the Americas from the 19th to the 21st Centuries

This course intends to answer the question: "What are the Americas today?" Addressing that question, the course takes an interdisciplinary approach in the study of the divergent postcolonial experiences in the Americas. This approach will include an analysis of decolonization, economical "imperialism" as well as the emergence of current transnational and racial identities and values. The study of cultural changes as a result of migrations, hybridizations and techno-economical dependency is a main focus in this course. Being by definition part of an inclusive program, this course contrasts the experiences of Native, French, Anglo, Spanish, and Lusophone speaking populations in the Americas. Students will layout the historical antecedents for the techno-economical dependency that has marked the transnational relations in the Americas. Students will discuss in a short paper (5 pages) the issue of cultural colonialism and its consequences in the uneven or failed development in some regions of the Americas. Based on the study of political and economical migrations, the students will create their own assessment of transnational and racial identities in the Americas. Based on the previous work and their bibliographical research, students will write a final paper developing a proposal for a socio-cultural definition of the Americas today.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A5030 - Geopolitics and Diplomacy Across the Americas

This course serves as an introduction to the geopolitics, that is the spatial expressions of power, that have shaped the geographic boundaries, cultural and racial representations and political and economic relations among the nations of the Americas. David Slater, writes in *Geopolitics and the Post-colonial States*: "It can be argued that US imperialism has always followed a double movement of erecting and policing boundaries, and of breaking down borders both internally and externally so as to open up new spaces of unfettered expansion" (30). We will examine the construction of US hegemony in the Americas, exploring continuities and critical conjunctures that have shaped relations among the nations of the Americas; we will also examine specific countries more closely through the close reading of primary and secondary sources. As a class, we will also attempt to extend the idea of geopolitics as it relates to protest, resistance and the structuring of people's everyday life.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6000 - Literature of the British West Indies

Both Henry James and James Baldwin were known for claiming that it was only through the experience of becoming estranged American ex-patriots traveling in Europe that they finally found their "American-ness." Likewise, many authors grouped within the so-called literature of the British West Indies had to leave home and migrate to Canada, the United States, and/or England to discover what it was to be "Jamaican, Guyanese, Trinidadian." Fleeing in some cases a colonial past and in others a questionable "post" colonial present, their transplantation problematizes what it means to be 'Caribbean.' At times tinged with "magical realism, at others only starkly realist, the art drawn from these writers' encounters with the past enchants, mystifies, at times, enrages, but always deals with what it means to constantly negotiate otherness. This graduate-level seminar will introduce students to the literature of 'British' 'West Indies' and its prevalent themes: colonial and post-colonial subjectivity"; exile and return; the interweaving of gender, race and class issues in their socio-cultural context; the notion of carnival; ethnicity and language; and otherness and hybridity, to name several.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6010 - Race and Gender Across the Americas

This course takes up a comparative approach rooted in the anthropology of race and gender. Students will build a theoretical framework from grounded studies of people's everyday lives in particular historical and cultural contexts across the Americas. We will engage with topics ranging from the role of science in perpetuating and then dismantling inequalities predicated on race, the forced sterilization of women of color, to relationships of power emergent in increasingly diasporic lives. While the course focuses on ethnographic readings, students will be able to develop an interdisciplinary perspective for analyzing, race, gender, and sexuality. We cannot do it "all" in this class and so you should take this as an opportunity to push yourselves to engage with a field that crosses Black studies, ethnic studies, gender studies.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6020 - Comparative Slaveries of the Americas

This graduate course explores the rise and fall of African slavery in the Americas from the 15th to the 19th centuries. Through readings discussions and films/documentaries, we shall analyze how slavery became the predominant mode of production in the Americas until the late 19th century. This course surveys the history, cultures and political economy of the Atlantic slave trade and its ongoing legacies in the Americas. In many ways, the themes of the course mirror the development of research interests and sensibilities concerning the defining of modernity and the emergence of new world transformations of European and African identities and transnationalisms. While we will concentrate on the Americas, there is little doubt that this forced migration was one element in an intertwined set of global exchanges and trade circuits. The consequences of extending new forms of labor, technology and capital alongside colonial exploration and expansion were germane in the development of ideologies of race and nationality on three continents. In this sense the Atlantic system conjoins multiple social practices, languages, and religions into new narratives of globalized identities. One of the goals of this course is to explore African Diasporic cultural expression and slave resistance in all of its manifestations. Another important objective of this course is to read and reflect upon the historical underpinnings of race relations and the legacies of racism across the Americas and internationally.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6035 - Latin American Writers in Translation (to English)

This course reviews the Latin American Literary production from the late 18th to the last decade of the 20th century. The program follows the developments of two literary genres: verse (poetry) and narrative (short stories) along with some short novels. It begins with an overview of Latin American history and its literary productions. The connections between literature and power will be underlined and questioned from a cultural materialist approach. Later, the students will analyze poems written in the heart of the avant-garde movements and short stories of the so-called Boom. Brazilian writers are included and their production contrasted with that of Spanish-speaking America, both historically and aesthetically.

IAS A6040 - Crossing Borders in the 21st Century

This course offers an ethnographic perspective on the ongoing movement of bodies, technologies, and commodities throughout the Americas in the 21st Century. Over the last two decades, anthropologists have offered a series of theoretical and ethnographic interventions on what was originally characterized as transnational processes. Students will examine various frameworks for understanding what is emerging as a "post/911" model for understanding the regimes of power, formal and informal, that organize border crossings as "transborder," "extraterritorial," transnational, global, and so on, in what can be broadly defined as a political and economic context of neoliberalism. In doing so, we will interrogate the place of the nation-state, and the ways in which territorial, ethnic, racial, gendered, postcolonial borders are crossed or not. While clearly U.S. hegemony is at the core of this discussion, significant attention will be placed on decentering the U.S. as the axis of interpretation. Through ethnographic case studies, students will be introduced to topics such as the links between structural, gendered, and everyday violence, the politics of clandestinity, to questions on the privileging of mobility as a problematic trope of the 21st Century.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6050 - Across the Americas: The Literature of Immigration and Migration

This graduate-level seminar focuses on the migration and immigration of people across the Americas during the 20th century. We begin the course by reading critical theory on the topic, from anthropology to economics, to the law. Then we explore the literature of migration and immigration, to and from the Americas, from the dawn of the twentieth century to the present. We first will investigate subtle and not-so-subtle shifts in the law and language of migration at the turn of the twentieth century, as the customary influx of northern European migration to the Americas mitigates and is complemented by waves of southern Europeans, eastern European Jews and Puerto Ricans moving west and north. Next, we study the mid-century, particularly the continued immigration and emigration of Puerto Ricans and Cubans. Finally, we look at population movement through the Americas late in the century, with special attention paid to Mexican, Caribbean and South American migration and immigration, and an unusual look at indigenous 'migration.'

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6051 - Markets, Power, and People

Privatization, devolution, and decentralization in many ways define neoliberal governance; these processes of shifting government services and political participation to the local level have redefined the role of the public sector not only in the US but internationally. We will raise questions about the public values we associate with the provision of government services as well as how the notion of "citizenship" changes as it becomes reframed within a "consumer-citizen" model. We will ask how the increasing emphasis on efficient and competitive "market-driven governance" has structured economic as well as political access and exclusion. The course readings will cover the following themes: encountering development; neoliberalism and the Washington consensus; governance, privatization, decentralization, and devolution; neoliberalising citizenship, consumer citizens; defining and decentering neoliberal urbanism; selling cities, culture, leisure and the production of urban space; fractured cities, fortress cities.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6060 - Music in the Americas

Music in the Americas will present a survey of selected styles of Latin America music including the classical and popular traditions and considering its native, African, and European heritage. Each session will be dedicated to discussing genres and styles (cumbia, tango, bolero, samba, corrido, Latin jazz etc.) through guided listening of relevant recordings, pertinent readings, and screening of videotapes. In addition, the course will present the relevant theoretical issues pertinent to those musical styles including perspectives that shed light on ethnic identities, gender issues, migration, and diaspora questions. Weekly assignments will include listening and readings. A term paper and a class presentation will also be required.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6080 - Gated Cities, Gated Communities, Gated Minds

This course explores the global phenomenon of "gating" and privatizing urban spaces to create residential and commercial areas that offer a sense of heightened security and seclusion, a respite from the perceived chaos, violence and anonymity of the ever encroaching city. Gated communities are no longer to be found in the suburbs but are fracturing city space as fortified enclaves become sanitized, re-imagined, branded

and sold. In this course we will explore the contours and content of this physical gating of urban metropolitan spaces through divergent lenses, taking an interdisciplinary journey into some of the "cities of walls" that have been emerging in the Americas. We will read ethnographic and sociological studies and urban theory as well as literary works that examine how the privatization of the city is redefining urban life in the Americas -from Buenos Aires and Sao Paolo to Los Angeles and New York. What does this (re)segregation by class, race, ethnicity and gender imply in terms of our day-to day encounters and relationships as well as our roles as citizens? Are we just gating our lives or our minds as well? We will cover some of the theoretical debates on gated communities, thinking about the reasons behind gating and the typologies associated with these different motivations, assessing the impact on the urban fabric as well as investigating the implication the increasing privatization of neighborhood and commercial spaces has in term social segregation and exclusion. We will also explore the historical continuities of gating, looking at the private practices and legal mechanisms by which communities have cordoned themselves off from others in the name of security, property values and ""life style"" choices to create segregated urban landscapes. We will be examining the formation of ""American Apartheid"" in the US, scrutinize the "the City of Walls" of Sao Paolo and "excavate the "fortress cities" of Los Angeles and New York. We will also read several novels, such as T.C. Boyle's *Tortilla Curtains* set in the California, *The Thursday Wives* by Claudia Piñeiro set in Argentina and *The Parable of the Sower* by Octavia E. Butler

Credits: 3. Contact Hours: 3 hr./wk.

IAS A6090 - Labor Strategies in the Americas

Labor movements across the Americas are revising strategies, deepening cooperation across borders and drawing inspiration from each other's struggles in difficult times for workers everywhere. While closer economic integration across the hemisphere may call for more internationalist union perspectives, it remains the case that labor politics is focused on the nation state, and the relations between unions and their allies in social movements and community organizations are most rooted at the local level. 'Neoliberalism' - free-market, bro-business policies enforced through the IMF, the World Bank and written into free trade agreements - presents a common challenge to labor. And yet labor's response to neoliberalism has been uneven between Latin-, Anglo- and Franco-American nations. Asymmetries in power and wealth between the North and South remain highly relevant to attempts at closer, more effective labor cooperation. The course is a survey of emergent labor strategies across the hemisphere, encompassing labor organizing, collective bargaining and political strategies. We will take a multi-scale approach, examining how strategies play out at the local, national and regional scales. The class will cover major debates, including the rise of new forms of worker representation, labor migration, labor-party and labor-state relations, free trade and alternative regional integration projects, and how to confront the power of multinational corporations. Case studies will include: coordinated cross-border bargaining and organizing in the steel and auto industries; comparative anti-privatization and anti-austerity strategies in the public sector; the relationship between labor and labor-backed parties in power in Southern Cone and Andean nations; North American labor's response to NAFTA and mobilization against the defeated Free Trade Agreement of the Americas; labor's 'green jobs' agenda and perspectives on climate change and ecological crises; organizing immigrant workers and migrant workers' rights in the US and Canada; the labor rights/trade agreement nexus. The class will be taught in seminar format and rely on extensive student participation.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A7000 - Thesis Research

Students register for three-thesis credits once they have selected a Thesis Advisor and Second Reader, and their thesis topic has been approved by the M.A. Committee.

Credits: 3. Contact Hours: 3 hr./wk.

IAS A7010 - MA Capstone Seminar

The capstone course requires students to apply what they have learned in other classes and to engage their research interests in a seminar setting. Course is taken toward the middle or end of the student's program. Required for students not writing a thesis. Topic varies; past topics have included "Weimar in the Americas," "Poverty," "Cinema and Slavery," "20th Century Revolutions in the Americas," and 'Dictatorship in the Americas'. Repeatable for credit once, with MA Director approval.

Credits: 3. Contact Hours: 3 hr./wk.

IR - International Relations Course Descriptions

B0000

IR B2502 - Latin America and the Caribbean in World Affairs

Examines inter-American relations and the foreign policies of selected countries in the region. It also explores various themes such as democratization, populism, military authoritarianism, economic development and the relationship of Latin America and the Caribbean with the United States.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6100 - Theories of International Relations

Course offerings include, but are not limited to, the following:

B6100 Theories of International Relations
Offers an introduction to contemporary theories and concepts in the discipline of international relations. It examines the competing paradigms offered by realism, institutionalism, the English School, and constructivism. The course is designed to advance students' knowledge of international relations by focusing on the ways in which theory can help them grasp the complexities of relationships among international actors. 3 hrs./wk.; 3 cr.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6200 - International Organizations

Analyses the major global and regional organizations and institutions that provide for cooperation among states with an emphasis on the United Nations system. In particular, the course examines how these organizations attempt to address problems of peace and security, economic and social development, human rights, and humanitarian assistance.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6300 - International Law

Examines the role and function of public international law in regulating the relations among sovereign states. Among other areas, the course focuses on the rights and duties of states, multilateral treaties, sovereignty, human rights, and the laws of warfare, the use of force, refugees, and international criminal tribunals.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6600 - Internship

Students may earn three credits for an internship with an international organization, non-governmental organization, government agency or policy think tank involved in the practice of international relations. Those doing so must get permission from the Program Director and work seven hours per week at the agency, keep a journal, and write a paper. The student must provide to the MPIR office a letter from the agency/organization confirming his or her appointment and outlining his or her duties.

Credits: 3. Prerequisite: IR B6100, IR B6200, IR B6300 and permission of the program director.

IR B6800 - Research Methods

This course is an IR political science course on developing student skills in conducting research, formulating an argument, and finding evidence to support that argument. The course is intended to help students research a topic and establish a strategy for writing their MA thesis.

Credits: 3. Contact Hours: 3

IR B6902 - Contemporary International Conflicts

Explores the political, psychological, sociological, cultural, and economic sources of international conflict. Topics include contemporary regional and global conflicts, and methods of conflict resolution such as negotiation, coercion, diplomacy, and war.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6915 - Asia in World Affairs

Explores the political dynamics that define Asia as a region, with a particular focus on the East Asian areas of China, Japan, South Korea and Singapore. Topics include the rise of nations and the formation of modern states, the impact of imperialism, political economy, and the growing role of China and Japan in world politics.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6917 - Africa in World Affairs

Analyzes the political relations among African states and nation/states outside the region. Topics include: imperialism, slavery, and colonialism; wars of independence; inter-state relations and economic cooperation; intrastate conflicts; and the role of international organizations in promoting human rights and the resolution of conflicts.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6918 - The Practice of Diplomacy

Examines how international relations are conducted at the dawn of the 21st century, from both a theoretical and empirical perspective. The course provides students with an understanding of the principles that underlie the practice of diplomacy in bilateral and multilateral settings & the concrete tools utilized by diplomats in their work.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6920 - The Middle East in World Affairs

Analyzes the relations among Middle East states and between the region as a whole and the rest of the world. The course pays special attention to the Israeli-Palestinian conflict, relations among Arab states and the role of the United States and Europe in the region.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6925 - Peacemaking and Negotiation

Examines efforts by regional and international organizations to facilitate negotiation and peacekeeping in the pursuit of international peace and security. It covers the period from the U.N.'s first inception up to current operations in the field, focusing on the Middle East, Africa, Central America, the former Yugoslavia, Cambodia, East Timor, and elsewhere.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6927 - International Political Economy

Explores the theories that explain the dynamics of the international economy, and examines the institutions that provide for cooperation in international trade, monetary exchange, and investment. It focuses on the World Trade Organization, World Bank, International Monetary Fund, U.N. development agencies, and globalization.

Credits: 3. Contact Hours: 3 hr./wk., plus conf.

IR B6928 - Human Rights in World Politics

Explores the development and implementation of human rights norms within the international system. It discusses the debates surrounding human rights in world politics and investigates efforts by states, international organizations, and non-governmental organizations to implement such norms at the national, regional and inter-national levels.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6930 - Europe in World Affairs

Examines the role of the European community and its major states in world politics. In particular, the course explores the development of European politics from the Napoleonic period in the early nineteenth century through the creation of the European Union in the late twentieth century. Topics will include interstate war, security, economic integration and political relations among the states.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6931 - Alternative Conceptions of International Security

Explores the various conceptions of international security offered by scholars, policy analysts, journalists, and activists from different parts of the world. The class includes traditional concepts such as deterrence, arms races and arms control, alliances, warfare, and balance of power as well as more contemporary notions such as human security, environmental security, community violence, civil war and weapons of mass destruction.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6933 - Decision-Making and Foreign Policy

Examines the theory and practice of decision making and how it affects the formation of foreign policy. Grounded in the literature on political psychology, it explores personality, group dynamics, and perception and misperception, and investigates how belief systems establish a framework for how policymakers make decisions.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B6934 - State-Building and Democratization

Examines questions of state power, democratic institutions, and their relationship in contemporary comparative and international relations. The course is divided into three sections: (1) origins, definitions and theories of the state and of democracy; (2) dynamic changes in state and democratic politics, particularly those that have occurred over the past several decades; (3) world of policy, investigating prescriptions that have emerged in an effort to produce broader and more complete democracies.

Credits: 3. Contact Hours: 2 hr./wk., plus conf.

IR B9800 - Independent Study

Students may pursue a program of independent study under the direction of a faculty member, with the approval of the Program Director. Such a program may not be pursued in lieu of a course that is already offered by the program.

Credits: 1-3.

IR B9900 - Thesis Research

Prerequisite: Successful completion of 24 credits, including IR B6100, IR B6200, IR B6300, IR B6800 and approval of the program director.

LAAR - Landscape Architecture Course Descriptions

LAAR 61100 - Landscape Architecture Studio I

The first design studio introduces a range of technical, spatial, and cognitive skills used in urban landscape design. Manipulation of terrain and spatial conditions are explored using two-dimensional traditional and digital drawings and three-dimensional physical models. Students learn analytic mapping techniques and investigate systemic site processes at multiple scales. Design research skills are interlaced with speculative environmental design strategies and spatial design propositions.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Corequisite: LAAR 61400 LAAR 61300

LAAR 61300 - Landscape Technology I

This course presents the fundamental principles of site planning: the environmental and ecological factors of siting a building, grading, drainage, site structures, and material selection. Students use the analysis of small sites to evaluate underlying issues of environmentally responsible design, accessibility, zoning requirements, and affordability. Methods of site inventory, site analysis, and site selection are explored. Site grading -- an environmental necessity, a functional requisite, and an aesthetic expression -- is a key component of the course, and it is used to integrate pragmatic design decision-making into the design process.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: LAAR 61400, LAAR 61100

LAAR 61400 - Digital and Traditional Drawing

This course provides instruction in the fundamental skills and techniques of both analog and digital landscape architectural representation. Graphic design skills are instilled with instruction in photo-based image editing, illustration, and publication software. Additional instruction in vector-based AutoCAD and advanced three-dimensional rendering software such as Rhino supports both two-dimensional and three-dimensional digital drawing techniques.

Credits: 3. Materials Fee: $50. Corequisite: LAAR 61100. LAAR 61300 Contact Hours: 3 hr./wk..

LAAR 61500 - Introduction to Ecology/Plant Identification

This course provides an introduction to ecological theory and physical geography by using the environs of New York City as a living laboratory for the study and investigation of plant material and ecological systems. Students identify and observe local flora, seeking to understand relationships among ecological function, plant habitat, plant associations, soils, and hydrology in both natural systems and designed landscapes. The course includes field trips to public parks, botanical gardens, and arboreta.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 61610 - Topics in Urban Landscape

Course number should be repeatable up to 5 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 61620 - Topics in History and Theory

Course number should be repeatable up to 5 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 61630 - Topics in Professional Practice

Course number should be repeatable up to 5 times and also able to be taken simultaneously in a semester – different topics/sections will fulfill requirements.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 62100 - Landscape Architecture Studio II

The second design studio expands the range of landscape scales and deepens an understanding of urban context. Site analyses reveal narratives richly layered with diverse historical, social, and cultural significance for various groups. Site design is considered as a transformational practice leveraged at multiple scales. Dynamic environmental processes (soils, hydrology, geology, plant communities, and climate) as well as social and economic factors are deeply examined. The studio emphasizes digital presentation techniques and professional collaboration. Design proposals present strategic and transformative plans for implementation at the human, urban, and regional scales.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: LAAR 61100Corequisite: LAAR 62200 and LAAR 62300

LAAR 62200 - Introduction to Landscape Architecture History

Synoptic themes in landscape architecture history will be presented with theoretical texts to provoke critical thinking about the evolution of landscape form and ideas in Western and non-Western culture. Students will research and document a thematic aspect of world landscape architecture to produce a verbally and visually articulate presentation. Topics include but are not limited to: the role of gardens in American cities, case studies through time in ecologically sustainable practices, and critical assessments of urban infrastructure form and function.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: LAAR 62100, LAAR 62300

LAAR 62300 - Landscape Technology II

This course is a continuation of the content described in the prerequisite LAAR 61300, with problems increasing in scale, complexity, and application constraints. In addition, the course provokes a deeper understanding of the relationship between urban development and constructed landform. Projects examine large areas and complex sites with multiple human and environmental overlays. Students address complex issues of site grading, drainage, site structures, and material. Site grading continues to be developed as a means of integrating design intent with the practical aspects of site planning and design.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: LAAR 61300Corequisite: LAAR 62100, LAAR 62200

LAAR 62700 - Urban Ecology

This course examines the ways that ecological systems function in the urban environment. The intertwined relationships between humans and so-called natural systems are explored, leading to an understanding of the effects of human activity on the biotic and abiotic components of urban systems. The course includes field trips to urban landscapes that are emblematic of the confluence of social, cultural, and environmental forces in the city. Geospatial analytic mapping is incorporated to spatialize the complex and dynamic systems present in urban ecologies.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: LAAR 61500

LAAR 63100 - Landscape Architecture Studio III

The third design studio challenges students to analyze the social and environmental forces shaping a given urban site, as well as produce significantly developed design proposals and documentation. Design proposals respond to the challenges of a specific studio brief or position; proposals are developed with detailed plans and sections describing grading, planting, and materials. Students produce a final set of drawings at the level of a professional design development drawing package.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: LAAR 62100Corequisite: LAAR 66200, LAAR 63300

LAAR 63300 - Environmental Planning

Theoretical texts frame an examination of techniques for mapping the physical environment of the New York City metropolitan region, including geology, soils, surface water, plant communities, and climate change impacts. These serve as the basis for an examination of urban infrastructure systems, including circulation, energy, water, and waste. Large-scale planning initiatives in the New York area are examined from the perspective of complex social and environmental ecologies. Students prepare geospatial mapping analyses that explore past, current, and future urban conditions in the urban environment.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: LAAR 62700Corequisite: LAAR 66200 and LAAR 63100

LAAR 64100 - Landscape Architecture Studio IV

The fourth design studio focuses on the complex and dynamic public spaces and public infrastructures of New York City or other urban sites. Students build upon previous studio work to investigate the physical and cultural forces that shape a specific urban landscape. Comprehensive planning in response to topics such as environmental, social, and multi-species justice is developed. Social and cultural issues and inequities are further explored through the development of detailed landscape plans.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: LAAR 63100Corequisite: LAAR 64400

LAAR 64150 - Design Research

Design research methodology is essential to landscape architecture design practice. Students pursue in-depth research by exploring archives and record repositories. Digital communication skills are developed through the evolution of a research project as an independent proposition. Through a process of information collection and analysis, hypothesis testing, and thesis assertion, students communicate their design research using documents with graphic information as well as advanced digital media. Project-specific reading lists are developed by both the student and instructor.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: LAAR 65100, LAAR 64700

LAAR 64400 - Planting Design

Students explore the aesthetic potential of plant material to create compelling spaces, with attention to techniques for anticipating growth rates, projecting mature form, and predicting seasonal character changes. Environmental tolerances of plants in the designed landscape, particularly in constructed urban soil conditions, are an important focus of the course. Technical aspects of plant material selection, nursery practices, planting plan production, and plant specification are discussed, as well as the implications of plant selection on landscape management practices.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: LAAR 65160Corequisite: LAAR 64100

LAAR 64700 - Landscape Restoration

This advanced course examines histories and theories of restoration, the question of preservation versus conservation, and novel strategies for both mitigation and adaptation to address ecological health in the current climate crisis. The course focuses on the terrestrial and aquatic biomes of North America. Students will question and rethink conceptions of restoration as a return to a past condition, and they will attempt to constitute a theory of dynamic ecological health that embraces novel ecosystems and natural disturbance regimes.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: LAAR 65100 and LAAR 64150

LAAR 65100 - Landscape Architecture Studio V

The fifth design studio is structured around a theme relevant to global urban conditions, but consistent with issues in the New York metropolitan region. Students are thus are able to extend their localized knowledge to a broader and relevant new context. Students are required to define key social, environmental, and ecological issues and independently explore the resolution of these issues, weighing the often conflicting demands of environmental mitigation and remediation, cultural habits of occupation, and economic and social constraints.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: LAAR 64100Corequisite: LAAR 64150, LAAR 64700

LAAR 65160 - Urban Plants

This course investigates plants as the quintessential material of urban landscape architecture. By building skills and knowledge drawn from the expertise of botanists, professional gardeners, and horticulturalists, the course connects plant knowledge with the workings of the larger urban ecosystem, including urban design, policy, civic infrastructure, funding, phasing, and maintenance. Students will develop analytic drawings that explore the multifaceted ways in which plants and humans connect in the urban ecosystem.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 65300 - Professional Practice

This course introduces the range of professional practice undertaken by qualified landscape architects at the site and planning scale in both the public and private sectors. The course familiarizes students with the range of legal and administrative requirements of practice and office projects. Topics explored include the pursuit of work, preparation of proposals, contracting of services, design and construction documentation, specifications, bidding, and construction administration. Final project hand-over to clients, project maintenance, and the ongoing management of liability are also discussed.

Credits: 3. Contact Hours: 3 hr./wk Prerequisite: LAAR 62300

LAAR 66100 - Landscape Architecture Studio VI

The objective of the sixth and final, comprehensive design studio is to enhance independent research methodologies, conceptual processes, and creative design skills necessary for transforming both academic and professional practice in the field of landscape architecture. Each student's project must test -- through site analysis, programmatic development, and a design proposition -- the objectives and rationale of an individually authored written project statement. This proposition is conceived as a dynamic hypothesis to be evolved and transformed throughout the semester.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk. Prerequisite: LAAR 65100

LAAR 66200 - Advanced Visual Representation

Current landscape architecture research and professional practice demand a wide range of advanced visual representation techniques. Students will learn how to conceptualize landscape design and research techniques including digital data-based infographics, advanced three-dimensional rendering, animation and effects, scripting, and three-dimensional printing.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: LAAR 61400Corequisite: LAAR 63100, LAAR 63300

LAAR 69003 - Independent Study

Repeatable 4 times.

Credits: 3. Contact Hours: 3 hr./wk.

LAAR 72100 - Landscape Architecture Thesis

The objective of the final project is to build independent conceptual processes and design skills in future academic and professional practitioners. To be considered complete for review, each project must test, through design, the objectives and rationale of a written project statement. It is in this phase of the program that the key objective of the school: to prepare students to design environmentally and socially vibrant landscapes for twenty-first century cities that address issues of

increasing globalization, expanding urbanization, environmental and social system sustainability, the promotion of social and environmental justice, the need for transformed land management practices in response to diminishing natural resources, and the mitigation and adaptation to climate change, is tested.

Credits: 6. Materials Fee: $50. Contact Hours: 8 hr./wk.

LALS - Latin American and Latino Studies

LALS 1100C - Puerto Rican Community: Field Research Work

Study of migration of the Puerto Rican to New York City, sociological impact, and resultant problems in education, housing, health services, family and community development. Practical experience and research through placement in agencies serving Puerto Ricans.

Credits: 3. Contact Hours: 3 hr./wk.

LALS 1200C - Vernacular Language of Puerto Rico

Provides basic knowledge of Spanish as spoken in Puerto Rico. Includes linguistic concepts needed to help students develop communicative skills in reading, writing, and speaking the vernacular language to allow research and facilitate communication with the Puerto Rican.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Fluency in conversational Spanish.

LALS 3200F - Independent Study and Research in Latin American and Latino Studies

Open to qualified graduate students in the School of Education interested in the study on special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

MATHE - Mathematics Education Course Descriptions

MATHE 1000E - The History of Mathematics

Historical evaluation of mathematical concepts. Selected topics related to elementary geometry and algebra, analytic geometry and calculus, and the modern postulational viewpoint.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 1100E - Advanced Euclidean Geometry

Extensions and generalization of elementary geometry; higher geometry of triangles, circles, quadrilaterals; constructions, classical problems.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 1200E - Fundamental Concepts of Modern Mathematics

Limit, length, area, volume (non-limit/limit developments). Euler's Theorem and consequences, angle-sum formulae (De-Gua) and generalization, isomorphic subdivisions. Pythagorean Theorem and Special Relativity. Combinational concepts. Foundations, axiomatics, proof-theory.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 1900E - Mathematical Computer Software

Survey of mathematical computer software. Using Geometer's Sketchpad to learn advanced geometry theorems. Sample programming problems drawn from scientific and mathematical applications.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 2100E - Probability

Finite sample spaces; probability as set function; permutations, combinations, conditional probability and Bayes' Theorem; independent events; random variables and distribution functions; expected values; Chebyshev's inequality.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 2200E - Mathematical Statistics

Frequency histograms, measures of location and dispersion, correlation and least squares, testing hypotheses, confidence intervals and estimation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A course in probability.

MATHE 2600E - Linear Algebra

Vector spaces, matrices, systems of linear equations, determinants, linear transformations.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 2700E - The Theory of Numbers

A study of problems concerning numbers as well as properties of numbers. Included are: divisibility, continued fractions, diophantine equations, primes, congruences. Fermat's and Euler's Theorems, quadratic residues and reciprocity, number theoretic functions.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 2800E - Numerical Analysis

Solution of algebraic equations by iteration interpolation; numerical integration; solution of ordinary differential equations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: One year of calculus.

MATHE 2900E - Topics in Higher Algebra

Topics include: polynomials and their properties, solution of third and fourth degree equations by formula and approximation, impossibility of solving equations of fifth degree or higher, real and complex roots of nth degree equations; other fundamental concepts of elementary algebra from an advanced standpoint.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 3200F - Indpt Study Resrch Math

Open to qualified graduate students in the School of Education interested in the study of special problems. MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

Credits: 1-3. Contact Hours: VARIABLE 1-3 CR./SEM. Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

MATHE 3200F-3203F - Independent Study and Research in Mathematics

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

MATHE 32400 - High School Mathematics from an Advanced Perspective

In this course, students will examine the topics in the high school curriculum through the lens of advanced college level mathematics courses (including Calculus, linear algebra, modern geometry, real analysis, abstract algebra and number theory). Connections between the mathematics taught in high school and college will be stressed, and students will also develop increased understanding of the connections between algebraic, geometric, and logical thinking. Students will be

asked to interpret mathematical ideas in contexts and will be expected to communicate effectively about connections they see, representations they create and generalizations they make.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Calculus, Linear Algebra and at least one proof-intensive course such as Abstract Algebra, Number Theory, Logic or Real Analysis

MATHE 3700E - Topology

Examples and classifications of surfaces; metric and topological spaces.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 4600C - Introduction to Mathematical Thinking

This course discusses mathematical thinking and methods for theorem proving. It includes truth tables, basic set theory, equivalence relations and functions, mathematical induction and other techniques for discussing and proving mathematical statements. Material to be proven will be drawn primarily from basic number theory and elementary combinatorics. This course may be required of students with insufficient background in abstract mathematics.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 4700C - Modeling with Algebraic and Trigonometric Functions

In this course, students will use algebra, geometry, and trigonometry to mathematize real life problems. Students will formulate questions, identify assumptions, collect data, and build and revise mathematical models. Students will use multiple representations and methods including formulas, diagrams, graphs, and procedures, and technology in modeling. Particular attention will be paid to linear, polynomial, exponential, logarithmic and trigonometric functions. Students will be asked to interpret models in contexts and will be expected to communicate effectively about connections they see, representations they create, and generalizations they make. Technological tools such as graphing calculators will be used to facilitate the learning. Adolescent certification candidates may not take this course for graduate credit without permission of the mathematics advisor.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATHE 4600C or permission.

MATHE 4800C - Foundations of Geometry

Continuation of MATHE 4700C. Further study of the theory of numbers, equations, inequalities, proof in a mathematical system, metric and non-metric geometry, topics in topology, probability and statistics. Senior high school mathematics teachers may not take this course for graduate credit without permission of the mathematics advisor.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 4900C - Fundamental Ideas of Calculus

Through the use inquire and discovery students will apply prior knowledge to explore the ideas and principles of calculus. Topics covered will include sequences and series; functions with a focus on the ideas of limits and continuity; differentiation with a focus on rates of change, optimization, graph sketching and exponential change; integration with a focus on area and volume. Students will also use mathematical tools such as graphing calculators to explore concepts and applications of calculus. Technological tools such as graphing calculators will be used to facilitate the learning.

Credits: 3. Contact Hours: 3 hr/wk Prerequisite: MATHE 4700C and MATHE 4800C.

MATHE 5000C - Data Analysis, Probability and Statistics

The course aims to develop a deep and flexible understanding of basic data analysis (probability and statistics) concepts and applications. Topics include descriptive statistics such graphs (histograms, box plots), two-way tables, and summary statistics (mean, median, mode, standard deviation, range) to describe data, sampling and study design, probability distributions, conditional probability, combinations, permutations, expected value and introduction to inference. Students will use technology such as spreadsheets to explore and analyze data sets.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 6000C - High School Mathematics from an Advanced Perspective

In this course, students will examine the topics in the high school curriculum through the lens of advanced college level mathematics courses (including Calculus, linear algebra, modern geometry, real analysis, abstract algebra and number theory). Connections between the mathematics taught in high school and college will be stressed, and students will also develop increased understanding of the connections between algebraic, geometric, and logical thinking. Students will be asked to interpret mathematical ideas in contexts and will be expected to communicate effectively about connections they see, representations they create and generalizations they make.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: One proof intensive course and Calculus II, Linear Algebra.

MATHE 6500C - Mathematical Applications in Science and Industry

Mathematics in contemporary science and industry, as illustrated in representative examples ranging through the mathematical subjects taught in secondary schools, but including other mathematics as well. Introduction to mathematics underlying instrumentation in science and technology.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 7400E - Foundations of Geometry

The basic concepts of Euclidean Geometry and the underpinnings of non-Euclidean Geometry.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 7500E - Classic Applications of Calculus I

Development of prediction techniques using various physical models developed by Newton, Leibniz, and their successors. Models using one variable differential and integral calculus will be described and used to make predictions. Applications will be taken from fields of population growth, electrical circuits, interest rates, planetary motions, and others.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 7600E - Classic Applications of Calculus II

Further applications will be taken from fields of population growth, electrical circuits, interest rates, planetary motions, and others.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 7700E - Modern Algebra

Sets, mappings, equivalence relations, operations, rings, integral domains, isomorphisms. Mathematical induction fields and groups.

Credits: 3. Contact Hours: 3 hr./wk.

MATHE 7800E - Transformational Geometry

The study of geometric transformation groups in the complex plane including similitudes, isometries, translations, rotations, dilations. Applications of cosets and normal subgroups, invariants.

Credits: 3. Contact Hours: 3 hr./wk.

MATH - Mathematics Course Descriptions

A0000

MATH A1200 - Topics in Mathematics

Topics to be chosen from graduate mathematics and related fields. This course can be repeated at most 2 times for a maximum of 12 credits total.

Credits: 4. Contact Hours: 4 hr./wk.

MATH A3200 - Theory of Functions of a Complex Variable I

Cauchy-Riemann equations, conformal mapping, elementary, entire, meromorphic, multiple-valued functions, Cauchy integral theorems, series expansion.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32500 or MATH 32404.

MATH A3400 - Theory of Functions of a Real Variable I

Lebesgue measure and integration on the real line, differentiation of real functions and the relation with integration, classical Lp spaces.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32500 or MATH 32404.

MATH A3500 - Partial Differential Equations I

First order equations, shock waves; classification and canonical forms of higher order equations, characteristics, the Cauchy problem for the wave equation: Huygens' principle; the heat equation; Laplace's equation; the Dirichlet and Neuman problems; harmonic functions; eigenvalue expansions; Green's functions.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: (MATH 32500 or MATH 32404) and MATH 39100.

MATH A4300 - Set Theory

Axioms of Zermelo-Fraenkel set theory; relations, functions, equivalences and orderings, cardinal numbers and cardinal arithmetic; well-ordered sets, ordinal numbers, transfinite induction and recursion, The Axiom of Choice and the Continuum Hypothesis.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32300.

MATH A4400 - Mathematical Logic

The propositional calculus, the sentential calculus, normal forms, first order theories, consistency, categoricity, decidability, Godel's incompleteness theorem, the Loewenheim-Skolem theorem.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32300 and either MATH 34700 or MATH 44900.

MATH A4500 - Dynamical Systems

Dynamical systems in one and more dimensions, symbolic dynamics, chaos theory, hyperbolicity, stable manifolds, complex dynamics.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32404 or its equivalent.

MATH A4600 - Linear Algebra

Linear systems, matrix decompositions, inner product spaces, self-adjoint transformations, spectral theory, discrete Fourier Transforms.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: C or better in MATH 34600 or departmental permission.

MATH A4900 - Modern Algebra I

Groups, rings, fields.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32300 and MATH 34600.

MATH A6100 - Differential Geometry

The theory of curves and surfaces in three-dimensional space: frames, fundamental forms, geodesics, curvature of surfaces, surface area, surfaces with boundary, the Gauss-Bonnet Theorem, introduction to Riemannian metrics.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32500 or MATH 32404.

MATH A6300 - Topology I

A course in general topology. Topological spaces: metric spaces, subspaces, continuous maps, connectedness, separation axioms; topological vector spaces: Hilbert spaces, Banach space, Frechet spaces; the quotient topology or identification spaces: the classification of two-dimensional manifolds; fundamental group and covering spaces; covering spaces of graphs: applications to group theory.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32500 or MATH 32404.

MATH A6400 - Number Theory

A first course in algebraic number theory which assumes some abstract algebra. Topics include: unique factorization in the integers and Euclidean domains, structure of the groups Z/mZ and their multiplicative units, quadratic residues and quadratic reciprocity, algebraic number fields, finite fields.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: C or better in MATH 34700 or departmental permission.

MATH A6800 - Combinatorial Analysis

Permutations, combinations, generating functions and recurrence relations, inclusion and exclusion, applications to matching theory, linear and dynamic programming, Polya's theory of counting, introduction to graph theory and coloring theory.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 30800 or MATH 32300.

MATH A7700 - Stochastic Processes I

Special topics in probability such as stochastic processes, Markov chains.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32300, MATH 34600 and MATH 37500.

MATH A7800 - Advanced Mathematical Statistics

The multivariate normal distribution, multiple and partial correlation, regression and least squares, the analysis of variance.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 32300, MATH 34600 and MATH 37600.

MATH A9801 - Independent Study

A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor.

Credits: 1 repeatable 2 times for a total of 3 credits. Contact Hours: 1 hr./wk.

MATH A9802 - Independent Study

A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor.

Credits: 2, repeatable 2 times for a total of 6 credits. Contact Hours: 2 hr./wk.

MATH A9803 - Independent Study

A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor.

Credits: 3, repeatable 2 times for a total of 9 credits. Contact Hours: 3 hr./wk.

MATH A9804 - Independent Study

A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor.

Credits: 4, repeatable 2 times for a total of 12 credits. Contact Hours: 4 hr./wk.

B0000

MATH B1100 - Selected Topics in Pure Mathematics

Topics to be chosen from the areas of algebra, analysis, topology, geometry, and logic. This course can be repeated at most 2 times for a maximum of 12 credits total.

Credits: 4. Contact Hours: 4 hr./wk.

MATH B1200 - Selected Topics in Classical Analysis

Topics to be chosen from applied mathematics and related fields. Typical subjects are: asymptotic methods, wave propagation, mathematical biology. This course can be repeated at most 2 times for maximum of 12 credits total.

Credits: 4. Contact Hours: 4 hr./wk.;

MATH B1300 - Selected Topics in Probability and Statistics

Topics to be chosen from the areas of probability, statistics, game theory, combinatorial analysis, etc. This course can be repeated at most 2 times for a maximum of 12 credits total.

Credits: 4. Contact Hours: 4 hr./wk.

MATH B3200 - Theory of Functions of a Complex Variable II

A continuation of MATH A3200, including such topics as analytic continuation, conformal mapping, Dirichlet problem, meromorphic functions, entire functions, Picard's Theorem, elliptic functions.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A3200.

MATH B3400 - Theory of Functions of a Real Variable II

Abstract measure and integration theory, abstract Lebesgue measure and integral, signed measures, Radon-Nikodym derivative, Lp spaces, product spaces, Daniell integral. Special topics such as Stieltjes integrals, Denjoy integral, Haar measure, measure rings, applications to probability.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A3400.

MATH B3500 - Partial Differential Equations II

First order quasi-linear and nonlinear equations, Cauchy-Kowalewsky Theorem, well-posed problems, Cauchy problem for hyperbolic systems, the wave equation in n-dimensions, boundary value problems for elliptic equations, Laplace's equation, parabolic equations, heat equation.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A3500.

MATH B4500 - Dynamical Systems II

Topics will be chosen from the areas of ergodic theory, topological dynamics, differentiable dynamics, complex dynamics and symbolic dynamics.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A4500 or departmental permission.

MATH B4900 - Introduction to Modern Algebra II

Field extensions, Galois theory, vector spaces and modules, category theory, special topics.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A4900.

MATH B6300 - Topology II

An introduction to algebraic topology. Homology: simplicial and singular, computations and applications; categories and functors; cohomology of groups, cup product, and Poincare duality; universal coefficients for homology; homotopy theory: homotopy groups, calculating them, connections with cohomology.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A4900 and MATH A6300.

MATH B7700 - Stochastic Processes II

Markov chains, limit theorems, renewal equations, random walks, Brownian motion, branching processes, queuing theory.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH A7700.

MATH B7800 - Advanced Topics in Statistics

The general decision problem, decision-making principles, application to hypothesis testing and estimation, minimax and Bayes solutions, utility theory, sequential procedures.

Credits: 4. Contact Hours: 4 hr./wk.; Prerequisite: MATH A7800

MATH B9800 - Independent Study

A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor.

Credits: Variable credit..

MATH B9801 - Independent Study

Independent Study. This course can be repeated at most 2 times for a maximum of 3 credits total.

Credits: 1. Contact Hours: 1 hr./wk.

MATH B9802 - Independent Study

Independent Study. This course can be repeated at most 2 times for a maximum of 6 credits total.

Credits: 2. Contact Hours: 2 hr./wk.

MATH B9803 - Independent Study

Independent Study. This course can be repeated at most 2 times for a maximum of 9 credits total.

Credits: 3. Contact Hours: 3 hr./wk.

MATH B9804 - Independent Study

Independent Study. This course can be repeated at most 2 times for a maximum of 12 credits total.

Credits: 4. Contact Hours: 4 hr./wk.

MCA - Media and Communication Arts Course Descriptions

B0000

MCA B0100 - Independent Media Arts - Idea, Structure and Realization

Examines the major developments in independent film, video and multimedia production and written theories and critical analysis that have resulted. Particular attention is given to media arts since 1960 and its role in questioning and reshaping American cultural identity.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B2100, MCA B2600 or MCA B3000, MCA B2700 or MCA B2800, MCA B2900 or MCA B3100.

MCA B2000 - Research & Awareness

In order to formulate a strategic message for use in an integrated communications campaign, some basic questions need to be answered: Who are we trying to reach? What environment will we be communicating in? How can we better understand our client and the challenges at hand? This course teaches students the quantitative and qualitative research methods to best answer these questions with a special focus on online resources - including electronic databases, blogs

and other ways of tracking grassroots market intelligence. Students will become familiar with library resources and develop the skills, practices, and mindset required for graduate studies in the communications field. Smaller papers throughout the semester will be the basis of a larger, final analysis & individual presentation of an actual brand or public relations case study.

Credits: 3. Materials Fee: $100. Contact Hours: 3 hr./wk. Prerequisite: MCA/BIC matriculated status.

MCA B2001 - Strategy & Measurement

The focus of this course is to teach students how to utilize market research, demographic and other data in the development of dynamic strategies for building and sustaining brand identity. Students will not only learn how to construct incisive strategies for advertising and integrated communications campaigns, but appreciate the value of long-term scenario planning as a necessity of brand management. Tools to evaluate the viability of strategies before implementation will be examined. Case studies will be analyzed to determine how well existing brands differentiate themselves in the marketplace.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/BIC matriculated status.

MCA B2002 - Idea Development

Students will learn how to transform a strategic message into a "big idea" that helps to create and nurture a brand's essence as it captures the consumer's imagination. This process- and critique-based course explores the distinction between strategic language and creative expression. Case studies as well as self-generated content will be used to teach students the basics of idea generation, how to recognize "big ideas," and how to critique them in order to keep the message on strategy and make the work better.

Credits: 3. Materials Fee: $100.. Contact Hours: 3 hr./wk. Prerequisite: MCA/BIC matriculated status.

MCA B2003 - Brand Experience

By using the strategic message as the anchor, today's digital world enables communication to create a 360 degree experience. This survey class explores methods of visualization, production, and immersion in the coordinated application of mass, personal, and social media. Traditional as well as experimental forms of communication will be considered as synergy helps to achieve strategic ubiquity. Emphasis will be given to how effective benchmarks and outcomes can be measured. Topics include: elements of good design, basic principles of digital production for broadcast, meaningful use of social and Internet media, and creating rich sensory environments.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/BIC matriculated status.

MCA B2050 - Strategic Media

While Marshall McLuhan may have stated that "the medium is the message" back in 1964, achieving communication goals in today's media landscape has never been more challenging. This course will examine the convergence of media and creative solutions to meet strategic ends as students study media outlets, planning, and buying.

Credits: 3. Materials Fee: $100.. Contact Hours: 3 hr./wk.

MCA B2051 - Leadership, Ethics, and Legal Issues

Students advancing careers in business, government and non-profits benefit from a thorough understanding of leadership, its theories, its techniques and its lurking ethical traps. This course examines the interplay between management and leadership, empowerment, mentoring, negotiation, change management and the special role of leadership in volunteer organizations. Rapidly changing dynamics growing from flattening organizations, instantly available information and round-the-clock communication are considered.

Credits: 3. Materials Fee: $50.. Contact Hours: 3 hr./wk.

MCA B2053 - Integrated Communications in a Shrinking World

Integrated communications in a multi-language, multicultural context is becoming the norm rather than the exception. This course examines the challenge of communications and advertising across linguistic, cultural, geographic, perceptual and national boundaries. This course also focuses on working with global actors beyond nation-states, including NGO's, private standard initiatives, value chain certification, transnational entities and activists groups.

Credits: 3. Materials Fee: $50.. Contact Hours: 3 hr./wk.

MCA B2054 - Creative Round Robin

This elective immerses Creative Track students in real-world agency life by developing campaign concepts across different media under the guidance of select creative teams currently working at high-level agencies. Overseen by a BIC faculty member, students will have the opportunity to visit five different firms and expose themselves to their distinctive ways of approaching a brief. Based on strategic thinking, students will create a number of campaign concepts that unite "art & copy" with an eye towards further development and inclusion in a spec book – or pre-professional portfolio.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIC matriculated status.Corequisite: Permission from BIC program director.

MCA B2055 - Portfolio Thesis: Creative

This elective, when taken in the final semester of the BIC program, supports students in the Creative Track in the development of their thesis portfolio which is a degree requirement. Portfolios must be of professional quality and are judged by a panel of discipline experts prior to graduation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIC matriculated statusCorequisite: Permission from BIC program director

MCA B2056 - Portfolio Thesis: Management/Planning

This elective, when taken in the final semester of the BIC program, supports students in the Management/Planning Track in the development of their thesis portfolio which is a degree requirement. Portfolios must be of professional quality and are judged by a panel of discipline experts prior to graduation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIC matriculated statusCorequisite: Permission from BIC program director

MCA B2057 - Portfolio Thesis: Public Relations

This elective, when taken in the final semester of the BIC program, supports students in the Public Relations Track in the development of their thesis portfolio which is a degree requirement. Portfolios must be of professional quality and are judged by a panel of discipline experts prior to graduation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: BIC matriculated statusCorequisite: Permission from BIC program director

MCA B2100 - Camera I

The first of a two-semester sequence of workshops in image gathering for HD video and 16mm film. Through a series of lectures and production exercises, student will build a foundation in the art and craft of cinematography, and the technical camera and lighting skills needed to execute their fiction or documentary productions. Topics include visual composition and design principles, the 3-demensional field, and the perception of time and space through camera position and lenses.

Credits: 3. Materials Fee: $100.. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B0100, MCA B2600 or MCA B3000, MCA B2700 or MCA B2800, MCA B2900 or MCA B3100.

MCA B2200 - Camera II

The second course in a two-semester workshop sequence in image gathering for HD video and 16mm film. Students build on the foundation of camera and lighting skills mastered in Camera I, executing increasingly more complex production exercises. Topics include 16mm

films and camera, exposure and lighting control, lighting styles and aesthetics, and a comparison between film and HD video.

Credits: 3. Materials Fee: $100.. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B0100, MCA B2100, MCA B2600 or MCA B3000, MCA B2700 or MCA B2800, MCA B2900 or MCA B3100.

MCA B2600 - Digital Production--Documentary

Workshop in the fundamentals of creating short documentary films in digital formats. Through a series of production exercises, students master skills in rendering locations visually, interviewing, working with archival elements and capturing unfolding action.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B0100, MCA B2100, MCA B2700, MCA B2900.

MCA B2700 - Production Sound - Documentary

This course emphasizes technical aspects of production sound in documentary film making through hands-on practical training. Topics also include emerging formats and troubleshooting techniques in the digital age as well as the relevant theoretical aspects in production sound.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA StatusCorequisite: MCA B0100, MCA B2100, MCA B2700, MCA B2900.

MCA B2800 - Production Sound - Fiction

This course emphasizes the technical aspects of production sound of narrative fiction film making through hands-on practical training. Topics also include emerging formats and troubleshooting techniques in the digital age as well as the relevant theoretical aspects in sound.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA StatusCorequisite: MCA B0100, MCA B2100, MCA B3000, MCA B3100.

MCA B2900 - Research and Writing for Documentary I

The first of a two-course sequence in conceptualizing, researching, writing and presenting an idea for a documentary film or video. Workshops focus on representational models, documentary and mass culture, testing the viability of the initial impulse, research strategies, crafting the idea into visual story, legal and ethical issues in documentary, and the filmic techniques available to the documentarian. Classes are augmented by a rigorous screening schedule of seminal documentaries.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B0100, MCA B2100, MCA B2600, MCA B2700.

MCA B3000 - Digital Production--Fiction

Introduction to visual storytelling for thefiction filmmaker. Students script and shoot a series of short fiction films employing new digital technologies for image gathering.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B0100, MCA B2100, MCA B2800, MCA B3100.

MCA B3001 - Relationship Building

To understand an advertising client's business needs, one must understand how the client does business. Students will learn about advertising from within the context of marketing, business and commerce. An emphasis will also be placed on vendors/suppliers beyond the client, group dynamics, various selling and negotiation techniques as well as dynamic new ways to package client presentations.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3002 - Consumer Behavior & Persuasion

This course is one part psychology and one part communication theory. It aspires to answer the questions: What makes people tick? How does communication work? Readings may include such seminal thinkers as BF Skinner, Marshall McLuhan, Neil Postman, Malcolm Gladwell, Harold Innis, Everett Rogers as well as the most recent developments in the scientific field of demography.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3003 - Internal Management

Despite the collaborative nature of creating advertising, this course focuses on ways to play a leadership role within the agency. As an "industry of idea development" and not the manufacture of goods, students learn the special challenges of evaluating creative work from strategy to concept development to execution. They will also learn about commercial production, overseeing media planning, the art of persuasion, and understanding the various roles and functions at play in developing successful communications programs.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3010 - Creative Concepts

An advanced studio course for creative development of advertising concepts. Based on strategic thinking, students will have the opportunity to create a number of campaign concepts for print executions with an eye towards further development and inclusion in a spec book - or pre-professional portfolio.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3011 - Multi-Media Executions

An advanced studio course that allows copywriting students to further refine rough campaign concepts in the creation of multi-media executions - from traditional print and broadcast to new media hybrids and more interactive advertising. Emphasis will be placed on developing a writer's "voice" as students exploring the convergence of brand and page personality in a series of individual projects.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3012 - Design & Portfolio Development

An advanced studio course in the BIC Creative Track where students work in teams as art director/copywriter to apply design skills, polish writing, and utilize design software basics in order to digitally produce their existing campaigns for inclusion in their spec book and to upload to an online portfolio. Final critiques will include a formal portfolio review with industry professionals.

Credits: 3. Materials Fee: $50.. Contact Hours: 3 hr./wk.

MCA B3020 - Branding Influentials

This course examines how to identify, cultivate and engage influencers who can help a company or business advance its brand in the marketplace. The class examines the role of influencers in media, the digital sphere (professional bloggers, citizen experts) and industry professionals/celebrities, and CEO's. Students will become proficient in developing targeted media lists using media databases and understand social media listening using the latest software to monitor the digital influencer space in identifying trends, understanding the news value, context and flow of information, and utilizing feedback to adjust an organization's digital media strategy to an equilibrium state.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3021 - Internal Corporate Branding

This course examines how an organization and its brand stay consistent with its mission, goals, and policies while engaging its employees through developing: communications that permeate throughout an entire organization, content that resonates across Intranet and digital media platforms and blogs; initiatives that inspire employees to embody the brand, mission and goals of the organization as they engage online and in their communities.

Students engage in such topics as brand building, change management, corporate communications, stakeholder engagement, digital media guidelines, and social listening so that they can take a leadership position at the management table.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3022 - Public Relations Branding Campaigns

This course provides a comprehensive overview of the PR strategic planning process within an integrated marketing communications plan. Students conduct environmental scanning on assessing a company's business goals and objectives in creating an effective communications plan that targets key audiences and stakeholders across traditional and digital media platforms. Throughout, students understand how strategic insights drive all aspects of the messaging (paid, earned, shared, owned), to deliver measureable results that tie the business goals and objectives to the public relations strategy.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B3100 - Fiction Screenwriting I

Focuses on finding meaningful stories on which short-fiction screenplays will be based. Through a series of oral and written exercises, students explore how personal experience and memory can inform their fiction. Required for Fiction Production Students.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status.Corequisite: MCA B0100, MCA B2100, MCA B2800, MCA B3000.

MCA B3200 - Fiction Screenwriting II

Students work on refining thesis screenplays by analyzing their story's tension devices, dialogue, action lines, and the visual components of the story. Each student will complete a screenplay of approximately twenty pages. Required for Fiction Production Students.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B0100, MCA B2100, MCA B2800, MCA B3000, MCA B3100Corequisite: MCA B2200, MCA B5100, MCA B6100, MCA B6200.

MCA B3201 - BIC Campaign Practicum-Not-for-Profit

Working in teams as competing, fully functioning "communications firms," students take this course in their penultimate semester to work on a semester-long project: an integrated marketing communications campaign for a non-profit organization (selected and coordinated by the instructor). Final projects will act as content for student portfolios required for completion of the program.

Credits: 3. Materials Fee: $50. Contact Hours: 3 hr./wk. Prerequisite: MCA B2000, MCA B2001, MCA B2002, MCA B2003.

MCA B3202 - BIC Campaign Practicum-Corporate

Working in teams as competing, fully functioning "communications firms," students take this course in their final semester to work on a semester-long project: an integrated marketing communications campaign for an actual client either directly or in partnership with a NYC agency (selected and coordinated by the instructor). Final projects will act as content for student portfolios required for completion of the program.

Credits: 3. Materials Fee: $50.. Contact Hours: 3 hr./wk. Prerequisite: MCA B3201.

MCA B3300 - Research and Writing for Documentary II

Conceptualizing, researching, developing, and writing advanced projects in documentary and cross-genre work with documentary elements. Required for students whose thesis projects will be in documentary or cross-genre with significant documentary elements. Required for Documentary Production Students.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B0100, MCA B2100, MCA B2600, MCA B2700, MCA B2900.

MCA B5100 - Editing

This course promotes students' critical and practical understanding of the role of editing in the filmmaking process. Through lectures, screenings, and discussions students are exposed to the art and craft of film editing. Three main components will be addressed: Discussions in aesthetics and techniques, screenings and analysis of different editing styles, and follow-through with all students' program-related projects (Fiction and Documentary).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA matriculated status, MCA B0100, MCA B2100, MCA B2600, MCA B2700, MCA B2900.Corequisite: MCA B2200, MCA B3200 or MCA B3300, MCA B6200 or MCA B6300.

MCA B5300 - Sound Design

Exploration of the aesthetics and practice of audio as a creative element in media production. Through a series of exercises, students learn to shape the aural environment of voice, music and sound effects to support the dramatic intent of a particular piece.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA Status. MCA B5100Corequisite: MCA B7100, MCA B9400 or MCA B9500.

MCA B6100 - Producing

Examines the production process from A to Z, from acquisition of literary rights to delivery of the finished product according to industry standards. Through a series of case studies, students analyze successful models for producing larger independent media projects as well as their thesis films. Please note: This course meets in the first summer session (June).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA matriculated status, MCA B0100, MCA B2100, MCA B2700 or MCA B2800, MCA B2600 or MCA B3000, MCA B2900 or MCA B3100.Offered: Summer Session I.

MCA B6200 - Directing Fiction

Emphasis is on script analysis and shaping actors' performance for the camera. Class time is turned into a workshop where students direct scenes from published screenplays. Students who are in the Directing Fiction track will additionally shoot an "Instant Film": they are given one week to prepare, 3 hours to shoot, and one week to edit their film. For each film specific guidelines relating to 'mise-en-scène' are given to its directors to challenge their artistic inclination and aesthetics. Required for Fiction Production Students.

Credits: 3. Materials Fee: $35. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B0100, MCA B2100, MCA B2800, MCA B3000Corequisite: MCA B2200, MCA B3200, MCA B6100.

MCA B6300 - Producing and Directing the Documentary

An advanced workshop examining the unique combination of skills required for the Director/Producer of documentary and cross-genre work with documentary elements. Students carry out exercises that hone skills in logistics and aesthetics of creative documentary that test the assumptions of the documentary proposals they create in Researching and Writing Documentary II. Required for students whose thesis projects will be reality-based.

Credits: 3. Materials Fee: $60.. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B0100, MCA B2100, MCA B2600, MCA B2700, MCA B2900.

MCA B7100 - Seminar in Independent Media Arts

Students and faculty evaluate the current state of media arts production, and potential roles for our graduates in that domain. Sessions are augmented by guest seminars conducted by working media artists from all areas of the independent community, site visits and internet conferences.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA 2200, MCA B6100, MCA B3200 or MCA B3300,

MCA B6200 or MCA B6300.Corequisite: MCA B5100, MCA B9100, MCA B9400 or MCA B9500.

MCA B7200 - Media Distribution and Marketing

A practical approach to distribution with a concentration on short fiction and documentary films. Students develop strategies for how to get work seen by distributors, festivals and the public. Exploration of different markets including Theatrical Educational, Specialty, Television, DVD, Electronic and new models such as VOD.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/M.F.A. matriculated status, MCA B5100, MCA B9100, MCA B7100, MCA B9400 or MCA B9500Corequisite: MCA B9200, MCA B5300 or MCA B9303

MCA B9100 - Thesis Project I - Production

The coordinating course for all logistics related to documentary and fiction thesis production. Thesis directors present production packages for critique, create schedules, review permitting, insurance and rights issues, as well as the auditioning process and location scouting. First cuts of thesis films are screened in the final month of the course.

Credits: 9. Contact Hours: 9 hr./wk. Corequisite: MCA B5100, MCA B7100, MCA B9400 or MCA B9500.

MCA B9200 - Thesis Project II - Post Production

Culminating course required of all candidates in the major. Candidates complete their thesis production and present at the annual student media arts showcase. Productions are expected to be original and represent a contribution to the field of media arts.

Credits: 6. Contact Hours: 6 hr./wk. Prerequisite: MCA B5100, MCA B7100, MCA B9100, MCA B9400 or MCA B9500Corequisite: MCA B7200, MCA B9200 and one of the following MCA B5300, MCA B9803, MCA B9303, MCA B9601 to MCA B9699.

MCA B9303 - Graduate Internship

Designed to build bridges to the student's chosen field through work experience. A limited number of positions may be made available through the MCA department, but students are encouraged to research their own internships. Student are evaluated in writing by their field supervisors and produce a report summarizing and evaluating the internship.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B9351, B9352, B9353 - BIC Graduate Internship

Designed to build bridges to the student's chosen field through work experience. A limited number of positions may be made available through the MCA department, but students are encouraged to research their own internships. Students are evaluated in writing by their field supervisors and produce a report summarizing and evaluating the internship. This set of courses is repeatable 2 times (for a maximum of 12 credits total for this entire set of courses: B9351, B9352, B9353).

Credits: 1-3. Contact Hours: 1-3 hr./wk. Prerequisite: MCA/BIC matriculated status, and permission from program director.

MCA B9400 - Advanced Documentary Workshop

Building on the skills acquired in the first year of the MFA program, this course enables documentary students to practice and perfect their craft as they work toward the realization of their thesis projects. The course is run as a workshop in that students prepare initial scenes from their film in which they find weaknesses as well as strengths. These scenes are presented for critique of structure, narrative intent, and technical viability in preparation for possible additional shooting and for First Cut screenings for the entire MFA class in B9100 Thesis Project I.

Credits: 6. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA matriculated status. MCA B2200, MCA B6100, MCA B3300, MCA B6300Corequisite: MCA B5100, MCA B9100, MCA B7100.

MCA B9500 - Advanced Fiction Workshop

Building on the skills acquired in the first year of the MFA program, this course enables fiction students to practice and perfect their craft as they work toward the realization of their thesis projects. The three benchmarks of the course are, 1. Screenplay presentation and discussion, where each student is required to present the project orally in class to receive final feedback in class from faculty and peers, and 2. Workshop, based on a selected scene and 3. Screening and critique of selects from dailies.

Credits: 6. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA matriculated status. MCA B2200, MCA B6100, MCA B3200 or MCA 3300, MCA B6200.Corequisite: MCA B5100, MCA B6100, MCA B7100.

MCA B9601-9699 - Selected Topics in Media Arts Production

Series of graduate-level elective courses exploring advanced topics in the rapidly changing field of Media Arts Production that are outside of the required course sequence.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MCA/MFA Matriculated Status, and permission from M.F.A Director.

MCA B9803 - Independent Study

The purpose of this course is to introduce students to the principles and practices of teaching in a student's chosen field. Students are assigned a faculty mentor and work closely with them on all instructional aspects of a particular course. Students will learn how to structure a syllabus, super-vise student production teams, provide instructional support and teach a minimum of one course session, which will be evaluated by the faculty mentor.

Credits: 3. Contact Hours: 3 hr./wk.

MCA B9851, B9852, B9853 - BIC Graduate Independent Study

This course allows students to experience independent, student-driven scholarship or practice by exploring a selected topic either outside the scope of existing courses or based on material already introduced during required coursework. Topics must be proposed to and approved by a selected faculty advisor who works with the student to structure, monitor, and evaluate the outcomes of the independent study. This set of courses is repeatable 2 times (for a maximum of 12 credits total for this entire set of courses: B9851, B9852, B9853).

Credits: 1-3. Contact Hours: 1-3 hr./wk. Prerequisite: MCA/MFA or MCA/BIC matriculated status, and permission from program director.

ME - Mechanical Engineering Course Descriptions

Goooo

ME Goooo - Selected Topics in Mechanical Engineering

Advanced topics selected for their timeliness and current interest.

Credits: Variable cr..

ME G0400 - Industry Oriented Design Project

ME G0500 - Mechanical Vibratns

Mechanical Vibratns

Credits: 3. Contact Hours: 3 hr./wk.

ME G0600 - Thermal Systems Design

Therml Syst Designs

Credits: 3. Contact Hours: Therml Syst Designs

ME G2300 - Heating, Ventilating and Air Conditioning

Htng-Vent-Air Cond

Credits: 3. Contact Hours: 3 hr./wk.

ME G3300 - Solar Energy

Solar Energy

Credits: 3. Contact Hours: 3 hr./wk.

ME G4300 - Non-Newtonian Fluid Mechanics

Non-Newt Fluid Mech

Credits: 3. Contact Hours: 3 hr./wk.

ME G4900 - Advanced Topics in Fluid Dynamics

Advanced Topics in Fluid Dynamics

ME G5100 - Vehicular Power Systems

Vehicular Power Systems

I0000

ME I0000 - Seminars

Recent developments in mechanical engineering and related fields; economic and social effects. The students report on assigned subjects.

Credits: Variable cr.. Prerequisite: Departmental approval.

ME I0100 - Introduction to Research

This course will introduce PhD students into developing skills and knowledge in research tools and methods, safety and ethics in research, technical research writing, professional communications and critical thinking. The students will be required to apprentice in various research laboratories in the department, familiarize themselves with the ongoing research and write reports with critical view of the research topics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Enrollment in Mechanical Engineering PhD program.

ME I0200 - Applied Fluid Mechanics

This course presents the fundamentals of fluid mechanics with a balance between, physics, mathematics and applications. It includes application of conservation laws in control volumes with moving boundaries in tensor notation, high medium and low Reynolds number flows, momentum integrals in boundary layers, jets and wakes. Also described adiabatic frictional flows, flows with heat addition and energy related issues. Final project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate fluid mechanics ME 35600 or equivalent with departmental approval, symbolic language Matlab.

ME I0390 - Solar Energy Engineering

This course studies the fundamentals of solar radiation, its measurement methods and estimation. Selected topics in heat transfer relevant to systems design applications of solar energy such as flat plate and focusing collectors, energy storage systems, heating and cooling systems, power generation systems and distillation processes. Principles of Photovoltaic systems design for direct conversion of solar energy to electricity.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate heat transfer ME 43000 or equivalent with departmental approval; symbolic language Matlab or EES.

ME I1700 - Finite Element Methods

Equilibrium and energy based formulations of the finite element method. Review of the direct stiffness method. Truss, beam, plane and three dimensional element formulations, including isoparametric elements. Static and transient response of structures with applications in solid mechanics. Students are expected to use the available workstations to complete a project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Departmental permission.Corequisite: None

ME I3100 - Steam and Gas Turbines

Classification of modern turbomachines. Concepts in applied thermo-fluid mechanics. Similarity in design; wind tunnels and cascade of aerofoils; loss mechanisms; radial equilibrium theory; performance prediction; erosion and high temperature problems; instrumentation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 33000, ME 35600.

ME I3400 - Advanced Heat Transfer

Conservation equations for mass, momentum and energy. Conduction with energy generation, transpiration cooling, and phase transformation. Boundary layer approximations. Laminar heat transfer from flat plates and tubes. Heat transfer in free convection. Turbulent flow heat transfer.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Students are required to have previous knowledge of ME 43300 or ChE 34200 or equivalent and ENGR I1100 or equivalent.

ME I3600 - Conduction Heat Transfer

Formulation of the basic governing equations in rectangular, cylindrical and spherical coordinates. Consideration of linear and nonlinear problems. Topics include: conduction with energy generation, transpiration cooling, conduction in non-stationary systems, phase transformation, and ablation. Exact analytic solutions. Application of the integral method.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39200 and ME 43300 or CHE 34200.

ME I3700 - Convection Heat Transfer

Conservation equations for mass, momentum and energy. Boundary layer approximations. Laminar heat transfer from flat plates and tubes. Heat transfer in free convection. Turbulent flow heat transfer. Boiling and condensation. Heat exchanger theory.

Credits: 3. Contact Hours: 3 hr./ wk. Prerequisite: ME 43300 or ChE 34200.

ME I4200 - Applied Stress Analysis

Linear elastic theory of solid mechanics. Includes concepts of stress and strain, governing equations of linear elastic theory, setup of boundary value problem, and two dimensional examples. Stress analysis of structural members. Includes failure criteria of materials, yielding, fracture and fatigue; Prandtle Torsion theory, torsion of thin walled structure; Bending of asymmetric beams and curved beam; and Energy methods for structural members and general solids.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Mechanics of Materials ME 33000 or equivalent with departmental permission.

ME I4400 - Nano/Micromechanics

Nano/Micromechanics encompass mechanics related to nano- and micro-structures of materials. In this course, the introduction to nano-scale science will be given first. Then the existing methods used to study

nanomechanics of materials and the current research status on nanomechanics will be presented. In contrast to nanomechanics, micromechanics theory has been better developed. Green's function and Eshelby's solution of an ellipsoidal inclusion will be introduced first. Then the variety methods including self-consistent method, generalized self-consistent scheme, Mori-Tanaka's method, and differential scheme will be studied. Finally, a hierarchical approach from nano- to micro- to meso- to macro-scale will be discussed.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate mechanics of materials ME 33000 or equivalent with departmental permission; symbolic language Matlab.

ME I4500 - Mechanics and Physics of Solids

A survey course covering several topics in solid mechanics and mechanical behavior of materials. Combines the experimental observations, underlying physical mechanisms and mathematical models. The measurable mechanical properties are discussed in the content of specific mechanics models. The topics include elastic deformation and stress, thermal stress, vibration, wave propagation, plasticity, fracture, fatigue, and linear viscoelasticity.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Mechanics of Materials ME 33000 or equivalent with departmental permission.

ME I4600 - Computational Fluid Dynamics

Governing equation and models of fluid flow and heat transfer; basic numerical techniques for solution; estimation of accuracy and stability of the numerical approximations; boundary conditions; grid generation; structure and performance of commercial software for applications in analysis and design of thermo-fluid systems; Final project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate fluid mechanics ME 35600 or equivalent with departmental permission; Introduction to Numerical Method I1500.

ME I4700 - Physical Properties of Materials

In this course, we first discuss the equilibrium properties of crystals such as permittivity, piezoelectricity, elasticity etc. The essential mathematical formula such as tensor and matrix notations will be used to describe the fundamental physical properties of materials. The focus of the course is to introduce the students with a broader view on all physical properties of materials including mechanical, electric, thermal and magnetic properties and their coupling behaviors based on the structure and symmetry of the material. Also the transport properties will be introduced at the end of the class. Some basic principles of transport phenomena and irreversible thermodynamics will be briefly introduced. Hopefully this course will provide the essential mathematical framework for the constitutive relations of the material.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Under graduate mechanics of materials ME 33000 & Engineering Materials ME 46100 or equivalent with departmental permission.

ME I4800 - Accidental Injury Biomechanics

In this course the principles of mechanics and/or biomechanics are used to understand how accidental injuries happen. The topics covered in this course are: biomechanics of human body and injuries including head, spine, abdominal and extremities; injury classification criteria; methods in trauma biomechanics such as: accident reconstruction, experimental and numerical methods; automotive accidental injuries and restrain systems; sport injuries; slip and fall injuries; safety standards; ergonomics and human factor; human body dynamics; and accident prevention. In addition, automotive safety features will be discussed.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate ME 47200 or equivalent, ME 37100 or equivalent, ME 33000 or equivalent with departmental permission. Knowledge of CAD/FE software is also required.

ME I4900 - Vehicle Safety Design and Biomechanics

In this course, the state-of-the-art and new technologies and design changes in all types of vehicles, and in particular automotive industry, that are geared towards safety issues and injury prevention of occupants will be discussed. Specifically, the topics of the course are: Vehicle body design; crash worthiness of the body; stability of vehicles; restraint system and supplemental restraint systems such as seat belts, pre-tensioner and airbags; crash sensors; seat and interior safety; occupant protection systems; codes and FMVSS standards; NHTSA standards and crash tests; simulation and accident reconstruction; biomechanics of occupant kinematics; brief anatomy; injury classification; and mechanisms of occupant injuries. The students are required to design and analyze a safety feature of a vehicle.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate ME 47200 or equivalent, ME 37100 or equivalent, ME 33000 or equivalent with departmental permission. Knowledge of CAD/FE software is also required.

ME I5000 - Advanced Computational Fluid Mechanics

Theory of finite element methods, Iterative solution methods, High-performance computing, Solution of incompressible Navier-Stokes equations (Projection methods, artificial compressibility methods, penalty methods, DAE), Applications in heat and fluid dynamics (in 1D and 2D), Final project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Computational Fluid Mechanics ME G4600 or equivalent with departmental permission; Introduction to Numerical Method ME I1500.

ME I5200 - Applied Plasticity

Theory of viscoelasticity with applications to vibrations and buckling. Introduction to the theory of plasticity Physical basis, yield conditions. Perfectly plastic and strain hardening materials. Druckers's postulates, flow rule. Upper and lower bound theorems. Applications to torsion, indentation and plate theory. Numerical solutions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Departmental permission.Corequisite: None.

ME I5400 - Advanced Stress Analysis

Adv Stress Analysis

Credits: 3. Contact Hours: 3 hr./wk.

ME I5800 - Trajectories and Orbits

Kepler's laws. The central force field. Ballistic trajectories. Minimum energy orbital transfer. Earth orbits and orbital parameters. Hohmann transfer. Two body and many body problems. Consideration of translunar trajectories and deep space problems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 24700 or equivalent.

ME I6100 - Wind Energy Fundamentals and Applications

In this course we consider the wind resources to extract energy. The aerodynamics of wind turbines are developed based on classical blade momentum theory and on numerical solutions of advanced transport equations. Betz limit is discussed and innovative concepts are described to illustrate principles. Advanced topics are presented including resource assessment, wake, losses and uncertainties. Term project is assigned involving the use of Computational Fluid Dynamics to evaluate wind turbine systems.

Credits: 3. Contact Hours: 3 hr./wk Prerequisite: Undergraduate fluid mechanics Or equivalent with departmental approval; symbolic language matlab.

ME I6200 - Mechanical Vibration

This course is the first course in Mechanical Vibration and includes developing equations for a single-degree-of-freedom system [SDOF] model based on concepts such as equivalent mass, stiffness and damping. Laplace transform approach is used to obtain response due to initial conditions, sinusoidal forced or base excitation and rotating unbalance. Vibrations under general forcing functions such as periodic inputs and nonperiodic inputs also studied using frequency response

function and convolution integral respectively. Above mentioned approaches are modified and used to investigate multi-degree-of-freedom system (MDOF). Modal analysis is introduced to find natural frequencies and mode shapes. As an application of MDOF un-damped and damped vibration absorbers are introduced to reduce resonant vibrations. The use of MATLAB software in vibration analysis is emphasized.

Credits: 3. Contact Hours: 3 hr./wk

ME I6400 - Wave Propagation in Solids

Hyperbolic and dispersive, linear and non-linear waves. Hyperbolic waves: the wave equations, stationary waves, breaking waves. Dispersive waves: dispersion relations, group and phase velocities. Non-linear waves and chaos in wave fields. Stress waves in solids (dilation and distortion waves, Rayleigh waves).

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Department permission.Corequisite: None.

ME I6500 - Computer Aided Design

Computer aided engineering design methodology; components of hardware, software and the use of commercial CAD systems in mechanical engineering design. Basic concepts of CAD and engineering analysis. Pro-Engineering Analysis Code; Splines and Coon's surfaces; geometric and wire frame modeling techniques. Simulation and modeling of an engineering problem; engineering assumptions. Introduction to finite element methods; mesh generation; simulation of loadings, and boundary conditions. Postprocessing and evaluation of results. Applications of these concepts to specific engineering design projects.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 14500, ME 33000, ME 47200 (or equivalent), MATH 39200.

ME I6600 - Boundary Element Method

Boundary Integral Equations. Green's functions and influence functions for one, two, and three dimensional problems. BE formulation for Laplacian, Poisson and biharmonic equations. Shape functions. Integration over element. Numerical formulation of the BE. Direct and indirect BE methods. BE solutions to Potential flow, torsion and heat transfer problems. Time dependent problems. Elastostatic, plane and Plate problems. Special Green's functions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR I1100.

ME I6700 - Composite Materials

Introduction, definition and classification of composites. Manufacturing, applications and advantages of composites. Macromechanics of a lamina. Anisotropic stress-strain relations. Strength and stiffness. Experimental determination of strength and stiffness properties. Failure theories. Stiffness and strength prediction theories. Classical lamination theory. Symmetric, anti-symmetric and non-symmetric laminates. Failure analysis of laminates. Interlaminar stresses, delamination, joining of composites; adhesively bonded joints. Structural applications.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ME 33000 or equivalent.

ME I6800 - Nonlinear Dynamics and Chaos

This course is built around a concrete mechanical system, for example, the pendulum. Definition of dynamical systems, phase space flows and invariant subspaces. Local and global bifurcation theory: Saddle-node, transcritical, pitchfork, and Hopf bifurcations, sability of homoclinic orbits, center manifolds and normal forms. Chaos: fractal geometry and dimension, Lyapunov exponents, routes to chaos (period doubling, quasi-periodicity, intemittency), spatio-temporal chaos.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 39100 or equivalent.

ME I6900 - Experimental Methods in Fluid Mechanics & Combustion

Introduction to fundamental concepts of experimentation: Error analysis, accuracy and precision. Analog to digital conversion. Sampling considerations. Data reduction. Time series analysis. Dynamical processes, Spectral and correlation functions. Probability and statistical variance. Engineering use of statistical averages. Frequency response and spatial resolution. Flow visualization techniques. Image processing. Particle Image Velocimetry. Laser Doppler and hot wire anemometry. Laser diagnostics in combustion. Spectroscopy and chromatography. Mie and Raman scattering. Laboratory demonstrations and hands-on experience with several modern techniques.

Credits: 3. Contact Hours: 3 hr./wk.

ME I9700 - Report

In-depth analysis of a specific topic by means of a written report using a number of technical papers, reports or articles as references. Topic to be chosen by student in consultation with a professor.

Credits: 0. Prerequisite: Completion of 12 credits toward the master's degree in Mechanical Engineering.

ME I9800 - Project

Theoretical or experimental project under the supervision of a faculty advisor. Student submits a written proposal, performs the required work, and submits a written final report.

Credits: 3. Prerequisite: Written departmental approval.

ME I9900 - Research for the Master's Thesis

Credits: 6.

Jooo0

ME J9900 - Research for the Doctoral Dissertation

Credits: Variable cr. (Up to 12 cr.).

Kooo0

ME K9000 - Doctoral Dissertation Supervision

1 credit repeatable up to 6 credits.

Credits: 1. Prerequisite: Approval of the departmental Ph.D. advisor.

MEDS - MEDS Course Descriptions

MEDS I7100 - Translational Challenges in Medicine

The course provides a basic understanding of current technical and scientific challenges and limitations in treating people with serious diseases. Clinical faculty present the challenges they encounter in their practice, and opportunities for advancing their fields by new discoveries. Students actively participate in organizing the lectures and discussing potential experimental solutions to these problems. Course includes a survey of basic ethical and legal concepts with emphasis on biomedical issues

Credits: 3. Contact Hours: 3 HR./WK.

MEDS I8100 - Biomedical Ethics and Responsible Conduct of Research

This course introduces the value of integrity in biomedical and scientific research. The topics include scientific misconduct, ownership of data and discoveries, documentation, ethics of animal and human research, and ethical challenges in the digital world.

Credits: 1. Contact Hours: 1 HR./WK.

MEDS I8200 - Translational Research Design

Credits: 2. Contact Hours: 2 hr./wk.

MIS - Computer Science Course Descriptions

G0000

MIS H2011 - Trends in Information Technology

This course offers a survey of information technology underpinning information systems in the private and public sectors. It aims to provide students with an overview of advances in information technology of importance to systems design and development. Topics to be covered will be updated each year the course is taught. Current topics would include cloud computing, mobile applications, user interfaces, data analytics, and social networks. The key elements of each of these technologies will be detailed together with examples of their use in existing information systems. The implications of these technologies for future information systems development will also be examined.

Credits: 3. Contact Hours: 3 hr./wk.

MIS G5010 - Seminar in Information System Management

This course presents an in-depth look at an area of specialization such as financial computing, business process management or medical informatics. Description of the specialization offered for coverage is as follows:

Financial Computing
This specialization presents theories and computational methods for analyzing and modeling various aspects of financial markets. It aims to provide students considering careers in Investment Banking with an in-depth understanding of financial services and significant computing and statistical skills. The topics in this area would introduce students to the modeling of asset values and financial derivatives and the software implementation of these models for pricing, simulations and scenario analysis. Also included would be an introduction to markets and financial derivatives, and a development of the necessary tools from the theories of stochastic processes and parabolic differential equations. Extensive use is made of financial information sources and software packages available on the Internet for modeling and analysis.

Semantic Business Process Management (SBPM)
Business Process Management can be viewed as a mapping between a business requirements process space of an enterprise and the actual process space of this enterprise comprised of IT systems, resources, and human labor. One paradigm of SBPM is to represent both spheres using Semantic Web Technology and then to process the information content, rather than just presenting the information. The Ontology Web Language (OWL), a language for defining and instantiating Web ontologies, which is seen as a major technology for the future implementation of Semantic Web, will be discussed. Laboratory work will form an integral part of this specialization. Projects will introduce students to Ontology Building tools, and Ontology Editors (e.g. Protégé from Stanford, and SemanticWorks, an OWL editor from ALTOVA).

Medical Informatics
The emerging field of Medical Informatics is dedicated to improving healthcare outcomes through the application of information technologies. This field blends healthcare management and information systems. The specialization in medical informatics aims to provide a balance of both conceptual and applied knowledge, preparing graduates for career paths in the field of medical information management. The topics in this specialization will cover a subset of the following: Computer-Based Patient Records; Medical Decision Support Systems; Medical Informatics in Web-Based Enterprise Computing; Clinical Data Acquisition and Analysis; and Telemedicine.

Credits: 3. Contact Hours: 3 hr./wk.

H0000

MIS H1010 - Statistics and Decision Making

The objective of this course is to analyze data and use methods of statistical inference in making business decisions. This course will focus on the application of fundamental concepts covered in Probability and Decision Making to the problem of drawing inferences from data on observed outcomes. Topics covered during the first part of the course will include statistical sampling and sampling distributions, point estimation and confidence intervals, hypothesis testing, and correlations among variables. The second part of the course will focus on multivariate analysis, with special attention paid to the inferences that may draw with respect to prediction and causality. Microcomputer statistical packages support the course content.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H2020 - Database Management

This course is concerned with the use of Database Management Systems (DBMS) to solve a wide range of information storage, management and retrieval problems, in organizations ranging from large corporations to personal applications, such as research data management. The course combines the practical aspects of DBMS use with more theoretical discussions of database design methodologies and the "internals" of database systems. The course will give the student a basic overview of Relational Database Systems and Relational Database Design. The student will acquire a working knowledge of Microsoft ACCESS and the ISO standard SQL language. Students will work individually on a series of small projects, and one larger project encompassing all phases of database design and implementation.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H2030 - Networking and Security

This course provides an overview of security issues in computer networks. Basic concepts of computer security will be introduced and illustrated by means of case studies. Topics to be covered include: risk analysis and security planning; access controls; program security in relation to malicious code such as Trojan horses, viruses, and worms; security policies and models; trusted systems and the TCSEC (Orange Book); cryptography and hashing; encryption-based protocols; authentication/PKI and network security.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H3010 - Managerial Economics

Managerial economics integrates microeconomic theories, statistics inference and other quantitative methods into a well-grounded subject so as to make optimum managerial decisions in a dynamic business world. It includes the theory of optimization, case studies and business strategies in managerial decision-making. Major topics include pricing strategies, estimating and forecasting market demand/supply, optimal production and input usages as well as long range planning for modern corporations.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H3020 - Developing Management Skills

The purpose of this course is to prepare students for future management and leadership positions, including developing the personal skills that are needed when working with other individuals and teams in modern organizations. Topics include: problem solving, stress management, managing and motivating others, coaching and counseling, managing conflict, and leading change. Students are provided with a solid background in fundamentals. They are also introduced to the assessment tools, tests, and exercises that help gauge their personal development in each area.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H3030 - Organization and Management

The modern corporation and its historic development: principal functions of management and its social role; structure of the management decision process; choice of management tools for analyzing decisions and coping with outcome uncertainty.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H4010 - System Analysis and Design

The objective of this course is to introduce methods to efficiently organize and manage software projects using advanced software engineering class tools including Rhapsody (ilogix) and Rational (IBM). Topics to be covered include: the software development life cycle, specification, analysis, design, implementation and testing; modular top-down analysis, design and testing, CASE tools for system analysis and design, data modeling and processing modeling tools (data flow diagrams, entity relationship diagrams) traditional and prototyping approaches, design and development of relational database systems, I/O design, input validation and user interface design (GUI), project management tools and source code control systems (SCCS), required communication skills for the systems analyst, and fact finding and interviewing techniques.

Credits: 3. Contact Hours: 3 hr./wk.

MIS H5020 - Project in Information System Management

The project will focus on real-world systems in the chosen area of specialization as described in course H5010. Students will be required to gain hands-on experience with a major computer-based information system, and to prepare a report based on their experience detailing the features, applications and limitations of the system.

Credits: 3. Contact Hours: 3 hr./wk.

MUS - Music Course Descriptions

V2000

MUS V2300 - Jazz Theory

Advanced concepts in jazz harmony, jazz improvisation and composition. Topics include reharmonization, functional and nonfunctional techniques, bitonality, and post-tonal theory. Principles of modal and free jazz will be explored through transcription and analysis. Classroom performance required.

Credits: 3. Contact Hours: 3 hr./wk.

MUS V2310 - Advanced Jazz Arranging

In depth study of jazz arranging with focus on writing for Septet through Jazz Orchestra. Focus on small ensemble writing will be 1960s to present. Large ensemble study will focus on recent works including those of Jim McNeely and Bob Brookmeyer. Discussion of ranges, form, voicings, harmonic approaches and languages, writing for rhythm section, and overall orchestration, craft, and techniques. Readings of student works. Expansion of vocabulary, development of aural imagination and personal voice.

Credits: 3. Contact Hours: 3 hr./wk.

MUS V2311 - Advanced Jazz Composition

In depth study of jazz composition with focus on form, style, counterpoint, harmonic and melodic language, rhythm, orchestration, and historic perspective. Model writing, readings of student works. Expansion of vocabulary, development of aural imagination and personal voice.

Credits: 3. Contact Hours: 3 hr./wk.

V6000

MUS V6900 - Jazz History Seminar

An in-depth examination of the work of a seminal artist, or time period, critical to the development of jazz.

Credits: 3. Contact Hours: 3 hr./wk.

MUS V6910 - Special Topics in Jazz

Topics vary on a rotating basis determined by the jazz faculty. These may include, but are not limited to, an in-depth examination of the music of a specific musician or group of musicians, as well as historical, analytical or performance studies.

Credits: 3. Contact Hours: 3 hr./wk.

V8000

MUS V8100 - Private Instruction

Private Instruction

Credits: 2. Contact Hours: 3 hr.wk.

MUS V8103 - Private Instruction for Jazz Students
Students study privately on their instrument/voice with a full-time faculty member or an accomplished artist/teacher from the New York jazz community, selected by agreement of the student, director of jazz studies and graduate advisor. Students will complete eight one-hour lessons each semester and receive an evaluation and grade from the private instructor. May be taken four times.

Credits: 1. Contact Hours: 1 hr./wk.

MUS V8200 - Recital

A one-hour recital of repertoire or original compositions performed at the university in the final semester. The program will be chosen in consultation with the jazz faculty and private instructor, and represents the culmination of the student's graduate work.

Credits: 2. Contact Hours: N/A Prerequisite: Acceptance into the MM in Jazz Studies.

MUS V8400 - Graduate Ensemble

Rehearsal and performance in small jazz ensemble. Involves intense work on performance skills, study of various composers, repertoire and styles. Students compose and arrange for the ensemble and rehearse supplemental to class meetings. May be taken up to four times.

Credits: 2. Contact Hours: 2 hr./wk.

V9000

MUS V9100 - Tutorial

Independent study under guidance of a faculty member.

Credits: Credits vary. Contact Hours: Hours and credits vary.

MUS V9200 - Jazz Pedagogy and Practicum

Students are mentored and supervised by jazz faculty members as they assist in activities such as rehearsing and instructing undergraduates in ensembles and academic jazz classes. Students will have practical training in writing syllabi and designing courses and receive critical feedback to better prepare to become jazz educators.

Credits: 3. Contact Hours: 3 hr./wk.

PHIL - Philosophy Course Descriptions

PHIL 77900 - Medical Ethics

This course examines "classic" and emerging issues in biomedical ethics paying particular attention to the history of medicine and the nature of scientific thought as it relates to medical ethics. While many issues in biomedical ethics seem timeless such as our concerns about the

withholding of treatment, abortion, truth-telling-others have arisen out of the development of an increasingly scientific medicine beginning in the 1700s. It is the availability of well confirmed effective treatments that forces us to wrestle with such questions as the propriety of medical intervention over the objection of the patient, the treatment of children over the objection of their parents, the right of all citizens to health care, the regulation of the sale of body parts for transplantation, and numerous circumstances arising out of assisted reproduction.

Credits: 4. Contact Hours: 2 hr./wk.

PHYS - Physics Course Descriptions

B0000

PHYS B9901 - Thesis Research

Credits: 3.

PHYS B9902 - Thesis Research

Credits: 3.

U0000

PHYS U3500 - Introduction to Quantum Physics I

Introductory material, 2-slit experiment, matter waves and addition of amplitudes. Superposition principle, Uncertainty principle, properties of matter waves. Boundary conditions and energy level quantization and Schrodinger interpretation. Wave equation, application to one-dimensional problems, barrier penetration, Bloch states in solids and how bands form in solids. The universality of the harmonic oscillator potential, simple harmonic oscillator and applications. One-electron atoms, spin, transition rates. Identical particles and quantum statistics. Beyond the Schrodinger equation: variational methods and WKB. Required for Physics majors.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: MATH 39100, MATH 39200; Pre/Coreq: PHYS 35100, PHYS 35400.

PHYS U3600 - Introduction to Quantum Physics II

Review of Schrodinger equation, Uncertainty principle. Formalism: Observables, Operators, etc. Application to simple cases: 2-level systems, electron in magnetic field; Angular momentum- Bohr model revisited; Magnetic properties of solids; Time-independent perturbation theory and applications; Time-dependent perturbation theory; Lasers, Masers, etc. Adiabatic processes: Berry's phase, when does phase matter? Quantum entanglement, Bell's theorem and recent experiments. Required for Physics majors.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: PHYS 55100, or PHYS U3500, MATH 39100, MATH 39200.

PHYS U4500 - Solid State Physics

Same as PHYS 55400.

Credits: 3. Contact Hours: 3 hr./wk.

PHYS U5300 - Photonics I - Laser Physics

Theory and application of lasers and masers. Physical principles underlying the design of lasers, coherent optics, and non-linear optics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A course in modern physics (PHYS 55100 or PHYS 32100 or PHYS 32300) and a course in electricity and magnetism (PHYS 35400 or EE 33200).

V0000

PHYS V0100 - Mathematical Methods in Physics

Topics in complex variables; methods for ordinary and partial differential equations; Green's functions; eigenfunction expansions; integral transforms; integral equations; tensor analysis; group theory; higher algebra; numerical methods. All master's students will generally be required to take PHYS V0100.

Credits: 4. Contact Hours: 3 hr./wk., plus conf.

PHYS V1100 - Analytical Dynamics

The Lagrangian formulation, including Hamilton's principle; Lagrange's equations; central force motion; Kepler problem, scattering; rigid body motion; transformation matrices. Eulerian angles, inertia tensor. The Hamiltonian formulation including canonical equations; canonical transformations; Hamilton-Jacobi theory. Small oscillations. Continuous systems and fields. Relativistic dynamics. All master's students will generally be required to take PHYS V1100.

Credits: 4. Contact Hours: 3 hr./wk., plus conf.

PHYS V1500-1600 - Electromagnetic Theory

Electrostatics, magnetostatics, and boundary value problems; Maxwell's equations; multipole radiation from accelerated charges; scattering theory; special theory of relativity. All master's students will generally be required to take PHYS V1500-1600.

Credits: 4 cr./sem.. Contact Hours: 3 hr./wk., plus conf.

PHYS V2500-2600 - Quantum Mechanics

Historical foundations. The Schroedinger formulation, wave packets, and uncertainty principle. Harmonic oscillator and potential barrier problems. W.K.B. approximation. Operators and eigenfunctions. Central forces and orbital angular momentum. Scattering, Born approximation, partial waves. Linear vector spaces. The Heisenberg formulation. Spin and total angular momentum. Perturbation theory: bound state, time-dependent. Systems of identical particles. Introduction of relativistic quantum mechanics. All master's students will generally be required to take PHYS V2500-2600.

Credits: 4 cr./sem.. Contact Hours: 3 hr./wk., plus conf.

PHYS V3800 - Biophysics

Introduction to the structure, properties and function of proteins, nucleic acids, lipids and membranes. In depth study of the physical basis of selected systems including vision, nerve transmission, photosynthesis, enzyme mechanism and cellular diffusion. Introduction to spectroscopic methods for monitoring reactions and determining structure including light absorption or scattering, fluorescence NMR and X-ray diffraction. The course emphasizes reading and interpretation of original literature.

Credits: 4. Contact Hours: 3 hr./wk., plus conf.

PHYS V3900 - Biophysics in Applications

An introduction to protein structure and molecular interactions needed for analysis of individual proteins. Focus on proteins that highlight important biophysical properties. Project-based courses emphasizing readings and interpretation of original literature. The groups of proteins chosen can be biological machines, including ribosomes; actin/myosin and muscle proteins; kinesin/dynesin transporters and cellular motion and deformation and bacterial flagellar motors. Alternatively, the class can study processes based on transmembrane potential gradients including respiration, photosynthesis and chemiosmotic energy coupling as well as nerve function.

Credits: 4. Contact Hours: 4 hr./wk. Prerequisite: Prerequisite: 1 yr. of Math, 1 yr. of Physics (Cell biology or biochemistry is recommended.)

PHYS V4100 - Statistical Mechanics

Probability theory, ensembles, approach to equilibrium, quantum and classical ideal and non-ideal gases, cooperative phenomena, density matrices, averages and fluctuations, and other selected topics, such as the time-temperature Green's functions, non-zero temperature variational and perturbation methods.

Credits: 4. Contact Hours: 3 hr./wk., plus conf. Prerequisite: PHYS V2500.

PHYS V4500 - Solid State Physics

Principles of crystallography; crystal structure; lattice vibrations, band theory, defects; study of ionic crystals, dielectrics, magnetism, and free electron theory of metals and semiconductors. Topics of current interest such as high temperature superconductivity, quantum Hall Effect, and fullerenes will be included, depending on interest.

Credits: 4. Contact Hours: 3 hr./wk., plus conf. Prerequisite: PHYS V2500.

PHYS V7100 - Graduate Physics Laboratory I

The concepts and tools of experimental physics. Basic analog apparatus and digital electronics; the use of minicomputers for data acquisition, the control of experiments and data analysis; discussion of intrinsic noise and error analysis. Execution of several advanced experiments, including statistics of radioactive decay, Raman spectroscopy, temperature dependence of resistivity, and others. The second semester of this course is PHYS W5901.

Credits: 4. Contact Hours: 2 lect., 2 lab. hr./wk.

PHYS V7200 - Graduate Physics Laboratory II

The concepts and tools of experimental physics. Basic analog apparatus and digital electronics; the use of minicomputers for data acquisition, the control of experiments and data analysis; discussion of intrinsic noise and error analysis. Execution of several advanced experiments, including statistics of radioactive decay, Raman spectroscopy, temperature dependence of resistivity, and others. The second semester of this course is PHYS W5901.

Credits: 4. Contact Hours: 2 lect., 2 lab. hr./wk.

PHYS V9100 - Colloquium

Recent developments and trends in the field of biology. Required of all candidates for the M.S. degree.

Credits: 1. Contact Hours: 2 hr./wk.

Colloquium must be taken twice.

W0000

PHYS W1200 - Continuum Mechanics

Credits: 4.

PHYS W2500-2600 - Quantum Field Theory

Credits: 4.

PHYS W3400 - Theory of Relativity

Credits: 4.

PHYS W4500-4600 - Quantum Theory of Solids

Credits: 4.

PHYS W5100-5900 - Selected Topics in Advanced Physics

Credits: 4.

PHYSE - Secondary Education Physics Course Descriptions

PHYSE 1401E - Development of Knowledge in Physics I

Selected topics in physics with emphasis on gaining a depth of understanding of the subject matter and an awareness of the development of skills essential to the scientific process. Background for teaching science in secondary schools or introductory college level. Integrated laboratory/discussion format.

Credits: 3. Contact Hours: 3 hr./wk.

PHYSE 1402E - Development of Knowledge in Physics II

Selected topics in physics with emphasis on gaining a depth of understanding of the subject matter and an awareness of the development of skills essential to the scientific process. Background for teaching science in secondary schools or introductory college level. Integrated laboratory/discussion format.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PHYSE 1401E.

PHYSE 3200F - Independent Study and Research in Physics

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

PHYSE 7100E - Modern Concepts in Physics I

A seminar designed for majors in science education to explore recent developments in physics and their application. Topics include plasma physics, sound and light.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: One year of college physics.

PHYSE 7200E - Modern Concepts in Physics II

A seminar designed for majors in science education to explore recent developments in physics and their application. Topics include black hole phenomena, space physics, mechanics.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: One year of college physics.

PHYSE 7300E - Introduction to Astronomy

Designed to introduce science educators to the universe, solar system, and galaxy. Topics include quasars, pulsars, black holes.

Credits: 3. Contact Hours: 3 hr./wk.

PSCE - Secondary Education Political Science Course Descriptions

PSCE 1600C - Political Parties

Political parties in relation to the electoral process, pressure politics, and democratic theory. Emphasis will be given to both the theory and dynamics of party politics.

Credits: 3. Contact Hours: 3 hr./wk.

PSCE 3200F - Independent Study and Research in Political Science

Open to qualified graduate students in the School of Education interested in the study of special problems. May be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

PSCE 5200C - The Governments of the New York Area

Government and administration of the central city and suburban communities. Emergence of regional forms of metropolitan government (e.g., the Port Authority) and of metropolitan planning as a means of metropolitan integration. Relation of local to state authority.

Credits: 3. Contact Hours: 3 hr./wk.

PSCE 6200C - Civic Participation of Youth

This course focuses on how youth develop civic identities and engage in civic life. Class readings and assignments will help students consider the history of civic education, current models of youth civic participation, and the value of various civic competencies.

Credits: 3. Contact Hours: 3 hr./wk.

PSCE 7500E - President and Congress

The nature of executive and legislative power in American national government, with particular focus upon constitutional bases, politics, and contemporary operation of the elective branches.

Credits: 3. Contact Hours: 3 hr./wk.

PSCE 7800C - American Political Thought

Development of political ideas in the United States, with particular relation to the forces and events that have influenced liberal and conservative theory.

Credits: 3. Contact Hours: 3 hr./wk.

PSM - Public Service Management Course Descriptions

B0000

PSM B1600 - Strategic Management of Public Organizations

Covers the analytical techniques that public and non-profit managers use to increase the value their organizations produce. Topics include: planning, decision making, leadership, organizational behavior, and resource management. The course will also cover performance management, human resource practices, technology management, and ethics in public service.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1610 - Public Budgeting and Finance

Covers the methods, terminology, and processes associated with the management of financial resources at the federal, state, and local levels. Topics include the politics of budgeting, budget reform, budget structure, cash and debt management, government accounting, tax evaluation, and financial reporting. Students will examine and evaluate a variety of budgets and financial reports.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1620 - Advanced Quantitative Methods

Covers the basic elements of how to find, synthesize, and interpret different types of data, both quantitative and qualitative. The course will provide an introduction to the use of statistical software such as Microsoft Excel, and SPSS. By the end of the course, students will be able to create a simple database, run basic statistical analysis, and prepare and analyze univariate and multivariate regressions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PSM B1877-Quantitative Methods.

PSM B1640 - MPA Internship

Students complete 400 hours of professional-level work in a government agency or non-profit organization.

Credits: 3.

PSM B1700 - Public Policy

Introduces public policy and many of the important issues in its formulation and implementation. Also covers the ways in which academics and practitioners evaluate the effectiveness of public policies. Topics covered include approaches to governance, and the politics, ethics, economic, and sociology of attempts to mobilize public power around an area of concern. Students apply what is learned to models of policy making and analysis.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1710 - Policy Frameworks and Target Populations: Race, Ethnicity, Gender, and Class

Focuses on reading policy critically, and on understanding the assumptions that underlie policies at the point of their formulation and execution. The course also covers the trade-offs and political compromises in policy history that may affect the ways in which political adversaries frame or publicly portray policies and target populations.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1720 - The Economics for Public Policy

Teaches the basic economic models that underlie most economic discussions of public policy and that are common knowledge to those in the field. Examines how scarce resources are allocated within or in lieu of markets.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1730 - Communication in Public Service

Covers methods and principles of effective communication in public service. Students learn about strategic communication and about writing press releases, policy memos, grant applications, and testimony.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1801 - Environmental Sustainability in Urban Systems

This course covers what sustainability and sustainable development mean for urban and urbanizing areas. Topics covered include land-use, environmental justice, greening initiatives, quality of life, urban geography, environmental psychology and behavior, transportation systems, and related topics.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1802 - Urban Youth Policy Development

This course examines cities and the impact of policy making on urban youth. Topics covered include public space, community organizing, the influence of the street, the growth and demise of urban landscape, education, justice, nutrition.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1805 - Governance and Public Administration

Focuses on the structure and processes of governments in the US and the US political system. Covers constitutional theory, federalism and the role of the media, the president, and the Congress. Examines the role of political participation. Also examines the history, theories, concepts, and practice of public administration in the US.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1808 - The Economics of Urban Areas

Covers the application of economic analysis to urban policy problems. It describes the economic forces that led to the rise of cities and urban areas, the economic functions they serve and the role of local government in addressing urban problems. The course will look at leading problems, the economics behind them, and how economic analysis helps in understanding alternative policy solutions.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1810 - Human Resources Management

The course focuses on the knowledge and practical skills that public managers need in managing employees. Topics include managing teams, discrimination and labor law, working with unions, motivating employees, privatization, recruitment, the aging workforce, and performance evaluations. Particular emphasis is given to developing human resources practices that support core organizational objectives.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1811 - Environmental Policy

Looks at the background and context of environmental politics and policy. Examines the rise of environmental issues to prominence, and offers a detailed analysis of key environmental concerns, as well as the current structures and policies designed to resolve problems.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1815 - The Politics of Urban Areas

Examines the actors and institutions of city government, political behavior, and the process of urban development. Focuses on the major aspects of urban politics: how the politics, demographic and socioeconomic environments of US cities are changing. Examines changes in population, political power, political culture, public policies and moral issues in cities.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1816 - Program and Policy Evaluation

This course covers the techniques and methods used in public administration for evaluating the effectiveness of programs and policies. Topics covered may include: performance measures, cost-benefit analysis, cost-effectiveness and efficiency analysis, surveys and working with survey data, case study, experimental design, present value analysis, and indexes.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B1877 - Quantitative Methods

The course prepares students for PSM B1620: Advanced Quantitative Methods. It focuses on the knowledge and practical skills that public managers need in working with data and basic methods of quantitative analysis. The course will cover descriptive statistics, inferential statistics and math models with management applications. Specific topics include: measures of central tendency and variation, probability distributions, estimation, rations, percentages, and randomness.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B3105 - Leadership in Public Service

This course assumes that leadership can be learned through the practice of skills, through guided reflection and discussion, and through observation and analysis of everyday leaders in everyday situations. By the end of the course, students will understand models and theories of leadership and leadership development learn to identify leadership skills in themselves and in others, and understand how leadership operates in different professional settings and context.

Credits: 3. Contact Hours: 3 hr./wk.

PSM B9900 - Capstone/Thesis

The Capstone course requires students to apply what they have learned in other courses to the analysis and evaluation of real-world problems. Course is taken during the last semester of the PSM program. Alternatively, students may choose to write a thesis.

Credits: 3. Contact Hours: 3 hr./wk.

PSY - Psychology Course Descriptions

B0000

PSY B9700 - Special Topics in Psychology

Credits: 3. Contact Hours: Hrs. to be arranged Prerequisite: Approval of the appropriate faculty sponsor.

PSY B9800 - Tutorial

May be taken twice for credit.

Credits: 3. Contact Hours: Hrs. to be arranged Prerequisite: Approval of the appropriate faculty sponsor.

PSY B9900 - Psychological Research and Seminar

Psychological research and seminar for candidates for the General M.A. degree who are engaged in thesis research. Offered each semester. Required for M.A. students on thesis track.

Credits: 3. Contact Hours: Hrs. to be arranged

J0000

PSY 7000J - History of Psychology

This course provides an overview of the history of psychology from ancient times to the present day. The aim of the course is to document the historical origins of the assumptions about science and psychology that shaped the development of twentieth century scientific psychology, and to identify conceptual continuities and discontinuities in the historical development of theories of human psychology and behavior.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7050J - Statistical Methods in Psychology I

Statistics I focuses primarily on learning the conditions under which one would employ different statistical analyses, how to select the relevant analysis and how to analyze the data under study.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7060J - Statistical Methods in Psychology II

Statistics II focuses on further development of statistical skills through advanced analyses of complex data sets.

Credits: 3. Prerequisite: PSY 7050J

PSY 7113J - Cognitive/Affective Aspects of Behavior

The course is designed to provide clinical graduate students in psychology with an overview of the history, theory, and measurement of human cognition and affect from a basic science perspective. The focus of this course will be the basic sciences of human cognition and emotion, how these two domains of human functioning can mutually influence each other, and how they can be harnessed to inform us about psychopathology.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7203J - Lifespan Development

This course will focus on the development of the individual across the lifespan. Multiple strands come together across a range of developmental stages to create the individual, and thus, psychological development must always be seen in the context of an individual's biology, her unique relational environment, her cognitive capacities, her social world, her community, and her culture.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7339J - Research Practicum in Clinical Psychology

Advanced group supervision of research proposals with individual faculty.

Credits: 3.

PSY 7410J - Psychoanalytic theories

This doctoral level course serves as an in depth introduction to the work of Sigmund Freud, using primary source material as well as supplemental texts. It will trace the development of the tenets of Freudian theory (i.e. the centrality of instincts and the hegemony of internal as opposed to external determinants of experience, the discovery of the unconscious and varied modes of representation, the primacy of memory in our apprehension of the present) and examine how current research and practice approach these areas.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7413J - Transference and Counter transference

This doctoral level elective clinical/theoretical course will introduce advanced clinical psychology graduate students to the basic concepts relevant to understanding transference and counter transference processes in psychotherapy. The course offers a comprehensive introduction to these constructs, and an opportunity, within a case presentation format, to consider their impact within the context of ongoing clinical work.

Credits: 3.

PSY 7460J - Social Psychology

This seminar provides a broad overview of social psychology, both classic and current. Social psychology has been described as "the thoughts, feelings, and behaviors of individuals" in the context of and shaped by "actual, imagined, or implied presence of others."

Credits: 3.

PSY 7512J - Biological Basis of Behavior

This course aims to provide an exposition of research and theory in the biological bases of normal and abnormal behavior. A survey of literature will span from nerve cells, the organization and functioning of the nervous system, to the neurobiological systems that underlie sensation, motor behavior, emotion, cognition, and self-other representation, and social behavior.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7550J - Psychopathology I

The aim of this doctoral course is to introduce clinical psychology graduate students to the basic concepts relevant to understanding psychopathology in adult patients. The course examines the clinical, research, and theoretical literature of a range of Axis I and Axis II disorders including personality disorders, affective disorders and psychotic disorder.

Credits: 3.

PSY 7560J - Psychopathology II

This course in Child Psychopathology is organized against the backdrop of 1) developmental factors, including level of emotional and cognitive/language functioning, capacities for affect and self-regulation, 2) risk factors, including biological, temperamental, neurodevelopmental, and genetic factors, as well as environmental factors such as parental psychopathology, family disruption, abuse, neglect, and other forms of trauma, 3) protective factors, and, finally, 4) cultural and other contextual factors.

Credits: 3.

PSY 7600J - Psychometric Methods

Standardized measures are used across all areas of psychological research, and provide a critical lens through which we can observe human nature—from diagnostic to characterological, neurocognitive to unconscious, intellectual, social and cultural. This second course in the testing sequence exposes doctoral-level clinical psychology students to methods by which psychologists strive to conceptualize human behavior and individual differences in terms such as skills, aptitudes, attitudes, values, personality, and intelligence.

Credits: 3. Prerequisite: PSY 7661J

PSY 7611J - Neuropsychological Assessment

This doctoral level course is the third in the diagnostic sequence and provides a broad overview of the assessment of the psychological and educational problems encountered by children with learning disabilities during their inevitably altered developmental trajectory.

Credits: 3. Prerequisite: PSY 7661J, PSY 7600J

PSY 7661J - Psycho diagnostics

This is the first semester of a three-semester-long approach to the psychological understanding of adult and child patients through psychological testing. The methods of clinical inference and the purpose of synthesizing the inferences into a coherent portrait of someone will hopefully be of use throughout one's professional career. It is certainly, both historically and heuristically, a hallmark of a clinical psychologist's training.

Credits: 3.

PSY 7770J - Practicum in Interviewing and Personality Appraisal I

This course is designed to introduce clinical psychology doctoral graduate students to the psychodiagnostic and therapeutic skills of the practicing clinical psychologist. The focus will be on mastering the art of interviewing and the initial phases of clinical processes with an emphasis on the psychological evaluation and diagnosis of adult patients including an understanding of the multicultural context and social location of the patient.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7713J - Ethical/Legal Issues for Psychologists

The purpose of the course is to introduce students to a comprehensive range of ethical and legal issues in the field of clinical psychology. We shall discuss various ethical systems in the history of western philosophy; bioethics; and research, clinical and professional ethics, as represented by the APA code of ethics.

Credits: 3.

PSY 7780J - Practicum in Interviewing and Personality Appraisal II

The purpose of this course is to teach the essentials of child evaluation and assessment. These are real world skills that are critical in making decisions regarding treatment, school placement, testing, and medication, and involve developing your skills in parent interviewing, child play sessions, formulation, and diagnosis.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 7800J - Quantitative Methods in Psychology

This doctoral course is designed to introduce graduate students in clinical psychology to the research process from the beginning to the end, while providing an overview of clinically relevant behavioral research method designs in psychology.

Credits: 3. Contact Hours: 3 hrs./wk.

PSY 7900J - Advanced Cognitive and Biological Bases of Behavior

An advanced course that integrates affective, biological and cognitive aspects and origins of behavior, all through a clinical lens.

Credits: 3 . Contact Hours: 3 hrs./wk. Prerequisite: PSY 7113J and PSY 7512J

PSY 8033J - Doctoral dissertation seminar

This course is designed to support advanced graduate students in clinical psychology in the development of their dissertations. The course will review the research process, from defining a research population to disseminating findings. Additionally, the course will touch upon the key components of a research question, the fundamentals of research methodology, and research ethics. These skills are critical to becoming independent researchers.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8013J - Seminar in special topics

This course number is reserved for the development and trial of new courses in the realm of clinical psychology and psychopathology.

Credits: 3.

PSY 8020J - Independent psychological research

Independent study on a pre-dissertation research topic with core faculty member.

Credits: 3. Prerequisite: PSY 7800J

PSY 8293J - Evidence based assessment/treatment of addictive disorders

The aim of this doctoral course is to introduce clinical psychology graduate students to the basic concepts relevant to understanding the process of treatment for addictive behaviors. The course will review modern theoretical viewpoints of addictions including neurobiological, harm-reduction and stages of change models and contrast these with psychodynamic models of addiction.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PSY 8500J

PSY 8297J - Integrative foundations of psychotherapy

The overall aim of the course is to develop an understanding of the way the key approaches to psychotherapy in our field have evolved, to evaluate their often unstated assumptions, their basis in clinical observation and systematic research, and their compatibilities and incompatibilities.

Credits: 3. Prerequisite: PSY 8500J

PSY 8343J - Sex and Gender

This course aims to address the determinants, development, and implications for mental and physical health and for positive adaptation of sex and gender identities. By the end of the course, the student should appreciate and understand the biopsychosocial factors underlying sex and gender, as well as the relations of those factors to health.

Credits: 3. Prerequisite: PSY 8440J

PSY 8392J - Therapeutic interventions: cognitive behavioral approaches

This course will introduce students to the assessment and cognitive-behavioral treatment of mood and anxiety disorders. Students will gain familiarity with the diagnostic criteria for mood and anxiety disorders using the Diagnostic and Statistical Manual Fifth Edition (DSM-5) as well as semi-structured clinical interviews and self-report measures for these disorders. Students will learn about and gain skills in CBT case conceptualization, treatment planning and treatment implementation.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8398J - Advanced Topics in Psychotherapy (Winnicott)

I think that a respectful way to approach Winnicott's work is to think dynamically, in the literal sense of the word. That is, to see his ideas as a presentation of paradoxes, never fully resolvable by words alone, yet capable of stirring us to find greater and deeper meanings to even the simplest of gestures and symbols. This course investigates his work in that context.

Credits: 3.

PSY 8410J - Clinical Practicum I

This course is designed to help students to develop their skills as psychotherapists. We will work on the ongoing challenge of diagnosing adult patients (and utilizing diagnosis in treating them), and we will discuss progress and how to handle lack of progress with treatment plans.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8420J - Clinical Practicum II

This is a practicum on working in therapy with children and adolescents Its aims are to: improve your ability to link diagnostic considerations to the process and content of your work with children; to better understand the meaning and nature of a child's play, both in terms of its diagnostic meaning and in its link to developmental/cognitive considerations and to be better able to link work in the therapy room to work with parents and school personnel.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8440J - Diversity issues in clinical psychology

This doctoral-level graduate course is designed to enhance the level at which clinical psychologists in training consider and discuss pertinent topics affecting the mental health of ethnic minority populations. Course material will focus largely on populations of African, Latino, and Asian descent, highlighting the variability that lies within these groups.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8441J - Health of lesbians/gays/bisexuals

Lesbian, gay, and bisexual (LGB) individuals are a neglected segment of the population whose health has only recently been investigated systematically. The health of LGB individuals requires attention, given reports of poor mental and physical health. This course will examine the mental and physical health of LGB individuals.

Credits: 3. Prerequisite: PSY 8440J

PSY 8500J - Evidence based psychodynamic treatment

This doctoral level clinical course will focus on psychodynamic evidence based treatments. Students will be exposed to current evidence based treatment and assessment models for personality disorders, affective disorders and panic disorder.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8548J - Supervision and consultation

This course is designed to equip advanced doctoral students with the fundamental theories, research, and techniques of clinical and academic supervision and consultation. Many graduates of our doctoral program include supervising and consulting as part of their careers. In addition, most find that after several years of absorbing clinical theories and practices as a student, the process of mentoring and guiding others in clinical and academic work and organizational change results in a next level of consolidation in the integration of theory, research, and practice.

Credits: 3. Contact Hours: 3 hr./wk.

PSY 8980J - Research/clinical supervision

An independent study course regarding advanced integration of clinical and research endeavors with a core faculty member.

Credits: 3.

PSY 9000J - Dissertation supervision

Upon attaining candidacy, students register for this course while completing their doctoral thesis.

Credits: 3.

V0000

PSY V0000 - History of Psychology

The historical development of modern psychology. Among the topics to be considered are: (1) psychological problems as they developed in philosophy; (2) psychological problems as they developed in natural science; (3) the early psychological systematists; (4) modern schools of psychology.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V0100 - Advanced Experimental Psychology I

Lectures deal with experimental methodology and research design, and with related problems such as the ethics of psychological experimentation. Laboratory work includes independent research, which may be conducted individually or by a group of students. Required for General Psychology M.A. students.

Credits: 4. Contact Hours: 2 lect., 4 lab. hr./wk.

PSY V0500 - Statistical Methods in Psychology I

Probability and statistical inference; estimation of parameters in survey research; analysis of variance and designs for experimental research; correlation methods for psychometrics. Required for General Psychology M.A. and Ph.D. students.

Credits: 3. Contact Hours: 2 rec., 2 lab. hr./wk.

PSY V0600 - Statistical Methods in Psychology II

A continuation of Psychology V0500. Also, multivariate analysis of correlation matrices and the use of computers for data analysis. Required for Ph.D. students.

Credits: 3. Contact Hours: 2 rec., 2 lab. hr./wk.

PSY V1000 - Advanced Physiological Psychology

Considers the interrelation of structure and behavior of the organism, and the physiological background of various psychological processes. The structure and function of the nervous system are surveyed. Various problems relating to the concept of "reflex," the organization, development and coordination of motor activities, and the physiological basis of emotions are discussed in detail.

Credits: 3. Contact Hours: 3 hr/wk.

PSY V1200 - An Introduction to Neuropsychology

This course provides an overview of the field of neuropsychology, focusing on what is known about the functional organization of brain systems. No prior knowledge of psychophysiology or cognition is required but would be helpful.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V1402 - Psychopharmacology

Science of drugs and their actions. Study of neuronal membranes and potentials, synaptic communication, neurotransmitters, receptor pharmacology, brain chemical circuits, neuroendocrine systems, hormones and neuropeptides. Primary is the goal of providing mental health professionals with a core knowledge of the biological bases and treatment of individuals with mental and addictive disorders.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V2000 - Developmental Psychology I

The development of children, from infancy to adolescence, will be discussed from a wide variety of theoretical perspectives, including Piagetian, psychoanalytic, behavioral, and cross-cultural viewpoints.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V2500 - Developmental Psychology II

Psychology of maturity, with emphasis on the later years. Social and cultural determinants of aging. Age-related changes in biological structure and function, perceptual processes, psychomotor skills, cognition, learning, and memory. Emotional and social adjustment during the later years. Maintaining the effectiveness of the older adult.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V3000 - Psychology of Learning

Analysis of contemporary researchand theory in the area of behavior modification.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V3300 - Psychological Aspects of Learning Disabilities

This course provides a broad overview of the psychological and educational problems encountered by children and adults with learning disabilities during their inevitably altered developmental trajectory. While it is not a course in the neuropsychology of learning disabilities, some background is essential and will be covered in the presentation of the three syndromes to be covered. These syndromes are: 1) developmental language disorders, 2) attention deficit hyperactivity disorder, and 3) right hemisphere learning disorders. Diagnosis and evaluation are a central component of the course, and a case presentation format is used to flesh out our understanding of each disorder.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Doctoral Students must have completed at least one semester of Diagnostic Testing.

PSY V3500 - Psychology of Perception

This course reviews basic psychophysics, psychophysiology and signal detection theory before an in-depth study primarily of vision and audition, with some comparisons from the touch systems and small and taste. Examination of the visual system will comprise both modern structuralist receptive field approaches and behavioral approaches from the Gestalt psychologists through Gibson and visual scene building and attention. Classes are primarily lecture and demonstration.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V3800 - Psychology of Cognition

Cognitive Psychology is the study of human thinking from behavioral, artificial intelligence and neuropsychological perspectives. The course touches on neural basics and brain organization, to focus on pattern recognition, attention, memory, imagery, language and problem-solving processes. Research in these areas to be reviewed will come from classic cognitive behavioral studies, neuroimaging studies and computer modeling studies.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V4200 - Health Psychology

This course is an introduction to health psychology. Health psychology brings the corpus of psychological knowledge to bear on understanding physical health. Many prevalent diseases are under the control of the individual both in terms of risk behaviors elevating the probability of disease and with respect to adherence to health promoting behaviors or treatment regimens that aim to control, reduce, or eliminate the disease cause agents. Health psychology is concerned with understanding the psycho-behavioral factors that explain physical disease. It also focuses on designing, implementing, and evaluating preventive interventions to reduce or eliminate the behaviors that place the individual at risk for poor health.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PSY 70500.

PSY V4300 - Positive Psychology

An introduction to the scientific study of optimal human functioning. Focus is on the factors that allow individuals and communities to thrive. In this course, students will critically assess primary readings in the field, covering topics such as optimism, happiness, resilience, spirituality, wisdom, and positive emotions.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Master's level Statistics or Experimental Psychology or permission from the instructor.

PSY V4600 - Advanced Social Psychology

This course introduces students to occupational health psychology (OHP). OHP involves the application of psychology to the study of the relation of the work organization to the physical and mental health and well-being of individual who work. The primary focus of OHP is the relation of ill health by creating healthy work environments.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V4700 - Epidemiology of Mental Disorders

The course introduces students to research on the distribution of mental disorders and their causes in different populations. The course covers basic epidemiological indices of risk, the measurement in mental disorder (reliability, validity), prevalence estimates, and research on the causes of selected disorders.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PSY 21500 AND PSY 32100 OR equivalent undergraduate Statistics and Research Methods courses.

PSY V4800 - Work, Stress, and Health

This course introduces students to occupational health psychology (OHP). OHP involves the application of psychology to the study of the relation of the work organization to the physical and mental health and well-being of individuals who work. The primary focus of OHP is the prevention of ill health by creating healthy work environments.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate courses in statistics and experimental psychology.

PSY V5200 - Psychology of Language

What is language, is it unique to humans conferring special cognitive power to us, and how is it shaped by human social, perceptual, and cognitive constraints? What role does biology play in shaping language structure? This course explores basic linguistic issues in semantics, syntax, phonology, language acquisition, literacy and pragmatics, and the cognitive processes underlying them. In addition, we look at sociolinguistics, bilingualism, secondary language processes, and second language reading and writing. While considering the neural underpinnings and nativist hypotheses, we also strongly emphasize the role of social processes in constructing meaning, in language and literacy acquisition, and in language change.

Credits: 3. Contact Hours: 3 hr/wk.

PSY V5500 - Psychopathology I

Covers the entire field of clinical expression of psychodynamics of the total personality as demonstrated in various forms of the psychoses and neuroses. It stresses the evolution of modern psychiatric thought. It is substantially supported by demonstrations of patients at a psychiatric hospital and clinic. The course stresses the functional psychoses.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V5650 - Gender and Psychopathology

The course will focus on theories and findings related to why specific psychological disorders tend to be much more prevalent among women and others tend to be much more prevalent among men. Readings will include theoretical work on gender, studies of the methodology used in relating gender and psychopathology, and research on the connection between gender and particular disorders, including perhaps depression, some anxiety disorders, disordered eating, autism, and conduct disorder.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V5700 - Biological Basis of Behavior

This course aims to provide an exposition of research and theory in the biological bases of normal and abnormal behavior. A survey of literature will span from nerve cells, the organization and functioning of the nervous system, to the neurobiological systems that underlie sensation, motor behavior, emotion, cognition, and self-other representation, and social behavior. The course also integrates understanding of altered behavioral processes of brain-damaged and psychiatric patients with knowledge of basic neuronal and neurobiological processes.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V5800 - The Health of LGB Individuals

Lesbian, gay, and bisexual (LGB) individuals are a neglected segment of the population whose health has only recently been investigated systematically, and who may be at greater risk for poor mental and physical health. We will examine theories and consider sociodemographic characteristics to help students develop a solid grasp of the biopsychosocial exigencies and health of LGB individuals.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6100 - Measurement of Abilities

Topics covered include the psychometric principles of testing and assessment, with an emphasis upon intelligence testing and the measurement of cognitive abilities. Hands-on experience with psychodiagnostic tests in a workshop format is an integral part of the course.

Credits: 3. Contact Hours: 2 lect., 2 lab. hr./wk.

PSY V6532 - Theories and Techniques of Counseling

Theoretical foundations of major contemporary approaches to counseling and psychotherapy and their applications are critically examined. Basic counseling skills are developed through lectures, demonstrations, small-group discussions and experiential activities.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6540 - Trauma and Resilience

This graduate level course offers the student a comprehensive exploration of the psychological trauma field, including its history, current theories, the nature of trauma (e.g., sexual violence, armed conflict, and natural disasters), how trauma affects individual and systems, grief reactions and traumatic stress. Students will develop a foundation for assessing and treating post trauma reactions in children, adolescents and adults.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6556 - Group Dynamics and Group Counseling

This course provides the essential knowledge and skills necessary for understanding, organizing, and working with groups within the counseling field. Students gain knowledge and competencies in these areas through a combination of traditional didactics and optional participation in an in-class personal growth group.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6560 - Multicultural Issues in Counseling

An introduction to the role of political and socio-cultural factors such as ethnicity, race, social class, religion, gender, and age in the delivery of culturally relevant and psychologically appropriate mental health services. Students develop the appropriate skills relevant to working with diverse communities in the United States.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6563 - Research and Program Evaluation

This course reviews the fundamentals of research methods and evaluation methods. Students are introduced to some aspects of evaluation theory, basic research methods used in applied research and evaluation, and to practical approaches to conducting and interpreting research. Students are introduced to research design and assessing program implementation. Students are expected to apply previous statistics and introductory research methods course content.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6564 - Psychoeducational and Community Interventions

This course is designed to provide students with the fundamental concepts and skills needed to create, evaluate, and disseminate prevention-oriented programs in communities. Students learn how to utilize qualitative and quantitative research, along with the interpersonal skills and sensitivity to diversity issues needed to implement and sustain community programs.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6575 - Assessment and Appraisal of Individuals, Couples, Families and Groups

The interview is the core technique for conducting a thorough clinical assessment that includes a diagnosis and formulation as well as an assessment of the clients' resources and strengths, and is the first step in creating a therapeutic relationship. In this course, students hone their interviewing and assessment skills.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6582 - Counseling Adolescents

Adolescent counseling is examined with emphasis on the issues unique to their stage of life. These include pubertal development, cognitive development, identity, dating and sexuality, family, peer relationships, school, and work all within a multicultural context.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6583 - Recognition and Reporting of Child Abuse

This course provides the knowledge and skills necessary to recognize signs and symptoms of physical abuse, sexual abuse, psychological abuse, and neglect. Students acquire knowledge of the ethical and legal issues pertinent to the role of counselors, and the required steps for reporting child abuse.

Credits: 1. Contact Hours: 1 hr./wk.

PSY V6584 - Professional Orientation and Ethics

This course provides knowledge of the ethical, legal, and professional standards relevant to the counseling field. It provides an overview of the history of the counseling field and an introduction to the roles, responsibilities, and identity of the professional counselor. Professional organizations, preparation and credentialing are addressed.

Credits: 2. Contact Hours: 2 hr./wk.

PSY V6587 - Clinical Instruction

This course introduces students to the assessment and diagnosis of mood and anxiety disorders and evidence-based treatments for these disorders. Students learn how to administer the Structured Clinical Interview for DSM-IV and reliable self-report measures. Students learn how to conceptualize and treat cases utilizing a Cognitive-Behavioral Treatment model.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6589 - Practicum in Counseling I

Students serve as counselors-in-training at pre-arranged practicum sites providing an integration of on-site counseling experiences with theories, treatment interventions, and legal/ethical issues learned in previous courses. Site and department supervisors provide formal evaluations of students' performance upon completion of the practicum experience.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6590 - Practicum in Counseling II

Students serve as counselors-in-training at pre-arranged practicum sites providing an integration of on-site counseling experiences with theories, treatment interventions, and legal/ethical issues learned in previous courses. Site and department supervisors provide formal evaluations of students' performance upon completion of the practicum experience.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6591 - Lifestyle and Career Development

This course examines the major theories of career development. The course examines the effect of depression, anxiety and substance abuse in a work environment. The effects of ethnicity, socio-economic status, age, gender and sexual orientation on career development are also examined.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6593 - Family and Couples Counseling

The capacities and difficulties of individuals are best understood in context of family functioning, and the broader systems within which families exist. This course covers the major approaches to family and couples therapy, including theories and research on family organization, affect and communication, development, culture, problem formation, resilience, and intervention.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6594 - Family and Couples Counseling II

This course provides an introduction to empirically-based practices (EBPs) in the field of family and couple therapy and counseling. It will cover the history of the development of EBPs, the scientific methods used to establish a treatment as empirically-based, assessment strategies, and empirically-based therapeutic techniques.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6597 - Foundations of Mental Health Counseling and Consultation

Prepares students in essential clinical and professional competencies. Students gain further experience with Psychodynamic, Person-Centered, Cognitive-Behavioral, and other approaches through readings and working with videotaped demonstrations, and in-class exercises with client cases from a wide range of cultural and ethnic backgrounds. Special emphasis is given to suicide assessment and intervention, professional ethics and HIPAA requirements.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V6600 - Practicum in CASAC Counseling

This practicum consists of a semester of supervised counseling experience in which students serve as CASAC counselors-in-training at approved practicum sites. Students perform 300 clock hours, including at least 120 direct service hours. Students will receive one hour weekly of face-to-face supervision with a qualified site supervisor, plus in-class supervision with the course instructor.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: PSY 10200 and PSY 21500 and PSY 32100 and PSY 35000 and PSY 36000 and PSY 36300 and PSY 36700 and PSY 37000 and PSY 38000 and PSY V5700 and PSY V6593 and PSY V7000 and PSY V7100 and PSY V0500 and permission of Department.Corequisite: PSY V0100

PSY V6602 - Theories of Individual Psychotherapy

Theories of individual psychotherapy from behavioral, client centered, cognitive, gestalt, existential and psychoanalytical perspectives are contrasted using written materials and films. The central place of value and cultural perspective is emphasized.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V7000 - Drug and Alcohol Abuse: Diagnosis and Treatment

Examines the stages and processes of addiction to alcohol and other drugs from the initiation of substance use through abuse and dependence, to treatment, recovery, and relapse prevention. Primary focus is on theories and techniques of substance abuse treatment. The range of treatment settings and services are examined for their relative benefits and limitations in treatment. Overview of short-term and long-term effects of major categories of abused drugs on abuser and community.

Credits: 3. Contact Hours: 3 hr./wk.

PSY V7100 - Chemical Dependency and Mental Health

This course aims to help students to understand the challenges to mental health caused by chemical dependency. A particular focus of the course will be on the concept of "dual diagnosis" and how it affects treatment. A number of specific (especially behavioral) techniques for the treatment of chemical dependency is examined.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate courses in substance abuse and/or abnormal psychology.

PSY V7500 - Psychopathology of Childhood

An introductory course designed to explore issues of normal and pathological emotional development during the school age years. Review of basic psychoanalytic notions of development during this period; classical analytic as well as object relations in attachment theories will be discussed. A number of specific syndromes and their possible etiologies; depression, additional situational disturbances, personality disorder, borderline syndromes and childhood schizophrenia

are also reviewed. Discussion of major diagnostic classifications systems, including DSM-III and the GAP manual.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Permission of the instructor.

SCIE - Secondary Education Science Course Descriptions

SCIE 1300E - Introduction to Chemistry

Designed to bring together principles and applications of basic chemistry. Topics include inorganic, organic, and physical chemistry.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 1400E - Introduction to Physics

Designed to bring together principles and applications of basic physics. Topics include mechanics, electricity, sound, light, and nuclear physics.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 1403E - Physical Sciences for Middle School Teachers I

Selected topics in physical science with emphasis on gaining a depth of understanding of the subject matter and an awareness of the development of skills essential to the scientific process. Background for teaching science in middle schools. Integrated laboratory/discussion format.

Credits: 4. Contact Hours: 4 hr./wk.

SCIE 1404E - Physical Sciences for Middle School Teachers II

Selected topics in physical science with emphasis on gaining a depth of understanding of the subject matter and an awareness of the development of skills essential to the scientific process. Background for teaching science in middle schools. Integrated laboratory/discussion format. May be taken independently of SCIE 1403E.

Credits: 4. Contact Hours: 4 hr./wk.

SCIE 1500E - Introduction to Earth and Planetary Sciences

Designed to bring together the principles and application of geology and meteorology. Topics include atmosphere, oceans, Earth's crust, and weather prediction.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 1700E - Environmental Energetics

A study of physical principles of energy; present and future national and international energy resources and the development of an energy policy. Topics include fission, fusion, geothermal, solar, wind, tide, and fossil fuels.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 2100E - Introduction to Botany

A study of the structure and function, diversity and ecology of green and non-green plants.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 2200E - Introduction to Zoology

A study of the structure and function, diversity and ecology of invertebrate and vertebrate animals.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 2300E - Introduction to Microbiology

A study of the structure and function, diversity and ecology of bacteria, viruses, and micro-organisms.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 3100E - Aerospace Science

Introduction to aerospace science, including aerodynamics, instruments and systems, meteorology, basic navigation, radio navigation and communication, and rocket/missile fundamentals.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 3200F - Independent Study and Research in Science

Open to qualified graduate students in the School of Education interested in the study of special problems. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the advisory committee.

SCIE 4101E - Life Science for Middle School Teachers I

This course will cover general and specific aspects of cell biology, molecular biology, and genetics. It will also cover the approaches for studying cells and genes and how genetic and cellular processes relate to physiological processes in organisms. Students will study the chemical components of the cell, such as proteins, nucleic acids, lipids, etc. The course will facilitate life science teachers' understanding of the principles and techniques of both biochemistry and genetics.

Credits: 4. Contact Hours: 4 hr./wk.

SCIE 4102E - Life Science for Middle School Teachers II

The purpose of this course is to provide graduate students (who have had little undergraduate preparation in biology) with a solid conceptual grounding in ecology and evolutionary biology (EEB) in one semester. The content coverage of the course provides both empirical study and theoretical exploration of topics that are considered central to the life sciences (according to the National Science Education Standards). These topics include organismal biology, ecology, and evolution.

Credits: 4. Contact Hours: 4 hr./wk.

SCIE 4103E - Science Across Contexts

This course explores the nature of science in the context of varied scientific disciplines. It begins with an overview of the philosophy of science and then uses case studies from the different domains of science to investigate the role of context and perspective in science. Each class will include a component bringing the nature of science and scientific thinking to the learning of science.

Credits: 3. Contact Hours: 45 hr./wk.

SCIE 4104E - Science in the Urban Environment

This course focuses on Earth as a system and explores the interdependent relationships among the atmosphere, hydrosphere, biosphere and lithosphere within the urban environment. Through inquiry-based laboratories and field investigations students learn to take scientifically valid measurements in the fields of atmosphere, hydrology, soil and land cover/phenology. Students will gain experience in the analysis of scientific data, will design and investigate their own science inquiry, and present oral and written reports to their peers.

Credits: 3. Contact Hours: 45 hr./wk.

SCIE 4105E - Principles of Atomic Theory

This science course aims to increase teachers' content knowledge, pedagogical content knowledge, and understanding of science education research, all integrated in the context of the nature of the atom. Content includes analysis of observations and experiments that give rise to the atomic model and atomic interactions. Related perspectives include epistemological approaches, theories of learning, and development of conceptual ideas.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 6100F - Seminar in Environmental Sciences

A seminar in which current environmental issues affecting humans, technology, and environment are discussed. Topics include population issues, pesticides, energy, wildlife conservation, and natural resources.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: A course in ecology or conservation or permission of the instructor.

SCIE 6200F - Salt Marsh Ecology

An on-site study of the energetics, diversity, and structure of salt marshes in the Greater New York area. Field visits to marshes included.

Credits: 1. Contact Hours: 1 hr./wk.

SCIE 6300F - Molecular Biology

The basic concepts at the cellular and molecular levels of living organisms including metabolism, structure, genetic continuity, and response mechanisms.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: An introductory course in biology or permission of the instructor.

SCIE 7300E - Laboratory and Demonstration Techniques in the Biological Sciences

Designed to introduce educators to the various laboratory activities, materials, and equipment used to demonstrate biological concepts. Construction and use of materials will be undertaken.

Credits: 3. Contact Hours: 3 hr./wk.

SCIE 7400E - Laboratory and Demonstration Techniques in the Physical Sciences

Designed to introduce educators to the various laboratory activities, materials, and equipment used to demonstrate physical science concepts. Construction and use of materials will be undertaken.

Credits: 3. Contact Hours: 3 hr./wk.

SOCE - Secondary Education Sociology Course Descriptions

SOCE 2100C - Marriage and the Family

Marriage and the family as social institutions. Changing family forms in Western civilization. Demographic trends and family size. The modern family and its relation to the total society. Marriage and divorce. Given jointly with the Graduate Liberal Arts Program in Sociology.

Credits: 3. Contact Hours: 3 hr./wk.

SOCE 3200F - Independent Study and Research in Sociology

Open to qualified graduate students in the School of Education interested in the study of special problems. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

SOCE 5100C - The Metropolitan Community

Study of the metropolitan community as a whole, central city and suburbs. Class structure of the city and its satellites.

Credits: 3. Contact Hours: 3 hr./wk.

SOCE 5200C - The People of the City of New York

The source and growth of the population, and population trends in the past and present. Composition of the population in terms of orthodox sociological variables. Marital status and family size. Immigration and outmigration. Vertical and horizontal mobility. The city as magnet and center of population. Demographic factors and future problems.

Credits: 3. Contact Hours: 3 hr./wk.

SOCE 6400E - Educational Applications of Group Dynamics

Concepts and methods of group dynamics and social group work, and their application to school situations' use of group process in meeting children's needs for activity, socialization, and emotional security; diagnostic and therapeutic implications.

Credits: 3. Contact Hours: 3 hr./wk.

SOC - Sociology Course Descriptions

SOC 51004 - Dominican Society: From African Black Slavery to the Advent of Trujillo

This course addresses relevant issues pertaining to the socioeconomic development of Dominican society. It looks at the formation of the first European colony in the New World, the creation of the Dominican Republic, and the formation of the Dominican people. The course ends in 1930, with the arrival of Trujillo.

Credits: 3. Contact Hours: 3

SOC 52004 - The Dominican People in the United States: From Migrants to Rooted People

This course examines the migration process of Dominicans to the U.S. and their transformation from migrants to settled, rooted people.

Credits: 3. Contact Hours: 3

Boooo

SOC B1002 - Qualitative Methods

Concepts and methods of qualitative research will be discussed for their relevance and utility in sociological analysis. Representative studies will be examined for the adequacy of their procedures and techniques, as well as the kind of knowledge which they provide.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SOC B1004 OR Departmental permission.

SOC B1003 - Analyzing Evidence 1

This course introduces the science and craft of social research. Partly this is a class about the scientific method, partly this is about learning the basic statistics that sociologists most often use, but there will also be an emphasis on doing research, and learning the tricks and traps of the trade. We will focus on learning quantitative research methods and survey design, but will also discuss experiments and qualitative research.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Open only to program majors OR with Departmental permission.

SOC B1004 - Analyzing Evidence 2

This course continues the introduction to research methodology, with a focus on qualitative research and the research process, examining the steps toward developing a sociological research project. A formal proposal for the capstone paper will be the final paper for the course.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SOC B1003 OR Departmental permission.

SOC B1100 - Seminar in General Sociological Analysis

A comparative overview of various current models of sociological analysis, including functionalism, ethnomethodology, and evolutionary schools.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B2100 - Seminar in Marriage and the Family

Marriage and the family as social institutions. Changing family forms in Western civilization. Demographic trends and family size. The modern

family and its relation to the total society. Marriage and divorce. Selected problems for discussion and research. Offered in cooperation with the School of Education.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B3200 - Research

Individualized research on specific projects, under the direction of a graduate professor. Maximum of 6 credits.

Credits: 3 cr./sem.. Contact Hours: Conferences to be arranged. Prerequisite: Approval of a faculty member and Chair of Graduate Committee required.

SOC B4100 - Comparative Social Systems

Description and classification of whole societies viewed as dynamic social systems in the relevant environmental setting, geographic and historical. Case studies will be selected from the American Indian, African, Oceanic, Asiatic, and European fields. The course is designed to prepare students for an understanding of their own contemporary society.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B5100 - Urban Sociology

This course examines theories of urbanization and urban life and current policy issues.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B5200 - People of the City of New York

An analysis of the many subgroups that live in New York City. This includes but is not limited to African and Hispanic Americans, Italians, Jews, Irish, etc. Focus on how the city developed historically, its spatial structure, its expansion, and its political, social, and economic life.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B6100 - Seminar: Problems in Criminology

Overview of criminology from the historical background to contemporary theories of criminological thought. Specific case studies will be used to illuminate the limitations and applicability of those theories.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B8000 - Seminar: Deviant Behavior

Overview of historical and contemporary approaches to defining and understanding deviance. Focus on development of those understandings and their repercussions for individuals and society.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B8100 - Sociology of Politics and Collective Behavior

The social bases of political participation and ideology will be explored within the context of modern industrial society. The problem of establishing, maintaining and dissolving political institutions will be examined as well as the relationships between the legitimacy and the effectiveness of political institutions. The social origins of democracy, authoritarianism, and totalitarianism. New approaches to the study of mass movements and collective behavior.

Credits: 3. Contact Hours: 3 hr./wk.

SOC B8300 - Sociology of Generations

Socialization processes occurring and associated with infancy, childhood, adolescence, student status, and various stages of adulthood. Secularization of various benchmarks in the life cycle. Special characteristics of each age group, their potential for intergenerational conflict and accommodation, and their relationship to social institutions. Contemporary modifications of age-graded experiences by social structure.

Credits: 3. Contact Hours: 3 hr./wk.

Coooo

SOC Coooo - Series

Courses given on special issues in sociology, on a rotating schedule, such as public policy, ethnic issues, drug and alcohol problems, etc. Courses offered in other graduate programs are available to graduate students in Sociology with permission of the Graduate Sociology Committee.

Credits: 3. Contact Hours: 3 hr./wk.

Vooo0

SOC V0100 - Development of Sociological Theory

Critical examination of the major classical theorists.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SOC V0200 OR Departmental permission.

SOC V0200 - Sociological Thinking

This course is an introduction to sociological thinking through readings of key texts in various subfields. It aims to enhance students' understanding of how sociological research is conceptualized, the relationship between theory and method, and some of the considerations that inform sociological writing.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Open only to program majors OR with Departmental permission.

SOC V0300 - Capstone Seminar

Completion of capstone paper, which is the grade for the course and the final degree requirement. Intensive workshop format that requires extensive reading, writing, and revision of one's own and others' ideas and writing. Multiple structured deadlines, various oral and written assignments, collaborative critique, continuous revision toward completed capstone paper.

Credits: 6. Contact Hours: 6 hr./wk. Prerequisite: SOC B1002, SOC B1003, SOC B1004, SOC V0100, and SOC V0200, OR Departmental permission.

SPANE - Secondary Education Spanish Course Descriptions

SPANE 1200E - Spanish and Spanish-American Poetry

The development of epic, lyric, and narrative poetry in Spain and Spanish America. The cultural history of the Hispanic nations as seen through the works of their principal poets. Conducted in Spanish.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 2500E - Civilizations of Latin America

Study of Latin American civilization from the pre-Columbian period to the present in Mexico and Central and South America. Extensive use of visual aids and recordings.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 2600E - Spanish Civilization

A survey of Spanish culture and institutions from the Middle Ages to the present. Extensive use of visual aids and recordings.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 3200E - Advanced Composition and Expression

A writing course designed to develop ease of expression. The finer shades of meaning of words: idioms, synonyms, and paronyms. Conducted in Spanish.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 3300E - Advanced Spanish Grammar

A selected review of Spanish grammar. Particular emphasis on language problems that arise in the high school classroom.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 3400E - Advanced Spanish Phonetics

Analysis of Spanish pronunciation, rhythm, and intonation. Practical application of theory to correction of individual speech problems.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 3500E - Independent Study and Research in Spanish

Open to qualified graduate students in the School of Education interested in the study of special problems. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits.

Credits: Variable 1-3 cr./sem.. Contact Hours: Hours to be arranged. Prerequisite: Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee.

SPANE 7200E - Contemporary Spanish Literature

Surveys the novel, drama, poetry, and short story in twentieth century Spain, especially works of major authors studied in secondary schools. Intended for teachers of foreign languages. Conducted in Spanish.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 7300E - Contemporary Spanish-American Literature

Study of the principal novelists, playwrights, poets, and short-story writers currently read in secondary schools, to provide a broader understanding of 20th century Spanish-America. Conducted in Spanish.

Credits: 3. Contact Hours: 3 hr./wk.

SPANE 7400E - Hispanic Literature for High School Students

Analysis of selected literary works suitable for high school classes, with emphasis on teaching literary techniques and methods. Conducted in Spanish.

Credits: 3. Contact Hours: 3 hr./wk.

SPAN - Spanish Languages and Literatures Course Descriptions

B0000

SPAN B7600 - Spanish-American Theatre

Study of representative plays reflecting significant literary trends and social developments in contemporary Spanish America.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN B7700 - Spanish-American Short Story

Examination of the short story emphasizing its literary, cultural, and social impact. Reading of representative works from the period of Independence through the current century.

Credits: 3. Contact Hours: 2 hr./wk.

SPAN B7800 - Seminar in Spanish-American Literature

Study of topics such as "indianista" and "indigenista" novels, the novel of the Mexican Revolution, and literary trends reflecting popular culture.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN B9800-B9805 - Special Topics in Language and Literature

Credits: 1-3. Contact Hours: 1-3 hr./wk.

SPAN B9900 - Hispanic Literature of the United States

Focus on contemporary Cuban-American, mainland Puerto-Rican and Mexican-American literature with an emphasis on poetry and narrative. Underscores how the literary production of the minority group reflects its place in mainstream American Society.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

V0000

SPAN V0100 - History of the Spanish Language

Traces the development of the Spanish language from its Latin origins to the present. The course provides a survey of historical grammar with emphasis on phonology and morphology and/or the evolution of Spanish in the Americas.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V0300 - Introduction to Methods of Research

Aims to develop proficiency in literary and bibliographical research through traditional and on-line methods. The course offers an overview of recent critical theories and requires library assignments applied to an individual research project.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V0600 - Spanish Morphology and Syntax

An advanced review of Spanish morphology and syntax with the purpose of allowing graduate students to explore analytically the structure of the Spanish language. The course will make frequent comparisons and contrasts between the target language and English grammatical structures.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V0700 - Spanish Stylistics

Analyzes the language used in literary texts through a study of representative Hispanic authors. The course will also consider how different patterns of style affect the writing and reading of a text.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V1000 - Medieval Epic and Lyric Poetry

Survey of prose, poetry and theater of the Middle Ages in the Iberian Peninsula from the earliest literary manifestations to the end of the 15th Century.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V2000 - Spanish Novel of the Golden Age

Study of the representative works characterizing the various narrative traditions that developed in Spain during the 16th and 17th centuries in light of their ideological and sociocultural contexts.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V2200 - Cervantes

Explores Cervantes' *Don Quixote* taking into account his life, ideology, as well as the philosophical, social and aesthetic contexts in which the author produced his masterpiece.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V2400 - Poetry of the Golden Age

Analysis of the work of the most representative Spanish poets from the late 15th century through the 17th century taking into account the philosophical and aesthetic currents in vogue at the time.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V2500 - Theatre of the Golden Age

Examination of the evolution of Spanish theater emphasizing theory of drama in the works of Lope and Calderón as well as their influence on

other playwrights of the period in the Iberian Peninsula and the Americas.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V3100 - Enlightenment and Romanticism in Spain

A review of the impact of French Enlightenment and European Romanticism on Spanish thought and literature through readings of representative Spanish works from several genres.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V3900 - Seminario Mario Vargas Llosa

A seminar offered through the Cátedra Mario Vargas Llosa at the Department of Classical and Modern Languages and Literatures that focuses on the work of the 2010 Nobel Prize winner and its impact on Hispanic and world literature through the analysis of selected novels, short-stories, and essays in print and other media. It is taught, generally in Spanish, by a rotating series of invited world-renowned and award-winning writers and critics. Because the instructor and topic of the course are different each year students may repeat the seminar 3 times for credit.

Credits: 1. Contact Hours: 1

SPAN V4200 - Spanish Novel of the Nineteenth Century

Study of the development of the Spanish novel from Romanticism though Realism and Naturalism. Particular attention will be given to works of key figures of the period such as "Clarin" and Galdos.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V5200 - Contemporary Spanish Drama

Review of the most influential trends of the 20th century world drama that affected the Spanish stage and its major playwrights.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V5600 - Contemporary Spanish Novel

Analysis of the representation of Spanish history and culture in fiction. Issues such as identity, change and authoritarianism will be explored through the examination of major novels.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V5800 - Contemporary Spanish Poetry

Analysis of recent poetic trends taking into account the influence of key voices from the "Generación del 27." Reading of representative works by major writers.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V6000 - Spanish-American Colonial Literature

Study of major literary figures and issues of the period in their cultural context and in light of how contemporary issues and critical debates have affected our perception of the colonial world.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V6400 - Romanticism in Spanish-American Literature

Survey of the major trends in Spanish-American literature of the 19th century with emphasis on "romanticismo," "costumbrismo," and the transition to "realismo" and "naturalismo." Readings of representative works of major writers and genres.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V6600 - Spanish-American Novel I

Analysis of the Spanish American novel in the first half of the 20th century, including the "novela de la tierra," "indigenismo" and the "novela psicológica." Readings of representative works of major writers and trends.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V6800 - Spanish-American Novel II

Study of the development of the Spanish-American novel beginning with the "Boom" to present-day trends. Readings of representative works of major writers.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V7000 - Modernism in Spanish-American Poetry

Study of the writings of Marti, Najera, Dario and other great figures of "modernismo," and their impact on Hispanic literature in Europe and the Americas.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V7200 - Contemporary Spanish-American Poetry

Examination of poetic trends through the reading of representative works of Huidobro, Guillén, Mistral, Neruda and Paz, among others.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SPAN V7400 - Spanish-American Essay

Study of the essay as a major genre in the development of Spanish-American social thought. Readings of representative works from the period of Independence through the 20th century.

Credits: 3. Contact Hours: 2 hr./wk. plus conf.

SUS - Sustainability in the Urban Environment Course Descriptions

SUS 7100A - Environmental Planning

This course provides an overview of the physical environment of the New York City metropolitan region including geology, soils, surface water, dominant weather systems, the changing climate, plant communities, wildlife habitat, and regional design style trends. The region serves as a case study site for multi-layered analysis. Each student prepares a colloquium presentation (short paper and slides) on a particular aspect of New York City regional ecology, design, local material, or historical feature. Presentations are compiled into a web format for future reference. The examination of the underlying environmental systems of New York City and the evolution of infrastructure in the city provides a case study for exploring the interplay of society, culture, and environment in sustainable design practice.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7100B - Sustainable Transportation

The course will review the role transportation plays in US society using a demand-supply economic perspective. Both freight and passenger movements will be considered. The first half of the course will establish transportation use and its impact on land use, energy consumption, air quality and related environmental issues. Development of basic economic models used to evaluate the impacts of transportation will be established. There will be a review of legislation and regulations as well as system funding that define how transport investment choices are made. The second half of the course will address current and evolving models addressing sustainability. These will include technical solutions to reduce carbon emissions, land use/transport shifts, including transit-oriented design, and information technology substitutions for transportation.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 19000 or equivalent, or consent of instructor.

SUS 7100C - Cities and Sustainability

This course will set out several frameworks for approaching sustainability, explore its foundational principles, and examine tools and metrics for measuring social, economic and environmental progress. The course will explore positive roles cities can play in safeguarding the sustainability of natural systems. It will look at policies and practices played out through both traditional and alternative forms of governance

- processes based on greater inclusion and participation across the various urban sectors. Through case studies, individual and team assignments, students will become familiar with the dimensions of more ecologically sound design decision-making. The course will combine seminar lectures, participant presentation of assignment exercises, and presentations of final papers.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7100I - Independent Study

Independent study in Sustainability.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Departmental Approval and Instructor Approval

SUS 7200A - Urbanism

This course provides students with a comprehensive overview of the history, theories, methods and values of urbanism, its positive and negative social/environmental attributes, addressing cities, suburbs and peripheral settlements in the United States and across the globe. Newly emergent models for sustainable urban design and planning are considered in the context of current imperatives to design and retrofit urbanized areas for social and physical resiliency.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7200B - Energy Systems Engineering for Global Sustainability

This course is intended to provide students with the background and tools to analyze energy choices for the future. World energy supplies, demand, and trends. The politics of energy. The scientific basis for anthropogenic global warming and its impact on climate and planetary ecosystems. Characterization and analysis of conventional sources of energy and fuels production including refineries, fossil fuel fired power plants, and gas turbine combined-cycle systems from both thermodynamic and environmental points of view. Alternate sources of power including nuclear, wind farms, solar (both photovoltaic and thermal), and biomass. Energy consumption by the transportation, manufacturing, and space heating and cooling segments of the economy. The hydrogen economy. Social barriers such as denial, lock-in, and NIMBY. After completing this course, students should: (1) Have a working knowledge of the supply and demand components of energy usage on both a national and global scale and the impact of the near-term end of cheap oil. (2) Have an understanding of the scientific basis of global warming and climate change, the predicted global impact, and the prospects based on various mitigation scenarios. (3) Have an understanding of the technological, environmental and economic aspects of producing and distributing energy from the entire range of inputs such as fossil fuels, nuclear fuels, solar insolation, wind, hydro, and biomass. (4) Be able to analyze, based on thermodynamic, safety, and economic considerations, the prospects for new energy technologies. (5) Be able to perform a systems engineering, life-cycle analysis of proposed technologies to reduce energy consumption. (6) Understand the societal and political factors that can inhibit the introduction of new approaches to dealing with our energy crisis, factors such as technological and economic lock in, perceived risk versus actual risk, and changes in lifestyle.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHE 22900 or ENGR 23000 or CHEM 33200.

SUS 7200C - Sustainable Aquatic, Terrestrial and Atmospheric Systems

This course provides students with a reasonably comprehensive understanding of the biosphere and the threats and challenges of global human activity to its sustainability. This course is structured into five modules pertaining to particular systems and culminating in a section that addresses systems interactions: Aquatic systems, terrestrial systems, atmospheric systems, human impact and the future and systems interactions. Each class will contain a one hour overview, one hour addressing case-studies, and one hour of discussion or group project. After completing the course, students should (1) Be familiar with the global environmental picture, (2) Understand ecosystems, their structure, how they function, and challenges to their sustainability, (3) Know the causes, dynamics and consequences of human population growth, (4) Have knowledge of renewable resources such as water and its stewardship, soil and its degradation, and the production and distribution of food, (5) Appreciate the value of ecosystems and biodiversity in terms of services provided and aesthetics, (6) Understand energy usage and production including renewable resources, (7) Know about the various sources of global pollution and its hazards, pest control, solid waste and hazardous chemicals, (8) Understand atmospheric processes and involvement in ecosystem interactions, and (9) Comprehend the dimensions of the sustainability challenge in terms of economics, resources, the public and public policy and urban sprawl.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 19500, PHYS 21900 or equivalent, or consent of instructor.

SUS 7200S - Selected Topics in Environmental Psychology, Education, and Communication

Offers selected topics that explore the myriad ways that human thinking influences sustainability issues: communicating and promoting environmental stewardship, systems thinking and organizational change, environ-mental conflict management and dispute resolution, and environmental risk assessment and response. Will help students deploy the insights of established social sciences to more effectively articulate and communicate sustainability issues and solutions to individuals and organizations.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7300A - Low-Energy Buildings

The aim of the course is to introduce state-of-the-art methodologies and tools for integrated design and optimization of energy efficient buildings with a good indoor environment. Focus is on the first part of the design process. The methodology for integrated design is based on listing of the functional requirements of buildings, preparation of space of solutions, generating of design proposals, and optimization analyses and decision processes. The participants will, on individual basis, work on development of the integrated design processes in relation to their own research projects.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 19000; MATH 195000; ARCH 61100 or ARCH 61001 or LAAR 61100; ARCH 35201 or LAAR 62600; and ARCH 35301. Any of these prerequisites may be waived upon consent of instructor.Cross-Listed as: ARCH 63102

SUS 7300B - Climate and Climate Change

We are in an era of rapid global warming and climate change. There is a large body of evidence that this is due to humankind's excessive use of energy, mainly derived from fossil fuels. So much misinformation has been disseminated that it is not clear to most what should be done. The purpose of this course is to separate the wheat of truth from this chaff of misinformation and to provide our students with a thorough understanding of the scientific basis for global warming and an appreciation of the potential outcomes of pursuing various scenarios for adaption and mitigation. That we have an informed citizenry is extremely important because the time left for effective action may be much shorter than we have been led to believe and the consequences of inadequate action are potentially much more catastrophic than previously anticipated.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 19000, MATH 17300, MATH 19500, PHYS 21900, SUS 7200C, equivalent or consent of instructor.

SUS 7300C - Industrial Ecology and Life Cycle Analysis

Students will be introduced to the purpose, philosophy, and applications of Industrial Ecology, as well as the status of environmental and urban resources. The basis and use of tools to assess Industrial Ecology will be reviewed, focusing on Life Cycle Analysis (LCA) and Carbon Footprinting. Several case studies that use the philosophy of Industrial Ecology to manage resources in the built environment will be presented

and discussed: energy, agriculture, commerce, transportation systems, manufacturing, and waste management. Next steps will be discussed.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: MATH 190 or equivalent, or consent of instructor

SUS 7300S - Sustainable Business Practices

Examines how sustainability intersects with the contemporary business environment. Explores how businesses can lessen the negative environmental impacts of their operations, supply chains, and products. Covers CSR (Corporate Social Responsibility), and notions of "shared value." Aims to help students distinguish "greenwashing" from sound practice with an objectively-grounded understanding of how sustainability and business practices come together.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7400A - Case Studies in Sustainability

This course will be structured to enable students to more broadly appreciate the complex dynamics of, and processes involved in, implementing successful sustainable development initiatives. Students will study and critique completed (or in some cases 'in-progress') projects. These may vary in terms of scale and in typology from individual buildings, to urban or neighborhood developments, or more complex civil infrastructural systems. The organization of the course will reveal a critical point of view and thematic approach to sustainability that unifies the projects being explored in detail. Lectures and readings will emphasize the crucial role of stakeholder involvement and cross-disciplinary partnership that are the basis of holistic, integrated designs. The course will combine seminar lectures, participant presentation of assignment exercises, and presentations of final projects.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.Cross-Listed as: ARCH 61388

SUS 7400B - Water Resources and Sustainability

Water and water resources are critical issues for the sustenance of nearly every society. This course examines the occurrence, use, management, and conservation of water and water resources in the U.S. and around the world. It further discusses the environmental, economic, and social implications of floods, droughts, dams, and water usage as well as current issues in water quality, water pollution, and water resource regulation. Students will gain an understanding of the environmental, societal, and political impacts of water, water resources, and changes in water supply and availability, and they will be introduced to current and emerging trends in water resource issues, development, and technology.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: SUS 7200C or consent of instructor.

SUS 7400C - Economics of Sustainability

Learn basic economic principles in the context of investigations of how consumer and producer choices affect the sustainability of economic development both regionally and globally. Theory of optimal allocation of resources and when markets fail to provide it. Inquiry into social institutions and government policies that correct market failures.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7500B - Green Chemistry

Principles of green chemistry/engineering. Focuses on the processes affecting anthropogenic organic compounds in the environment. Uses molecular structure-reactivity relationships to estimate chemical, photochemical, and biochemical transformation rates. Biomimetic process in materials chemistry. Awareness of current energy sources and energy management. Alternate and future sources (feedstock) for energy, chemicals, pharmaceuticals and materials from Biomass. Biorefinery concept.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHEM 26100.

SUS 7501C - Capstone Interdisciplinary Team Project - I

This course is designed to teach skills that are required in addressing interdisciplinary problems in sustainability. Students learn to work in teams on projects in disciplines unfamiliar to them. They develop confidence in tackling and solving problems where technology, economics and environmental issues intersect. Teams are assembled from more than one concentration. Lectures on project management and team work are given early in the semester. Project topics are either selected from a list or proposed by students. Seminars by invited speakers on topics of interest to team assignments are given during class hours. Depending on the nature of a project, outside experts may be engaged as mentors. A formal report is prepared and submitted by the team at the end of the term.

Credits: 3. Materials Fee: $25. Contact Hours: 3 hr./wk. Prerequisite: Permission by project committee.

SUS 7502C - Capstone Interdisciplinary Team Project - II

This course is designed to teach skills that are required in addressing interdisciplinary problems in sustainability. Students learn to work in teams on projects in disciplines unfamiliar to them. They develop confidence in tackling and solving problems where technology, economics and environmental issues intersect. Teams are assembled from more than one concentration. Lectures on project management and team work are given early in the semester. Project topics are either selected from a list or proposed by students. Seminars by invited speakers on topics of interest to team assignments are given during class hours. Depending on the nature of a project, outside experts may be engaged as mentors. A formal report is prepared and submitted by the team at the end of the term.

Credits: 3. Materials Fee: $25. Contact Hours: 3 hr./wk. Prerequisite: Or Corequisite(s): SUS 7501C.

SUS 7600A - Perspectives on Sustainable Materials

This course provides students with a critical understanding of practicing responsible architecture and engineering from a materials and products perspective. It will cover the full range of complex issues involved in material selection and specification: critical health and environmental issues and life-cycle analysis. Using current evaluation tools (Athena, Pharos Lens, CSI Green Spec, and others) students will research materials and products according to cost, availability, and environmental performance criteria to include embodied energy, life-cycle LEED criteria such as salvaged, renewable, and environmentally benign materials or products with recycled-content. "Smart materials" will also be considered. The seminar will produce a first draft of green specifications for a generic project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7600B - Design of Mechanical Systems for Sustainable Buildings

Fundamentals of HVAC Equipment. Principles of psychrometrics and comfort requirements. Analysis of thermal performance of building envelopes by transient and steady methods. Design of HVAC systems. Energy efficient HVAC systems. Renewable energy in buildings. On-site energy-generation systems. District cooling and heating systems. Principles of building-management systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate course in heat transfer or transport phenomenon.

SUS 7600C - Environmental Policymaking

Broadly examines environmental policymaking-the process of managing human activities in order to prevent or reduce harmful impacts on the natural world and humans. Examines how sound environmental policymaking must be fully attuned to the evolving international policy and legal environment. Gives special attention to the policymaking point of view, i.e., the active creation and shaping of environmental policy.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7700A - Sustainable Soil and Water

Via lectures and field work, explores topics related to the conservation of soil, surface water and groundwater in urban settings; understanding floodplains; treating polluted brownfields; the relation of soil and groundwater in natural and urban/designed settings; "sustainable details" such as porous infrastructure and pavements; and field methods for understanding soil and groundwater.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7700B - Solid Waste Reuse and Recycling

Characterization of solid waste streams. Solid waste generation in municipal, commercial and industrial sectors. Waste minimization by waste reuse and recycling. Analysis of state-of-the-art reuse and recycling technologies. Economics of waste and its impact on reuse/recycling. Implementation of reuse and recycling technologies in major commercial and industrial sectors such as paper, glass, plastics, metals, wood, tire, electronics and construction/demolition wastes. Local, state and national legislative trends and regulatory requirements. Impact of reuse and recycling of wastes on CO_2 emissions, urban sustainability and global warming. Examples of public and private reuse and recycling programs in New York City. Field trips. Invited speakers. The goals of the course are to familiarize the students with: (1) Generation, characterization and disposal methods for domestic, commercial and industrial solid wastes. (2) Environmental, societal and economic considerations in handling of solid wastes. (3) Current state of the art technologies for processing of solid wastes for recycling, including their implementation in selected industries. (4) Laws and local ordinances regulating recycling and reuse of solid wastes. (5) The impact of materials reuse on CO_2 emissions, urban sustainability, and energy consumption with specific examples from local and national reuse industries. (6) Factors affecting the success or failure of reuse and recycling in urban systems.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CE 37200 equivalent or graduate standing.

SUS 7800A - Natural Resources: Types, Sources, Supplies, Reuse, and Sustainability

Examines the types, sources, supplies, and reuse/repurposing of natural resources and their products to achieve sustainability goals. Covers minerals, metals, fossil fuels, forestry, and other natural resources involved in land use and design of built spaces. Examines resource limits; substitutive options; and how conservation, recycling, and repurposing can extend resources. Focuses on the triple bottom line framework of Environment, Economy, and Community.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

SUS 7800B - Sustainability in Infrastructure

Develop conceptual and mathematical tools for considering the sustainability and environmental impact of infrastructure projects. Topics studied include mass and energy balance, thermo-dynamic analysis (energy and exergy efficiency), life cycle analysis (ecological footprint, carbon footprint), global warming, and standards and certification programs (LEED, EnergyStar, Global Reporting Initiative), with applications and case studies in water, food, energy, and building systems. Lectures, assignments, student presentations and discussions, and a term project.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: CHEM 10401, MATH 20200, PHYS 20800, or permission of instructor.

SUS 7900B - Sustainable Energy Conversion Systems

Examines energy resources, contemporary energy conversion systems, and factors affecting the rate of global energy consumption. Compares conventional and renewable energy conversion systems with respect to limitations and efficiencies of each, and their comparative impacts on the environment. Covers applications including steam, gas, wind, hydro turbine systems, internal combustion engines, fuel cells, solar energy converters, and tidal and wave energy converters.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: ENGR 23000 Thermodynamics (or equivalent); ME 35600 Fluid Mechanics (or equivalent).

SUS 8100-8199 - Selected Topics in Sustainability

Offers selected topics that provide critical review, analysis, and evaluation of emerging issues in sustainability. Particular course contents may include topics related to energy, architecture, urbanism, environmental science, law, policy, management, economics, urban infrastructure, industrial ecology, etc.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: Undergraduate degree.

UD - Urban Design Course Descriptions

UD 61001 - Urban Design Studio I

Working both collaboratively and individually, students will pursue the design of an autonomous city in an abstracted setting. The studio-utopian in mood-investigates principles and practices of city design at regional, urban, neighborhood, and architectural scales and engages a wide variety of analytical, representational, and expressive media.

Credits: 7. Materials Fee: $50. Contact Hours: 10 hr./wk. Corequisite: UD 61004

UD 61002 - History of Urban Space I

An overview of the general process of modernization implicit in histories of city planning. The class traces the transformation of pre-modern "cities of faith" from a variety of cultures into the proto-modern cities of the Renaissance and the more controlled expressions of Baroque and Enlightenment urbanism. It examines the rise of the "city of machines" of the nineteenth century and concludes with the rise of the modernist urbanisms of Ebenezer Howard, Le Corbusier, and others.

Credits: 3. Contact Hours: 3 hr./wk.

UD 61003 - Reading the City I

A reading course devoted to close analysis of a series of major texts in urban theory. These readings are broadly drawn from the fields of urbanism, geography, cultural studies, cinema studies and other disciplines. The course aims to show both the range and nuance of styles of reading the city as well as the presence of the city as a shifting trope in larger formats by which we understand and reproduce contemporary culture.

Credits: 3. Contact Hours: 3 hr./wk.

UD 61004 - Urban Ecologies I

An investigation of the place of the city in a variety of planetary and natural systems that seeks to define the limits of urban sustainability. Using the concept of the urban "ecological footprint", the course examines the practical boundaries of urban growth, the interaction cities and the environment, the cycles of urban respiration and development, and the fundamentals of a sustainable urban economy.

Credits: 3. Contact Hours: 3 hr./wk. Corequisite: UD 61001

UD 62001 - Urban Design Studio II

The second urban design studio will incorporate strategies and methods developed in the first semester in the investigation of a large urban site in New York City. Drawing on a variety of "real world" influences and sources, students will produce viable designs that investigate the interplay of scale, site, program, and vision.

Credits: 7. Contact Hours: 10 hr./wk. Prerequisite: UD 61001, UD 61004Corequisite: UD 62004

UD 62002 - History of Urban Space II

A survey of urban design since 1945 in the context of post-war American suburbanization and the reconstruction of Europe. The course examines the impact of the growth of the globalized economy on urban form and development. It also considers theoretical styles-collagist,

deconstructivist, phenomenological, etc.-and their impact on attempts to understand the contemporary city of fragments and layers.

Credits: 3. Contact Hours: 3 hr./wk.

UD 62003 - Reading the City II

Drawing on insights and methods of the first semester, the course examines specific strategies for reading and analysis of urban sites. These will be used to reveal both the limits of different techniques of observation and the ways in which the contemporary metropolis overlays many social and imaginative spaces in the same physical place to produce the multiple and fragmentary territories that characterize the contemporary, plural metropolis.

Credits: 3. Contact Hours: 3 hr./wk.

UD 62004 - Urban Ecologies II

The second semester of the ecology sequence is focused both on ways in which the city provides a setting and a medium for a variety of human interactions and organizations and on the ways in which the city collaborates in the invention of "people" and in teaching them how to be, how to exist, in the modern world. It explores some of the basic forms of metropolitan life-the crowd, the street, the park, the mass transit system, the store, the office, etc.-as well of forms of loneliness, mass-association, art, entertainment, and politics-via a variety of imaginative and critical texts.

Credits: 3. Contact Hours: 3 hr./wk. Prerequisite: UD 61001, UD 61004Corequisite: UD 62001

UD 64001-64003 - Advanced Research in Urban Design

Students in Urban Design, advanced undergraduates, and others may complete independent research projects under the supervision of the Director. Credits awarded will vary depending on the scope of the project. Repeatable 4 times.

Credits: Variable credit..

Policies on Non-Discrimination and Sexual Harassment

The City College prohibits discrimination on the basis of race, color, creed, national origin, ethnicity, ancestry, religion, age, sex (including pregnancy, childbirth and related conditions), sexual orientation, gender, gender identity, marital status, partnership status, disability, genetic information, alienage, citizenship, military or veteran status, status as a victim of domestic violence/stalking/sex offenses, unemployment status, or any other legally prohibited basis in accordance with federal, state and city laws. The Sexual Misconduct policy prohibits sexual harassment, gender-based harassment and sexual violence (together "sexual misconduct") against any CUNY student, employee or visitor.

It is also the University's policy to provide reasonable accommodations when appropriate to individuals with disabilities, individuals observing religious practices, employees who have pregnancy or childbirth-related medical conditions, or employees who are victims of domestic violence/stalking/sex offenses. Questions, concerns, or complaints based on any of the above may be directed to the Office of Diversity and Compliance, Shepard Hall, Room 109A-D (212-650-6310). Additionally, complaints under the Sexual Misconduct policy can also be filed with the Office of Public Safety or Office of Student Affairs.

Disclaimer

The City College of New York, 2021–2022 Graduate Bulletin represents the academic policies and procedures, services, course and program offerings that are in effect at the time of publishing. The Bulletin will not be updated to include any changes taking effect since publication. The most current information regarding academic programs and course descriptions, academic policies and services available to students can be found on The City College of New York web site. For matters of academic policy (e.g., applicable degree requirements), students are also advised to consult their major department adviser, refer to the departments web page, the Office of the Provost, and/or the Registrar for additional information.

Important Notice of Possible Changes

The City University of New York reserves the right, because of changing conditions, to make modifications of any nature in the academic programs and requirements of the University and its constituent colleges without advance notice. Tuition and fees set forth in this publication (or website) are similarly subject to change by the Board of Trustees of the City University of New York. The University regrets any inconvenience this may cause. The College does not guarantee to offer all courses it announces. The announcement is made in good faith, but circumstances beyond the control of the College may sometimes necessitate changes. The college may cancel courses if the enrollment does not warrant their being offered or if other contingencies make such a cancelation necessary.

About The City College

The City College of New York is a small university within The City University of New York, offering a rich program of undergraduate and graduate study through its College of Liberal Arts and Science and the Professional Schools. The College of Liberal Arts and Science consists of the following:

Division of Humanities and the Arts
Division of Science
Division of Interdisciplinary Arts and Sciences

The Professional Schools are the:

Spitzer School of Architecture
Colin Powell School for Civic and Global Leadership (formerly the Division of Social Science)
School of Education
Grove School of Engineering
CUNY School of Medicine

Founded in 1847 by a referendum of the people of New York City, City College's mandate was to offer the best education possible to the children of the poor and working class, and to open to new immigrants the opportunities of America. The City College (CCNY) is the oldest college among the twenty-four public institutions that make up The City University of New York (CUNY), which was established in 1961.

The City College campus occupies thirty-five acres along tree-lined Convent Avenue from 131st Street to 141st Street in Manhattan. The College can be reached easily by several subway and bus lines. Many buildings in the area are landmarks, including the six historic Neo-Gothic structures and three archways on CCNY's North Campus.

The College's resources include the Morris Raphael Cohen Library, the largest library in the University system, with holdings of over one and a half million volumes; more than two hundred teaching and research laboratories; the Towers, a 600-bed residence hall; and an Information Technology Center that provides instructional and research-oriented services and student access through numerous student computer labs. The Aaron Davis Hall is the site of rehearsals, performances, exhibits and technical training for students in the arts, as well as presentations by professional artists. It is a major cultural asset for CCNY as well as the New York City community. We are also home to two recent science research additions: The Center for Discovery and the Advanced Science Research Center, both located on our South Campus.

The Towers Residence Hall

The Towers, which opened in 2006, is the first residence hall built on the CCNY campus in its 169-year history. Located at the corner of 130th Street and St. Nicholas Terrace on the South Campus it offers accommodations to nearly 600 resident students. The Towers also includes studio apartments for faculty housing.

The residence hall consists of 164 fully furnished, air-conditioned apartments in a variety of configurations; all units have full kitchen facilities. The residence hall includes wireless lounges, a multi-purpose study/seminar room, a fitness center, a central laundry facility, convenience store and a community kitchen. Living at The Towers is all-inclusive and includes Internet, phone, cable, laundry and all utilities. The Towers has twenty-four hour security with cameras installed throughout the building. CCNY operates a complimentary shuttle/escort service, which connects residents to local subway stations and North Campus. Residence Life Staff provide supervision of the building in accordance with CCNY resident housing policies and procedures while Resident Assistants create a sense of community through educational and social programming.

Information regarding housing costs and the application process can be found at www.ccnytowers.com or prospective students can contact the Office of Housing and Residence Life at 917-507-0070. Tours are offered throughout the year through The Office of Admissions and The Towers leasing office.

Accreditation

All degree programs are registered by the New York State Department of Education. The College is regionally accredited by the Middle States Commission on Higher Education (3624 Market Street, Philadelphia, PA, 19104-2680; 267-284-5000; email: info@msche.org). Additionally, professional curricula are accredited by the appropriate professional educational agency or board including the Council for the Accreditation of Educator Preparation, the National Architectural Accrediting Board, the American Society of Landscape Architects, the Accreditation Board for Engineering and Technology, and the Liaison Committee on Medical Education.

Continuing a Tradition of Excellence

The College continues today to pursue aggressively its joint goals of excellence and access in its undergraduate and graduate offerings as well as its research and community service efforts.

More than 89% of the City College faculty hold the Ph.D. and 18% Distinguished Professors teach at The City College, more than at any other City University college. The faculty are committed to active professional lives as teachers, researchers and scholars. At the same time, the College, through the efforts of its faculty, has developed important collaborative projects with other institutions and agencies in the New York City area to provide needed services in education, housing, health care and communications.

In recent years, The City College has become a major center for research and scholarship and leads all other colleges of the City University in attracting outside funding for research activities. In addition, many funded programs on campus seek to promote participation in the sciences, engineering and other fields, especially by students from traditionally underrepresented backgrounds (or communities).

About Graduate Study

The City College master's programs are designed both for the student seeking graduate training ending at the master's level and for those interested in preparing for admission to doctoral degree programs. More than fifty different master's degree programs in the College of Liberal Arts and Science and the Schools of Architecture, Education and Engineering offer students a wide range of specialized learning opportunities. Ninety percent of students enrolled in the College's graduate programs are pursuing advanced degrees. Currently, more than eight hundred master's degrees are conferred each year.

The City College's student body of approximately 16,000 men and women is drawn from eighty different countries and represents over one hundred different language groups, bringing an international and cosmopolitan ambiance to the campus. An approximately equal number of men and women make up the graduate student body of over 3,000. A large percentage of these attend school on a part-time basis. The wealth of diversity and range of experience represented in the graduate student body is an important learning asset that enriches both classroom and out-of-class learning for all students.

Graduate programs are designed for individuals at different stages of career development. Students returning to school after time spent working or in other pursuits will find a particularly receptive environment. Schedules can accommodate both full-time and part-time students.

Programs offer a balance of coursework, research training and, where appropriate, supervised fieldwork. Graduate faculty engage with

students in classrooms, tutorials, laboratories and independent inquiry to develop skills in creative thinking as well as in the academic discipline. Working in partnership with the faculty, students are in an environment where they are known personally and well, and where concern for them is strong.

Doctoral Degree Programs

In August 2008, The City College was granted the authority by the state of New York to offer Ph.D. Degrees in engineering as well as joint degrees in science with the CUNY graduate center. Students interested in applying to the Ph.D. Programs in science should contact Admissions at the CUNY Graduate Center and for students interested in information to the Ph.D. programs in Engineering should consult the Grove School of Engineering section of this Bulletin. In 2016, the state approved the conferral of the BS/MD degree in Biomedical Science/Medical Education. Students interested in applying to the BS/MD program should contact CUNY School of Medicine Office of Admissions.

Master's/Ph. D. Degree Admissions Requirements

Master's level graduate study is open to qualified students who possess a bachelor's degree from an accredited U.S. college or university or the equivalent from a foreign institution, and an adequate background in the field of study that they wish to pursue. Normally the equivalent of an undergraduate major in the field is required but the final judgment of preparation remains with the department concerned and the divisional dean. For policies and information governing the Masters and Ph.D. engineering and computer science programs, please refer to the Grove School of Engineering section of the Bulletin. Applicants will be evaluated based on the following:

- Previous academic record: a minimum of 3.0 in the undergraduate field of specialization and a 2.7 overall undergraduate minimum.
- A personal statement.
- International students whose native language is not English and who are not permanent residents (green-card holders) will be required to submit results of the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Department score requirements vary; please visit the Graduate Admissions webpage for more information.
- Letters of recommendation.
- Some programs require writing samples, portfolios or auditions.
- GRE test scores are required for some programs. Contact the Office of Admissions for further information.
- Application procedures.

For further information on admission to the **College of Liberal Arts and Science or the Grove School of Engineering** contact:

The City College of New York
Office of Admissions
Wille Administration Building, Room 101
160 Convent Avenue
New York, NY 10031
Telephone: 212-650-6977
graduateadmissions@ccny.cuny.edu

Information and applications for **Architecture** and **Education** programs may be obtained from:

School of Architecture
Bernard and Anne Spitzer School of Architecture
141 Convent Avenue, Room 120
New York, NY 10031
212-650-5663
archgrad@ccny.cuny.edu

School of Education
School of Education
NAC 3/223A
160 Convent Avenue
New York, NY 10031
212-650-6236
edgradadm@ccny.cuny.edu

To apply for admission to a City College Graduate program, submit the following information:

- An online application for Graduate Admission with a $125 non-refundable fee.
- Of all undergraduate and graduate work.
- Letters of recommendation.
- A personal statement.
- GRE Scores (if applicable for transcripts).
- Master's program, required for all Ph.D. programs).
- International Students Must Have A Minimum Passing TOEFL or IELTS Score (Please see Graduate Admissions webpage for more information).
- Some programs require writing samples, portfolios, and/or auditions. Please consult the Office of Admissions for the requirements of the program in which you are seeking admission.

Admissions decisions are made only after receipt of all valid credentials. The Office of Graduate Admissions encourages applicants to apply early. International students should apply a minimum of six months prior to the semester of enrollment.

Admissions decisions are made by the Graduate Admissions Committee of the department and the divisional dean. Students may be admitted to the graduate program as fully matriculated or matriculated with conditions. Matriculant conditional students must fulfill requirements as specified by the academic department.

Application Deadline Dates

Please refer to the college website for the most up to date information on deadline dates, www.ccny.cuny.edu/admissions.

Applications received and completed after the deadline dates cannot be guaranteed a review and will be considered for the subsequent semester. Postponements cannot be made for the following programs: Fine Arts (Studio Art), Media Arts Production, and all PhD programs in Engineering. Applicants who cannot enroll after acceptance will be required to reapply for the next admissions cycle.

Official offers of admission are made by the divisional dean of each division or school. Admission is only for the semester requested. Formal requests for postponements should be made in writing to the Office of Graduate Admissions.

CUNY requires new students to pay a commitment deposit beginning Spring 2011

On June 28, 2010, the Board of Trustees of the City University of New York approved the implementation of a **non-refundable** commitment deposit of $100 for undergraduate students, and $250 for students in masters and professional programs, indicating their intention to enroll in such programs. This commitment deposit will be applied toward tuition upon enrollment. Students receiving full financial aid will receive a refund of the deposit upon final confirmation of aid eligibility.

Payment of the commitment deposit will ensure priority scheduling for orientation and registration.

The commitment deposit is due on December 15 (for Spring semester), May 1 (for Fall semester) or fifteen days after the date of the admission letter (whichever is later).

Please submit a money order or personal check (drawn on a U.S. bank) for this amount made payable to The City College of New York by the date indicated above to:

Office of the Bursar, Commitment Deposit
Wille Administration Building, Rm. A-103
The City College of New York
160 Convent Avenue
New York, NY 10031

Cash payments will also be accepted in person at the above location (do not send cash through the mail). The Commitment Deposit will be waived for students who file the Free Application for Federal Student Aid (FAFSA) and have an Expected Family Contribution (EFC) of $3,000 or less. SEEK students, staff members receiving tuition waivers, veterans of the U.S. armed forces, Ph.D. candidates, as well as graduate students enrolling in the Rockland Teacher's Center or NYC Teaching Fellows Program are not required to pay the commitment deposit. Deposit waivers based on financial hardship will be considered based on demonstrated financial need. Students will be required to document the hardship by submitting a letter of explanation along with supporting documentation to the college's Tuition Refund Committee at the Office of the Registrar, Wille Administration Building, Rm. 102.

Admission to a Master's Degree Program

The college reserves the right to deny admission to any student if in its judgment, the presence of that student on campus poses an undue risk to the safety or security of the college or the college community. That judgment will be based on an individualized determination taking into account any information the college has about the crime committed by the student and the particular circumstances of the college, including the presence of a child care center, summer camp, public school or public school students on the campus. In addition, the college may consider factors such as the amount of time since the crime was committed, the amount of jail time served by the student, the number of years the student was on probation or parole, whether the student has satisfied probation or parole requirements at the time of the student's application, whether the student has completed drug, alcohol, sex offender or other treatment, and what work or educational experience the student has had after the conviction. Finally, if the student is known to have been assisted by CUNY-sponsored or other re-entry program or initiative, the college will consult with a counselor or representative from said program.

Non-Matriculated Status

The Graduate Admissions Committee of the department and the divisional dean may also admit students on a non-matriculated (non-degree) basis. Applicants who do not meet the requirements for admission as matriculated students may be allowed to take courses as non-matriculants. There are two types of non-matriculated students: (1) a student who has submitted a formal application with official documents to the Office of Graduate Admissions and has received a formal letter by the divisional dean accepting him/her as a non-matriculated student. These students may subsequently achieve matriculation by meeting one or more of the condition(s) specified in the letter or by meeting matriculation requirements or (2) a "walk-in non-matriculated student" is for students who have not submitted official documents or who are unable to complete their application by the deadline date. "Walk-in" non-matriculation is also available for students who wish to take graduate courses for personal or professional enrichment and who do not seek matriculation.

Students who require an F-1 visa are not eligible to be in non-matriculated status.

Walk-in Non-Matriculate Status Admissions Process and Matriculation Process

To apply as a "walk-in non-matriculant", a student must complete the online application and provide a transcript indicating proof of a baccalaureate degree. Approval is based on space availability and adequate prior preparation. Once the necessary approval has been received, the student pays the $125 application fee and may register.

Students who obtain approval in this status are limited in the number of credits they may take, as follows:

School of Education – nine credits

School of Engineering – six credits

Liberal Arts & Science – twelve credits

A student may apply to the College of Liberal Arts and Science, the Grove School of Engineering and the School of Education as a "walk-in non-matriculant" during the Fall, Spring and Summer registration period. The following programs do not accept non-matriculated applications: All Ph.D. programs, all Architecture programs, Branding + Integrated Communication, Computer Science-Information Systems, Digital and Interdisciplinary Art Practice, Media Arts Production, Mental Health Counseling and Public Service Management.

Education students who are planning to matriculate must take the New York State Teacher Certification Examination (NYSTCE) of the Academic Literacy Skills Test (ALST formally LAST) before completion of the 9 credit maximum as a non-degree student.

To obtain degree candidacy and obtain a master's degree a student must be matriculated. Walk-in non-matriculants are encouraged to apply for matriculated status if they wish to continue graduate study at City College. Students must submit a Graduate Admissions application and official documents to the Office of Graduate Admissions in order to have their application reviewed.

Advanced Standing

Students who have completed graduate work at other regionally accredited institutions may receive advanced standing toward the master's degree, pending approval of the CCNY departmental graduate advisor and the divisional dean. Courses considered for advanced standing must have been taken within a five-year period preceding matriculation at City College. The maximum number of credits awarded for advanced standing is:

Requirements:

1. Up to six credits in advanced standing may be allowed for graduate work satisfactorily completed at institutions other than The City College of New York, provided that the program head deems the work appropriate to the student's program of study. An official transcript must accompany this completed form and submitted to The Admissions Office.
2. The course or courses for which such credit is sought must have been completed within the three-year period prior to the date of matriculation in the graduate program.

College of Liberal Arts and Science	12*
Bernard and Anne Spitzer School of Architecture	
(M. Arch. I)	36
(M.L.A. I)	30
(M.U.P, M. Arch II; M.L.A. II)	0
Grove School of Engineering	6
School of Education	6

*Advanced standing will be granted for graduate courses in visual arts from accredited art schools.

Immunization

New York State Public Health Law (PHL) 2165 requires proof of immunity to measles, mumps and rubella (MMR) as a condition for attendance. The College reserves the right to prevent the registration of any applicant who fails to provide a record of immunization or who

otherwise provides a health risk to the College community. It is University policy that all students who register for six or more credits/equivalent credits and were born after December 31, 1956 must provide proof of their immunity to measles, mumps and rubella. Students may fax their immunization records and the forms to 212-650-8227.

Recently, New York State passed Public Health Law 2167, addressing meningococcal meningitis. In compliance with PHL 2167, all New York State students, regardless of how many credits they take in college, must fill out a Meningococcal Meningitis Response form within 30 days of registration or at the same time they send in their MMR compliance document.

Students may download forms at https://www.ccny.cuny.edu/shs. If submitting the forms by fax, be sure to include the student's name, social security number (or assigned City College identification number) and birth date. Applicants are advised to confirm the receipt of the fax by calling 212-650-8222

Students may download forms from the Wellness website, which can be accessed from the CCNY homepage. If submitting the forms by fax, be sure to include the student's name, social security number (or assigned City College identification number) and birth date. Applicants are advised to confirm the receipt of the fax by calling 212-650-8222.

Academic Requirements and Regulations for Graduate Students

Academic Appeals

The faculty of each of the schools or Division defines the degree requirements, academic standards, and rules for students enrolled in the school and has jurisdiction over the courses offered by the school. Each of the schools and Divisions has a Committee on Course and Standing charged with overseeing special cases and appeals from graduate students. Students have the right to appeal any decision to the appropriate Committee on Course and Standing, which is the final authority on enforcement of curriculum, degree requirements, academic standards, grades and academic rules. For more information, students should see their divisional Dean's office. Students may also contact the appropriate contact person(s) on list below for further guidance on the academic appeal process.

It should be noted that most academic rules are enforced without exception. Generally, the committee will consider requests for deviations from the rules only when the deviation is within the spirit, if not the letter, of the rule.

CCNY Contacts for Graduate Academic Standards Information by School/Division/Program

ARCHITECTURE
Hannah Borgeson
Director of Graduate Affairs
Spitzer School of Architecture Room 120
(212) 650-5663
hborgeson@ccny.cuny.edu

DIVISION OF INTERDISCIPLINARY STUDIES/ CENTER FOR WORKER EDUCATION
Dr. Susanna Rosenbaum
Associate Professor
Phone - 2129256625 / Ext. 208
Location - 25 Broadway
srosenbaum@ccny.cuny.edu

COLIN POWELL SCHOOL
Dr. Kevin Foster
Interim Associate Dean
NAC Room 6/141
(212) 650-6201
kfoster@ccny.cuny.edu

CUNY SCHOOL OF MEDICINE / PA PROGRAM
Dr. Dani McBeth
Associate Medical Professor and
Associate Dean for Student Affairs
Harris Hall Room 113
(212) 650-7727 / 8485
dmcbeth@med.cuny.edu

SCHOOL OF EDUCATION
Ms. Stacia Pusey
Assistant Dean SOE Enrollment & Student Services
NAC Room223A
(212) 650-5345
spusey@ccny.cuny.edu

Dr. Nadjwa Norton
Associate Professor of Leadership and
Human Development
(212) 650-6330
NAC 6/204F
nnorton@ccny.cuny.edu

ENGINEERING
Ms. Belkys Bodre
Director of Graduate Affairs
(212) 650-8030
Steinman Hall, Rm. 209
bbodre@ccny.cuny.edu

HUMANITIES AND THE ARTS
Mrs. Migen Prifti
Director of Graduate Student Advising
(212) 650-7383
NAC Room 5/225
mprifti@ccny.cuny.edu

SCIENCE
Dr. Elizabeth Rudolph
Assistant Dean
Marshak Room 1320
(212) 650-6474
erudolph@ccny.cuny.edu

SUSTAINABILITY IN THE URBAN ENVIRONMENT PROGRAM
Mr. George Smith
Program Manager
(212) 650-6974
Shepard Hall Room 301B
Gsmith2@ccny.cuny.edu

MASTER'S IN TRANSLATIONAL MEDICINE PROGRAM
Dr. Jeffrey Garanich
Director
(212) 650-5330
Steinman Hall Room 503
jgaranich@ccny.cuny.edu

Advanced Standing

Students who have completed graduate work at other regionally accredited institutions may receive advanced standing toward the master's degree, pending approval of the CCNY departmental graduate advisor.

Courses considered for advanced standing must have been taken within the five-year period preceding matriculation at City College. The maximum number of credits awarded for advanced standing is:

College of Liberal Arts and Science	12 credits
School of Engineering	6 credits
School of Education	6 credits

Credit will be granted based on the applicability of course work towards the CCNY master's degree as determined by the appropriate Dean's Office.

Auditing

Students wishing to audit a course must select audit status at the time of registration. Auditors must register in the normal manner and pay required tuition and fees. No credit or grade will be given for audited classes. Auditor status cannot be changed to credit status after the closing date for change of program. Likewise, credit status cannot be changed to auditor status after the change of program period. The Audit Form can be either accessed online through the following link https://www.ccny.cuny.edu/registrar/request-forms, or it may be picked

up at the Office of the Registrar, in the Wille Administration Building, Room A-201.

Cancellation of Courses

The College does not guarantee to give all courses it announces. The announcement is made in good faith, but circumstances beyond the control of the college sometimes necessitate changes. The College may cancel courses if the enrollment does not warrant their being offered or if other contingencies make such a cancellation necessary.

CUNY School of Medicine
For policies and information governing students in the BS-MD program or the Master of Science in Physician Assistant Studies program, please refer to the relevant program at CUNY School of Medicine.

Certification of Full-Time Status

All graduate students registering for a minimum of nine credits may be certified as full-time students. While nine credits will make the student eligible to be certified by the college or school as a full-time student, this in no way precludes an individual program, for purposes of cohort design, professional licensing, program accreditation or any other legitimate academic reason approved by the campus curriculum governance, from requiring students to register for more credits in one or more semesters. See information on individual programs for more information. Students eligible for New York State resident tuition must be enrolled in at least twelve credits a semester to qualify for the New York State resident flat-rate tuition.

For full-time enrollment status in Ph.D. programs, see: Full Time Status: Doctoral Students (p. 204)

List of City College Degrees

Art History	MA
Bilingual Childhood Education	MSED
Branding and Integrated Communications	MPS
Biochemistry	MS
Biology	MS
Biotechnology	MS
Chemistry	MS
Childhood Education	MSED
Creative Writing	MFA
Early Childhood Education	MSED
Economics	MA
English	MA
Geology	MS
History	MA
International Relations	MIA
Language and Literacy	MA
Mathematics Education	MA
Mental Health Counseling	MA
Music	MA
Physics	MS
Public Service Management	MPA
Psychology	MA
Spanish 7-12 for Spanish Majors	MSED
Spanish	MA
The Study of the Americas	MA
Sustainability in the Urban Environment	MS
Teaching English to Speakers of Other Languages	MS
Teaching Students with Disabilities in Childhood Education	MSED
Teaching Students with Disabilities: Grade 7-12 Generalist	MSED
Biomedical Engineering	MS
Civil Engineering	ME
Chemical Engineering	ME
Computer Engineering	MS
Computer Science	MS
Electrical Engineering	ME
Earth Systems and Environmental Engineering	MS
Information Systems	MS

List of City College Degrees

Mechanical Engineering	ME
Translational Medicine	MS

Course Numbering

As a general rule, course numbers reflect the level of difficulty of the course content. For a variety of reasons, some course numbers may not adhere to the description below. If in doubt about the level of a particular course, consult a departmental advisor.

10000-19900:	introductory courses for lower division students
20000-29900:	beginning major courses intended for sophomores and juniors
30000-39900:	first level upper division courses; intermediate major courses
40000-49900:	advanced undergraduate courses intended for juniors and seniors
50000-59900:	advanced undergraduate courses

Graduate Course Numbering

All graduate courses will contain a letter either before or after the course number.

Exception: Spitzer School of Architecture – Graduate courses are numbered 60000 and above.

Courses Outside a Degree Program

Students who wish to take courses that are outside of the primary field of study must receive permission to do so from the department and the dean of the school or division that awards the degree. These courses, as well as any undergraduate courses, will not count towards fulfilling any outstanding degree requirements.

Cross-listing of Courses Among Departments and Programs

Courses may be assigned two numbers in two different departments or programs in order to foster interdisciplinary study only upon approval of the Chairs and/or relevant Curriculum Committees of the program. Cross-listed courses must be at the same course level (unless approved by the Dean). No special topics courses may be cross-listed unless a course description has been filed with the Office of Scheduling and Workload.

CUNY Graduate Center Ph.D. Candidates Seeking Master's Degrees At CCNY

En-Route Master's Degree for candidates continuing in Ph.D. Program at the CUNY graduate center

Students who are currently registered in a Ph.D. Program at the CUNY Graduate Center, and intend to complete that degree, may receive a master's degree from The City College in graduate academic disciplines offered by CCNY. Students must:

- Complete the appropriate forty-five (45) credits in the Ph.D. Program.
- Pass the first examination in their field of study.
- File the "eligibility for degree" form at the Graduate Center.

In all cases, the student must contact the Executive Officer of their program, at the Graduate Center, to initiate the process.

The en-route master's will be awarded as of the commencement dates at CCNY. City College will not maintain a transcript record for en-route master's students. However, for purposes of record keeping, the College will maintain an abbreviated record, indicating that the student has been awarded an En-Route Master's Degree from CCNY.

Note: The en-route master's is not available in the following areas: Classics, Comparative Literature, Linguistics, Liberal Studies, Philosophy and Political Science.

Master's degree candidates at CCNY who do not intend to continue in the Ph.D. Program at the CUNY Graduate Center

Students who wish to obtain a master's degree and who do not intend to continue in the Ph.D. Program at the Graduate Center must do the following:

- Officially withdraw from the Ph.D. Program prior to applying for admission to the master's program at City College.
- Complete an application for graduate admission with the Office of Admissions at City College.
- Complete an application for degree with the Office of the Registrar at City College.

Courses taken at the Graduate Center will count toward the CCNY residency requirement.

Grade of Incomplete

A grade of incomplete (INC) may be given by an instructor to a student who, through unavoidable circumstances, has been unable to complete the assigned course work. Course work must be completed no later than the date published in each semester's academic calendar (e.g., a student who receives an INC for a course ending in May must complete the work by mid-march of the following year). A grade of INC not resolved in a timely manner will become an FIN. Extensions of time for resolving FIN grades may be considered only by written appeal to the appropriate Committee on Course and Standing of the particular school.

Grading System

Grade	Explanation	Quality Points
A+	Exceptional	4.00
A	Excellent	4.00
A-		3.70
B+		3.30
B	Good	3.00
B-		2.70
C+		2.30
C	Satisfactory	2.00
F	Failure/Unsuccessful Completion of Course	0.00
P	Pass	—
W	Withdrew without penalty (student initiated)	—
WN	Never attended	—

Grade	Explanation	Quality Points
FIN	F due to incomplete	0.00
WU	Withdrew without approval	0.00
INC	Incompletes	—
SP	Satisfactory progress (restricted to thesis and research courses requiring more than one semester for completion)	—
AUD	Audit-no credit	—

Maintenance of Matriculation

Graduate students are expected to maintain continuous involvement and enrollment in the program. Failure to register for any period constitutes a de facto withdrawal. A student is not eligible to receive a master's degree while not in attendance. Students who find it necessary to interrupt their graduate studies and wish to maintain their academic standing during the semesters when they are not registered for courses or research credits must pay the Maintenance of Matriculation fee. Students who do not maintain matriculation and wish to resume study must apply for readmission. Readmission is granted only on the recommendation of the department and the approval of the divisional dean.

Policy on Lateness and Absence

Students are expected to attend every class session of each course in which they are enrolled and to be on time. An instructor has the right to drop a student from a course for excessive absence. Students are advised to determine the instructor's policy at the first class session. They should note that an instructor might treat lateness as equivalent to absence. No distinction is made between excused and unexcused absences. Each instructor retains the right to establish his or her own policy, but students should be guided by the following general College policy:

In courses designated as clinical, performance, laboratory or fieldwork courses, the limit on absences is established by the individual instructor. For all other courses, the number of hours absent may not exceed twice the number of contact hours the course meets per week.

When a student is dropped for excessive absence, the instructor will enter the grade of WU. A student may appeal this action to the Committee on Course and Standing in the school in which the course is offered.

Probation and Dismissal

A student will be placed on probation if the grade point average falls below 3.0. The student may be removed from probation when the G.P.A. reaches 3.0.

A student will be dismissed if the G.P.A. remains below 3.0 for two semesters. Students may appeal their dismissal to the Committee on Course and Standing.

Progress of Non-Matriculated Students

A student who is registered as a non-matriculant is not eligible to receive a master's degree while in that status. A non-matriculant will not be granted a permit to register for courses off campus. Non-matriculated students must change status by formal application through the appropriate Office of Admissions. Applicants for a change in status from non-matriculant to matriculated students will be considered as new applicants for admission and therefore, may be accepted or denied admission. A non-matriculated student who wishes to become matriculated and thus eligible to receive a degree must have a B average or better in courses, which do not include more than two courses of Independent Study or Tutorial.

Requirements for Graduation with the Master's Degree

The master's degree is awarded three times during the year: January, May or June, and September. Commencement exercises take place once each year, in late May or early June.

Students are expected to be familiar with the requirements of their degree programs. All requirements for the degree must be met before the date of graduation. Therefore, all temporary grades must be resolved prior to the date of graduation, including those assigned in the final semester of attendance.

In addition, all "stops" must be cleared by the date of graduation. Failure to clear "stops" will result in the delay of the distribution of diplomas and the processing of requests for transcripts.

Students should have a preliminary graduation check conducted a minimum of two semesters before the anticipated date of graduation by an advisor in their department or division. Final graduation check and certification is conducted in the divisional dean's office. All students must apply for graduation, which is **not automatic**, upon completion of the program. Students must apply for graduation on the their CUNYfirst self-service account by the published dates on the academic calendar.

1. **Residence:** A minimum of 24 credits in residence at the College.
2. **Matriculated status.**
3. **Satisfactory completion of an approved program of study:** This program should normally comprise a coherent sequence of courses, lectures, seminars, discussions, and independent studies or investigations designed to help the student acquire an introduction to the mastery of knowledge, creative scholarship and research in the chosen field. Completion of the program generally requires one to two years of full-time study or the equivalent beyond the bachelor's degree. Each program must be approved and must include a minimum of 30 credits. Some programs may require more credits.
4. **Grades:** An average grade of B in all courses taken toward the degree. When students receive a grade of less than B in any of the required courses, their academic progress will automatically become subject to review.
5. **Comprehensive examination:** Some programs require the successful completion of a comprehensive examination; in some cases a comprehensive examination may be substituted for a thesis. The specific requirements are listed under each program. Students who plan to take a comprehensive examination must file an application with the chair of their program's Graduate Committee. Students who wish to take a first examination in a doctoral program in lieu of a master's comprehensive examination should make arrangements with the chair of the Graduate Committee.
6. **Research and thesis:** Many programs require a thesis; some do not. Where a thesis is required, the student must register the thesis topic, together with written certification of the mentor's acceptance of the topic, with the chair of the department's Graduate Committee and with the divisional dean. Any change of topic or mentor must be similarly recorded. When the completed thesis has been approved by the mentor and by additional faculty readers, the formal written notice of acceptance of the thesis must be submitted to the chair of the Graduate Committee in the field and to the divisional dean. Appropriate forms for both thesis topic registration and certification of the approved thesis may be secured from department or divisional offices.

   The thesis must have a title page bearing the subject, the department, the author's name, the mentor's name, and the date.

The approved thesis can be submitted to Academic Works (http://academicworks.cuny.edu/), CUNY's institutional repository. Select "Submit Research" from the sidebar on the left. Under the heading "Submit Research" select The City College of New York Master's Thesis as the institution for the submission and type of work, create a log-in account and follow the instructions. Your department will inform you if a print copy is also required. The digital license agreement form is required for submission by all authors. . The terms of the digital license agreement form, which can be accessed at (http://libguides.ccny.cuny.edu/services/theses), are to inform the authors of their rights regarding their scholarly work and its distribution. Students in the MFA in Creative Writing program have the option of submitting an unbound print copy of the thesis, a CD-Rom with a copy in pdf format of the thesis, and the digital license agreement form. The author submits the copy of these three documents, and is required to reimburse a binding fee of $40.00 payable to The City College Library. All copies of the thesis should be prepared on paper equivalent to a 16 lb. Bond, 8 1/2 x 11 inches, with a margin of 1 1/2 inches on the left-hand side of the page, and with pages consecutively numbered. If required by the department, the copy of the thesis submitted to the department is to be placed in a hardcover, spring-back binder. The copy of the thesis to be submitted to the City College Library is to be unbound. The $40.00 binding fee is for the cost of professional binding. The digital license agreement form required from all thesis authors is to be submitted to the office of the divisional or school dean by the divisional deadline, together with the formal certification of the accepted thesis, signed by the thesis mentor and by the chair of the Graduate Committee in the program.

7. **Foreign language proficiency:** Some programs require evidence of proficiency to read and utilize in research, a foreign language or another appropriate tool of research (e.g. statistics, computer). The specific requirements are listed under each program. The Language Proficiency Examination is administered by the Department of Foreign Languages and Literatures, which assists in appropriate selection of texts and is responsible for grading the examination. Translation will be from the chosen language into English. Students wishing to take the language exam must apply in the office of the appropriate divisional or school dean.
8. **Graduate scholastic standards:** The result of a student's work in any course completed will be expressed by one of the following grades (including + and – grades): A (Excellent), B (Good), C (Pass), F (Failure).

The Right to Privacy

The College complies fully with the Family Educational Rights and Privacy Act (FERPA).

Student Complaints

Discrimination

The City College and The City University of New York are committed to addressing discrimination complaints promptly, consistently and fairly. Any City College employee, student, applicant for admission or employment or other participant in the College's programs or activities who believes they have been unlawfully discriminated against on the basis of age, color, disability, national or ethnic origin, race, religion, sex, sexual orientation, or veteran status may file a complaint in writing with the Office of Diversity and Compliance using the Discrimination Complaint Form by e-mail to the Interim Chief Diversity Officer/Title IX Coordinator, Ms. Diana Cuozzo, at dcuozzo@ccny.cuny.edu or by stopping in the Diversity and Compliance Office in Shepard Hall, Room 109 A-D.

Sexual Assault

Please consult the Office of Affirmative Action, Compliance and Diversity Title IX Sexual Assault Policy web page.

Grades

For information about appealing grades and other academic appeals, see Academic Appeals (p. 118).

Other Complaints

Students with grievances concerning matters other than grades should first attempt to resolve the grievance at the department level through discussion with the faculty member(s) or department chair. If the matter is not resolved, the student or department may refer the problem to the appropriate academic dean, the Ombudsman, or the Vice President for Student Affairs, via the Student Complaint Procedure Form, who shall, if necessary, refer it to the Office of the Provost for further consideration and possible action. See also Procedures For Handling Student Complaints About Faculty Conduct In Academic Settings.

Time for Completion of Degree

Normally a student will complete all requirements for the master's degree within four years of matriculation. Extension of time for a student in regular attendance may be granted in exceptional circumstances upon recommendation by the departmental Graduate Committee and approval of the dean. However, a student who has been absent from the College for more than five years must reapply for admission to the program. All previous credits will be reevaluated by the graduate advisor and the remaining courses necessary for completion of the degree will be determined.

Withdrawals

A student may withdraw from a course during the first ten weeks of the semester by logging into their CUNYFirst account and withdrawing from the course. A course that is withdrawn from during the first three weeks will be dropped and will not appear on the record. A grade of W will be assigned to courses that are withdrawn from between the fourth and tenth week. A student who wishes to withdraw from a course after the tenth week must petition the appropriate Committee on Course and Standing. The student must present, in writing, satisfactory reasons for requesting permission to withdraw. It is the responsibility of the student to refer to the academic calendar for the appropriate deadlines and to officially withdraw from a class that they are not attending. Any student who fails to attend a course for a significant part of the semester may be given the grade of WU by the instructor.

The Office of the Registrar

The Office of the Registrar is located in the Wille Administration Building, room A-102 on 160 Convent Avenue (at 138th Street), New York, New York 10031.

Some of the operations that are handled in the office include maintaining academic records, issuance of transcripts, course registrations, processing of verification letters, maintenance of the academic calendar, and awarding of student degrees, while protecting all students' information in accordance with FERPA regulations. We encourage students to visit our webpage at www.cuny.edu/registrar for additional information. Students can contact a representative via telephone at 212-650-7850 or via Zoom by going to our home-page and clicking on the link for our Virtual Front Desk. In addition students can contact the office by sending an email to registrar@ccny.cuny.edu.

Tuition and Fees

The Bursar's Office is located in the Wille Administration Building, Room 103, and the telephone number is 212-650-8700.

Tuition is set by the CUNY Board of Trustees and is subject to change without notice of their actions. Students should arrange to pay their total tuition, fees and charges as the final step of the registration process if they wish to be admitted to classes. Students who may be eligible for financial assistance or grants should consult with the Financial Aid Office as early as possible.

Graduate Tuition Per Semester

Masters in Architecture & Engineering

	Resident	Non-Resident
Full-Time	$6,485 per Semester	$945 per Credit
Part-Time	$550 per Credit	$945 per Credit
Excess Hours	$65 per Credit	$85 per Credit

Masters in Public Administration & International Affairs

	Resident	Non-Resident
Full-Time	$6,375 per Semester	$1,010 per Credit
Part-Time	$545 per Credit	$1,010 per Credit
Excess Hours	$65 per Credit	$85 per Credit

Masters in Professional Studies

	Resident	Non-Resident
Full-Time	$7,510 per Semester	$1075 per Credit
Part-Time	$865 per Credit	$1075 per Credit
Excess Hours	$65 per Credit	$85 per Credit

Master's in Translational Medicine

	Resident	Non-Resident
Full-Time	$5,545 per Semester*	$855 per Credit
Part-Time	$470 per Credit	$855 per Credit
Per Excess Credit Hour	$65	$85
Academic Excellence Fee**	$3,000	$3,000
**Academic Excellence Fee Summer	$1,000	$1,000

*Program consists of 2 semesters plus Summer Session complete the Masters.

All Other Masters Programs

	Resident	Non-Resident
Full-Time	$5,545 per Semester	$855 per Credit
Part-Time	$470 per Credit	$855 per Credit
Maintenance of Matriculation	$225 per Semester	$370 per Semester
Excess Hours	$65 per Credit	$85 per Credit

Doctoral Tuition

	Resident	Non-Resident
Level 1: Full Time	$4,965 per Semester	$965 per Credit
Level 1: Part-Time	$560 per Credit	$965 per Credit
Level 2: Full Time	$3,110 per Semester	$6,910 per Semester
Level 2: Part Time	$3,110 per Semester	$6,910 per Semester
Level 3: FT/PT	$1,235 per Semester	$2,450 per Semester

*There is no Part-Time Rate for Level II Doctoral Studies.

Excess Hours	$65 per Credit	$85 per Credit

Maintenance of Matriculation Fee

A $225 fee per semester must be paid by all matriculated New York State resident graduate students who wish to maintain their academic standing during terms when they are not registered for course or research credits. The fee for non-residents is $370. Students paying this fee need not pay the Activity Fee. Students who fail to pay the Maintenance of Matriculation fee will be deemed to have withdrawn from the graduate program and must reapply if they wish to be readmitted.

Excess Hours

Excess hours are contact hours (class hours) in excess of credit hours. Graduate students taking classes that have more contact hours than credit hours pay an excess contact hour charge. For example, if a 3-credit class meets 5 hours a week, a NY State resident student pays $65 per excess contact hour ($130 for 2 extra hours) and a non-NY State resident pays $85 per excess contact hour ($170 for 2 extra hours).

Student Activity Fees

*Mandatory Fees	**Resident**	**Non-Resident**
Full Time	$155.95	$155.95
Part Time	$93.45	$93.45

Application Fees

* Subject to change through a student referendum & Board approval

There may be other costs and fees associated with academic work, such as textbooks and studio or lab materials. Notice of additional fees will appear in the course listing in each semester's Schedule of Classes.

Tuition Refunds

When courses are withdrawn by the College, a full refund of appropriate tuition and fees will be made. In other cases, tuition refunds will be made or liability reduced only in accordance with Board of Trustees regulations. Further information can be obtained from the Office of the Registrar. On approved applications, proportionate refunds of tuition will be made in accordance with the schedule below. The date on which the application is filed, not the last date of attendance, is considered the official date of the student's withdrawal and serves as the basis for computing any refund.

Withdrawal before first day of classes (as published in the academic calendar)	100%
Withdrawal before completion of the first full scheduled week of classes	75%
Withdrawal before completion of the second full scheduled week of classes	50%
Withdrawal before completion of third full scheduled week of classes	25%
Withdrawal beyond third week	0%

Consolidated and activity fees are not refundable.

Payment of Collection Costs

Students who do not make full payment of their tuition, fees and other college bills and whose account is sent to a collection agency will be responsible for all collection costs, including agency fees, attorney fees and court costs, in addition to whatever amounts are owed to the college. In addition, non-payment or a default judgment against a student's account may be reported to a credit bureau and be reflected in their credit report.

New York State Residency Requirements

Students are assigned residency status when admitted to the College. Since residency determines tuition rates, students should know their classifications. If there is a question of status it is the responsibility of the student to prove residency. An "Application for Proof of Bona Fide Residency" is available at the Office of the Registrar. New students must apply through the Office of Admissions.

The Financial Aid Office administers federal and state funds, as well as those provided by special programs and the College itself. Federal funds may be disbursed only to those who maintain their academic standing and are not in default of a student loan or owe a refund on a federal grant. For the most recent information on application filing procedures, deadline dates, and eligibility criteria for the various programs, students are urged to contact the Financial Aid Office.

*For further information or additional questions, please visit the Bursar website.

Financial Aid

The Financial Aid Office is located in the Wille Administration Building, Room 104, and the telephone number is 212-650-6656.

Zoom: https://ccny.zoom.us/j/2126506656
meeting ID: 212-650-6656

Tuition is set by the University Board of Trustees and is subject to change without notice by their action. Students should arrange to pay their total tuition, fees and charges to complete their registration if they wish to be admitted to classes. Students who may be eligible for financial assistance or grants should consult with the Financial Aid Office as early as possible.

Campus-Based Aid Programs

Funds from the Federal Work Study program (FWS) are offered to eligible students who attend on at least a half-time basis (six credits). Graduate students who are U.S. citizens or eligible non-citizens may apply. These are not an entitlement programs; the Free Application for Federal Student Aid (FAFSA), should be filed by March 15th for the following academic year. Applicants for federal programs should consult the Financial Aid Office regarding academic progress standards that are required to continuing to receive aid.

Federal Work-Study Program (FWS)

Students are offered an opportunity to earn wages while pursuing their course of study. Federal Work-Study jobs are available on campus or off campus at an approved public service or non-profit agency.

Federal Teacher Education Assistance for College and Higher Education grant program (TEACH Grant)

This is a federal program that provides grants of up to $4000 per year to graduate students who are enrolled in an approved program that leads to Teacher certification in a federally approved high-needs field. Recipients must agree to fulfill a service obligation as a full-time teacher in a high-needs field, at a public or private elementary or secondary school that serves low-income families. Applicants for this grant must file a FAFSA, complete entrance counseling & TEACH Grant Agreement to serve (ATS) and submit a TEACH Grant application to the CCNY School of Education. For details including service obligation and agreement to serve, contact the CCNY School of Education. Maximum awards are subject to review and may be changed from year to year.

Exit counseling is required for students who are no longer enrolled in a TEACH Grant eligible program.

William D. Ford Federal Direct Loan

The Ford Federal Direct Loan Program enables matriculated students who are enrolled a minimum of half-time (6 credits) per semester to meet educational expenses. Graduate students may borrow a maximum of $20,500 per year in unsubsidized loans regardless of income. Applicants for these loans must file a FAFSA and a loan application. For details including repayment and interest rates, contact the Financial Aid Office or visit the Financial Aid Office website. Maximum awards are subject to review and may be changed from year to year.

William D. Ford Plus Loan for Graduate and Professional Students

A graduate PLUS Loan is available to graduate students who need additional financial assistance to meet their educational expenses. Students are eligible to borrow up to their cost of attendance minus all other estimated financial aid. These loans require a credit check. Interest is accrued and repayment begins while a student is enrolled in school. Contact the Financial Aid Office or visit the Office's website for more information.

Verification

Students who file a FAFSA may be chosen for a process called "verification". When the federal government requires verification, the financial aid office must confirm the information on a student's FAFSA. Items to be verified include adjusted gross income, US taxes paid, education credits, untaxed IRA distributions, untaxed pensions, IRA deductions and payments, tax-exempt interest, income earned from work, household size, number in college, and high school completion status. Students chosen for verification cannot receive any disbursements until this process has been completed.

Federal Return to Title IV Policy

Students who cease to be enrolled prior to the end of a payment period or period of enrollment (semester), may have their financial aid package recalculated based on the Federal Return to Title IV regulations. The regulations require that the College calculate the portion of the federal aid a student is entitled to, based on the aid that could have been disbursed had the student remained enrolled and the number of days the student attended classes.

The enrollment status used to calculate financial aid eligibility is set either on the 7th day of classes or at the point the student's financial aid record becomes payable. Updates on Financial Aid certification dates are available in the Financial Aid Office and on its website. Students who withdraw from some or all classes prior to the earlier of those dates will have their aid recalculated and could lose some or all of their aid. If a student fails to begin attendance in some or all of their classes, the unattended classes will not be used to calculate their enrollment status for financial aid eligibility. If aid has been disbursed for unattended classes, the student may be required to return funds, with the exception of federal work-study earned, which will not be recouped.

Students who officially withdraw after completing more than 60% of the semester are considered to have "earned" 100% of their federal financial aid, and the College is not required to recalculate their eligibility.

If the Return to Title IV calculation determines that the student is not entitled to a portion of the money that has already been disbursed, the College will return the "unearned" portion to the federal government and the student will be billed for the money that was returned on his or her behalf. A "Negative Service Indicator" will be placed on the student's record until the money has been repaid to the Bursar.

If the calculation determines that the student is entitled to aid that has not been disbursed, the Office of the University Controller will notify the student of his or her eligibility and give the student the opportunity to decline the post withdrawal disbursement. However, post withdrawal disbursements of federal grant aid will automatically be disbursed to the student's account.

To receive a post withdrawal disbursement of loan funds, the student must sign and return the post withdrawal notice, confirming that he or she wants the loan to be disbursed; however, only the first disbursement of a loan may be disbursed after a student has withdrawn.

Satisfactory Academic Progress (SAP) Requirements
Federal Financial Aid - All students must satisfy qualitative and quantitative academic standards in order to remain eligible for federal financial aid. Students will be measured against the Title IV Satisfactory Academic Progress Standards at the end of each spring semester in order to determine eligibility for the upcoming year. Those who fail to meet the academic standards will have their federal aid automatically suspended until they meet the minimum standards. (Students who can document that their failure to satisfy academic requirements were the result of extraordinary or exceptional circumstances may be able to apply for a waiver to receive federal aid for another semester).

Financial Aid Refunds
A student can receive financial aid refunds in one of two ways:

1. A check mailed to the student's address

2. Direct deposit

For safety and security, direct deposit is strongly recommended.

Other Scholarships, Prizes, and Awards

Many prizes, scholarships, and various kinds of commendations are awarded annually to graduate students for their achievements at the College. Departmental awards are listed with the departmental descriptions. For more information on these, see the appropriate dean or chair. Information is also available on centrally administered merit and need-based scholarships. A listing and common application are available on the College's website.

Research and Study Facilities

Library

CCNY Libraries includes:

- The Morris Raphael Cohen Library (North Academic Center)
- The Architecture Library (Spitzer School of Architecture 101)
- The CUNY Dominican Studies Institute Archives and Library (NAC 2/202)
- The Music Library (Shepard 160)
- The Science/Engineering Library (Marshak 29)
- The Center for Worker Education Library (25 Broadway, 7th Floor)

Cohen Library, built around an atrium in the North Academic Center, occupies five floors and houses Humanities, Powell School, and Education materials. The collections are the largest in the CUNY system, totaling more than 1,700,000 books, 901,600 microforms, 27,800 scores and recordings, 8,000 videos and DVDs, and 1.3 million digital images. Designated a federal depository in 1884, the library has 148,826 government documents. The Archives and Special Collections Division contains 4,191 linear feet of official records and historical material on the College in addition to rare books and special subject collections. Digital holdings include 944,121 e-books, 150,000 online periodicals, and 100,000 digital government documents. The library serves the instructional and research needs of undergraduate through doctoral levels and provides study areas, carrels, and computer workstations for students and faculty.

The City College Libraries web site (http://library.ccny.cuny.edu) provides quick and easy access to digital resources – full text, indexes, dissertations and catalogs – in 236 databases. The OneSearch library catalog provides access to library holdings both at City College and throughout CUNY.

Books and periodicals are arranged on open stacks. The Library of Congress classification is used for the shelf arrangement of most books.Three hundred and fifty computers provide access to digital resources, document preparation software, and the Internet. CLICS, the intra-CUNY borrowing service, allows users to request materials from any library in the University, for delivery to any CUNY library of their choice. Document delivery, Interlibrary Loan, and METRO referrals enable faculty and students to obtain materials from other library collections in the metropolitan area and beyond. MaRLI (Manhattan Research Library Initiative) provides borrowing privileges at NYPL, Columbia and NYU libraries to graduate students who apply to the program. See https://www.nypl.org/help/research-services/MaRLI for more information.

Library faculty provide individualized library service and information literacy instruction on multiple levels, from FIQWS classes through graduate courses. For research assistance, contact us at: library.ccny.cuny.edu/askus/contact.

Office of Information Technology

Over the past few years the Office of Information Technology (OIT), overseen by the Vice President and Chief Information Officer, has undergone a dramatic expansion. Major changes have included deploying smart classrooms in Shepard Hall, Marshak, Steinman, the North Academic Center and Harris Hall; extending wifi coverage (to include all libraries); and the creation of the Tech Center.

The mission of the Office of Information Technology is to:

- Empower the user community to achieve the highest level of academic and administrative success through the effective use of information technologies
- Facilitate academic innovations in teaching, learning, research and scholarship
- Deliver excellent technology services in support of City College's mission.

The OIT is committed to collaborating with the college community to provide excellent information technology products and services. We recognize that the College community has the best chance to succeed when we within the OIT strive for excellence and uphold the highest standards in our daily operations.

The OIT is responsible for software applications, hardware support, telecommunications, media services, network infrastructure, instructional technologies and information security. In addition to providing technical support services to the College community we also initiate technology enhancement projects and implement innovative solutions to technology-based issues to improve campus life.

As College populations become more and more technology savvy, the professional skills development of the OIT staff has become extremely important. Technology is constantly evolving, and it seems that every day there is yet another new application released that is meant to simplify business dealings. We are committed to staying current with the high-level trends of technology and their corresponding impact on education with constant training courses for our staff.

The OIT houses two general computer labs to facilitate the technology needs of our students. (1) The North Academic Center (NAC) General Student Lab, which provides 108 Windows-based computers; and (2) The cITy Tech Center, City College's new state-of-the-art computing, learning and training resource center, located on the ground floor of the Cohen Library in the North Academic Building, room NA 1/301. Re-designed to accommodate student learning in a variety of stimulating configurations. The Tech Center provides the following services:

- Over 300 workstations
- Seven printers (five general-use, one color, and one wifi enabled)
- Ten media study rooms (MSR) with dual-flat panel displays that accommodate from three to six students
- Fifteen two-person study rooms equipped with Windows or Macintosh desktop workstations
- Three smart classrooms containing 32, 35 and 50 workstations, high definition projectors, and, in the largest classroom, a podium with AV controls and laptop connections.
- Over 80 single-use desktop in the open bays
- Laptop loan program for students' use while using the MSR rooms

The workstations are configured with compatible version of the college's site-licensed software, including Adobe Creative Suite, Matlab, Microsoft Office Suite, SAS, and SPSS. The spatial configurations accommodate students who choose to work individually, as well as provide incentives for student collaboration.

The Service Desk was revamped in the summer of 2011, expanding services to improve support for the CUNY Portal, Blackboard LMS, laptops, CUNYfirst wireless configuration and access, and act as a central distribution point for campus-wide, site-licensed software to the college community. The Service Desk also provides Tier 1 technical support for students, faculty and staff in the following areas:

- Technical information technology support
- Mobile devices
- Laptop
- Wireless configuration and access
- Site-licensed software
- College e-mail system (Citymail)
- Registration
- CUNY Portal

- Password Reset
- Blackboard
- Active Directory log-in

This one-stop shop solution has given the OIT staff a more efficient way of addressing the technology needs of students, faculty and staff.

Call us at 212.650.7878, email us at servicedesk@ccny.cuny.edu or come find us on the ground floor of the Cohen Library in the North Academic Building, room NAC 1/301.

For more information on our services and opening hours visit our website: https://www.ccny.cuny.edu/it/help

Our iMedia department provides audio-visual (AV) resources and services in support of academic instruction, scholarly communications, and other activities consistent with the College's mission.

iMedia provides the following services:

- iMedia and classroom technology support
- Audio-visual resources for loan
- Video conferencing services
- Video duplication and conversion services

iMedia also provides in-classroom AV technology support for users in smart room locations, video-conferencing services utilizing IP based Polycom equipment, DVD duplication services, VHS to DVD conversion services and a host of AV resources including microphones, document cameras, AV cables, audio and video recorder and playback devices and Mac and PC laptops for loan on a per class or per semester basis.

The College has 115 Smart Classrooms that are outfitted with an LCD projector, projection screen, audio speakers and an audio and video input interface for use with laptops, iPods, document cameras and other AV devices. Our iMedia and Client Services technicians maintain and service this equipment.

Call us at 212.650.5480 or come find us in NAC 5/220.

At City College you will be joining a community devoted to creating and sharing information. Whatever happens you will be a learner, a discoverer, and a technology consumer at City College. You will be using computers and other information technologies for your coursework. We in the OIT are committed to helping you to achieve your full potential and are ready and available to answer any questions at any time.

The Division of Student Affairs

"Students First!" is the motto that guides the work and commitment of our talented and dedicated Student Affairs team. Our team is comprised of the Division of Student Affairs, a group seasoned professionals, and you, the students who care deeply for their peers and who partner with us to provide The City College community with a tremendously rewarding college experience. The Division of Student Affairs is organized into three clusters, each with its own goals for addressing the different components for students' success.

We help students to successfully move through critical transitions, beginning with new student orientation through graduation, professional development, and graduate studies. The Professional Student Development cluster provides guidance to students as they transition from their college to career path, by providing numerous opportunities for experiential learning through internships and professional development, as well as employment and career services for current students and alumni. Included in the Professional Student Development cluster are the Professional Development Institute, the Office of International Students and Scholar Services, and the Office of Community Standards and Judicial Affairs.

We engage students, their families, and the college community in activities that build relationships and promote college spirit. Student Campus Involvement offers programs that encourage community engagement through the following departments: The office of Student Life and Leadership Development, Athletics and Recreational Sports, the Auxiliary Enterprise Corporation, and the Office of Veterans Affairs.

Student Affairs promotes a holistic model of Wellness for all our students. From the dedicated medical staff in Student Health Services, to our robust athletic and fitness programs, we help students to achieve and maintain a balanced and healthy lifestyle. The one-stop Health and Wellness Services provides critical support for students who have urgent needs. The departments housed within Health and Wellness Services are Student Health Services, the Counseling Center, the Office of AccessAbility and Student Disability Services, Gender Resources and Emergency Grants.

The Division of Student Affairs also offers services to accommodate students whose needs and responsibilities exceed their academic commitments. The Child Development and Family Services Center provides daily childcare and educational services to children and families of City College students. The Division also has a Student Affairs department at the Center for Worker Education to address the needs of working students.

The Division of Student Affairs is located in the Wille Administration Building, Room 204. The telephone number is (212) 650-5426. The Division office will help you to navigate its many programs and services.

Health and Wellness Services

Health and Wellness Services provides programmatic and informational support to help students further their academic and personal growth goals. This office serves as an umbrella for several different departments including the AccessAbility Center (Student Disability Services), the Counseling Center, Student Health Services, Gender Resources and Emergency grants. Through Health and Wellness Services, students are given assistance with different types of problems, such as how to navigate the College bureaucracy to resolve an academic or personal dispute, where to get counseling within and outside of the institution, and how to locate the College's programs and resources that address student financial and social concerns. The goal is to provide clear and accessible information to allow students to feel confident and empowered in their interactions with the institution. Health and Wellness Services is currently located in the Marshak Science Building, Room J-15, with some of its various offices located throughout campus.

AccessAbility Center (Student Disability Services)

The AccessAbility Center/Student Disability Services (AAC/SDS) ensures full participation and meaningful access to all of City College's services, programs, and activities that correspond with the Americans with Disabilities Act of 1990, amended in 2008, Section 504 of the Rehabilitation Act of 1973, the Fair Housing Act of 1968, and other applicable Federal, State, and local non-discriminations laws. AAC/SDS accomplishes this goal through the coordination and implementation of appropriate accommodations and support services for students with disabilities. The Center works actively toward full inclusion in policies, procedures, and practices in the context of accessibility, while maintaining essential academic and technical standards. If you are a student with a disability and believe you could benefit from AAC/SDS accommodations and services, please contact the Center via: telephone: (212) 650 -5913, TTY/TTD: (212) 650-8441, email: disabilityservices@ccny.cuny.edu, or visit in-person at North Academic Center, Room 1/218, during business hours (Monday-Friday, 9:00 am-5:00 pm).

While students can request accommodations at any time, it is best to contact AAC/SDS as early as possible.

For more information, please visit www.ccny.cuny.edy/accessability.

Student Health Services

Student Health Services (SHS) is committed to the delivery of quality care to the student population in order to promote, improve and advance the health, wellbeing and overall success of college students as directed by the guidelines of the American College Health Association (ACHA).
Clinical services provided by a full time and part time Registered Nurse. These services are free and confidential to all currently enrolled CCNY students. Medical services include immunizations such as MMR, Hepatitis B, Tdap (Tetanus) and seasonal Influenza, PPD/ Tuberculin testing, Health Education and First Aid. SHS arranges for free on-site HIV Testing and health insurance navigators as part of the Affordable Care Act for information and enrollment to various health insurance plans. SHS provides continuity of care with referrals to community based organizations. SHS has also joined the National Campaign for the Prevention of Teen and Unwanted Pregnancy along with other CUNY campuses and is committed to comply with the Campus Sexual Health Initiative by providing students with the education, tools and resources available.

Immunization Requirements:

New York State Public Health Law (PHL) 2165 (1b and Title 10 New York Codes, Rules and Regulations Subpart 66-2 (10 NYCRR Subpart 66-2) mandates that all incoming students, whether full time or part time, born on or after December 31, 1956, must be immunized against measles, mumps, and rubella (MMR) and requires proof of immunity as a requirement for attendance. City College reserves the right to prevent the registration of any applicant who fails to provide a record of immunization or who, otherwise, provides a health risk to the College community. It is University policy that all students who register for six or more credits/equivalent credits and were born after December 31, 1956 must provide proof of their immunity to measles, mumps, and rubella.

New York State passed Public Health Law 2167, addressing meningococcal meningitis. In compliance with PHL 2167, all New York

State students, regardless of how many credits they take in college, must fill out a Meningococcal Meningitis Response form. Students may download both forms from the Student Health Services website: http://www.ccny.cuny.edu/shs

Student Health Services is located in the Marshak Building, Room J-15 and can be reached at 212-650-8222.

The Counseling Center

The mission of the Counseling Center is to assist students in the resolution of any barriers that may hinder their ability to achieve their highest academic potential, while ensuring their mental health needs are met, regardless of ability to pay. Counselors provide free of charge and confidential short-term, student-centered and culturally informed psychological services from a modern and integrative theoretical orientation, treating all students with respect and recognition of their unique strengths. Counseling offers students a safe, confidential, and nonjudgmental space to voice their concerns and address these concerns with a counselor. Counselors provide students with feedback, they listen, reflect, and validate students' emotions, and they offer support and strategies for coping with challenges. Counseling has been shown to be helpful with a wide range of concerns and is effective for both chronic problems and situational difficulties. Most students learn that counseling offers tremendous benefits in helping them work through problems that are affecting their lives.

The Counseling Center also serves as a liaison to the community, linking students to more intensive and longer term services when needed. Additionally, the Counseling Center is committed to supporting faculty in the identification of students who may benefit from counseling services and reaching students in need.

Services at the Counseling Center include individual counseling, crisis intervention, group counseling, consultation, referral, and psycho-educational activities. Students who are interested in scheduling an appointment or learning about the Counseling Center should call (212) 650-8222, stop by Health and Wellness Services in the Marshak Science Building J-15, or email counseling@ccny.cuny,edu.

Gender and Sexuality Resources

Gender and Sexuality Resources

Gender and Sexuality Resources at CCNY promotes a culture of inclusion of all gender and sexual identities at CCNY while recognizing the intersectionality of oppression, race, religion, class, ability/disability, immigration status and ethnicity. The office provides confidential clinical services to registered CCNY students including crisis support and resources for LGBTQIA+ students, survivors of sexual assault, intimate partner violence, stalking and interpersonal violence. We nurture and support the LGBTQIA+ community. Students who are interested in scheduling an appointment or learning more should call (212) 650-8222, stop by Health and Wellness Services in Marshak Building, Room J-15 or email genderresources@ccny.cuny.edu. Visit our website for additional information and resources: ccny.cuny.edu/health-wellness/gender-resources.

Emergency Grants

Emergency Grants

Health and Wellness facilitates the Emergency Grant Program for currently enrolled students in degree granting programs who do not owe tuition to the college. These grants can assist students for short-term, non-recurring emergencies with a one-time grant to alleviate the situation. Any matriculated student in good academic standing, who is experiencing a current and unforeseen emergency, is eligible to apply for a grant. Interested students can visit the emergency grant website: www.ccny.cuny.edu

The Office of Student Life and Leadership Development

The Office of Student Life and Leadership Development works collaboratively with undergraduate and graduate student leaders to create an engaging and vibrant co-curricular experience at City College. The office advises and provides assistance to over 150 student organizations in chartering their clubs, planning their activities and offering leadership training. The office also houses the CitySERV program that organizes and matches interested students with volunteer or community service opportunities. Additionally, the SEEDS (Student Empowerment & Engagement Development Series) program and the SLAPC (Student Life Activities Planning Committee) committee offer students the opportunity to get involved in planning campus events while developing leadership skills.

The office also manages the Hoffman Student Lounge, the Game Room, the NAC Ballroom, the Aronow Theater, a computer lab and several conference rooms for use by CCNY students and their organizations. Additionally, the office oversees the New Student Orientation Program, the annual Student Elections and serves as advisor to the Undergraduate Student Government, the Graduate Student Council and all student media. The office is located in NAC 1/210 and the phone number is 212-50-5002.

Intercollegiate Athletics

The City College of New York features fourteen varsity sports and one club sport (co-ed lacrosse) that compete at the National Collegiate Athletic Association (NCAA) Division III intercollegiate level: seven for women (basketball, soccer, volleyball, fencing, cross country running, indoor and outdoor track and field) and eight for men (basketball, baseball, soccer, volleyball, tennis, cross country, indoor and outdoor track and field) and seven for men (basketball, baseball,soccer, volleyball, cross country, indoor and outdoor track and field).

The City College of New York Department of Intercollegiate Athletics takes pride in laying a solid foundation built on teamwork, honesty, respect, and sportsmanship. The Department of Athletics does adhere to all City College, City University of New York Athletic Conference (CUNYAC), and National Collegiate Athletic Association guidelines and demonstrate highly ethical behavior in pursuit of excellence.

Our fourteen NCAA sports all have long histories of success and championships, both individual and team. Teams compete in various local, regional, national events and leagues, with primary affiliation being the CUNY Athletic Conference. The primary goal of the college is to provide an environment where student-athletes can excel academically, athletically, and personally. Athletic scholarships are not offered by Division III colleges. Membership on a team is open to all qualified undergraduate students in good academic standing and who meet the NCAA eligibility standards. For more information, contact the Athletics office (Marshak Building, Room J20; 212-650-8228; www.ccnyathletics.com; www.cunyathletics.com)

The Office of Recreation and Campus Fitness

The Office of Recreation & Campus Fitness provides the campus community with structured competitive athletic events, tournaments, and leagues, as well as access to a wide variety of athletic and fitness facilities. The structured activities of the Intramural program generally takes place during club hours on Thursdays. Some of the events that take place during the semester include basketball, volleyball, badminton, soccer, and tennis. The recreation program offers the campus community opportunities to work out with cardiovascular equipment and weight training in the Wingate Fitness Center. Individuals can swim, play tennis, basketball, volleyball, badminton, soccer, frisbee, or jog in a recreational, non-competitive environment. The recreation program emphasizes enjoyment, health and wellness, social interaction, camaraderie, and physical activity. The intramural

programs also offer that along with the challenge of competition with one's peers. (Wingate Hall, 3rd floor; 212-650-6595)

The City College Welcome Center

Centrally located near the entrance the NAC building, the Welcome Center provides a warm and collegial introduction to student life on the City College campus. The Center is staffed by a team of enthusiastic student workers who are dedicated to accommodating students' needs in a "One-Stop Center" that promotes student success and retention in a nurturing and welcoming environment. It serves as the key information, resource and referral center for students and visitors to City College. In addition to sharing vital information about campus resources and facilities the Center also arranges college tours and provides information on upcoming student events and programs. Other services include courtesy telephones for on-campus calls and maps to find your way around campus. Stop by and say "Hi" to the staff or call 212-650-5338 for more information.

Career and Professional Development Institute

The Career and Professional Development Institute of the City College of New York is committed to providing essential resources, services, and opportunities that enable CCNY students and alumni to achieve their professional goals and career satisfaction in a global marketplace. The objective of the Career and Professional Development Institute is to identify significant student transitions and strategically guide their college and career passages. In addition, it provides and expands opportunities for experiential learning through the greater development of internships. The Career and Professional Development Institute's programs and skills training provide a crucial link between talent and teamwork: connecting candidates with job opportunities while meeting the hiring needs of employers, businesses, and organizations. (North Academic Center 1/116; 212-650-5327)

The Office of Community Standards

Academic communities exist to facilitate the process of acquiring and exchanging knowledge and understanding, to enhance the personal and intellectual development of its members, and to advance the interests of society. In order to realize its purpose, the College and its members must be free from personal injury or harm; bias or harassment; intimidation or coercion; damage or loss of property; disruption of educational and social activities; unreasonable interference with the exchange of concepts and ideas; and unreasonable interference with the administrative and supporting services offered by the College. Accordingly, all student members of the college community are expected to conduct themselves in a manner that demonstrates mutual respect for the rights and personal/academic well-being of others, preserves the integrity of the social and academic environment, and supports the mission of the college. The Office of Community Standards' chief responsibility is to educate students of their role in maintaining this learning environment and to address behavior that impedes, obstructs, or threatens the maintenance of order and attainment of the aforementioned goals by violating the standards of conduct set forth in the college and University student conduct policies. The Office of Community Standards is also responsible for investigating alleged violations of the intuitional rules on student conduct and for the coordination and implementation of the conduct process.
For more information about the Office of Community Standards, the CCNY Rules for Student Conduct and the Student Conduct Process you may visit the City College web site at https://www.ccny.cuny.edu/studentaffairs/community-standards or contact the Office of Community Standards at 212-650-5009 and grhinehart@ccny.cuny.edu.

Child Development and Family Services Center

The Child Development and Family Services Center provides quality childcare and early educational services to the students of City College New York. Services are provided for children ages two to five years old. The Center, which is located on-campus, operates daily from 7:45 a.m. to 5:30 p.m., Monday through Friday. To meet the needs and schedules of busy students, there is an evening program offered from 4:00 to 9:00 p.m., Monday through Thursday, as well as a summer program that is offered Monday through Thursday. Breakfast, lunch, and supper-snack are provided in the day program everyday during the fall and spring semesters. Additionally, the Center is a fieldwork placement site for students from the School of Education, the Sophie Davis School of Biomedical Studies, the Spitzer School of Architecture, and the departments of Psychology and Sociology, as well as a work-study placement site. (Schiff House, 133rd Street & Convent Avenue; 212-650-8615)

Office of Veterans Affairs

The goal of the Office of Veterans Affairs (OVA) is to educate the veterans, guardsmen, and reservists of the United States Armed Forces whose courageous service to their country must be rewarded by investing in their future and ensuring their academic success. The OVA is committed to recruiting, enrolling, and retaining veteran students and their families. The OVA works in collaboration with the various offices on campus including Student Affairs, Admissions, Disability Services, Financial Aid, Registrar, Student Health Services, the Counseling Center, and Affirmative Action to assist veterans in becoming acclimated to college life while obtaining veteran educational benefits and other available resources. Student veterans receive a maximum of 12 military elective credits and a maximum of 12 military credits from non-traditional sources for a total maximum of 24 credits. Credits will be granted for military training courses based on the recommendations from the ACE (American Council on Education) armed forces military evaluation guidelines. (Wingate Hall, Room 107; 212-650-7132)

Auxiliary Enterprise Corporation

The Auxiliary Enterprise Corporation (AEC) at The City College of New York provides administrative oversight over revenue-generating, entrepreneurial activities at the college. The services include cam-pus-wide dining, vending, catering, bookstore operations, ATM ser-vices, copier services, student housing, and other service enhance-ments and initiatives. The Executive Director serves as the adminis-trator of the CityONECard program. The AEC also provides funding to student Clubs and Organizations each year to support student ex-periences on and off campus. For more information about the AEC, visit http://www1.ccny.cuny.edu/current/aec/index.cfm

Dining Services

Dining Services at City College strives to provide products and ser-vices that are high quality, offer variety and good value in all of our dining locations and Starbucks Cafes throughout campus. We offer bountiful meals at modest cost, snacks, and beverages to satisfy midday cravings and those on the run, while our Starbucks Cafes provide diners with places they can relax and exchange ideas. Our chefs prepare healthy and nutritious fare to meet the desires of a diverse community each day. From vegetarian and vegan to Halal and Asian, as well as pizza and grilled burgers, we offer a variety of fare tempting to all.

There are several, convenient Dining Services locations on campus: our main Food Court is located on the second floor of the North Academic Center together with the Grab & Go coffee cart in the Rotunda, the Bare Planet Cafe on the first floor, and the Faculty Dining Room on the third floor. A second coffee station is located in the lower level of the Marshak Science building. All of our coffee locations brew Starbucks Coffee.

CityONECard Dining Dollars may be used at all campus dining locations, in addition to many vending machines located around campus. Voluntary Meal Plan options are available to all commuter and res-ident students. Students save sales tax with every Dining Dollar purchase.

For more information about our City College Dining Services visit http://www1.ccny.cuny.edu/current/cafe/index.cfm

Bookstore

The CCNY Campus Bookstore stocks new and used textbooks, reference and general reading books, school supplies, computer soft-ware and supplies, sportswear and spirit apparel, CCNY memorabilia, magazines, greeting cards, and convenience foods and snack items. The bookstore also offers a text rental program, which can save students money versus the purchase price for a new or used text. The new CityONECard, along with most major credit cards and debit cards, are accepted. The bookstore also buys textbooks back from students throughout the year. For more information about the CCNY Campus Bookstore, visit www.ccny.bkstr.com

CityONECard

The CityONEcard is your new and improved City College ID with added features and benefits. It is a secure ID that enhances safety on campus. It is valid for building access and all services. And it serves as a cash card – a convenient payment method for shopping and dining while on campus! The card also comes with bonus and savings fea-tures only available to CityONECard users.

All CCNY students, faculty and staff members must obtain a CityONE ID Card. Each card includes a unique City College ID number, a magnetic stripe, (which works just like a bank debit or credit card), and it has to be swiped through a reader to process your payment. The card also has a bar code which is used in the campus libraries.

The CityONECard allows you to:
Access all CCNY and CUNY buildings and use the libraries and other services
Purchase food at all campus dining locations, The Towers C-Store and most vending machines
Purchase textbooks, supplies and merchandise in the campus bookstore
Attend City College sporting, arts and entertainment events

For more information about the CityONECard and its features and benefits visit
http://www1.ccny.cuny.edu/current/student/welcome/orientation/cityonecard.cfm

Housing and Residence Life

The Towers at CCNY (On-Campus Residence Hall)

The Towers at CCNY is the first residence hall to be built on the CCNY campus in the College's 165-year history. The Towers, located on the South campus, offers a vibrant living and learning experience for all residents (which includes CCNY students, faculty, staff, and students from other CUNY campuses).

The Towers consists of 164 fully furnished, air-conditioned suites in four configurations that house one to four students each, as well as a limited number of studio and one-bedroom suites available for faculty housing. All suites have a kitchenette that includes a cooktop stove, a microwave, full-size refrigerator, a sink, cabinets, and countertop space. The Towers offers free wireless internet service throughout the entire building (including resident rooms and lounges), a multipurpose seminar room, a fitness center, a 24-hour security desk, a central laundry facility (free for residents), a community kitchen, and lounge area with a billiards table and large TV with comfortable seating.

The Residence Life Staff, which consists of resident assistants and professional staff, provides supervision of the building in accordance with CCNY/CUNY policies and procedures. Residence Life also strives to create a sense of community through educational and social programming and serves as a resource to all residents. (The Towers at CCNY, 401 West 130th Street; Phone: 917-507-0070, Email: towers@ccny.cuny.edu; Website: www.ccnytowers.com)

The Office of Off-Campus Housing

This resource allows for students to find housing accommodation around or close to the City College Campus. We provide assistance and counseling to students looking for a room or apartment and want to know more about the rental process in New York City. Off-Campus Housing operates a website that allows student and faculty to access all the resources that this department provides at their own convenience. We are currently introducing other aspects to the department and website to allow for students to find roommates and find a way to get help for housing. We want to provide as much help as possible for students looking to move around the college, which in turn will boost on-campus activity and increase students' study time and decrease commute time. (Wingate Hall, Room 107; Phone: 212-650-5370, Fax: 212-650-7369)

The College of Liberal Arts and Science

Graduate Programs in Liberal Arts and Science

The College of Liberal Arts and Science has long recognized the need and value of graduate studies for students, for the college, and for the community. The first course of study in the liberal arts and science leading to the earned master's degree (Psychology) was introduced in 1944. Subsequently, a comprehensive survey confirmed the need for the expansion of graduate work. A Division of Graduate Studies was established in 1951 and a second master's program (in International Relations) was inaugurated in that same year. As the need for additional programs developed, particularly after The City University came into being in 1961, the College extended its master's offerings to include most of the disciplines in the arts and sciences, as well as several interdisciplinary programs. The College of Liberal Arts and Science offers master's degrees in approximately 24 fields of study. Several of these programs are offered in cooperation with one or more of the other senior colleges of the City University or with The City University Graduate School. In 1962, The City University introduced its first doctoral programs; since then many others have been instituted. The City College fully participates in these programs. In several graduate programs, the master's course of study is the same as the first year of doctoral work and students in the master's program may be admitted to the Ph.D. program with advanced standing.

Goals

The graduate programs offered by the College of Liberal Arts and Science emphasize the standards of excellence and scholarship historically associated with The City College. The work of the College is animated by the ideals of scholarship and re-search, and prepares highly qualified students for careers in the learned professions, in the performing and visual arts, speech, creative writing, for government service, for positions in private industry, labor and welfare agencies, and for further study and research.

Admissions Requirements

Admissions policies for the various departments within the College of Liberal Arts and Science are described below. Additional information is available at http://www1.ccny.cuny.edu/prospective/admissions/grad/.

Department of Art

(Division of Humanities and the Arts)

Professor Becca Albee, Chair

Department Office: Compton-Goethals 109 • Tel: 212-650-7420

General Information

The City College offers the following master's degrees in Art:
M.F.A. Art (p. 134)
M.F.A. Digital and Interdisciplinary Art Practice (DIAP) (p. 134)
M.A. Art History (p. 135)
M.A. Art Education (p. 136)

Art, Master of Fine Arts (M.F.A.)

Degree Requirements for the M.F.A. Art

Required Courses

ART B0051	Graduate Critique Studio I	3
ART B0052	Graduate Critique Studio II	3
ART B0053	Graduate Critique Studio III	3
ART B0054	Graduate Critique Studio IV	3
ART B0300	Studio Art MFA Seminar I	3
ART B0400	Studio Art MFA Seminar II	3
ART B0500	Professional Development	3
ART B0600	M.F.A. Thesis Preparation	3
ART B0800	Teaching Practicum	3

Elective Courses

	Studio electives	27
	Art History and Theory Courses	6

Subtotal: 60

Additional Requirements for the M.F.A. Art

At the discretion of the Graduate Committee, a maximum of six credits of graduate work in other departments may be substituted for elective courses.

End of Semester Reviews

The Graduate Committee and the department chair will review and evaluate the work of all candidates for the M.F.A. degree at the end of each semester.

Thesis Exhibition and Statement

In the final semester, candidates for the M.F.A. degree are required to demonstrate their professional competence by exhibiting a body of work and presenting a written statement about it, both of which will be reviewed and evaluated by the departmental Graduate Committee and the department chair.

Deposit of Visual Documentation

All M.F.A. candidates must provide the department with visual documentation of their work as part of the requirements for the degree.

Transfer Credits

At the discretion of the Graduate Committee, no more than twelve (12) credits of graduate work in art may be transferred from institutions within the CUNY system. No more than six such credits may be transferred from other institutions.

Graduate Studios

Matriculated students in the M.F.A. Program are granted studios for four (4) semesters. Graduate students who take longer than four (4) semesters to complete their program must consider this stipulation and plan accordingly.

Advisors

M.F.A.: Tom Thayer, Associate Professor

Digital and Interdisciplinary Art Practice (DIAP), Master of Fine Arts (M.F.A.)

Degree Requirements for the M.F.A. DIAP (Digital & Interdisciplinary Art Practice)

Required Courses

First Year: Fall

ART B2010-2040	Workshop: Theme	3
ART B2050-2080	Workshop: Medium	3
ART B2210	Working Critique I	3
ART B2410	Project Research Seminar	3
ART B2420	Research-based Art Practice	3

First-Year: Spring

ART B2050-2080	Workshop: Medium	3
ART B0800	Teaching Practicum	3
ART B2220	Working Critique II	3
ART B2600	First-Year Project	6

Second-Year: Fall

ART B2050-2080	Workshop: Medium	3
	OR	

	Related Elective	3
ART B3210	Working Critique III	3
ART B3410	Theory in Practice	3
ART B3610	Thesis Project Development: Research	3
ART B0500	Professional Development	3

Second-Year: Spring

ART B2050-2080	Workshop: Medium	3
	OR	
	Related Elective	3
ART B3220	Critique Conferences	3
	Art History or related academic course	3
ART B3620	Thesis Project Development: Exhibition	6

Subtotal: 60

Additional Requirements for the M.F.A. DIAP

Advisors
M.F.A.: Hajoe Moderegger, Associate Professor

Admissions Procedures
Admission will be based on artistic merit and ascertained by portfolio (and/or evidence of research-based experience) and interview. Portfolio advising is available by appointment.

Graduate Studios

Matriculated students in the [DIAP] M.F.A. Program are granted a workspace within the 4000 sq. ft. open [DIAP] Studio and digital fabrication lab.

Graduation Requirements
At the end of the third semester each student must submit a final project proposal to the faculty review committee. This final project must to be completed during the last semester and can be an individual or a collaborative project. In order to graduate, each MFA candidate will be required to submit a written thesis paper, present their final project in an exhibition or other appropriate public format and defend the project to the faculty review committee, which evaluates the candidates' success. It is further recommended the student find an additional outside evaluator and thesis advisor for their committee. If needed, the faculty will aid in the search for this advisor and evaluator by supplying names and contact information. All students must prepare a packet for the Department archive that consists of their written Thesis paper and documentation of their Thesis Exhibition in digital format.

Transfer credits
At the discretion of the program director, no more than six credits of graduate work in art may be transferred.

Art History, Master of Arts (M.A.)

Degree Requirements for the M.A. in Art History

Art History

MA students must take required courses at the City College of New York. Students may take classes via e-permit at the other CUNY schools only if they are not typically offered at City College. Students should obtain approval from one of the MA program co-directors before taking classes at other CUNY schools.

Required Courses

ART A1000	Research Methods of Art History	3
ART B9000	Master's Thesis Research	3
	Graduate courses in Art History	24

Subtotal: 30

Art History with Art Museum Studies Concentration

Required Courses

ART A1000	Research Methods of Art History	3
ART B7000	Museology	3
ART B7100	Museum Apprenticeship I	3
ART B7200	Museum Apprenticeship II	3
ART B7400	Museum Exhibition Analysis Seminar	3
ART B8000	Art Museum Studies Colloquium	3
	OR	
ART B9000	Master's Thesis Research	3

Elective Courses

Subtotal: 36

Art History with Art Museum Education Concentration

Required Courses

ART A1000	Research Methods of Art History	3
	OR	
ARTE 3100C	Community-Based Art Education	3
ART B7000	Museology	3
	OR	
ART B7400	Museum Exhibition Analysis Seminar	3
ART B7500	Museum Education I	3
ART B7505	Museum Education II	3
ART B7100	Museum Apprenticeship I	3

ART A1000: if not taken as an undergraduate

Select 1 of 3 in consultation with advisor: (3 credits)

EDSE 4100E	Curriculum and Assessment in Art Education	4
EDSE 4200E	Identity, Community and Culture in Art Education	3
EDSE 4300F	Materials and Methods in Art Education	4

Select one of the following (3 credits)

ART B9000	Master's Thesis Research	3
	OR	
EDSE 7200I	Master's Project	3

ART B9000: For students pursuing the MA thesis option

EDSE 7200I: For students pursuing the Qualifying Paper option

Elective Courses

	Graduate courses in Art History in consultation with advisor [must include Research Methods in Art History if not taken as an undergraduate]	9-12
	Graduate courses in Education and/or Art Education in consultation with advisor	3-6

Subtotal: 36

Additional Requirements for the M.A. Art History

Thesis
All students pursuing the MA in Art History track but not one of the concentrations are required to complete a written thesis demonstrating competence in scholarly research in the field.

Option for Art Museum Studies Candidates
Art Museum Studies candidates may opt to write two qualifying papers: one in an art history elective course and the other in Art Museum Colloquium. Alternatively, Art Museum Studies candidates may choose

to write a thesis provided that they can propose an acceptable thesis topic and secure an advisor.

The option to write two qualifying papers applies retroactively to all students pursuing the two art museum concentrations. As per the policies stated in the course bulletin, students who began their coursework before Fall 2013 and were required to take only 30 credits to complete their degrees may choose to write two qualifying papers, instead of a thesis, and will not be required to complete the 36 credits of coursework.

Option for Art Museum Education Candidates
Art Museum Education candidates may opt to write two qualifying papers: one in an art history elective course and the other in Master's Projects. Alternatively, Art Museum Education candidates may choose to write a thesis provided that they can propose an acceptable thesis topic and secure an advisor.

Comprehensive Examination
Not required.

Foreign Language Proficiency
Candidates for the M.A. degree in Art History with or without an Art Museum Studies or Art Museum Education concentration must demonstrate a reading proficiency in a foreign language approved by their graduate advisor.

Transfer Credit
At the discretion of the program director, no more than six credits of graduate work in art may be transferred.

Advisors
M.A.: Craig Houser, Lecturer.

Art Education, Master of Arts (M.A.)

Degree Requirements for the M.A. Art Education

M.A. in Art Education
See the School of Education section (p. 168) of this Bulletin.

Facilities

Art Gallery
The Art Department's gallery space displays work of undergraduates and graduate students, professional artists, and specially curated exhibitions. Approximately 2000 sq. ft. in size, the gallery accommodates two- and three-dimensional art.

Ceramic Design
The facilities include a large open work area with 18 pottery wheels and a slab roller, extruder, and a kiln room with electric kilns. There is a plaster studio where students learn mold-making. Various clay bodies are used for utilitarian, sculptural, and architectural ceramics, with equal emphasis on clay's multicultural traditions, e.g., Egyptian paste, majolica.

Digital Output Center
Operating under the aegis of Electronic Design & Multimedia and Photography, the Digital Output Center is a service bureau that provides digital printing and equipment check-out services to E.D.M., Photography, and M.F.A. students. The Digital Output Center is a dedicated center and only open to students currently taking E.D.M. or specifically designated photography courses or enrolled in the B.F.A. or M.F.A. programs.

Painting and Drawing
The painting and drawing rooms are equipped with architectural-quality drafting tables and large easels. Each studio has wall space for critiques and large-scale projects. Model platforms, mat cutters, props, and tools for the construction of painting supports are available. The Visual Resources Library maintains a collection of images of student work for reference.

Photography
The photography facilities include a black & white darkroom, a conventional color darkroom, a color processing lab, and an advanced digital lab. Facilities also include shooting studios/classrooms. Equipment includes: Speedotron, Bowens Calumet Travelite, and Interfit flash systems, as well as Smith Victor, Arri and Lowell hot lights, Seconic light meters, Manfrotto and Oben tripods, large-format Omega enlargers, a 30" Colenta processor, and a NuArc mercury exposure unit. Cameras available for student use include: Hasselblad H5D DSLR, Mamiya 7 and RZ medium format systems, Cambo, Chamonix, and Toyo 4x5 field cameras. A five station advanced digital lab is equipped with iMac stations, Imacon Flextight X1 scanners, a Nikon 5000EDLS scanner, Epson XL10000 and, Epson 750 scanners, and Epson 3880 and 4880 printers. The David and Lenore Levy Collection of Contemporary Photography is available for student and faculty study in all areas of the Art Department.

Printmaking
The studio is equipped for the teaching of intaglio, lithography, relief processes including woodcut and lino-cut, collagraph, carborundum aquatint, water-based silk-screen, photo-printmaking in etching, silkscreen, lithography, and combinations of all the print media. The Printshop houses three etching, one relief and two lithography presses. There is a 62" x 62" Duhit plate maker with a deep well blanket, a plate cutter, large hot plate, aquatint box, large aluminum bed for lithographic plates, lithographic stones in a full range of sizes, a queen size drying rack, numerous rollers of various durometers and dimensions, a hydrobooth and hydroblaster for silk screen, a large format ink jet printer to facilitate the production of oversized images and a Universal laser cutter with a 12" x 24" cutting bed. The integration of equipment for digital and photographic processes with conventional printmaking equipment allows for the full range of printmaking experiences.

Sculpture
The sculpture studio facility is amply equipped for the creation of traditional and non-traditional three-dimensional art. It accommodates various techniques including wood assemblage, construction, woodcarving, plaster, clay, and stone carving. There is a small efficient area for metal fabrication with metal working tools including mig welders and plasma cutters. The studio also houses a basic wood design shop with a table saw, jointer, surfacing tools, hand tools, and several band saws.

Visual Media Lab

Located in the Compton-Goethals building in Room 245A, the Visual Media Lab is a facility that offers digital media resources to students and faculty in the Art Department at CCNY. Fostering community between the labs in the EDM and Photography programs and building on the model of the former slide library, the VML serves as a supplemental facility that provides technology and image resources in a welcoming learning-based setting. By providing various workshops, the VML offers students and faculty access to tools to work on their class projects and the confidence to apply those tools successfully and creatively.

Department Activities

Art Department
The Department sponsors exhibitions, guest lectures, and appearances by visiting artists throughout the academic year.

Student Art Society
The Graduate Art Students Society is the primary student organization. The group, open to all graduate students, participates in department activities and generally promotes and stimulates various activities and events at the college.

Awards and Scholarships

The Therese McCabe Ralston Connor Awards
For the study of art and art history.

The Holly T. Popper Art Scholarship Award
For an outstanding graduating female City College art major to study in an M.F.A. program in the Art Department..

Seymour Peck Awards in the Arts
For outstanding undergraduate and graduate majors in the arts.

The Jacob Rothenberg Award for Excellence in Art
For an outstanding student who has demonstrated excellence in all courses.

Faculty

Molly Aitken, Associate Professor
B.A., Harvard Univ.; M.A., Columbia Univ., M.Phil., Ph.D.

Becca Albee, Associate Professor
B.A., Evergreen State College; M.F.A., Univ. of North Carolina Chapel Hill

Patterson Beckwith, Lecturer
B.F.A, Cooper Union; M.F.A., Univ. of California (Los Angeles)

Colin Chase, Professor
A.A.S., Fashion Institute of Technology; B.F.A., Cooper Union; M.F.A., Univ. of Michigan

Joshua Cohen, Assistant Professor
B.A., Vassar College; Ph. D., Columbia Univ.

Marit Dewhurst, Associate Professor
B.A, Univ. of Michigan; Ed.M., Harvard University, Ed.D.

Carl Fudge, Assistant Professor
B.F.A., Brighton University; M.F.A., Tyler School of Art

Leopoldo Fuentes, Assistant Professor
B.F.A., California State Univ. (Los Angeles); M.F.A., Northwestern Univ.

Stalgia Grigg, Assistant Professor
B.S.V.A., SUNY Purchase; M.F.A., UCLA

Ellen Handy, Associate Professor
B.A., Barnard College; Ph.D., Princeton Univ.

Sherry Muyuan He, Assistant Professor
B.A., Macalester College; M.F.A., Minneapolis College of Art and Design

Craig Houser, Lecturer
B.A., Carleton College; M.A., Hunter College; M. Phil., CUNY Graduate Center, Ph.D.

Anna Indych-López, Professor
B.A., New York Univ., M.A., Ph.D.

Lise Kjaer, Lecturer
M.F.A., Academy of Fine Arts (Poland); M. Phil., CUNY Graduate Center, Ph.D.

Abby Kornfeld, Assistant Professor
B.A., Cornell University; M.A. New York Univ., Ph.D.

Hajoe Moderegger, Associate Professor
M.F.A, Bauhaus-University Weimar (Germany)

Sylvia Netzer, Professor
B.A., City College; M.F.A., Columbia Univ.

Harriet F. Senie, Professor
B.A., Brandeis Univ.; M.A., Hunter College; Ph.D., New York Univ.

Mark Smith, Associate Professor

B.F.A., Georgia State Univ.; M.F.A, School of the Art Institute of Chicago

Tom Thayer, Associate Professor
B.F.A., Northern Illinois Univ., M.F.A.

Professors Emeriti

Robert E. Borgatta

Sherman Drexler

Madeleine Gekiere

Michi Itami

Irving Kaufman

Jay Milder

Seong Moy

Elizabeth O'Connor

George Nelson Preston

Joan Webster Price

Annette Weintraub

Department of Biology

(Division of Science)

Professor Jonathan Levitt, Chair • Department Office: MR 526 • Tel: 212-650-6800

General Information

The City College offers the following Master's Degree in Biology:
M.S.

For students wishing to pursue doctoral work in Biology, the Doctor of Philosophy degree is offered jointly by CCNY and The City University of New York Graduate Center. The office of the Ph.D. program is at The City University of New York Graduate Center, 365 Fifth Avenue, New York, N.Y. 10016.

Programs and Objectives

Areas of specialization include Molecular, Cellular, and Developmental Biology; Ecology, Evolutionary Biology and Behavior; and Neuroscience.

Biology, Master of Science (M.S.)

Degree Requirements
A student may elect one of two routes to the M.S. Degree in Biology: either writing a thesis or passing a Comprehensive Examination.

Thesis Option

Required Courses

BIO V9100	Colloquium	1
BIO B9901	Thesis Research	3

BIO V9100: 1 CR. each term, for 2 credits

Elective Courses

	Graduate courses in an approved area of specialization	12
	Additional elective courses	10

Additional elective courses: may include up to 6 credits of BIO V9200: Tutorial, or BIO V9201: Advanced Study

Doctoral Courses Open to Master's Students Qualified students may take or substitute, with the approval of the Graduate Committee, courses available in the doctoral program in Biology. Those courses are described in the Bulletin of The Graduate Center of The City University of New York.

Subtotal: 30

Comprehensive Exam Option

Required Courses

BIO V9100	Colloquium	1

BIO V9100: 1 CR. each term, for 2 credits

Elective Courses

	Graduate courses in an approved area of specialization	12
	Additional elective courses	20

Additional elective courses: may include up to 6 credits of BIO V9200: Tutorial, or BIO V9201: Advanced Study

Additional Requirements

Elective courses are to be chosen in consultation with the advisor and are subject to the approval of the Departmental Graduate Studies Committee. No more than 12 credits may be taken with any one faculty member.

Thesis: Candidates must complete a thesis based on independent laboratory or field investigation and pass an oral defense of the thesis. The faculty member selected by the student as research sponsor subsequently will serve as advisor and chairman of an Advisory Committee of at least three faculty members, three of whom must be from the Biology Department. This committee will serve in the preparation and approval of the thesis proposal, the thesis, and defense of the thesis.

Comprehensive Exam: Candidates not offering a thesis must pass a written and oral comprehensive examination during the final semester of study. With the approval of the Master's Advisor and the appropriate doctoral subprogram, students are permitted to take the first doctoral examination in lieu of the Comprehensive Exam. An advisory committee of three faculty members from the Biology Department will serve to advise the student.

Residency Requirements: Some elective courses offered by other departments at CCNY or CUNY can be credited toward the M.S.A. degree. However, students are cautioned that a minimum of 60% of the credits required for the MA degree (i.e., 18 or 20 credits for the thesis or comprehensive exam options, respectively) must be taken from courses offered directly by the faculty in the Biology Department at CCNY.

TOEFL Requirements: Foreign students must have a minimal TOEFL score of 60% percentile.

Foreign Language Proficiency: Not required.

Application Deadlines: Completed applications must be received by the CCNY Graduate Admissions deadlines (May 1 for the Fall semester, and Nov 15 for the Spring semester).

Affiliated Programs

City College has a long-standing affiliation with curators at the American Museum of Natural History. Admission to the AMNH programs requires approval by AMNH curators as well as CCNY faculty. Interested students are encouraged to contact curators directly to discuss potential research projects. City College also has an affiliation with Memorial Sloan-Kettering Cancer Center for performing research. Interested students are encouraged to contact Professor Karen Hubbard to discuss potential research mentors.

Advisement

Students interested in entering the M.S. Program should contact:

Master's Advisor
Department of Biology
The City College of New York
New York, NY 10031
Telephone: (212) 650-6800

Enrolled students should consult one of the following advisors:

M.S. Candidates
Professor Amy Berkov
Loc: MR815
Tel: 212-650-8570
Email: aberkov@ccny.cuny.edu

Ph.D. Candidates
Professor Shireen Saleque
Loc: MR716
Tel: 212-650-8538
Email: ssaleque@ccny.cuny.edu

Faculty

Robert P. Anderson, Professor
B.A., Kansas State University; Ph.D., University of Kansas

Amy Berkov, Assistant Professor
BFA., University of. Colorado; Ph.D., CUNY

Ana Carnaval, Associate Professor
B.S., Universidade Federal do Rio de Janeiro (Brazil), M.S.; Ph.D., University of Chicago

Jay A. Edelman, Associate Professor
A.B., University of California (Berkeley), Ph.D. University of California (Berkeley)/ University of California (San Francisco)

Mark Emerson, Associate Professor
B.A., Oberlin College; Ph.D. Harvard University

Fardad Firooznia, Lecturer
B.S., Yale University; Ph.D. Cornell University

Shubha Govind, Professor
B.S., M.S., Delhi University (India); Ph.D., University of Illinois (Urbana-Champaign)

Yevgeniy Grigoryev, Lecturer
B.S., Hunter College, CUNY; Ph.D., Scripps Research Institute

Michael Hickerson, Professor
B.S., The Evergreen State College; M.S., Western Washington University; Ph.D., Duke University

Karen Hubbard, Professor
B.A., Barat College; Ph.D., Illinois Institute Of Technology

Anuradha Janakiraman, Professor
B.Sc., Presidency College (India); M.Sc. University of Calcutta (India); M.S. Kent State University; Ph.D. University of Illinois (Urbana-Champaign)

Jonathan B. Levitt, Professor and Chair
B.A., University of Pennsylvania; M.A., Ph.D., New York University

Christine Li, Professor
A.B., Columbia University; M.S.; Ph.D., Harvard University

David Lohman, Associate Professor
B.S., Bradley University; A.M., Ph.D., Harvard University

Hysell V. Oviedo, Assistant Professor
B.A., B.S., Richard Stockton College; Ph.D., New York University

Mark Pezzano, Associate Professor
B.S., William Paterson University; Ph.D., CUNY

Stefan Pukatzki, Professor
B.Sc., M.Sc., University of Bremen; Ph.D. Columbia University

Robert Rockwell, Professor

B.S., Wright State University; M.S., Ph.D., Queen's University, Kingston (Canada)

Adrian Rodriguez-Contreras, Associate Professor
B.Sc., Universidad Nacional Autonoma de Mexico; Ph.D., University of Cincinnati

Andrey Rudenko, Assistant Professor
B.S., M.S. Kharkiv National University (Ukraine); D.Phil., Oxford University (U.K.)

Shireen Saleque, Associate Professor
B.Sc., M.Sc., Calcutta University (India); M.A., M.Phil., Columbia University; Ph.D., Albert Einstein College of Medicine

Tadmiri R. Venkatesh, Professor
B.S., Univ. of Mysore (India); M.S., Ph.D., Birla Institute of Technology and Science (India)

Bao Q. Vuong, Associate Professor
B.S., Cornell University; M.A., M. Phil., Ph.D., Columbia University

Osceola Whitney, Assistant Professor
B.S., Lincoln University; M.S., Florida A&M University; Ph.D., Florida State University

Professors Emeriti

Jane C. Gallagher

Robert P. Goode

Jerry Guyden

Sally Hoskins

John J. Lee

Daniel Lemons

Linda H. Mantel

Olivia McKenna

Joseph Osinchak

Janis Roze

Carol Simon

John H. Tietjen

Ralph C. Zuzolo

Program in Biotechnology

(Division of Science)

Professor Christine Li, Advisor • Office: CDI 13384 • Tel: 212-650-8450

General Information
The City College offers the following Master's Degree in Biotechnology: **M.S** (p. 139)

Programs and Objectives
The Division of Science offers an interdisciplinary biotechnology program that provides a firm foundation and understanding of the biological sciences through a series of core courses. Additional required courses will build on this biological foundation to expose students to the multidisciplinary approaches used in biotechnology. Hence, the curriculum involves faculty from Biology, Chemistry, and Physics. The coursework will be integrated with research experiences in the laboratories performing cutting-edge research within the Division of Science. The MS degree in Biotechnology will prepare students for entrance into industry, governmental service, the health-oriented professions, or further graduate education.

For students wishing to pursue advanced studies, the Doctor of Philosophy degree is offered by The City University of New York. The office of the Ph.D. program is at The City University of New York Graduate Center, 365 Fifth Avenue, New York, N.Y. 10016.

Biotechnology, Master of Science (M.S.)

Degree Requirements

Required Courses

BIO A8000	Current Topics in Microbiology	3
BIO V0005	Genetics	4
BIO V1401	Cell Biology	4
BIO C0300	Molecular Biology	4
PHIL 77900	Medical Ethics	4
PHYS V9100	Colloquium	1
PHYS B9901	Thesis Research	3
PHYS B9902	Thesis Research	3

BIOL 71013 at the Graduate Center can be taken instead of BIO C0300.
**Bioethics and similar courses are allowable in consultation with the program advisor. No more than 6 credits of thesis research credits are allowed.*

Elective Courses

	Graduate courses in an approved area of specialization	7

Subtotal: 36

Additional Requirements
Elective courses are to be chosen in consultation with the advisor and are subject to the approval of the Divisional Science Graduate Studies Committee.

Thesis: Candidates must complete a thesis based independent laboratory or field investigation and pass an oral defense of the thesis. The faculty member selected by the student as research sponsor will serve as advisor and chairman of an Advisory Committee of at least three faculty members, three of whom must be from the Science Division. This committee will serve in the preparation and approval of the thesis proposal, the thesis, and defense of the thesis.

Residency Requirements: Some elective courses offered by other departments at CUNY or equivalent required courses offered by other departments at CUNY can be credited toward the MS degree. However, students are cautioned that a minimum of 60% of the credits required for the MS degree (i.e., 21 credits) must be taken from courses offered directly by the faculty in the Division of Science at CCNY.

TOEFL Requirements: Foreign students must submit a minimum TOEFL score of 75th percentile.

GRE Requirements: While the GREs are not required, the GRE general test is highly recommended.

Foreign Language Proficiency: Not required.

Application Deadlines: Completed applications must be received by the CCNY Graduate Admissions deadlines (May 1 for the Fall semester, and Nov 15 for the Spring semester).

Affiliated Programs

City College has an affiliation with Memorial Sloan-Kettering Cancer Center for performing research. Interested students are encouraged to contact Professor Karen Hubbard to discuss potential research mentors.

Advisement
Students interested in entering the M.S. Program should contact:

Master's Advisor

Program in Biotechnology
Department of Biology
The City College of New York
New York, NY 10031
Telephone: (212) 650-6800

M.S. Candidates
Dr. Christine Li
Loc: CDI 13384
Tel: 212-650-8450

Faculty

Zimei Bu, Professor
B. Engineering, Chengdu Univ. of Science & Technology (China); Ph.D., Louisiana State Univ.

Mark Emerson, Ass Professor
B.A., Oberlin College; Ph.D. Harvard University

Kevin Gardner, Einstein Professor, Director of the ASRC Structural Biology Initiative
B.S., Univ. of California, Davis; Ph.D., Yale Univ.

Ranajeet Ghose, Professor
B.Sc., Presidency College (India); M.S., Yale Univ., Ph.D. Yale Univ.

Shubha Govind, Professor
B.S., M.S., Delhi University (India); Ph.D., University of Illinois (Urbana-Champaign)

Marilyn Gunner, Professor
B.A., SUNY (Binghamton); Ph.D., Univ. of Pennsylvania

Karen Hubbard, Professor
B.A., Barat College; Ph.D., Illinois Institute Of Technology

Anuradha Janakiraman, Professor
B.Sc., Presidency College (India); M.Sc. University of Calcutta (India); M.S. Kent State University; Ph.D. University of Illinois (Urbana-Champaign)

David Jeruzalmi, Professor
B.S., Univ. of Cincinnati; M. Phil., Univ. of Cincinnati; Ph.D., Yale University

George John, Professor
B.S., Univ. of Kerala (India), Ph.D. Univ. of Kerala

Reza Khayat, Assistant Professor
B.S., Univ. of California, Irvine.; M.S., Ph.D., Columbia University

Ronald Koder, Associate Professor
B.S., Univ. of Missouri-Columbia, Ph.D., John Hopkins

Themis Lazaridis, Professor
Diploma in Chemical Engineering, Aristotle Univ. (Greece); Ph.D., Univ. Of Delaware

Christine Li, Professor
A.B., Columbia University; M.S.; Ph.D., Harvard University

Mark Pezzano, Associate Professor
B.S., William Paterson University; Ph.D., CUNY

Stefan Pukatzki, Professor
B.Sci., M.Sc. University of Bremen; Ph.D., Columbia University

Adrian Rodriguez-Contreras, AssociateProfessor
B.Sc., Universidad Nacional Autonoma de Mexico; Ph.D., University of Cincinnati

Andrey Rudenko, Assistant Professor
B.S., M.S. Kharkiv National University (Ukraine): D.Phil., Oxford University (U.K.)

Kevin Ryan, Professor
B.S., Providence College; M.S., Univ. of Rochester, Ph.D. Univ. of Rochester

Shireen Saleque, Associate Professor
B.Sc., M.Sc., Calcutta University (India); M.A., M.Phil., Columbia University; Ph.D., Albert Einstein College of Medicine

Ruth Stark, Distinguished Professor
A.B., Cornell University; Ph.D., Univ. of California (San Diego)

Tadmiri R. Venkatesh, Professor
B.S., Univ. of Mysore (India); M.S., Ph.D., Birla Institute of Technology and Science (India)

Bao Q. Vuong, Assistant Professor
B.S., Cornell University; M.A., M. Phil., Ph.D., Columbia University

Department of Chemistry and Biochemistry

(Division of Science)

Professor Stephen O'Brien, Chair • Department Office: MR 1024 • Tel: 212-650-8402

General Information
The City College offers the following Master's Degrees in Chemistry and Biochemistry:
M.S.
5-Year BS/MS in Chemistry (see UG Bulletin)
"4 + 1" Accelerated Master's Degree, Biochemistry, M.S.

Programs and Objectives
The Department of Chemistry and Biochemistry, established in 1849, offers rigorous and up-to-date graduate level instruction and research training in the following areas:

- Analytical Chemistry
- Biochemistry and Biophysics
- Environmental Chemistry
- Inorganic Chemistry
- Organic Chemistry
- Physical Chemistry

The M.S. curricula are flexible, and programs of study are available for students planning to go into industry, governmental service, the health-oriented professions, and secondary school education.
For students wishing to pursue advanced studies in the above areas, the Doctor of Philosophy degrees are offered by The City University of New York in Chemistry, Biochemistry, and many other fields. The offices of the Ph.D. programs are located at The City University of New York Graduate Center (CUNY GC), 365 Fifth Avenue, New York, N.Y. 10016

Chemistry and Biochemistry, Master of Science (M.S.)

Degree Requirements

Graduate courses from other departments may be taken if approved by the advisor.

Chemistry Option

Required Courses

CHEM B1000	Inorganic Chemistry	5
CHEM B5000	Organic Mechanisms	5

Elective Courses

Twenty credits chosen from the following: (20 credits)

CHEM A1100	Environmental Chemistry	3
CHEM A1101	Environmental Chemistry Lab	2
CHEM A1200	Environmental Organic Chemistry	3
CHEM A1400	Chemical Information Sources	1
CHEM A8200	Chemistry-Physics-Engineering Seminar I	1
CHEM A8300	Chemistry-Physics-Engineering Seminar II	1

CHEM B3000	Polymer Chemistry	5
CHEM B5100	Organic Synthesis	5
CHEM B5200	Spectroscopy and Structural Proof in Organic Chemistry	5
CHEM B5300	Organometallics	5
CHEM B6000	Quantum Chemistry	5
CHEM B7200	Surface Chemistry and Colloids	5
CHEM B7300	Computers in Chemistry	5
CHEM B8900	Introduction to Research Methodology	5
CHEM B9100	Basic Laboratory Techniques for Research in Physical, Analytical and Inorganic Chemistry	5

Additional Requirements:

Thesis: There is also the possibility of doing a thesis (offered as CHEM B9901-B9905, 10 credits). The thesis must be approved by the Graduate Committee. Students choosing to do a thesis will take ten credits of elective Chemistry courses in addition to CHEM B9901-B9905.

Comprehensive Examination: A comprehensive examination is required of all students except for those who have completed a thesis. The comprehensive examination includes material from any undergraduate course, plus CHEM B1000 and CHEM B5000.

Subtotal: 30

Biochemistry Option

Required Courses

CHEM A8005	Biochemistry II	3
BICM U71010	Adv. Biochem. I (CUNY GC)	3
BICM U71020	Adv. Biochem. iI (CUNY GC)	3
BICM U71110	Adv. Biochem. iI (CUNY GC)	3
BIO V0005	Genetics	4
PHYS V3800	Biophysics	4

Two of the following four: (2 credits)

CHEM B9800	Seminar in Biochemistry	1
BICM U72010	Basic Seminar in Biochem I	1
BICM U72020	Basic Seminar in Biochem II	1
BICM U81000	Seminar in Biochemistry	1

Two of the following four: (7-9 credits)

CHEM B5000	Organic Mechanisms	5

Additional Requirements:

Thesis: Students who wish to complete a thesis must obtain approval by the Graduate Committee.

Comprehensive Examination: A comprehensive examination is required of all students except those who have completed a thesis.

Subtotal: 29-31

Advisement

All students wishing to pursue Master's work in Chemistry or Biochemistry should consult with one of the program directors listed below:

Chemistry
Professor Barbara Zajc
Location: MR 1234
Tel: 212-650-8926

Biochemistry
Professor Kevin Ryan
Location: CDI 4.304
Tel: 212-650-8132

Seminars

The Department of Chemistry and Biochemistry sponsors weekly seminars on topics of current interest. Advance notice of these seminars is posted near MR-1024 and on public monitors in the Marshak and CDI Buildings. All interested students are invited to attend.

Awards, Scholarships and Prizes

Each year the department presents a number of awards to its outstanding students.

Ernest Borek Scholarship
Albert and Frances Hochman Scholarship
Sol and Bettina Kornbluh Award

Doctoral Courses Open to Master's Students

Qualified students may take or substitute, with the approval of the Graduate Committee, courses available in the doctoral program in Chemistry or Biochemistry. Those courses are described in the bulletin of The Graduate School of The City University of New York.

Faculty

Teresa Bandosz, Professor
B.S., Univ. of Mining Metallurgy (Cracow, Poland), M.S. Univ. of Mining Metallurgy (Cracow, Poland); Ph.D., Technical Univ. of Cracow

Mark Biscoe, Assistant Professor
B.A., Wesleyan Univ.;Ph.D., Columbia Univ.

Sean Boson, Lecturer
B.S., Jahangirnagar Univ., (Bangladesh), M.S. Jahangirnagar Univ. (Bangladesh); Ph.D., Univ., of Cambridge (U.K.)

Zimei Bu, Professor
B. Engineering, Chengdu Univ. of Science & Technology (China); Ph.D., Louisiana State Univ.

Dorthe Eisele, Assistant Professor
Dip-Phys (MS equiv), Technical Univ. of Berlin; Dr.rer.nat (Ph.D. equiv), Humboldt Univ. of Berlin

Amédée des Georges, Assistant Professor, ASRC Structural Biology Initiative
B.S., M.S., Université Perre et Marie Curie (France); Ph.D., Univ. of Cambridge (UK)

Kevin Gardner, Einstein Professor of Chemistry, Director of the ASRC Structural Biology Initiative
B.S., Univ. of California, Davis; Ph.D., Yale Univ.

Ranajeet Ghose, Professor
B.Sc., Presidency College (India); M.S., Yale Univ., Ph.D. Yale Univ.

David K. Gosser, Professor
B.S., St. Joseph's Univ.; Ph.D., Brown Univ.

Urs Jans, Professor
Diploma in Chemistry, Swiss Federal Institute of Technology, Ph.D. Swiss Federal Institute of Technology

David Jeruzalmi, Professor
B.S., Univ. of Cincinnati; M. Phil., Univ. of Cincinnati; Ph.D., Yale Univ.

George John, Professor
B.S., Univ. of Kerala (India), Ph.D. Univ. of Kerala

Reza Khayat, Associate Professor
B.S., Univ. of California, Irvine.; M.S., Ph.D., Columbia University

Glen Kowach, Associate Professor
B.S., Univ. of Wisconsin, Madison; Ph.D., Cornell Univ

Mahesh Lakshman, Professor
B.S., University of Bombay (India), M.S. Univ. of Bombay; Ph.D., Univ. of Oklahoma

Themis Lazaridis, Professor

Diploma in Chemical Engineering, Aristotle Univ. (Greece); Ph.D., Univ. of Delaware

John R. Lombardi, Professor
A.B., Cornell Univ.; M.A., Harvard Univ., Ph.D.

Stephen O'Brien, Professor and Chair
B.Sc., Sussex Univ. (UK); D.Phil., Oxford Univ. (UK)

Kevin Ryan, Associate Professor, M.S. Biochemistry Coordinator
B.S., Providence College; M.S., Univ. of Rochester, Ph.D. Univ. of Rochester

Issa Salame, Assistant Professor
B.S., The City College; M. Phil., CUNY, Ph.D. CUNY

Simon A. Simms, Associate Professor
B.S., The City College; Ph.D., Princeton Univ.

Ruth E. Stark, CUNY Distinguished Professor
A.B., Cornell University; M.S., Ph.D., Univ. of California (San Diego)

Mark L. Steinberg, Professor
B.A., Univ. of Michigan; Ph.D., Univ. of Pennsylvania

Maria Tamargo, Professor
B.S., Univ. of Puerto Rico; M.S., Ph.D. John Hopkins Univ.

Barbara Zajc, Professor, M.S. Chemistry Coordinator
B.S., Univ. of Ljubljana (Slovenia), M.S., Ph.D., Univ. of Ljubljana

Professors Emeriti

Daniel Akins

Theodore Axenrod

Ronald Birke

Vernon G. S. Box

David Calhoun

Michael E.l Green

Thomas Haines

Neil McKelvie

Stanley R. Radel

Henri L. Rosano

Charlotte S. Russell

Horst Schulz

Maria Luisa Tasayco

Department of Classical and Modern Languages and Literatures

(Division of Humanities and the Arts)

Professor Ángel Estévez, Acting Chair • Department Office: NA 5/223 • Tel: 212-650-6731

General Information
The City College offers the following master's degree in Classical and Modern Languages and Literatures:
M.A. in Spanish (p. 142)

Spanish, Master of Arts (M.A.)

Degree Requirements

Required Courses

One of the following two: (3 credits)

SPAN V0100	History of the Spanish Language	3
SPAN V0600	Spanish Morphology and Syntax	3

Plus:

SPAN V0300	Introduction to Methods of Research	3
	Graduate Electives	27

Subtotal: 33

The graduate electives (27 credits) are to be taken from among the courses offered by the department. With the permission of the Departmental Graduate Studies Committee, a maximum of nine graduate credits may be taken in another Department or Division of the College.

Additional Requirements

Essay in Lieu of Thesis: A term essay approved by two members of the graduate faculty is required.

Comprehensive Examination: A written comprehensive examination is required.

Foreign Language Proficiency: Students must demonstrate their ability to read, write and speak Spanish. In addition, they must show a reading knowledge of a second foreign language by passing the Foreign Language Qualifying Examination.

Advisement

It is essential that all students consult with the Director of the M.A. Program in Spanish, at the beginning of each semester.

Professor Devid Paolini
MA Program Director
NA 5/223 - G
212 - 650 - 6385
dpaolini@ccny.cuny.edu

Faculty

Silvia Burunat, Professor
B.A., M.A., Boston University; Ph.D., City University of New York

Regina Castro McGowan, Lecturer
B.A., City College of New York; Ph.D., City University of New York

Raquel Chang-Rodríguez, Distinguished Professor
B.S., Montana State University; M.A., Ohio University; Ph.D., New York University

Ángel Estévez, Associate Professor
B.A., Hunter College; Ph.D., City University of New York

Isabel Estrada, Associate Professor
B.A.,University of Seville ; Ph.D. Columbia University

Dulce M. García, Associate Professor
B.A., Barry University; M.S., Ph.D., Georgetown University

Edwin Lamboy, Associate Professor
B.A., Universidad de Puerto Rico (Rio Piedras); MS.Ed., Lehman College; Ph.D., Pennsylvania State Univ.

Jaime Manrique, Distinguished Lecturer
B.A., Univ. of South Florida (Tampa)

Juan Carlos Mercado, Professor and Dean, Division of Interdisciplinary Studies (CWE)
B.A., Univ. del Comahue (Argentina); M.A., Queens College; Ph.D., City University of New York

Corinna Messina-Kociuba, Lecturer
B.A., S. Pio V Univ. of Rome; M.A., City College of New York

Devid Paolini, Associate Professor
M.A., University of Bologna; Ph.D., City University of New York

Carlos Riobó, Professor
B.A., Columbia University; M.A., M. Phil, Ph.D., Yale University

Daniel Shapiro, Distinguished Lecturer

B.A. San Diego State University; M.F.A, Creative Writing, University of Montana, Missoula

Mary Ruth Strzeszewski, Associate Professor and Executive Director of Academic Affairs/Student Success
B.A., M.A., Ph.D., Columbia University

Araceli Tinajero, Professor
B.A., M.A., Ph.D., Rutgers University

Vanessa K. Valdés, Associate Professor
B.A., Yale University; M.A., Ph.D., Vanderbilt University

Professors Emeriti

Laura Callahan

Carole Berger

Gisele Corbíere-Gille

Stephen G. Daitz

Gabriella de Beer

Antonio R. de la Campa

Manuel de la Nuez

Adriana Garcia-Davíla

Françoise Dorenlot

Janette Gatty

Marshall S. Hurwitz

Theodore Litman

Antonio Sacoto

Eve Sourian

Elizabeth Starčević

Zvi Henri Szubin

Renée Waldinger

Sharifa M. Zawawi

Jacques Zéphir

Department of Earth and Atmospheric Sciences

(Division of Science)

Professor Pengfei Zhang, Chair • Department Office: MR 926• Tel: 212-650-6984

General Information
The City College offers the following master's degree in Earth and Atmospheric Sciences:
M.S. in Earth and Atmospheric Sciences (p. 143)

Programs and Objectives
The Department of Earth and Atmospheric Sciences has developed a unique version of the Earth Systems Science (ESS) model, the proposed national curriculum in earth sciences. The focus of ESS is to integrate the chemical and physical principles which interlink earth processes and features. The integrated curriculum gives us the flexibility to offer research training in the following areas:
Atmospheric Science and Climate

Geology and Geophysics
Geochemistry and Environmental Chemistry

Remote Sensing/Geographic Information Systems
Terrestrial and Coastal Ecology

Students who receive an M.S. from the EAS Department will be prepared for employment in environmental companies and government agencies, as well as for Ph.D. level studies in ESS, Geology, Environmental Sciences, Environmental Public Policy, or Terrestrial Ecology.

EAS Departmental Facilities

The EAS Department maintains well-equipped hydrology, geochemistry, geophysics, and remote sensing laboratories. Geochemical analysis equipment includes spectroscopy, spectrometry, and microscopy. Environmental geophysical equipment includes an electromagnetic ground conductivity meter, an automated resistivity system, a gravimeter, and a proton precession magnetometer. In remote sensing, field gear supporting ground measurements for validation of remote sensing datasets concerning terrestrial ecosystem dynamics and the carbon and water cycles is available, as well as workstations for analyzing satellite data. The EAS facilities also include a Weather and Climate Lab that hosts a wide range of tools for the downloading and analysis of data from weather satellites. Additional access to the CUNY supercomputing center at College of Staten Island, analytical equipment (e.g., electron microscopy, XRD, stable isotope mass spectrometry) through the CCNY Division of Science Core Facility, the CUNY Advanced Science Research Center, the NY Structural Biology Center on South Campus, and allocated time for electron probe microanalysis through our faculty affiliation with the American Museum of Natural History.

Research
Qualified students are encouraged to become research assistants to faculty. Many are assisted in their research with support from the NOAA sponsored Center for Earth System Sciences and Remote Sensing Technologies (NOAA-CESSRST), CUNY Environmental Crossroads Initiative and CUNY Advanced Science Research Center (ASRC), or through other resources provided by the faculty.

Departmental Activities
The Geology Club has meetings during club hours. Meetings include guest lecturers, environmental films, and field trips in the New York City area.

The American Meteorological Society is for students interested in meteorology and its applications. Weather station operation and visits to other weather stations are scheduled.

A student chapter of the Society of Exploration Geophysicists (SEG) focuses on the use of geophysics for environmental and engineering applications.

Earth and Atmospheric Sciences, Master of Science (M.S.)

Degree Requirements

Thesis Option: Most candidates for the master's degree complete 24 credits in Earth and Atmospheric Sciences in a program of study organized in cooperation with the graduate advisor and submit a thesis for six credits. The thesis will consist of an independent theoretical, laboratory or field investigation supervised by a faculty advisor. The thesis option totals 30 credits.

Credit Option: Students selecting the credit option will be required to complete 36 credits of approved course work. The option will be selected with the consent of the student's advisor and must be approved by the Graduate Studies Committee. Students selecting the credit option must pass a written comprehensive examination during the final semester of study.

For students with an interest in Environmental Studies, the following sequence of courses is recommended:

EAS A1300	Environmental Geochemistry	3
EAS A2300	Subsurface Remediation	3
EAS B4500	Hydrology	3

EAS B4600	Groundwater Hydrology	3
EAS B6500	Environmental Geophysics	3
EAS B8800	Climate and Climate Change	3
EAS B4400	Global Environmental Hazards	3
EAS A7200	Environmental Project	4
EAS B9503	Thesis Research	3

EAS B9503 taken over the course of 2 semesters.

Additional Requirements
Any basic courses must be completed with at least a grade of B before the student is permitted to register beyond 15 credits, depending on the specialization.

All courses are to be chosen in consultation with the student's advisor and are subject to the approval of the Departmental Graduate Studies Committee. A maximum of nine credits in other departments or divisions of the College or units of CUNY may be taken toward the M.S. degree.

Foreign Language Proficiency: Not required.

Basic Skills: All graduate students in the Department are expected to acquire basic skills in computer science and numerical data analysis.

Advisement

For general advisement for all program options:

Professor Steven Kidder
MR 831; 212-650-8431.
Additional information:
http://easgrad.ccnysites.cuny.edu/

Doctoral Courses Open to Master's Students

Qualified students may take or substitute, with the approval of the Graduate Committee, courses available in the doctoral program in Earth and Environmental Sciences. Those courses are described in the bulletin of The Graduate School of the City University of New York.

Faculty

Karin Block, Associate Professor
A.B., University of Michigan; M. Phil., CUNY, Ph.D.

Benjamin Black, Assistant Professor
A.B., Harvard University; M.F.A., New York University; Ph.D., Massachusetts Institute of Technology

James Booth, Associate Professor
B.S., Univ. of North Carolina, Chapel Hill; M.S., Univ. of Kentucky; Ph.D., Univ. of Washington

Jorge Corredor, Professor
B.A., Gimnasio Moderno (Colombia); M.S., Univ. of Wisconsin; Ph.D., Univ. of Miami

Patricia Kenyon, Associate Professor

B.S., Rensselaer Polytechnic Inst.; Ph.D., Cornell Univ.

Steven Kidder, Associate Professor
B.S., Univ. of Minnesota; M.S., Univ. of Arizona; Ph.D., California Inst. of Technology

Angelo Lampousis, Lecturer
B.S. Aristotle University of Thessaloniki (Greece); M.Phil., CUNY, Ph.D.

Z. Johnny Luo, Professor
B.S., Peking Univ. (China); M.Phil., Columbia Univ., Ph.D.

Kyle McDonald, Terry Elkes Professor

B.E.E., Georgia Institute of Technology; M.S. Johns Hopkins Univ.; M.S.Ph.D., Univ., of Michigan, Ph.D.

Maria Tzortziou, Professor
B.S., Aristotle Univ. (Greece), M.Sc.; M.S., Univ. of Maryland, Ph.D.

Zhengrong Wang, Associate Professor
B.S., Univ. of Science and Technology of China, M.S.; Ph.D., California Inst. of Technology

Pengfei Zhang, Professor and Chair
B.S. Univ. of Science and Technology of China; M.S., Montana Tech; Ph.D., Univ. of Utah

Professors Emeritus

Stanley Gedzelman

Edward Hindman

Margaret Anne Winslow

Department of Economics and Business

(The Colin Powell School for Civic and Global Leadership)

Professor Punit Arora, Chair • Department Office: NA 4/121 • Tel: 212-650-6205

General information
The City College offers the following master's degree in Economics: M.A. (p. 144)

Economics, Master of Arts (M.A.)

Degree Requirements

Students may complete the degree in one of two ways: with a thesis (ECO B9900 plus additional MA Thesis practicum, 3 credits each) and 30 additional credits, or without a thesis with 36 credits. For course prerequisites relating to all program courses, please consult the Course Descriptions section.

Required (Core) Courses

ECO B0000	Microeconomic Analysis	3
ECO B1000	Macroeconomic Analysis	3
ECO B2000	Statistics and Introduction to Econometrics	3
ECO B2100	Foundations of Empirical Research	3
Subtotal: 12		

Specialization Requirements:

Students are generally required to specialize in one of the four areas listed below. A specialization consists of 4 courses from among the courses listed under the relevant specialization area, except in the case of Chinese Economy, for which a specialization consists of 8 courses (or 6 if the student writes a thesis in Chinese Economy). Additional courses may be selected from among any of the program courses in order to complete the 36 credits requirement. Under special circumstances, subject to approval by the Graduate Advisor, a student may take the required courses and a set of additional courses with no particular area of specialization.

Finance

ECO B9510	Corporate Finance	3
ECO B7900	Advanced Financial Economics	3
ECO B8000	Advanced Options and Futures	3
ECO B8100	International Finance	3
ECO B9511	Money and Banking	3
ECO B9512	Investments	3
ECO B9520	Accounting	3
ECO B8200	International Financial Management	3

Business and Management

ECO B9510	Corporate Finance	3
ECO B9513	Managerial Economics	3
ECO B9514	Organization and Management	3
ECO B9516	Operations and Production	3
ECO B9517	Marketing	3
ECO B9518	Government Regulation and Executive Decision Making	3
ECO C0016	Strategic Management	3
ECO C0011	Organizational Behavior	3

Public Economics

ECO B4000	Labor Economics	3
ECO B9502	Urban Economics	3
ECO B9503	Labor (Seminar)	3
ECO C0012	Economics of the Environment and Natural Resources	3
ECO C0013	Law & Economics	3
ECO C0014	Transportation Economics	3
ECO B3100	Public Finance	3
ECO C0019	Public Investment Analysis	3

Chinese Economy

ECO B8400	International Business Economic Policy	3
ECO B8200	International Financial Management	3
ECO B9514	Organization and Management	3
ECO B9516	Operations and Production	3
ECO B9517	Marketing	3
ECO B8600	Chinese Political Economy I	3
ECO B9400	Chin Political Econ 2	3
ECO B8700	Chinese Culture and Society	
ECO B8800	Commercial Chinese Language	3

Additional Requirements/Notes:

1. Calculus and Statistics must be taken before or during the first year of the program.
2. The core courses must be completed during the first year. For ECO B0000 and ECO B1000, no grade lower than B- will be accepted toward graduation from the program. A student getting a grade lower than B- must retake the class or be dropped from the program
3. Program course work must be completed with a grade average of B (3.0) or better. If a student's GPA slips below 3.0, he or she may be dropped from the program if this is not corrected within one (additional) semester.
4. With the consent of the Graduate Advisor, a student may also elect up to 3 courses from other MA programs such as Computer Sciences, Statistics, Mathematics, Political Science, PSM, Sustainability (MA level courses only).
5. Graduate courses from other institutions outside City College must be approved by the Graduate Advisor. No more than 3 Permit courses, taken outside of City College, will be accepted toward graduation from the program.

MA Thesis:

The emphasis of a thesis prepared for the MA in Economics is on an empirical application of theory, typically with a policy component. To this end it must include a substantial empirical, usually, an econometric section. The thesis must include:

1. Statement of the problem under study.
2. Formulation of operational hypotheses.
3. Clear description of the database used, including its sources.
4. Statement of Methodology. This must include a clear statement of the manner in which inferences will be drawn from the estimated statistical model (e.g. OLS, multivariate regression model, etc.).
5. Empirical Estimation:
    a. The computation of test statistics from the sample data.
    b. The inferential significance.
6. Discussion of empirical results.
7. Conclusions:
    a. Clear statement of conclusions that must relate the empirical findings to the stated hypothesis.
    b. If relevant, a clear statement of the policy (or other) relevance of the empirical findings.

Advisement

B.A. Program
Professor Punit Arora
NA 4/121

B.A/M.A Program
Professor Prabal De
NA 5/106B

Graduate Program
Professor Prabal De
NA 5/106B

Faculty

Punit Arora, Associate Professor and Chair
B.A., D.A.V. College Punjab Univ. (India); M.P.A., Syracuse Univ., Ph.D.

Marta Bengoa Calvo, Professor
B.A.,Univ. Cantabria, (Spain), M.A.,Ph.D.

Joseph Berechman, Marvin Kirstein Professor
B.A., Hebrew Univ., M.B.A.; Ph.D., Univ. of Pennsylvania

Maria C. Binz-Scharf, Associate Professor
M.A., Bocconi Univ.; Ph.D., Univ. of St. Gallen, Switzerland

Peter Chow, Professor
B.A., National Taiwan Univ.; M.S., Southern Illinois Univ., Ph.D.

Prabal Kumar De, Professor
B.Sc., Presidency College (India); M.A., Jawaharlal Nehru Univ. (India); M.A., New York Univ., Ph.D.

Kevin Foster, Associate Professor
B.A., Bard College; M.A., Yale Univ., Ph.D.

Matthew G. Nagler, Professor
B.A., Cornell Univ.; Ph.D., Univ. of California (Berkeley)

Glenford Patterson, Lecturer (with CCE)
B.A., Georgia State Univ.; M.A., NYU; M.P.

Yochanan Shachmurove, Professor
B.A., Tel Aviv Univ. (Israel), M.B.A.; M.A., Univ. of Minnesota, Ph.D.

Kameshwari Shankar, Associate Professor
B.A., Lady Shri Ram College (India); M.A., Delhi School of Economics (India); Ph.D., Cornell Univ.

Yan Zhao, Associate Professor
B.A., Peking Univ. (China); M.S., Univ. of Nottingham (UK); Ph.D., Brandeis Univ.

Professors Emeriti

Stanley L. Friedlander

Malcolm Galatin

Mitchell H. Kellman

Benjamin Klebaner

Morris Silver

Department of English

(Division of Humanities and the Arts)

Professor Elizabeth Mazzola, Chair • Department Office: NA 6/219 • Tel: 212-650-6302

General Information

The City College offers the following master's degrees in English:
MA in English (p. 146)
MFA in Creative Writing (p. 146)
MA in Language and Literacy (p. 146)

English, Master of Arts (M.A.)

Literature

Required Courses

	Literature courses	27
ENGL B2800	Thesis Research Tutorial	3

For ENGL B2800, an essay of 8-13,000 words (including references), in the genre of an academic article intended for a peer-reviewed journal.

Additional Requirements

Foreign Language Proficiency: satisfied by a semester of study abroad in a non-English speaking country or by a reading knowledge of Spanish, French, Latin, German or another language.

Comprehensive Examination: Students will be required to take one general examination, testing breadth of knowledge as a whole.

Courses are to be chosen in consultation with the advisor to prepare the student for general comprehensive examinations and the completion of the thesis. No more than six approved graduate credits may be taken outside the literature offerings of the Department of English.

Subtotal: 30

International Perspectives in Language and Literature

City College participates in a consortium also consisting of five European universities (The University of Bamberg, The University of Graz, Paris-Diderot University – Paris 7, The University of Pécs, and The Ca' Foscari University of Venice). The International Perspectives of Literature and Linguistics track accommodates students who wish to add an international perspective to their degree by participating in this program. Students participating in this program will do one semester of their coursework abroad with one of the partner institutions. Students must be admitted by the consortium, as well as by the CCNY program.

Required Courses

	Literature courses (Including at least one course with a Cultural Studies orientation. (For the purposes of this track, Cultural Studies courses are defined as Literature courses that pay particular attention to historical and cultural context.))	24
	Linguistics course (may include the Translation and Critical Practice Workshops offered through the Department's MFA in Creative Writing)	3
ENGL B2800	Thesis Research Tutorial	3

For ENGL B2800, independent research for the Master's thesis is under the supervision of a mentor

Additional Requirements

Foreign Language Proficiency: satisfied by a semester of study abroad in a non-English speaking country or by a reading knowledge of Spanish, French, Latin, German or another language.

Comprehensive Examination: Students will be required to take one general examination, testing breadth of knowledge as a whole.

No more than 12 approved graduate credits may be taken outside the Department of English, 9 credits of which will be earned through a semester of full-time study (30 ECTS [European Credit Transfer System] credits) at one of the partner institutions. No more than six approved graduate credits may be in areas outside the study of English Literature.

Subtotal: 30

Creative Writing, Master of Fine Arts (M.F.A.)

Creative Writing

Required Courses

	Critical Practice courses	9
	Literature courses	15
	Workshops in creative writing	15
ENGL B3800	Thesis Tutorial	3

Subtotal: 42

Additional Requirements

Thesis: Degree candidates must submit a mature, substantial body of work (a collection of stories or poems, a novel, or a play) to be so judged by their mentor and at least one other member of the faculty.

No more than six (6) approved graduate credits may be taken outside the Department's graduate offerings, and all writing workshops must be taken within the program.

Language and Literacy, Master of Arts (M.A.)

Language and Literacy

Required Courses

ENGL B6000	Introduction to Language Studies	3
ENGL B6400	Theories and Models of Literacy	3
ENGL B8100	Second Language Acquisition	3
ENGL B8200	Studies in Literary and Historical Backgrounds	3
	Language and Literacy electives	6
	Four General Electives (selected in consultation with the Language and Literacy Program Advisor)	12

Electives may be selected from English Department course offerings and from course offerings in other departments. All course enrollments are subject to the Language and Literacy MA program director's approval.

Additional Requirements

Foreign Language Proficiency: satisfied by a semester of study abroad in a non-English speaking country or by a reading knowledge of Spanish, French, Latin, German or another approved language.

Students who have limited teaching experience are encouraged to enroll in ENGL B5100: Supervised Team Teaching.

Graduates of the Language and Literacy MA are required to satisfy the City College of New York Residency Requirement by completing 24 credits of course work at the City College of New York.

Up to six (6) credits of course work may be completed either at a non-CUNY college (if accepted as transfer credits) or at another CUNY college (via our CCNY e-permit process). All transfer credits and e-permit course requests must be pre-approved by the Language and Literacy MA program director.

Language and Literacy MA students are required to complete at least 18 credits of course work from English Department graduate course offerings. With the Language and Literacy MA director's approval, a L &

L MA student may enroll in courses offered in other CCNY departments or divisions.

Subtotal: 30

International Perspectives in Language and Literacy

City College participates in a consortium also consisting of five European universities (The University of Bamberg, The University of Graz, Paris-Diderot University – Paris 7, The University of Pécs, and The Ca' Foscari University of Venice). Although open to other students, the International Language and Literacy track accommodates students who wish to add an international perspective to their program by participating in this program and do one semester of their coursework abroad with one of the partner institutions. Students must be admitted by the consortium, as well as by the CCNY program.

Required Courses

ENGL B6000	Introduction to Language Studies	3
ENGL B6400	Theories and Models of Literacy	3
ENGL B8100	Second Language Acquisition	3
ENGL B8200	Studies in Literary and Historical Backgrounds	3
	Language and Literacy electives	6
	One English and/or American Literature elective (in consultation with an advisor	3
	One English and/or American Cultural Studies elective (in consultation with an advisor	3
	One General Elective (in consultation with an advisor)	3

For ENGL B5200, independent research for the Master's thesis is under the supervision of a mentor

Electives may be selected from English Department course offerings and from course offerings in other departments.

All course enrollments are subject to the Language and Literacy MA program director's approval.

Additional Requirements

Foreign Language Proficiency: satisfied by a semester of study abroad in a non-English speaking country or by a reading knowledge of Spanish, French, Latin, German or another approved language.

Students who have limited teaching experience are encouraged to enroll in ENGL B5100: Supervised Team Teaching.

No more than 12 approved graduate credits may be taken outside the Department of English, 9 credits of which will be earned through a semester of full-time study (30 ECTS [European Credit Transfer System] credits) at one of the partner institutions.

Subtotal: 30

Activities

Publications

- Fiction, edited by Professor Mark Mirsky, is published at The City College, and anyone is welcome to submit material.
- Promethean, the official City College journal, publishes the prose, poetry, and art of students, faculty, and alumni.
- Basic Writing Electronic (BWe) journal, edited by Professor Barbara Gleason, is published at The City College of New York.
- Basic Writing Electronic (BWe) journal, edited by Professor Barbara Gleason and sponsored by the Council of Basic Writing, publishes essays and webtexts focusing on basic writing curriculum and teaching. Submissions from graduate students and faculty are welcome.

Readings

The MFA Program presents the Kowald Reading Series featuring contemporary writers. A monthly reading series highlights the work of students, faculty, and alumni of the MFA and MA Programs. Additional readings by prominent authors are presented throughout the year.

Professional Series

A monthly Masters Series provides students with the opportunity to learn from and network with established writers, academics, and publishing professionals.

Advisement

Director of the MA in Literature Program

Professor Andras Kisery
NA 6/247; 212-650-6315
akisery@ccny.cuny.edu

Director of the MFA in Creative Writing Program

Michelle Valladares, Lecturer
NA 6/210: 212-650-6340
mvalladares@ccny.cuny.edu

Director of the MA in Language and Literacy Program

Professor Barbara Gleason
NA 6/333A; 212-650-6329
bgleason@ccny.cuny.edu

Awards

Creative Writing Awards

- The Doris Lippman Prize in Creative Writing
- The David Dortart Prize in Creative Writing
- The Jerome Lowell DeJur Award in Creative Writing
- The Henry Roth Memorial Scholarship
- The Goodman Fund Grants
- The Graduate Children's Writing Award

The Irwin and Alice Stark Awards

- The Stark Award in Drama in Memory of Ross Alexander
- The Irwin and Alice Stark Short Fiction Prize
- The Stark Poetry Prize in Memory of Raymond Patterson

Essay Awards

- The Meyer Cohn Graduate Essay Award in Literature

Awards for General Excellence

- The Albert Friend Award for Excellence in Medieval Studies
- The Lillian Feder Scholarship
- The Marilyn Sternglass Writing Award
- The Marilyn Sternglass Overall Merit Award

Teaching Awards

- The Norman Levine Outstanding Teaching Award
- The Teacher-Writer Award

Faculty

Salar Abdoh, Professor
B.A., U.C. Berkeley; M.A. City College

Doris Barkin, Lecturer
B.A., Queens College; M.A., CUNY; Ph.D., CUNY Graduate Center

Carla Cappetti, Professor
B.A., Torino; M.A., Univ. of Wisconsin; M. Phil., Columbia Univ., Ph.D.

Mikhal Dekel, Professor
Tel Aviv School of Law; M.A., The City College; Ph.D., Columbia University

Lyn Di Iorio, Professor

B.A., Harvard Univ.; M.A., Stanford Univ.; Ph.D., Univ. Of California (Berkeley)

Grazyna Drabik, Lecturer
M.A., Univ. of Warsaw; M.A., Columbia Univ., M. Phil.

Keith Gandal, Professor
B.A., Amherst College, M.A.; Ph.D., Univ. of California (Berkeley)

Barbara Gleason, Professor
B.S., Univ. of Missouri (Columbia); M.A., Oklahoma State Univ.; Ph.D., Univ. of Southern California

Daniel Gustafson, Associate Professor
B.A., Kenyon College; M.A., Yale University, Ph.D.

Robert Higney, Associate Professor
B.A., Boston College, M.A. Johns Hopkins Univ., Ph.D.

Laura Hinton, Professor
B.A., Univ. of Arizona, M.A.; Ph.D., Stanford Univ.

András Kiséry, Associate Professor
M.A., Univ. of Bristol (U.K.); M.Phil., Columbia Univ., Ph.D.

Pamela Laskin, Lecturer
B.A., Harper College, M.A.

Elizabeth Mazzola, Professor
B.A., Univ. of Virginia, M.A., New York Univ., Ph.D.

Renata Kobetts Miller, Professor
B.A., Princeton; M.A., Indiana University, Ph.D.

Mark Jay Mirsky, Professor
B.A., Harvard Univ.; M.A., Stanford Univ.

Paul Oppenheimer, Professor
B.A., Princeton Univ.; M.A., Columbia Univ., Ph.D.

Václav Paris, Assistant Professor
B.A., University College London; M.Phil. Cambridge Univ.; Ph.D., Univ. of Pennsylvania

Thomas Peele, Associate Professor
B.A., New York Univ.; M.A., City College of New York; Ph.D., Univ. of South Florida

Emily Raboteau, Professor
B.A., Yale Univ.; M.F.A, New York Univ.

Gordon Thompson, Professor
B.A.,The City College; M.A., Yale Univ., Ph.D.

Michelle Valladares, Lecturer
B.A., Bryn Mawr College; M.F.A., Sarah Lawrence College

Harold Aram Veeser, Professor
B.A., Columbia Univ., M.A., Ph.D.

Melissa Watson, Associate Professor
A.A., American River College; B.A. San Diego State Univ.; M.A., Ph.D., Syracuse Univ.

Kedon Kevin Willis, Assistant Professor
B.A., Ithaca College, NY, MFA in CW, Virginia Tech, VA, Ph.D., Univ. of Florida, FL

Professors Emeriti

Linsey Abrams

Marcia Allentuck

Ilona Anderson

Nathan Berall

Felicia Bonaparte

Saul N. Brody

David P. Buckley

Arthur K. Burt

Gladys Carro

Alice Chandler

Morton Cohen

James de Jongh

Barbara Fisher

Byrne R. S. Fone

Arthur Ganz

Robert Ghiradella

Arthur Golden

Frederick Goldin

Ralph Gordon

Theodore Gross

Leon Guilhamet

Marilyn Hacker

Jo-Ann W. Hamilton

James Hatch

Mary V. Jackson

Leonard Kriegel

Valerie Krishna

Patricia Laurence

Daniel Leary

Karl Malkoff

Jane Connor Marcus

Charles T. Mark

Philip Miller

Robert K. Morris

Stephen Merton

Geraldine Murphy

Nathaniel Norment, Jr.

William L. Payne

Beatrice Popper

Fred Reynolds

Irving Rosenthal

Earl Rovit

Paul Sherwin

Robert Silber

Frederic Tuten

Geoffrey Wagne

Michele Wallace

Barry Wallenstein

Barbara Bellow Watson

Department of History

(Division of Humanities and the Arts)

Professor Anne Kornhauser, Chair • Department Office: NA 5/144 • Tel: 212-650-7137

General Information

The City College offers the following master's degree in History: **M.A.** (p. 149)

We offer a dual track Master's program. We provide a non-thesis track for secondary school teachers looking to broaden their horizons and maintain their state certification, and a thesis track for students interested in applying to competitive doctoral programs.

History, Master of Arts (M.A.)

Degree Requirements

To fulfill the requirements for the MA degree in History, students must accumulate a total of 30 credits of approved graduate coursework.

All students must take HIST B0000: Historical Methods and Historiography. The remaining eight or nine courses (depending on which track is pursued), are free elective credits, although students may wish to take up to half of those courses in a geographical or thematic area of concentration such as U.S. History, Asian History, global history, etc. .

Up to nine (9) credits of course work in other graduate programs may be accepted for the MA.. Approval for such outside credits must be secured from the Graduate History Committee.

Thesis Track, Additional Requirements

In addition to 27 credits of approved graduate coursework, students must complete a thesis, which accounts for 3 of the total 30 credits necessary for the degree. To obtain these thesis credits, students should register for HIST B9900: Thesis Research.. The thesis is a 40- to 60-page research paper on a topic worked out in consultation with the student's thesis advisor.

The candidate for the MA in History on the thesis-track is required to write a thesis prospectus and to gain the approval of that prospectus from their thesis advisor. A thesis prospectus is a 10- to 15-page thesis proposal, in which the student not only identifies their topic and its sources but also locates their work within the larger historical literature of their field, broadly defined. The prospectus should include a bibliography of the historical literature on the student's topic and within the student's field that was drafted in consultation with their adviser. The completion of an approved prospectus is required for qualification for History B9900, Thesis Research.

There is no foreign language proficiency requirement. However, it is strongly suggested that all students with foreign language skills who intend to apply to Ph.D. programs in History demonstrate foreign language proficiency in their field of study by taking a foreign language exam.

Non-thesis Track, Additional Requirements

In addition to thirty (30) credits of course work, students must submit two field papers of twenty (20) pages each. These papers are normally written, either entirely or in part, as assignments for coursework. One paper should be in a major area of concentration and one in a minor area.

Advisement

All students accepted into the program should consult with the Director of Graduate Studies, Professor Barbara Naddeo.

Secondary School Teaching

Students wishing to teach History in secondary schools must be certified in the area of Social Studies. Certification requirements are listed under the Secondary Education department listings in this bulletin. Please consult Professor Shira Epstein, Department of Secondary Education. History M.A. candidates must consult with the History departmental advisor about their programs.

Faculty

Beth Baron, Distinguished Professor
B.A., Dartmouth College; M.A., Univ. of London; Ph.D., Univ. of California (Los Angeles)

John Blanton, Assistant Professor
B.A., SUNY (Albany); M.Phil., CUNY Graduate Center, Ph.D.

Lale Can, Associate Professor
B.A., M.A., New York. Univ., Ph.D

Craig Daigle, Associate Professor
B.A., Univ. of Maryland; M.A., James Madison Univ.; Ph.D., George Washington Univ.

John Gilloolly, Lecturer
B.A., Univ. of California (Los Angeles); M.A., Columbia Univ.; Ph.D.

Ravi Kalia, Professor
B.A., Univ. of Delhi, M.A.; M.B.A, Univ. of California (Los Angeles), Ph.D.

Andreas Killen, Professor
B.A., Reed College (English); M.A., New York Univ., Ph.D.

Anne M. Kornhauser, Associate Professor and Chair
B.A., Barnard College; M.A., Columbia Univ., Ph.D.

James Lewis, Lecturer
B.A., American Univ.; M.A., Washington Univ. in St. Louis, Ph.D.

Barbara Naddeo, Associate Professor
B.A., Princeton Univ.; M.A., Univ. of Chicago Ph.D.

Clifford Rosenberg, Associate Professor
B.A., Carleton College; M.A., Princeton Univ., Ph.D.

Yaari Felber-Seligman, Assistant Professor
B.A. Univ. of Pennsylvania; M.A. Northwestern Univ., Ph.D.

Seiji Shirane, Assistant Professor
B.A. Yale Univ; M.A., Princeton Univ., Ph.D.

Darren Staloff, Professor
B.A., Columbia College; M.A., Columbia Univ., Ph.D.

Barbara Syrrakos, Lecturer
B.A. Univ. of Wisconsin, M.A.; M.A., New School for Social Research , Ph.D

Matthew Vaz, Assistant Professor
B.S., Cornell Univ.; M.S. Brooklyn College; M.A., Columbia Univ., Ph.D.

Laurie Woodard, Assistant Professor
B.A. Columbia Univ.; M.A, Yale University, Ph.D.

Professors Emeriti

Harriet Alonso

Bernard Bellush

Susan K. Besse

David Johnson

Fred L. Israel

Lawrence Kaplan

Thomas H.C. Lee

Radmila Milentijevic

Dante A. Puzzo

George Schwab

Conrad M. Schirokauer

Richard Skolnik

Herbert A. Strauss

Walter Struve

Arthur Tiedemann

Robert Twombly

Martin Waldman

Joel Weiner

Irwin Yellowitz

Oscar Zeichner

Department of Interdisciplinary Arts and Sciences

Division of Interdisciplinary Studies

Professor Juan Carlos Mercado, Dean
Professor Kathlene McDonald, Chair
25 Broadway 7th Floor
New York, New York
Telephone: 212-925-6625
http://www.citycollegeamericasma.org/

https://www.ccny.cuny.edu/cwe/30-credit-master-arts-study-americas

Virtual Front Desk (Stablished in response to COVID19)
https://us.bbcollab.com/guest/918023431aec47bd9ac8ad299acb9d25
+1-571-392-7650 PIN: 767 683 2815

General Information
The City College offers the following master's degree in the Study of the Americas:
M.A. (p. 150)

The Master of Arts in the Study of the Americas offers students a liberal arts degree, in step with the most cutting-edge trends in interdisciplinary education. The program seeks to address new questions and concepts about the Americas as it focuses on topics such as racial identities, migration and immigration, popular culture, politics, gender relations, and human rights. It examines the historical, political economic and socio-cultural formations of the Americas. As the name of the program suggests, our curriculum pays attention to both methodology and content, where "study" emphasizes our faculty's expertise in conducting interdisciplinary research, and the "Americas" points to the way we look comparatively at spaces across the hemisphere and to consider, interrogate, and reevaluate the impact that concepts such as nation, race, and gender have had on regional and historical formations of family, community, governance, and civil society. The focus of the program is timely and joins an emerging field of study, that among its concerns, breaks apart notions about what the "Americas" are, how they are connected historically, politically, and culturally across national boundaries and transnational spaces. We call attention to how certain areas continue to be disenfranchised and examine the reasons for such marginalization.

Mission Statement of the M.A. in the Study of the Americas

One of the practical goals of our program is to nourish a collaborative space within which students may develop their intellectual engagement, applying diverse and myriad disciplinary approaches to intersections among education, policy, government, society, history, culture, and the arts. For students who already have careers, we offer a scholarly space in which they may engage their current professional responsibilities and interests using theoretical frameworks. For students who are preparing for a first career or career change, our program offers varying perspectives from which to explore potential paths.

A second concrete objective of our program is to provide students with a rigorous, well defined curriculum that not only grounds them in an interdisciplinary perspective, but one that also allows them to explore more individual interests. Our 30-credit program enables students, with approval, to take up to three 3-credit courses at another division within The City College or at another CUNY campus, or even benefit from the study abroad programs whose content areas complement that of the MA in the Study of the Americas.

One of the historical missions of The City College of New York has been to serve the educational needs of the working people of the city. The college's Division of Interdisciplinary Studies represents the heart of this mission, and our MA program enhances our ability to serve working students more fully and successfully. Our program is intended to accommodate the busy schedules of professional students. The majority of our courses are taught in the evenings. As with all of The City College's curricula, our program is extremely rigorous, preparing students to master both academic and professional environments. Although only in existence since 2010, graduates and students in the program have gone on to work in the diplomatic sector, have been accepted to PhD programs, and have complemented their current careers in communications, education, health, law, human resources, or marketing.

To this end, our program is housed at the Division of Interdisciplinary Studies at the Center for Worker Education, which is located at 25 Broadway. Our facilities are state-of-the-art (Wi-Fi, smart classrooms, computer lab) and our infrastructure is extremely personalized: we have an in-house library and award-winning librarian, writing center and tutors, a student services coordinator with experience in career counseling, and a clinical psychologist. The Center for Worker Education also houses the Frances S. Patai Program in Holocaust, Genocide, and Human Rights Studies, the Americas Poetry Festival of New York, and the Americas Film Festival of New York. The Center regularly hosts lecture series organized around themes that bring in outside scholars to share their research, such as "Human Rights," "Aesthetic and Cultural Expressions of African-Derived Religions," and "The Child."

Study of the Americas, Master of Arts (M.A.)

Degree Requirements

Requirements for the M.A. degree in the Study of the Americas are as follows:

Required Courses

IAS A5000	Inventing the Americas	3
IAS A5010	Graduate Research Methodology	3

Elective Courses

	Approved graduate courses in	21

	disciplinary or interdisciplinary fields	
	Capstone Seminar OR Thesis Credits	3

Subtotal: 30

Dominican Studies Track

Required MA courses (6):

IAS A5000	Inventing the Americas	3
IAS A5010	Graduate Research Methodology	3

Required Dominican Studies Track courses (12):

IAS 51000	The Dominican People from Pre-Columbian Time to the 1844 Independence	3
IAS 52000	The Dominican People from the 1844 Independence to the Present	3
IAS 51004	Dominican Society: From African Black Slavery to the Advent of Trujillo	3
SOC 51004	Dominican Society: From African Black Slavery to the Advent of Trujillo	3
IAS 52004	The Dominican People in the United States: From Migrants to Rooted People	3
SOC 52004	The Dominican People in the United States: From Migrants to Rooted People	3
	Three elective courses	9

Thesis or Capstone:

IAS A7000	Thesis Research	3
IAS A7010	MA Capstone Seminar	3

Subtotal: 30

Human Rights Track

Required Courses (6)

IAS A5000	Inventing the Americas	3
IAS A5010	Graduate Research Methodology	3
	Three elective courses	9

Select 4 elective courses in Human Rights (12) from the below.

IAS A6080	Gated Cities, Gated Communities, Gated Minds	3
IAS A6090	Labor Strategies in the Americas	3
IAS A6010	Race and Gender Across the Americas	3
IAS A6051	Markets, Power, and People	3

OR Human Rights project in program elective, with the MA Committee approval.

Thesis or Capstone (3)

IAS A7000	Thesis Research	3
IAS A7010	MA Capstone Seminar	3

Subtotal: 30

Student may take up to nine credits of relevant graduate coursework outside of the program. For graduate courses from other departments or schools within CUNY, approval of the MA Program Director is required. For graduate coursework outside of CUNY, approval of the MA Director and the College is required.

Additional Requirements

Completion of a Thesis or the Capstone Seminar required

Students will need to meet a foreign language reading proficiency requirement in French, Haitian Kreyòl, Spanish, or Portuguese. This requirement may be fulfilled either by passing an exam, or completing a language proficiency course with the passing grade of C or above. For students apprehensive about foreign-language acquisition, please do not be discouraged. We have a very supportive faculty.

Advisement

For registration and program planning, graduate students must meet with the MA Program Director: 212-825-0210; ma.americas@ccny.cuny.edu

Awards

Students at the Center are eligible for a variety of awards and prizes at the College. Some are specifically designated for students at the Center. For students who seek nationally recognized awards and scholarships to further academic studies and burnish their credentials, The City University of New York has created a consolidated website and expanded campus-based guidance for major national scholarships and fellowships available at distinguished foreign and U.S. universities.

Scholarship information can be found at www.cuny.edu.

Frances S. Patai Essay Prize
Albert A. Blum Award in Labor Studies

Faculty

Carlos Aguasaco, Associate Professor
B.A., National University of Colombia; M.A., City College of New York, Ph.D., Stony Brook University

Marlene Clark, Associate Professor
B.A., Ramapo College; Ph.D., CUNY

Kathlene McDonald, Associate Professor
B.A., Colgate Univ.; M.A., Binghamton, SUNY; Ph.D., Univ. of Maryland

Joan H. Robinson, Assistant Professor
B.A. Syracuse University; J.D. (Law), Brooklyn Law School; Ph.D., M.Phil., M.A., Columbia University

Susanna Rosenbaum, Associate Professor
B.A., Wesleyan University; Ph.D., New York University

Susanna Schaller, Assistant Professor
B.A., Barnard College; M.A. and M.C.R.P., Univ. of New Mexico; Ph.D., AICP Cornell University

Justin Williams, Associate Professor
BA, History, Columbia College (Missouri); MA/PHD History, Stony Brook University

Martin Woessner, Associate Professor
B.A., Univ. of San Francisco; Ph.D., CUNY

Visiting Professors
The program also attracts experts from other CCNY departments and from around the NYC area.

International Relations Program

(Colin Powell School for Civic and Global Leadership)

Professor Jeffery Kucik, Director • Program Office: NA 6/293 • Tel: 212-650-5844

General Information

The City College offers the following master's degree in International Relations:
M.I.A. (p. 152)

Programs and Objectives

The program covers the following areas: International Relations, International Political Economy, International Organization and Law, Diplomacy, Foreign Policy of Selected Regions, and International Security.

International Relations, Master of International Affairs (M.I.A.)

Degree Requirements

Required Courses

PSM B1877	Quantitative Methods	3
IR B6800	Research Methods	3
IR B6100	Theories of International Relations	3
IR B6200	International Organizations	3
IR B6300	International Law	3
IR B6927	International Political Economy	3
IR B9900	Thesis Research	

Elective Courses (12 credits)

Students must choose four additional classes from the list of courses offered in International Relations and of the approved graduate courses offered by the departments of History, Economics, PSM and Sociology. Courses may also be taken, by permission, at any CUNY school

Subtotal: 33

Additional Requirements

Thesis: Required.

Foreign Language Proficiency: Students must demonstrate reading proficiency in a language approved by the graduate advisor.

Advisement

Jeffrey Kucik, Director MIA, JD/MIA

Juris Doctor Master in International Affairs

General Information

The City College of New York, in conjunction with the CUNY School of Law, offers the following dual degree in law and international affairs: JD/MIA

Programs and Objectives

The JD/MIA program capitalizes on the CUNY School of Law's nationally renowned expertise in Public Service and Public Interest Law with the Colin Powell School's internationally recognized scholarship addressing critical topics of societal concern from multiple intellectual perspectives. The dual program prepares lawyers to understand the political, economic, social and cultural dynamics of international affairs preparing them for careers working for governments, international organizations and international non-government organizations and enhancing their ability to function as social justice lawyers in an increasingly globalized environment.

The MIA portion of the program, housed at the Colin Powell School on CCNY's campus, focuses on core issues in international policy, including: theories of international relations; international political economy, international law & organization; and security.

Juris Doctor Master in International Affairs (J.D./M.I.A.)

Degree Requirements

To complete the MIA within the joint degree, students in this program will complete 24 credits in international affairs, thereby enabling them to develop expertise in international economic, political, scientific and cultural issues relevant to contemporary policy debates; an additional 9 cred-its of transfer credits from courses taken at the CUNY School of Law are required. Students are responsible for fulfilling their JD requirements as specified by CUNY School of Law. The requirements for the MIA portion of the degree are as follows:

Required Courses

IR B6100	Theories of International Relations	3
IR B6200	International Organizations	3
IR B6300	International Law	3
IR B6927	International Political Economy	3
PSM B1877	Quantitative Methods	3

Elective Courses

	Three classes shown from the list of graduate level courses offered under International Relations course codes	9

Total Credits of CCNY courses	24*
Credits transferred from CUNY School of Law	9
Total Credits for MIA degree within the MIA/JD	33

Advisement

Jean Krasno, Director MIA, JD/MIA

Department of Mathematics

(Division of Science)

Professor, Thea Pignataro, Chair Department Office: NA 8/133 · Tel: 212-650-5346

General Information

The City College offers the following master's degree in Mathematics: **M.S.** (p. 152)

Mathematics, Master of Science (M.S.)

Prerequisites

Students who have not completed undergraduate real analysis or upper-division proof-based advanced calculus courses deemed equivalent to MATH 32300 and MATH 32404 will be required to complete this sequence immediately upon admission; students who have not completed a satisfactory course in linear algebra will be required to complete MATH 34600 or its equivalent during their first semester. No credit toward the M.S. is given for any of these courses.

Degree Requirements

M.S. degree in Mathematics:

Required Courses

	Three B-level courses in Mathematics	12
	Additional graduate courses in Mathematics	6-18
	Graduate courses in other mathematically based disciplines*	0-12

**Prior approval for such courses must be secured from a Graduate Mathematics Advisor.*

Subtotal: 30

Additional Requirements

Thesis: None required.

Comprehensive Examination: A written or oral examination is required on all or part of the work counting toward the degree unless waived by the Graduate Advisor.

Foreign Language Proficiency: None required.

Accelerated Master's Option in Mathematics

Through CUNY's policy of double counting graduate credits students within an Accelerated Masters Option, qualified students may complete both the master's and bachelor's degrees in fewer semesters. The Department of Mathematics offers an accelerated option in Mathematics.

Description

Undergraduate students accepted to the Accelerated Mathematics MS program will be able to apply up to 12 credits of graduate courses in the mathematics department (any of our A-level and B-level graduate courses) to both their undergraduate Mathematics degree (BA or BS) and the Mathematics MS requirements. (Undergraduates pursuing Applied Mathematics BS and a Secondary School Education BA/BS degrees are not eligible for this program.)

Admissions

To be admitted to the program, a student must have at least 60 credits and have an overall GPA of at least 3.0. Prospective students are further expected to

1. be a current CUNY undergraduate student with a declared mathematics major,
2. have a 3.3 minimum GPA in Mathematics courses at the 20000-level and above, and
3. have received a grade of B or better in Math 32300: Advanced Calculus I or in a course deemed equivalent by the Mathematics Graduate Advisor(s).

Applicants must submit a completed application form, two letters of recommendation from Mathematics faculty, a personal statement describing their mathematical interests and tentative post-degree plans. Applications can be submitted to the Mathematics Department Graduate Advisor(s).

Advisement

Professor W. Patrick Hooper

NA 6/282; 212-650-5149

Professor Jay Jorgenson

NA 6/274, (212) 650-8720

Scholarships

The Dr. Barnett and Jean Hollander Rich Mathematics Scholarships
Awarded annually to talented graduate students who have demonstrated superior ability in mathematics.

Ph.D. Level Courses

With the approval of the Graduate Advisor students may register for Ph.D. level courses. Refer to the bulletin of The City University Graduate School for a description of courses and prerequisites.

Faculty

Ethan Akin, Professor
B.S., CCNY; Ph.D., Princeton Univ.

Asohan Amarasingham, Associate Professor
B.S. Univ. of Virginia; M.S., Brown Univ., Ph.D.

Eli Amzallag, Doctoral Lecturer
B.A., Queens College; M.A., M. Phil., CUNY Graduate Center, Ph.D.

Matthew Auth, Doctoral Lecturer
B.A., Brandeis Univ.; Ph.D., Univ. of Massachusetts

Joseph Bak, Associate Professor
B.A., Yeshiva Univ., M.A., Ph.D.

Khalid Bou-Rabee, Associate Professor
B.A., Rice Univ.; Ph.D., Univ. of Chicago

Shirshendu Chatterjee, Assistant Professor
B.Stat., Indian Stat. Inst., M.Stat.; M.S., Cornell Univ., Ph.D.

Gautam Chinta, Professor
B.S., Yale Univ.; Ph.D., Columbia Univ.

Sean Cleary, Professor
A.B., Cornell Univ.; Ph.D., Univ. of California (Los Angeles)

Zajj Daugherty, Assistant Professor
B.S., Harvey Mudd College; M.A., Univ. of Wisconsin-Madison, Ph.D.

Cheikhna Mahawa Diagana, Lecturer
B.A., CCNY; M.S. New York Univ.

Brooke Feigon, Associate Professor
B.S. Stanford Univ.; MS., Univ. of California (Los Angeles), Ph.D.

Jack Hanson, Assistant Professor
B.S. Rutgers Univ.; M.A., Princeton Univ., Ph.D.

W. Patrick Hooper, Professor
B.S., Univ. of Maryland (College Park), M.A.; Ph.D., SUNY (Stony Brook)

Jay Jorgenson, Professor
B. Math., B. Stat. Univ. of Minnesota; M.S., Stanford Univ., Ph.D

Tamara Kucherenko, Associate Professor
Dipl., Kharkiv National Univ., Ukraine; Ph.D., Univ. of Missouri - Columbia

Sergiy Merenkov, Professor
Specialist, Kharkiv State Univ.; Ph.D., Purdue Univ.

Chun Sae Park, Lecturer
B.S., CCNY, M.A.

Thea Pignataro, Associate Professor and Chair
B.S., Polytechnic Inst. of New York; M.A., Princeton Univ., Ph.D.

Bianca Santoro, Associate Professor
B.S., Pontificia Universidade Católica do Rio de Janeiro, M.S.; Ph.D., M.I.T.

Vladimir Shpilrain, Professor
M.A., Moscow State Univ., Ph.D.

Michael Shub, Distinguished Professor
A.B., Columbia College; M.A., Univ. of California (Berkley), Ph.D.

Benjamin Steinberg, Professor
B.A., Rice Univ.; Ph.D., Univ. of California (Berkeley)

Christian Wolf, Professor
Dipl.-Math., Univ. of Munich; Ph.D., Technical Univ. of Munich

Professors Emeritus

Jacob Barshay
Mark Brown
Isaac Chavel
Morton Davis
Michael Engber
Jacob Eli Goodman
Edward Grossman
Alberto Guzman
Karel Hrbacek
John Landolfi
Jonah Mann
Michael Marcus
Jack Miller
Stanley Ocken
Niel Shell
William Sit
Norman Wagner

Department of Media and Communication Arts

(Division of Humanities and the Arts)

Professor Jerry W. Carlson, Chair • Department Office: SH 470 • Tel: 212-650-7167

General Information

The City College offers the following master's degrees in Media and Communication Arts:
M.F.A. in Media Arts Production (p. 154)
M.P.S. in Branding and Integrated Communications (p. 154)

Film, Master of Fine Arts (M.F.A.)

The Master of Fine Arts in Film is designed to train the next generation of independent media-makers, through the creation of intelligent, informed and visually stimulating short digital films in documentary or fiction.

Film Admission Requirements
Applicants to the M.F.A. program must have a 4-year bachelor's degree (preferably in area of film/video) with a minimum 3.0 GPA in the major, and must demonstrate experience in film/video production through an online portfolio reel as part of the application. The GRE is not required. Applicants may apply for the concentrations of Documentary Production or Fiction Production. The program is for full-time matriculation only. Admission is only offered for the fall semester. Minimum TOEFL score of 575 (or 91 IBT based) required for International Students.

Applications, supporting material and URL's(http://) to online portfolio reels must be submitted online via: https://app.applyyourself.com/?id=CUNYCCNYG

Film Degree Requirements

Required Courses

Media and Communication Arts

Plus one of the following concentration sequences (9 cr.):

Required for students in Fiction Production:

MCA B0100	Independent Media Arts - Idea, Structure and Realization	3
MCA B2100	Camera I	3
MCA B2200	Camera II	3
MCA B2800	Production Sound - Fiction	3
MCA B3000	Digital Production--Fiction	3
MCA B3100	Fiction Screenwriting I	3
MCA B3200	Fiction Screenwriting II	3
MCA B5100	Editing	3
MCA B5300	Sound Design	3
MCA B6100	Producing	3
MCA B6200	Directing Fiction	3
MCA B7100	Seminar in Independent Media Arts	3
MCA B7200	Media Distribution and Marketing	3
MCA B9200	Thesis Project II - Post Production	6
MCA B9500	Advanced Fiction Workshop	6

Required for students in Documentary Production:

MCA B2600	Digital Production--Documentary	3
MCA B2700	Production Sound - Documentary	3
MCA B2900	Research and Writing for Documentary I	3
MCA B3300	Research and Writing for Documentary II	3
MCA B5100	Editing	3
MCA B5300	Sound Design	3
MCA B6100	Producing	3
MCA B6300	Producing and Directing the Documentary	3
MCA B7100	Seminar in Independent Media Arts	3
MCA B7200	Media Distribution and Marketing	3
MCA B9200	Thesis Project II - Post Production	6
MCA B9400	Advanced Documentary Workshop	6

Plus one of the following electives in the 4th semester only (3 cr.):

MCA B9303	Graduate Internship	3
MCA B9803	Independent Study	3

Subtotal: 54

Students may also request to take additional elective Graduate Internship, Independent Study, or Selected Topics courses [MCA B9301, MCA B9302, MCA B9801, MCA B9802, MCA B9601-9699] with the permission of the M.F.A. Director.

Branding and Integrated Communications, Master of Professional Studies (M.P.S.)

The Master of Professional Studies in Branding + Integrated Communications (BIC) is a portfolio-driven graduate program that uniquely combines three critical disciplines in a collaborative and cross-disciplinary environment. BIC students gain shared foundational knowledge as well as specialization depth in one of three areas (Public Relations, Management/ Planning, and Creative) in order to determine how communication creates meaning and adds value to a company, for the consumer, and in society.

Branding and Integrated Communications Admission Requirements
Candidates for the three areas of specialization (Public Relations, Account Management/Planning, and Creative) must have a BA or BFA degree, with a minimum 3.00 GPA (or equivalent). Minimum TOEFL score of 575 (or 91 IBT based) required for International Students. Professional expertise is a plus.

Candidates interested in the Public Relations or Management/Planning track must also have completed prerequisite coursework in Statistics by the time of their enrollment.

Candidates for the Creative track must also submit a spec portfolio consisting of 2 print campaigns consisting of 3 ads each submitted on a DVD as PDFs or JPGs. The clients/products are of the students' choosing. The campaigns must reveal conceptual thinking as well as executional finesse. Proficiency in Adobe InDesign and Photoshop is expected and should be demonstrated in their submission.

Applicants must submit two samples of writing (academic papers, capstone projects, research analyses, etc.) and/or professional work that give dimension to their candidacy. A third sample must be a "passion project" in a format of their choice. Please label this submission "Passion Project."

The M.P.S. in Branding + Integrated Communication is a full-time program and will only admit part-time students on a limited basis. It does not offer courses for non-matriculated students. Admission is only offered for the fall semester. Specific requirements for graduate admissions along with supplemental material must be submitted online via: https://app.applyyourself.com/?id=CUNYCCNYG

Branding and Integrated Communications Degree Requirements

Required Courses

Foundational Courses

MCA B2000	Research & Awareness	3
MCA B2001	Strategy & Measurement	3
MCA B2002	Idea Development	3
MCA B2003	Brand Experience	3

Specialization Requirements: Students Choose One of Three Tracks

Track One: Management and Planning

MCA B3001	Relationship Building	3
MCA B3002	Consumer Behavior & Persuasion	3
MCA B3003	Internal Management	3

Track Two: Creative

MCA B3010	Creative Concepts	3
MCA B3011	Multi-Media Executions	3
MCA B3012	Design & Portfolio Development	3

Track Three: Public Relations

MCA B3020	Branding Influentials	3
MCA B3021	Internal Corporate Branding	3
MCA B3022	Public Relations Branding Campaigns	3

Required Convergence Workshops

MCA B3201	BIC Campaign Practicum-Not-for-Profit	3
MCA B3202	BIC Campaign Practicum-Corporate	3

Electives

MCA B2050	Strategic Media	3
MCA B2054	Creative Round Robin	3
MCA B2055	Portfolio Thesis: Creative	3
MCA B2056	Portfolio Thesis: Management/Planning	3
MCA B2057	Portfolio Thesis: Public Relations	3
MCA B9351, B9352, B9353	BIC Graduate Internship	1-3
MCA B9851, B9852, B9853	BIC Graduate Independent Study	1-3

Subtotal: 36

Students must take a minimum of 9 elective credits. In addition to the above listed courses, students may elect to take Special Topic one credit courses [MCA B8500 – MCA B8599] that vary from semester to semester. Graduate Internship [MCA B9351, MCA B9352, MCA B9353] and Independent Study [MCA B9851, MCA B9852, MCA B9853] courses require the permission of the M.P.S. Director.

Advisement

Media Arts Production

Professor Andrea Weiss & Professor Antonio Tibaldi
M.F.A. Program Co-Directors
Office: SH 286
Tel: 212-650-7235
info@city-film.org
http://www.ccny.cuny.edu/mfafilm
http://www.city-film.org/

Branding and Integrated Communications

Branding + Integrated Communications
Professor Nancy R. Tag
BIC Program Director
Office SH 102
Tel: 212-650-6562
http://www.ccny.cuny.edu/bic

Awards/Scholarships

MFA Media Arts Production Awards and Scholarships

- ***The Bert Saperstein Fellowship***
- ***Princess Grace Foundation-USA Scholarship***
- ***The National Board of Review of Motion Pictures Grant***
- ***The DGA Student Film Awards for Women & Minority Directors***
- ***New York Women in Film & Television Scholarship***
- ***Eastman Kodak Awards for Excellence in Cinematography***
- ***The Alan & Helene Boss Media Arts Production Scholarship***
- ***The Colin Powell Fellowship Program in Leadership & Public Service***

MPS Branding+ Integrated Communications Awards and Scholarships

- ***Desmond Maxwell Scholarship***

Faculty

Chantal Akerman, Distinguished Lecturer
INSAS Film School, Brussels; Univerisite Internationale du Théâtre, Paris

Lynn Appelbaum, Professor
B.M., Ithaca College; M.A., Indiana Univ.

Gerardo Blumenkrantz, Associate Professor
BFA, School of Visual Arts; MFA, School of Visual Art

Jerry W. Carlson, Professor and Chair
B.A., Williams College; A.M., Univ. of Chicago, Ph.D.

Angela Chitkara, Assistant Professor
BA, Seton Hall University, MA, City University (London), MIA, Columbia University

Campbell Dalglish, Associate Professor
B.A., Univ. of Colorado; M.F.A., Yale School of Drama

David Davidson, Professor
B.A., Univ. of Illinois; M.F.A., New York Univ.

Dierdre Fishel, Associate Professor
B.A., Brown University; M.F.A., Hunter College CUNY

Annie Howell, Distinguished Lecturer
B.A., Whitman College; M.F.A., New York Univ.

Andrzej Krakowski, Professor
M.F.A. (Equiv.), Polish State Film School, American Film Institute.

Babak Rassi, Associate Professor
B.A., George Mason Univ.; M.F.A., Florida State Univ.

Nancy Tag, Professor
B.A., Univ. of Pennsylvania; M.F.A., New School Univ.

Antonio Tibaldi, Associate Professor
B.A., Univ. of Florence; M.F.A., California Institute of the Arts

Andrea Weiss, Professor
B.A., State Univ. of New York at Binghamton; Ph.D., Rutgers Univ.

Professor Emeritus

Dennis DeNitto

Department of Music

(Division of Humanities and the Arts)

Professor Shaugn O'Donnell, Chair • Department Office: SH 72 • Tel: 212-650-5411

General Information

The City College offers the following master's degree in Music:
M.M. in Jazz Studies

The graduate program is designed to award the Master of Music degree to those interested in acquiring the professional foundation for careers in jazz performance and composition.

Jazz Studies, Master of Music (M.M.)

Degree Requirements

Performance Courses (14 Credits)

MUS V8100	Private Instruction	2
MUS V8400	Graduate Ensemble	2
MUS V8200	Recital	2

MUS V8100 (4 semesters), MUS V8400 (4 semesters).

Seminars (18 Credits)

MUS V2300	Jazz Theory	3
MUS V2310	Advanced Jazz Arranging	3
MUS V2311	Advanced Jazz Composition	3
MUS V6900	Jazz History Seminar	3
MUS V6910	Special Topics in Jazz	3
MUS V9200	Jazz Pedagogy and Practicum	3

MUS V8100 (4 semesters).

Total Credit Hours: 32

Audtion Requirements

All applicants must file an audition application and performance video. Please see our website for current details: jazz.ccnysites.cuny.edu/mm-audition-requirements/

Graduate students meet with the Graduate Advisor, Professor Mike Holober (SH 175; 212-650-5411; jazzgrad@ccny.cuny.edu) at registration each semester to review their progress and to plan their programs.

Graduate Faculty

Ray Gallon, Lecturer
B.F.A., The City College, M.A.

Michael Holober, Professor
B.A., SUNY Oneonta; M.M., SUNY Binghamton

Suzanne Pittson, Assistant Professor
B.A., San Francisco Univ., M.A.

Steve Wilson, Associate Professor, Director of Jazz Studies

Professors Emeriti

Ronald L. Carter

Scott Reeves

Department of Physics

(Division of Science)

Professor Vinod Menon Chair • Department Office: MR 419 • Tel: 212-650-6832

General Information

The City College offers the following master's degree in Physics:
M.S. (p. 156)

Physics, Master of Science (M.S.)

Degree Requirements

Required Courses

PHYS V0100	Mathematical Methods in Physics	4
PHYS V1100	Analytical Dynamics	4
PHYS V1500-1600	Electromagnetic Theory	4 cr./sem.
PHYS V2500-2600	Quantum Mechanics	4 cr./sem.
	Elective Courses	6

Subtotal: 30

Additional Requirements

No more than nine credits taken in 60000-level(U-level) courses (see PHYS 55100-55500, PHYS 58000, PHYS 58100 in the Undergraduate Bulletin) may be counted toward the graduate degree. Nine credits may be taken in graduate courses in subjects other than Physics, upon approval of the Graduate Committee.

Thesis: Not required.

Comprehensive Examination: A written comprehensive examination is required unless waived by the Graduate Committee.

Foreign Language Requirement: Not required.

Advisement

Graduate Advisor
Prof. Timothy Boyer
Location: MR-331
T: 212-650-5585

Doctoral Courses Open to Master's Students

The City College is a major participant in the University Ph.D. program in Physics and offers extensive research facilities for experimental and theoretical research. Both Master's and undergraduate students often take part in these research efforts. For more details please see the Bulletin of The Graduate School of the City University of New York.

Some of the courses offered regularly on the advanced level include:

PHYS W1200	Continuum Mechanics	4
PHYS W2500-2600	Quantum Field Theory	4
PHYS W3400	Theory of Relativity	4
PHYS W4500-4600	Quantum Theory of Solids	4
PHYS W5100-5900	Selected Topics in Advanced Physics	4

Faculty

Robert R. Alfano, Distinguished Professor
B.S., Fairleigh Dickinson Univ., M.S.; Ph.D., New York Univ.

Timothy Boyer, Professor
B.A., Yale Univ.; M.A., Ph.D., Harvard Univ.

Ngee-Pong Chang, Professor
B.S., Ohio Wesleyan Univ.; Ph.D., Columbia Univ.

Swapan K. Gayen, Professor
B.Sc.(Honors), M.Sc., Univ. of Dacca; M.S., Ph.D., Univ. of Connecticut

Sebastian Franco, Associate Professor
B.S., Universdad de Buenos Aires; M.S., Instituto Belseiro, Univ. National de Cuyo, Argentina; Ph.D., Massachusetts Institute of Technology

Sriram Ganeshan, Assistant Professor
M. Sc Jawaharal Nehru Univ., India; Ph.D. Stony Brook University, SUNY

Pouyan Ghaemi, Assistant Professor
B. Sc., Sharif Univ. of Technology, Tehran, Iran; Ph.D., Massachusetts Institute of Technology

Marilyn Gunner, Professor
B.A., SUNY (Binghamton); Ph.D., Univ. of Pennsylvania

James Hedberg, Lecturer

B.A., St. John's College, Santa Fe, NM; M.S., Portland State University; Ph.D., McGill University, Montreal, QC, Canada

Michio Kaku, Henry Semat Professor
B.A., Harvard Univ.; Ph.D., Univ. of California (Berkeley)

Ronald Koder, Associate Professor
B.S., Univ. of Missouri-Columbia, Ph.D., John Hopkins

Joel Koplik, Professor
B.S., Cooper Union; Ph.D., Univ. of California (Berkeley)

Lia Krusin-Elbaum, Professor
B.S., Ph.D., New York Univ.

Tony Liss, Provost, Professor

B.A. Johns Hopkins University; Ph.D. University of California (Berkeley)

Michael S. Lubell, Mark W. Zemansky Professor
A.B., Columbia Univ.; M.S., Ph.D.,Yale Univ.

Hernan Makse, Professor
Licenciatura (Physics), Univ. of Buenos Aires; Ph.D., Boston Univ.

Vinod Menon, Professor
M.S., Univ. of Hyderabad, India; Ph.D., U. Mass, Lowell
Carlos Andres Meriles, Professor
B.Sc., FaMAF, Ph.D., Universidad Nacional de Cordoba, Argentina

V. Parameswaran Nair, Acting Dean of Science, Distinguished Professor
B.S., Univ. of Kerala, India; M.Sc., Ph.D., Syracuse Univ.

Vladimir Petricevic, Professor
Dipl. EE., Univ. of Belgrade; M.S. Miami Univ.; Ph.D., CUNY

Alexios P. Polychronakos, Professor and Chair
Dip. E.E., National Technological Univ. of Athens, Greece; M.Sc., Ph.D., California Institute of Technology

Alexander Punnoose, Associate Professor
B.S., Indian Institute of Technology, Kharagpur, India; M. Sc., Indian Institute of Science, Bangalore, India; Ph.D., Indian Institute of Science, Bangalore, India

David Schmeltzer, Professor
B.Sc., Hebrew Univ., Israel; M.Sc., D.Sc., Technion

Mark Shattuck, Professor
B.A., Wake Forest Univ., M.A.; Ph.D., Duke Univ.

Brian Tiburzi, Associate Professor
B.A., Amherst College; M.S., Ph.D., Univ. of Washington

Jiufeng J. Tu, Professor
A.B., Harvard Univ., A.M.; M.S., Ph.D., Cornell Univ.

Sergey A. Vitkalov, Professor
M.S., Moscow Institute of Physics and Technology, Russia; Ph.D., Institute of Solid State Physics, Russian Academy of Sciences

Participating Faculty

Richard N. Steinberg, Professor
B.S., SUNY Binghamton; M.S., Ph.D., Yale Univ.

Professors Emeriti

Adolf Abrahamson
Robert Callender
Victor Chung
Harold Falk
Joel Gersten
Daniel M. Greenberger
Myriam P. Sarachik,
David Shelupsky
Frederick W. Smith
Martin Tiersten

Department of Psychology

(The Colin Powell School for Civic and Global Leadership)

Professor Robert D. Melara, Chair • Department Office: NA 7/120 • Tel: 212-650-5442

General Information

The City College offers the following Master's degrees in Psychology:
M.A. in General Psychology (p. 158)
M.A. in Mental Health Counseling (p. 158)

Admissions

General Psychology
The Psychology Department offers a Master of Arts degree in General Psychology. The program is designed for students who need to enhance their background and credentials in psychology, either for the job market or to advantage themselves in applying to doctoral programs. Students may enter the program with an undergraduate major either in Psychology or in another field. Acceptance is based on assessment of the student's overall record and promise. Special attention is given to the student's performance in undergraduate courses in statistics and experimental psychology; students who have earned less than a B in either of these courses, or who have not taken them, are advised to contact the graduate advisor before applying.

Mental Health Counseling
The Masters of Arts degree in Mental Health Counseling is a New York State approved program. Students who complete the program will be eligible to sit for the state licensing exam once they complete the state required 3000 post graduate supervised hours of experience (equivalent to two years of full time employment). Our approach to counseling integrates modern dynamic, cognitive behavioral, person centered, and family systems approaches. The curriculum provides a thorough foundation in the theory and practice of counseling for the prevention and amelioration of psychological distress. We provide an opportunity for entry in a high demand, high growth career area. Sixty graduate credits are required to complete the program.

Applicants must have an undergraduate degree with a GPA of 3.2 or better, especially in psychology. An undergraduate major in psychology is preferred. However, students with another major who have completed courses in introduction to psychology, developmental psychology, abnormal psychology, psychological statistics and experimental psychology (or an equivalent course in psychological research) will be considered. Applicants should also have had some type of hands-on experience working with others in a helping capacity, either through paid work or by volunteering; applicants should include in the application at least one letter of reference from someone familiar with the way they performed in that capacity.

Other requirements include an individual and/or group interview and two additional letters of recommendation. The deadline for submitting an application for fall admission is February 1st. Students are not admitted mid-year.

Advisement

General Psychology
Professor Vivien Tartter, Program Director
NA 7/209; Tel: 212-650-5709

Mental Health Counseling
Professor William King, Program Director
NA 7/323; Tel: 212-650-5689

Department Activities

Psi Chi

Psi Chi is the National Honor Society in Psychology, founded in 1929 for the purposes of encouraging, stimulating, and maintaining excellence in scholarships, and advancing the science of psychology. Psi Chi provides national recognition for academic excellence in psychology, an honor that can be noted on employment applications, vitae, and resumes. Psi Chi also provides over $250,000 annually in awards and grants to its student members and chapters. The City College of New York chapter of Psi Chi was chartered in 1961, and has supported both undergraduate and graduate students pursuing research interests in such areas as clinical, cognitive, social, and developmental psychology. Membership in Psi Chi is recognized at departmental honors ceremonies. Psi Chi also publishes a journal of undergraduate research that includes useful information for students in psychology. Membership in Psi Chi is open to qualified candidates of any age, sex, sexual orientation, race, handicap or disability, color, religion, and nation and ethnic origin. Membership is for life. The national registration fee of $49 is the only payment ever made to the national organization, which does not charge dues. Students qualify for membership in Psi Chi if they: (1) are recommended by a faculty member, (2) have taken 9 credits of psychology beyond PSY 10200, (3) have a minimum 3.0 grade point average in Psychology and in cumulative grades, and (4) have completed 3 semesters of college courses. Interested students should contact Dr. Brett Silverstein (bsilverstein@ccny.cuny.edu), NAC 7/120A, 212-650-5700.

Department Colloquium Series

Throughout the year, the Psychology Department sponsors lectures on various topics in psychology, including cognitive neuroscience, clinical psychology, and health psychology, given by prominent members of the scientific community. The lectures are free and open to the public. Majors are encouraged to attend.

Psychology, Master of Arts (M.A.)

Degree Requirements

Students may complete the degree in one of two ways: with a thesis (PSY B9900) and 28 credits of coursework or without a thesis with 40 credits of coursework.

Required Courses

PSY V0100	Advanced Experimental Psychology I	4
PSY V0500	Statistical Methods in Psychology I	3

One course from the areas of cognition, sleep, neuroscience, psychometrics, psycholinguistics, psychopharmacology, or else achieve a score in at least the 65th percentile of the advanced psychology section of the Graduate Record Examination. (3 credits)

A student must maintain a minimum grade point average of 3.0.

Thesis Option: Students choosing the thesis option are required to enroll in PSY B9900 for which they receive 3 credits with no grade until they complete their thesis. Most students enroll in PSY B9900 for two semesters (6 credits total) to develop their thesis plans and complete the proposal. They are required to complete 31 credits for their degree. A maximum of 12 credits may be transferred from other graduate institutions.

Non–Thesis Option: Students not completing a thesis must complete 40 graduate credits, including the 11 required credits and minimum 3.0 GPA listed above. The other degree requirements are identical as for the thesis students. Up to 16 graduate credits are eligible for transfer from other approved institutions.

Mental Health Counseling, Master of Arts (M.A.)

The Two-Year Sequence

Semester I

PSY V2000	Developmental Psychology I	3
PSY V6532	Theories and Techniques of Counseling	3
PSY V5500	Psychopathology I	3
PSY V6584	Professional Orientation and Ethics	2
PSY V6540	Trauma and Resilience	3

Semester II

PSY V6556	Group Dynamics and Group Counseling	3
PSY V6587	Clinical Instruction	3
PSY V6575	Assessment and Appraisal of Individuals, Couples, Families and Groups	3
PSY V7000	Drug and Alcohol Abuse: Diagnosis and Treatment	3
PSY V6597	Foundations of Mental Health Counseling and Consultation	3

Semester III

PSY V6560	Multicultural Issues in Counseling	3
PSY V6563	Research and Program Evaluation	3
PSY V6582	Counseling Adolescents	3
PSY V6589	Practicum in Counseling I	3
PSY V6593	Family and Couples Counseling	3

Semester IV

PSY V6564	Psychoeducational and Community Interventions	3
PSY V6590	Practicum in Counseling II	3
PSY V6591	Lifestyle and Career Development	3
PSY V6594	Family and Couples Counseling II	3
	Elective	3

Subtotal: 60

Students are required to complete three credits of elective courses in addition to the 57 required credits. The electives must be approved by the Program Director.

Registration

All students should have their courses approved by the M.A. Program Director every semester. Failure to do so may result in the student being deregistered, either because of the lack of background or because the course is oversubscribed with properly registered students.

Pre-registration for the following semester is generally held toward the end of each semester. Students should check with the department for the dates.

Students wishing to take credits outside the department need approval from the Program Director. Courses with grades less than B are not eligible for transfer credit.

Training Opportunities

Credentialed Alcohol and Substance Abuse Counselor (CASAC) Program

Majors are able to complete the undergraduate coursework in psychology required for a CASAC training certificate awarded by the New York State Office of Alcoholism and Substance Abuse Service (OASAS), the official state authority that awards credentials for addiction counseling. In addition to the required courses for all psychology majors, OASAS has approved eight 3-credit psychology courses as meeting the NY State education requirements for the addiction counselor-trainee credential. A CASAC-Trainee certificate is used by NY State OASAS-registered education and training courses have been satisfactory completed at the CCNY. For further information and to register in the CASAC program, contact DR. Denise Hien (dhien@ccny.cuny.edu), NAC 8/131, 212-650-5666.

Psychological Center and the Counseling Center

The Department's Psychological Center and Counseling Center offer psychological testing and short- and long-term therapy to CCNY students with mood, anxiety, and interpersonal problems. Married and unmarried couples, single-parent and two –parent families, students of

all ages and their parents are welcome. The Psychological Center is part of the doctoral training program in Clinical Psychology. Treatment is provided by advanced doctoral students under the supervision of the clinical faculty, licensed clinical psychologists from other programs, and external licensed clinical supervisors. All services are completely confidential. For further information and to request an application for services, visit the Psychological Center's front desk, which is located in NAC 8/101, or call 212-650-6602. The Center staff is available on Tuesdays, Wednesdays, and Thursdays from 8:30-11:30 AM and from 2:00-7:00 PM. Counseling services are also available to students free of charge at the Counseling Center, located in the Marshak Science Building, Room J-15. This Counseling Center provides internship opportunities for several students each semester.

Ph.D. Electives

In addition to the M.A. Program, City College houses a Ph.D. program in Clinical Psychology. Several Ph.D. courses are open to M.A. students. Students interested in taking courses at the Ph.D. level should contact the M.A. program directors.

Faculty

Adeyinka Akinsulure-Smith, Professor
B.A., Univ. of Western Ontario; M.A., Columbia Univ., Ed.M., M.Phil., Ph.D.

Deidre M. Anglin, Associate Professor
B.S., Cornell Univ., Fordham University, Ph.D.

Sophia A. Barrett, Lecturer
B.A., City College, M.A. City College

William Crain, Professor
A.B., Harvard Univ.; Ph.D., Univ. of Chicago

Diana Diamond, Professor
B.A., Wesleyan Univ.; M.A., Univ. of Massachusetts, M.S., Ph.D.

Timothy Ellmore, Associate Professor
B.A., George Washington Univ.; Ph.D., Univ. of Arizona

Adriana Espinosa, Assistant Professor
B.A. City College; Univ. of California at Berkeley, Ph.D.

Eric Fertuck, Associate Professor
B.S., Michigan State Univ.; Ph.D., Adelphi Univ.

Tiffany Floyd, Assistant Professor
B.A. SUNY (Binghamton); M.A.,Temple Univ., Ph.D.

Peter Fraenkel, Associate Professor
B.A., Boston Univ.; Ph.D., Duke Univ.

Benjamin Harris, Clinical Professor
B.A., Wesleyan Univ; M.E., Lesley Univ; Ph.D., CUNY

Jon C. Horvitz, Professor
B.A., Haverford Univ.; Ph.D., Univ. of California (Santa Barbara)

Elliot Jurist, Professor
B.A., Harford College; Ph.D. (Philosophy) Columbia Univ.; Ph.D., CUNY

William L. King, Professor
B.A., Rutgers Univ.; M.A., Univ. of Colorado, Ph.D.

Teresa Lopez-Castro, Assistant Professor
B.A., Columbia Univ.; Ph.D. CUNY

Arthur D. Lynch, Associate Professor
B.A., Univ. of Texas, Ph.D.

Robert D. Melara, Professor and Chair
B.A., Stony Brook Univ.; M.A., New School, Ph.D.

Glen Milstein, Associate Professor
B.A., Brandeis Univ.; Ph.D., Teachers College (Columbia Univ.)

Sarah O'Neill, Assistant Professor
B.S.C., Univ. of Otago (NZ); Ph.D. Univ. of Otago (NZ)

Richard Paino, Lecturer
B.A., Rutgers Univ.; M.A., Fairleigh Dickenson Univ.

Margaret Rosario, Professor
B.A., Princeton Univ.; Ph.D., New York Univ.

Jeffrey J. Rosen, Professor
B.A., George Washington Univ.; M.A., Clark Univ., Ph.D.

Millicent Roth, Professor
B.A., Brooklyn College, M.S.W., D.S.W., New York Univ.

M. Sasha Rudenstine, Assistant Professor
B.A., Haverford College; M.A., CCNY; Ph.D., CUNY

Lesia Ruglass, Assistant Professor
B.A., New York Univ.; M.A., Boston Univ.; Ph.D., New School Univ.

Irvin S. Schonfeld, Professor
B.S. Brooklyn College; M.A., New School; Ph.D., CUNY

Brett Silverstein, Professor
B.A., State Univ. of New York (Stony Brook); Ph.D., Columbia Univ.

Ratna Sircar, Professor
B.S., Univ. of Delhi (India); M.Sc., All-India Institute of Medical Sciences (New Delhi, India), Ph.D.

Vivien C. Tartter, Professor
B.A., Brown Univ., M.A., Ph.D. Brown Univ.

Steven B. Tuber, Professor
B.A., Yale; M.A., Univ. of Michigan, Ph.D.

Deborah Vietze, Professor
B.S., Univ. of Redlands; M.S., Univ. of Southern California; Ph.D., Columbia Univ.

Paul Wachtel, Distinguished Professor
A.B., Columbia Univ.; M.S., Yale Univ., Ph.D.

Lissa Weinstein, Associate Professor
B.A., SUNY (Stony Brook); M.A., The City College; Ph.D., CUNY

Ann Marie Yali, Associate Professor
B.A., Eckerd College; M.A., SUNY (Stony Brook), Ph.D.

Professors Emeriti

John Antrobus

Anderson J. Franklin

Douglas C. Kimmel

Jerry Siegel

Arietta Slade

Public Service Management Program

(Colin Powell School for Civic and Global Leadership)

Bobby Derival, Executive Director • Program Office: Shepard Hall room 1* Tel: 212-650-6809

General Information

The City College offers the following master's degree in public administration:
M.P.A. (p. 160)

Programs and objectives

This program is designed to prepare students for management-level positions in government agencies,non-profit organizations and social enterprises.The program combines course work in management, economics, policy, and research, with opportunities to gain real-world experience.

Public Service Management, Master of Public Administration (M.P.A.)

Degree Requirements

Required Courses:

PSM B1600	Strategic Management of Public Organizations	3
PSM B1610	Public Budgeting and Finance	3
PSM B1620	Advanced Quantitative Methods	3
PSM B1640	MPA Internship	3
PSM B1700	Public Policy	3
PSM B3105	Leadership in Public Service	3
PSM B1720	The Economics for Public Policy	3
PSM B1730	Communication in Public Service	3
PSM B1805	Governance and Public Administration	3
PSM B1810	Human Resources Management	3
PSM B1816	Program and Policy Evaluation	3
PSM B1877	Quantitative Methods	3
PSM B9900	Capstone/Thesis	3
		Subtotal: 39

Elective Credits

Subtotal: 6

Subtotal: 45

Advisement

Faculty and staff review each student's progress every semester. The Academic Advisor advises students about remaining program requirements and available courses. The Director coordinates any additional advising or assistance requested by students.

Janet Kyle, Academic Adviser

Faculty

Janet Kyle, Lecturer, Public Service Management
Fatima Ashraf, Lecturer, Public Service Management
Marissa Davis, Lecturer, Public Service Management
Eric Schnurer, Lecturer, Public Service Management
Ofronama Biu, Lecturer, Public Service Management
Ryan Hallock, Lecturer, Public Service Management
Jeff Holland Lecturer, Public Service Management
Caleb Gayle, Lecturer, Public Service Management
Betsy McLean, Lecturer, Public Service Management
Gara Lamarche, Lecturer, Public Service Management
Stan Altman, Lecturer, Public Service Management

Charles B. Rangel Center for Public Service

R. Mark Musell, Deputy Director • Office: Shepherd Hall 1 • Tel. 212 650-5095

General Information

The Charles B. Rangel Center sponsors research and coordinates various educational programs designed to increase diversity at the management level of non-profit organizations and federal, state, and local government agencies. Additional programs are under development, and new facilities for the center are planned.

Support for CCNY's Master's Degree Program in Public Administration (MPA)

The MPA program focuses on preparing students, particularly those from under-served communities, for management-level positions in government agencies and non-profit organizations. The Rangel Center coordinates various internship programs designed to offer students first-hand experience in public service. It also offers scholarships designed to promote participation in the program among under-served groups. The Rangel Center also sponsors a speakers series, writing program, and math boot camp in support of the MPA program. Eventually, the center will offer a mid-career fellows program that will bring experienced professionals to campus to mentor students, and to participate in professional development workshops and seminars.

Research at the Charles B. Rangel Center

The Rangel Center provides small grants to faculty for research on diversity in public service. It also sponsors paid research opportunities for students in the Public Service Management program.

Archives of Congressional Documents

The Rangel Center will help support an archive of important documents pertaining to the public service careers of members of groups underrepresented in many aspects of public service. The core of the collection will be the Congressional papers and other materials donated by Congressman Charles B. Rangel. The archives will serve as a resource for students, faculty and scholars interested advancing research on US politics in general, as well as on the particular topic of diversity in US public service.

Department of Sociology

(Colin Powell School for Civic and Global Leadership)

Associate Professor Maritsa Poros, Chair • Department Office: NA 6/125 • Tel: 212-650-5485

Sociology, Master of Arts (M.A.)

This program is not currently accepting new students.

Degree Requirements

Required Courses

SOC B1002	Qualitative Methods	3
SOC B1003	Analyzing Evidence 1	3
SOC B1004	Analyzing Evidence 2	3
SOC V0100	Development of Sociological Theory	3
SOC V0200	Sociological Thinking	3
SOC V0300	Capstone Seminar	6

SOC V0300: or, for thesis students, two independent studies

Elective Courses (12 credits)

Subtotal: 33

Additional Requirements

The student may take up to twelve (12) elective credits of graduate courses in other Divisions and at other CUNY Colleges, subject to the approval of the MA Program Director.

Required Comprehensive Examination: The candidate must pass a written comprehensive examination.

Capstone Paper: Required.

Thesis Option: A student may request, under certain circumstances, to write a thesis instead of a capstone paper.

Advisement

Graduate students must see the graduate advisor each semester to review their progress and plan their programs.

Faculty

James J. Biles, Associate Professor
B.S.S., Ohio State Univ.; M.A., Michigan State Univ., Ph.D.

Katherine K. Chen, Associate Professor
B.A., Stanford Univ., M.A.; M.A., Harvard Univ., Ph.D.

Gwendolyn Ann Dordick, Lecturer
B.A., Univ. of California (Los Angeles), M.A.; M.Phil, Columbia Univ., Ph.D.

Norma Fuentes-Mayorga, Assistant Professor

B.A., M.A., M.Phil., Ph.D., Columbia Univ.

Ramona Hernandez, Professor
B.A., Lehman; M.A., New York Univ.; Ph.D., CUNY

Yana Kucheva, Assistant Professor
B.A., Brown Univ.; M.A., Ph.D., Univ. of California (Los Angeles)

Jack Levinson, Associate Professor
B.A., Wesleyan Univ.; Ph.D., CUNY

Iris Lopez, Professor
A.A., Borough of Manhattan Community College; B.A., New York Univ.; M.A., Columbia Univ., Ph.D.

Leslie Paik, Associate Professor
B.A., Brown Univ.; M.A., Univ. of California (Los Angeles), Ph.D.

Maritsa V. Poros, Associate Professor and Chair
B.A., Goucher College; M.A., Columbia Univ., M.Phil., Ph.D.

Professors Emeriti

Ibtihaj Arafat

Milton L. Barron

Mehdi Bozorgmehr

Steven Goldberg

Gerald Handel

Gabriel Haslip-Viera

William Helmreich

Lily M. Hoffman

F. William Howton

Baidya Nath Varma

Charles Winick

Betty Yorburg

Bernard and Anne Spitzer School of Architecture

Professor Bradley Horn, Interim Dean • Professor June Williamson, Chair • Department Office: SSA 113 • Tel: 212-650-7118

General Information

The Spitzer School of Architecture offers the following graduate degrees:
M. Arch. (p. 163)
M. S. in Arch. (p. 163)
M.L.A. (p. 164)
M.U.P. (Urban Design) (p. 164)

In addition, the School offers the following joint program with the Grove School of Engineering, and the Division of Science, and the Colin Powell School for Civic and Global Leadership.

Sustainability in the Urban Environment (offering an M.S. in Sustainability degree)

Additional information about programs in Architecture may be found in the Bulletin of Undergraduate Programs.

Research

The J. Max Bond Center for Urban Futures is founded on the legacy of architect and former Dean J. Max Bond, Jr. (1935-2009) and the City College Architecture Center (CCAC), which operated in the 1980s and 1990s as an influential pro bono architecture and planning service for underserved communities throughout New York City.

To architect J. Max Bond, Jr. (1935-2009), social equity was a core value, as was design integrity. Founded in 2011 and through 2015 The J. Max Bond Center for the Just City at CCNY advanced Max's vision through collaborative faculty research projects, urban design advocacy and projects, leadership development, and educational programs at its home within the Spitzer School of Architecture.

The center was re-established and renamed The J. Max Bond Center for Urban Futures in 2018. The Center honors its past with its mission to advance our collective urban futures toward greater social equity and cultural cohesion. Our methodology and belief is that social impact and innovation are both achievable and actionable through applied research and design.

The center offers research opportunities for students including independent study for credit.

Admissions

The following information applies to the programs housed solely within the Spitzer School: Master of Architecture I, Master of Science in Architecture, Master of Landscape Architecture I and II, and Urban Design (MUP). (Candidates for the interdisciplinary MS Sustainability, including its architecture track, should refer to its application instructions.) Spitzer School applications for admission are completed online through the college website, www.ccny.cuny.edu. All applications must include a resume, three academic or professional letters of recommendation from persons familiar with the applicant's intellectual and/or design abilities, an academic transcript, a 500-word personal statement, a portfolio of creative work, and a non-refundable application fee.

As the program curriculum includes rigorous reading and writing requirements, international students who were educated in non-English-speaking countries must submit current standardized test scores certifying English language ability. The IBT TOEFL minimum score is 79. Students educated outside the United States should also arrange for an authorized agency to submit an evaluation of their non-U.S. credentials.

The deadline for the receipt of applications is January.

Transfer Students and Course Waivers for M. Arch I Program

Candidates who have completed the equivalent of certain required M Arch I courses in another accredited master program may apply to transfer those credits. All credit transfers are at the discretion of the faculty heads in each curricular area and require a grade of B or greater.

Candidates who hold a B.A. or B.S. in Architecture (a pre-professional program from a NAAB recognized school if from the U.S.) and who have completed the equivalent of certain of our required courses may qualify for a waiver of those courses (up to 36 credits). Students receiving waivers must still complete 108 graduate level credits at The City College in order to qualify for the Master of Architecture degree.

Whether seeking transfer credits or a course waiver, all candidates will be asked to provide additional information including completed coursework and course syllabi as well as course descriptions and transcripts to determine eligibility. All granting of either course waivers or transfer credit is at the discretion of the School and under no circumstances will any student be allowed to spend less than two full academic years of study in the M Arch program.

Accreditation

Architecture Accreditation
In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a pre-professional undergraduate degree in architecture for admission. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The City College of the City University of New York, Bernard and Anne Spitzer School of Architecture offers the following NAAB-accredited degree programs:

B. Arch. (160 undergraduate credits)
M. Arch. (non-preprofessional degree + 108 credits)
Next accreditation visit for all NAAB-accredited programs: 2026 (postponed from 2025 due to COVID-19).

Landscape Architecture Accreditation
The CLARB registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The ASLA (American Society of Landscape Architects) is the sole agency authorized to accredit U.S. professional degree programs in Landscape Architecture. It recognizes two types of degrees: the Bachelor of Landscape Architecture and the Master of Landscape Architecture First Professional Degree. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

The City College of New York's Master of Landscape Architecture first professional degree program (MLA I) received a 6-year term of accreditation in 2015. The next accreditation visit for the program will be in 2022 (postponed from 2021 due to COVID-19).

The City College of New York Bernard and Anne Spitzer School of Architecture also offers the following non-accredited degree programs:

- M.U.P. Urban Design (32 credits)
- M.S. in Arch. (48 credits)
- MLA II (36 credits)
- M.S. in Sustainability in the Urban Environment (30 credits)

The M.S., M.L.A. II, and M.U.P. have been registered by the New York State Education Department. They are also accredited, as are other graduate programs at The City College, by the Middle States Association of Colleges and Secondary Schools.

Architecture, Master of Architecture (M.Arch.)

Programs and Objectives

Master of Architecture Program (Program Director - Associate Professor Jeremy Edmiston)

Through three one-year projects, the M Arch I program invests in the project as the vehicle of thought, learning, and change. First is a foundation year of skill-building, followed by two vertically integrated, comprehensive, year-long studies, each working closely with two or three faculty members. Other consultants collaborate and tutor at different times throughout the year.
Many students come into the program driven by questions they are seeking to address. Our project-focused format provides a place — a scaffold — to engage these questions within the context of an architectural studio and the discipline of a project. The time we give to these projects promotes a dialogue among professors and classmates, where the ambition is for all of us to learn to ask better questions.
The project covers the conventional areas of architecture — design, history, critical thinking, structure, material assembly, building science — and also allows for the professors' interests and the students' interest to comingle. Projects are substantial and cross-disciplinary because of the time we allocate to them — a rehearsal for the practice of architecture that so many of our students engage in upon graduation.
New York City serves as our open library, our lab, our inspiration, our call to change, our call to keep up with change. The city invites us to participate, perhaps to lead, but mostly to contribute in the discussion of what our world is and how better we might live in it.
All undergraduate backgrounds are welcome in the M Arch I program; its prerequisites are one semester of both college-level precalculus and physics.

Requirements for the M.Arch. Degree

Master of Architecture I First Professional Degree

Semester 1		
ARCH 61001	Digital Techniques	3
ARCH 61100	Architectural Studio 1.1	6
ARCH 61201	Survey of World Architecture 1	3
ARCH 62301	Materials/Construction S	3
ARCH 73500	Site Design	3
Semester 2		
ARCH 62001	Visual Studies	3
ARCH 62100	Architectural Studio 1.2	6
ARCH 62201	Survey of World Architecture 2	3
ARCH 61301	Materials/Construction L	3
ARCH 62401	Structures I Introduction to Structures	3
Semester 3		
ARCH 73100	Architecture Studio 1.3	9
ARCH 73201	Survey of World Architecture III	3
ARCH 71301	Building Modeling	3
	Elective	3
Semester 4		
ARCH 74100	Architecture Studio 1.4	9
ARCH 74501	Environmental Systems	3
ARCH 73401	Structures 2 – Design of Structural Elements	3
ARCH 85201	Survey of World Architecture IV	3
Semester 5		
ARCH 85101	Advanced Studio	6
ARCH 85200	Design Seminar	3
ARCH 85300	Advanced Computing	3
ARCH 85600	Professional Practice	3
ARCH 74401	Structures III Behavior of Structural Systems	3
Semester 6		
ARCH 85101	Advanced Studio	6
ARCH 85200	Design Seminar	3
	Electives	9

Subtotal: 108

Architecture, Master of Science (M.S.)

Programs and Objectives

Master of Architecture Program (Program Director - Associate Professor Nandini Bagchee)
The Spitzer School's Master of Science in Architecture program is directed at students who already hold a professional degree in architecture and who wish to deepen their design abilities and expand their knowledge of contemporary theory, social practice, technology, and environmental systems. The year-long integrated research culminating in a design realization can be completed in two semesters (fall and spring). The remaining six-credit summer studio provides an opportunity for self-directed research with a faculty member. This program, designed for advanced students from different parts of the world, also affords a supportive faculty and advisory staff that connects students to resources within New York City and beyond.

Within this flexible curricular framework, students can choose from a number of elective courses and pursue independent coursework. Open-ended and flexible in many respects, the program does have certain priorities: interdisciplinarity, the city as a learning lab, experimental learning, and social engagement.

Spitzer School grad programs share a teaching, research, and design environment known as the unit system. Within year-long, team-taught, vertically integrated design units, students and professors work together to define questions and propose design solutions. Just like in the professions, students synthesize diverse skills and subject areas into their projects.

Master of Science in Architecture Post-Professional Degree

Semester 1		
ARCH 91102	Advanced Studio	6
ARCH 91202	Design Seminar I	3
	Electives	9
Semester 2		
ARCH 92202	Design Seminar II	3
ARCH 92102	Advanced Studio	6
	Electives	9
Semester 3		
ARCH 93103	Advanced Studio	6
	Elective Courses	6

Subtotal: 48

Landscape Architecture, Master of Landscape Architecture (M.L.A.)

Programs and Objectives

Master of Landscape Architecture Program (Program Director - Professor Catherine Seavitt Nordenson)
Landscape architecture plays an essential role in connecting social justice to environmental design and the planning of landscape systems in the urban realm. The Graduate Program in Landscape Architecture at the Spitzer School of Architecture, City College of New York prepares students to be leaders in the field of landscape architecture through innovative research and practice in urban ecological design, planning, and policy-making. The program aims to meet the profession's current and future challenges through the lens of environmental justice, including globalization, availability of natural resources, land management, and climate change. The curriculum engages critical thinking about complex systems, empowering students to work across multiple scales of the urban landscape.

Landscape architecture is a discipline that actually works with the surface of the earth — it literally changes the world and the world's systemic flows. Our program attracts activist students who seek to rethink accepted paradigms and implement actionable change in the public realm and the quality of public space in terms of equity, accessibility, and justice — climate justice, social justice, environmental justice, and multispecies justice. Transforming the profession begins in the academy. Our landscape architecture program is committed to challenging the entrenched biases and historical canons of landscape architecture that have too long been accepted as the norm, and we support the clarity and resonance of our students' diverse voices in the field.

Spitzer School grad programs share a teaching, research, and design environment known as the unit system. Within year-long, team-taught, vertically integrated design units, students and professors work together to define questions and propose design solutions. Just like in the professions, students synthesize diverse skills and subject areas into their projects.

Master of Landscape Architecture I
The Master of Landscape Architecture (first professional degree) program is intended for students who hold degrees in disciplines other than landscape architecture. This 90 credit, six-semester program leads to a first professional degree (M.L.A.) in landscape architecture. The principal medium of instruction is the design studio unit. Students undertake design and planning problems of growing complexity. The studio courses are supported by and sometimes integrated with seminars in natural science, technology, history and theory, and other related topics.

Master of Landscape Architecture II
A two-semester, 36-credit sequence leading to a graduate or second degree (M.L.A.) for students with a first professional undergraduate degree in Landscape Architecture (B.L. A. or B.S.L.A.). The program is of particular interest to those seeking a more extensive understanding of the theory of landscape architecture and for those interested in pursuing an academic career. There is a broad range of opportunities for students to engage in independent research and enroll in the full offering of courses in the college and university.

Requirements for the M.L.A. Degree

Master of Landscape Architecture I First Professional Degree

Semester 1		
LAAR 61100	Landscape Architecture Studio I	6
LAAR 61300	Landscape Technology I	3
LAAR 61400	Digital and Traditional Drawing	3
LAAR 61500	Introduction to Ecology/Plant Identification	3
Semester 2		
LAAR 62100	Landscape Architecture Studio II	6
LAAR 62200	Introduction to Landscape Architecture History	3
LAAR 62300	Landscape Technology II	3
LAAR 62700	Urban Ecology	3
Semester 3		
LAAR 63100	Landscape Architecture Studio III	6
LAAR 66200	Advanced Visual Representation	3
LAAR 63300	Environmental Planning	3
LAAR 65160	Urban Plants	3
Semester 4		
LAAR 64100	Landscape Architecture Studio IV	6
LAAR 64400	Planting Design	3
	Elective (Urbanism)	3
	Elective (History)	3
Semester 5		
LAAR 64700	Landscape Restoration	3
LAAR 65100	Landscape Architecture Studio V	6
LAAR 65300	Professional Practice	3
LAAR 64150	Design Research	3
Semester 6		
LAAR 66100	Landscape Architecture Studio VI	6
	Elective (Professional)	3
	Elective (History)	3
	Elective General	3
		Subtotal: 90

Master of Landscape Architecture II Second Professional Degree

Semester 1		
LAAR 64150	Design Research	3
	Electives in History/Theory of Landscape Architecture and/or Natural Systems	9
	Electives in Planning	6
Semester 2		
LAAR 72100	Landscape Architecture Thesis	6
	Elective (Professional)	3
	Elective (Professional)	3
	Elective (Urbanism)	3
	Elective (History)	3
		Subtotal: 36

Urban Design, Master of Urban Planning (M.U.P.)

Programs and Objectives

Master of Urban Planning - Urban Design Program (Program Director - Associate Professor Julio Salcedo-Fernandez)

The Urban Design program is newly centered on the premise that only a combination of leadership, technical, and design skills will lead to meaningful change in the way we think, plan, and construct our built environments. Building on the leadership of the late Michael Sorkin, the program is specifically designed to foster new conversations in response to our urbanized planetary crises and provide transformative alternatives that radically reimagine our cities as equitable, diverse, resourceful, and ecologically nimble.

Participatory Urbanism fuses research, design, advocacy and leadership in unique and transdisciplinary ways. We bring together technology, practice and activism in different strengths and scales across the program's innovative pedagogy, year-long "design think tanks" where students and professors work together to define questions, propose solutions, and disseminate their findings. We have deep links and

interests in both the Global North and Global South, as well as across the emerging economies of the East. Equity, democracy, intelligence, and efficacy are understood as key and important urban tools. Students in the program will learn how to adapt and translate conventional methods of analysis and production to a new projective framework, resulting in imaginative proposals that productively tap into infrastructural engineering, environmental planning, big data technology, and digital protocols that are fundamentally reshaping our built environments.
Participatory Urbanism redefines the very objectives and scope of urban design by foregrounding racial, social, and environmental justice as primary drivers and areas of enquiry. Emergent protocols and concerns from spatio-social practices, urban anthropology, sociology, and public health afford students new agency for working with underserved communities and collectives, allowing them to question and radically reimagine urban power structures.

Participatory Urbanism is a joint initiative between the J. Max Bond Center for Urban Futures and Graduates Programs Spitzer: architecture, landscape architecture and sustainability in the urban environment -- a program fusing engineering, sciences, and social sciences. Together, we provide a broad range of resources, engagement opportunities, and renowned faculty extending to the CUNY system. We aim to equip students to tackle deeply rooted biases and inefficiencies within our urban design and decision-making processes. Research in the program examines specific critical agendas in order to extrapolate alternatives and focuses on flash-point crises such as migrancy, urban interdependencies, social and spatial inequities, epidemiology, urban health, density, and ecology.

The program is designed to be completed in two full-time, sequential semesters. Applicants to the Urban Design program should hold a professional degree in either architecture or landscape architecture. Applicants from other backgrounds will be considered only in exceptional circumstances and on demonstration of a high level of design ability.

Requirements for the M.U.P. Degree

Semester 1 (Fall)

UD 61001	Urban Design Studio I	7
UD 61002	History of Urban Space I	3
UD 61003	Reading the City I	3
UD 61004	Urban Ecologies I	3

Semester 2 (Spring)

UD 62001	Urban Design Studio II	7
UD 62002	History of Urban Space II	3
UD 62003	Reading the City II	3
UD 62004	Urban Ecologies II	3

Subtotal: 32

Faculty

Jacob Alspector, Distinguished Lecturer
B.Arch., Cooper Union

Ahu Aydogan, Associate Professor
B.Arch.,Uludag University, M.Arch., M.S. Izmir Institute of Technology; M.S., Ph.D. Rensselaer Polytechnic Institute
Nandini Bagchee, Associate Professor and Director of M.S. in Architecture
B.Arch., Cooper Union; S.M.Arch.S, M.I.T; R.A.

Cesare Birignani, Associate Professor
Ph.D., Columbia University

Mohammad Bolhassani, Assistant Professor
B.Sc. K.N. Toosi Univ. of Tech. (Iran); M.S., Drexel Univ., Ph.D.

Hillary Brown, Professor and Director of M.S. in Sustainability
B.A., Oberlin; M.Arch., Yale Univ.; F.A.I.A.

Mi-Tsung Chang, Assistant Professor
B.Arch., Pratt Institute, M.Arch.; Ph.D., Union Institute

Jeremy Edmiston, Associate Professor and Director of M. Arch Program
B. Arch., Univ. of Technology (Australia); M.S., Columbia Univ.; R.A.

Gordon A. Gebert, Professor
B.Arch., M.I.T.; M.Arch., Princeton Univ.; R.A.

Marta Gutman, Professor
B.A., Brown Univ.; M.Arch., Columbia Univ.; Ph.D., Univ. of California (Berkeley)

Denise Hoffman-Brandt, Professor
B.A., Univ. of Pennsylvania; M.F.A., Pratt Institute; M.L.A, University of Pennsylvania; A.S.L.A.

Bradley Horn, Associate Professor and Interim Dean
B.Arch., Cooper Union; M.Arch., Columbia Univ.; R.A.

Fran Leadon, Associate Professor
B.Arch., Univ. of Florida; M.Arch, Yale Univ.; R.A.

Fabian Llonch, Associate Professor
M.Arch., Univ. of Washington

Frank Melendez, Associate Professor
B.A., University of Arizona; M.Arch., Yale Univ.

Shawn Rickenbacker, Associate Professor
B.Arch., Syracuse Univ.; M.Arch., Univ. of Virginia

Julio Salcedo-Fernandez, Associate Professor and Director of the M.U.P. in Urban Design Program
B.A., Rice Univ.; M. Arch., Harvard Univ.; R.A.

Catherine Seavitt Nordenson, Professor and Director of M.L.A. Program
B.S., University of Michigan, B.S. Landscape Architecture, CCNY, B.Arch., Cooper Union, M. Arch., Princeton University; R.A., R.L.A.

Elisabetta Terragni, Associate Professor
M.Arch., Facolta di Architettura, Politecnico di Milano

Christian Volkmann, Associate Professor
Dipl. Arch. ETH, Eidgenossische Technische Hochschule (Switzerland)

Sean Weiss, Associate Professor
B.A., Honors in Art History, Vassar College; Ph.D., Art History, Graduate Center, CUNY

June P. Williamson, Professor and Chair
B.A., Yale Univ.; M.Arch., M.I.T.; M.U.P., The City College of New York; R.A.

Visiting Faculty (2012 - Present)
Kutan Ayata
Kelly Bair
Karen Bausman
Ann Beha
Ruth Berktold
Monica Bertolino
Sara Caples
Jose Inaqui Carnicero
Alessandra Cianchetta
Yolande Daniels
Maria Fullaondo
Brian Healy
John Hong
Carla Juaçaba
Judith Leclerc
Audrey Matlock
Michael Meredith
Jinhee Park
Shawn Rickenbacker
Luis Rojo de Castro
Ivan Rupnik
Mitchell Squire
Carl-Fredrik Svenstedt
David Tajchman
Joseph Tanney
Claire Weisz

Professors Emeriti

Jonathan Barnett
Carmi Bee
Horst Berger
Lance Jay Brown
Alan Feigenberg
M. Paul Friedberg
Peter Gisolfi
David E. Guise
Ghislaine Hermanuz
James B. Jarrett
Hanque Macari
Garrison McNeil
M. Rosaria Piomelli
Labelle Prussin
Bernard P. Spring
Achva Benzinberg Stein
Lee Weintraub

Sustainability and the Urban Environment, Master of Science (M.S.)

Programs and Objectives

Sustainability in the Urban Environment Program (Program Director - Professor Hillary Brown)
This innovative, interdisciplinary program draws upon emerging approaches in each of the disciplines of architecture, engineering and science, and prepares students for the burgeoning field of sustainability. The program's goal is to train current, emerging and next-generation professionals to solve pressing local, regional and global sustainability problems. The curriculum is designed to prepare students to plan and implement strategies for sustainable development of buildings, open spaces and infrastructure, energy, water resources, air quality, land use, waste management, transportation, urban planning and construction. The curriculum enables students to acquire experience in interdisciplinary analysis of advanced concepts, principles and methodologies for solving a wide range of challenging sustainability problems. Graduates are trained to work in diverse professional settings involving collaboration, interaction and communication with teams of scientists, engineers, architects and others.

The Master's program is geared to applicants with a bachelor's degree in architecture, engineering or science from an accredited US college or university. Applicants with degrees in other fields may qualify for admission to the program depending on their experience and academic back-ground. Courses will be taught by the faculties of The Bernard and Anne Spitzer School of Architecture, The Grove School of Engineering, the Division of Science, and the Colin L. Powell School for Civic and Global Leadership.

Each candidate for a master's degree must complete at least 30 credits: 18 in the Core Curriculum, and 12 from a diverse collection of Architecture or, Engineering-Science, and Social Sciences elective courses. The core includes a key sequence of courses, the year-long Capstone Interdisciplinary Team Project (I and II), which accounts for 6 credits and involves diverse teams of students, who will cooperate to solve real-world sustainability problems.

Requirements for M.S. in Sustainability

Sustainability in the Urban Environment

Core Courses for All Students

Requirements

SUS 7100C	Cities and Sustainability	3
SUS 7200C	Sustainable Aquatic, Terrestrial and Atmospheric Systems	3
SUS 7300C	Industrial Ecology and Life Cycle Analysis	3
SUS 7400C	Economics of Sustainability	3
SUS 7501C	Capstone Interdisciplinary Team Project - I AND	3
SUS 7502C	Capstone Interdisciplinary Team Project - II	3

Elective Courses in Architecture

LAAR 63300	Environmental Planning	3
ARCH 61388	Case Studies in Sustainability	3

Elective Courses in Engineering and Science

SUS 7100B	Sustainable Transportation	3
SUS 7200B	Energy Systems Engineering for Global Sustainability	3
SUS 7300B	Climate and Climate Change	3
SUS 7400B	Water Resources and Sustainability	3
SUS 7500B	Green Chemistry	3
SUS 7600B	Design of Mechanical Systems for Sustainable Buildings	3
SUS 7700B	Solid Waste Reuse and Recycling	3

SUS 7600B: ME 547

SUS 7700B: G7800

The School of Education

Dr. Edwin M. Lamboy, Interim Dean • NA 3/203 • Tel: 212-650-5471

The School of Education, an outgrowth of the extension courses organized in the fall of 1908 for teachers, librarians, and social workers, was established as a separate school of The City College in the spring of 1921. It is organized under its own faculty to prepare men and women for various educational services, teaching and non-teaching, in day care/preschool setting, as well as in the elementary and secondary schools. It is also open to in-service personnel who wish to take courses for professional improvement.

In collaboration with the other schools and divisions of The City College, the School of Education offers programs of study in a number of professional fields. Professional preparation for educational service is under the jurisdiction of the Board of the Trustees of The City University of New York and is coordinated by its Committee on Coordination of Teacher Education.

The graduate programs lead to the degrees of Master of Arts, Master of Science or Master of Science in Education. Initial, professional and advanced certificate programs are available in many professional fields. Advanced certification programs are designed to accommodate those who desire certification as a teacher or school leader but are not pursuing a degree. Some advanced certificate programs require a master's degree for admission. For elementary and middle school teachers, a variety of programs are offered including bilingual and special education. For secondary school teachers, highly specialized professional courses are offered in the context of the discipline taught and supported heavily by course work in these content areas. For current and prospective school supervisors and administrators, programs that are designed to address school and district needs and priorities are offered. The college participates in offering the doctorate (Ph.D.) in both Educational Psychology and Urban Education at The Graduate Center of the City University of New York.

Mission and Shared Vision of The School of Education

In keeping with the historical mission of the College, the School of Education provides access to the field of education for all those who show promise of contributing to New York City schools and the education of the City's children, regardless of national origin, home language, or economic condition.
The preparation of teachers in the United States is intended to meet the needs of a democratic society. In New York City, this is extended to preparing educators to work with students who are diverse in all respects. To that end, the School seeks to draw on the varied strengths of candidates while ensuring that they acquire the academic, pedagogical, technological, professional, and personal skills required of an educator in an urban setting. The School commits itself to ensuring that its graduates can demonstrate solid grounding in the liberal arts and sciences, a deep understanding of public purposes of education in a democracy, thorough training in effective teaching skills, and the professional and affective dispositions to work successfully with students, families, and colleagues in the field.
The School focuses on five themes to ensure coherence across its curriculum, instruction, field experience, and assessment:

- Content knowledge
- Pedagogical knowledge
- Diversity
- Leadership
- Building of caring communities.

Developing In-Depth Knowledge About the World

Candidates preparing to work in schools in teaching or supervisory roles demonstrate the content knowledge and skills necessary to help all students learn. All the College's programs attempt to meet national and professional standards of content, rigor, and coherence. This knowledge is found in the liberal arts and sciences and is presented with the most up-to-date technology. Indeed, there is a consensus of educators, from progressives to traditionalists, that literature, history, philosophy, mathematics, natural science, foreign languages, and art and music must be part of a university curriculum.
To that end, the institution requires a core curriculum emanating from its College of Liberal Arts and Sciences. The School adopts and enhances this curriculum by requiring of its candidates additional math and science courses. Undergraduate candidates, in addition to their pedagogical courses, must complete an academic major or concentration. (In addition to these requirements, pedagogical courses echo the content of the liberal arts core and concentrations. Philosophy, history, mathematics, and English are part of these courses.)
Content knowledge is demonstrated in teaching methods courses: e.g. language arts, social studies, math and science. In these courses, candidates are introduced to State learning standards at the level appropriate to the certification they seek. Through use of content knowledge, candidates must be able to determine the widest and deepest potential knowledge base of each of their students with the accompanying strategies that range from direct instruction to inquiry so the student can, from textual and electronic sources, obtain, rehearse, recall, and transfer new knowledge to routine and new learning contexts. Knowledge of students and pedagogy goes hand-in-hand with content knowledge.
The seven knowledge areas of a university curriculum, listed above, have value in themselves, a value that education and liberal arts faculty communicate, deliberately and in passing, even in pedagogical courses. These faculties work together on curriculum and search committees. Only if they share and transmit the value of these knowledge areas will candidates develop a disposition to continue experiencing these and participate in lifelong learning. If they are not disposed to recognize this value they will not be able to pass it on to their students.
The target for teacher and other professional candidates with regard to content includes in-depth knowledge of the subject matter to be taught or supervised including the methods of the discipline that determine what becomes knowledge. Candidates demonstrate this knowledge through inquiry, critical analysis, and synthesis of the subjects they plan to teach. Some are able to meet target levels of performance by graduation from the programs of the School. Others, at that point in their development as educators, meet, at least, acceptable levels. But all graduates have the basic tools, technology, and necessary dispositions to continue their development as educational professionals as well as learners. In order to ultimately meet target levels of performance, our graduates will have to continue to develop their content as well as their professional knowledge.

Becoming Skilled, Reflective Practitioners

Teacher competence is obviously a primary influence on student learning. Critical dimensions of competence are pedagogical knowledge and skills. The School of Education adds to this the knowledge and skills to be a successful educator in urban schools that serve a diverse population of children and families and the disposition to use these to promote the learning of all children. In order to articulate the School's purposes and goals, pedagogical competence is divided into six subcategories:

1. Knowledge of human learning and development. In coursework, candidates build their pedagogical knowledge on a foundation of learning and developmental theory in tandem with practice in fieldwork. Candidates observe students in an educational and cultural context.
2. Knowledge of constructivism and inquiry learning. In coursework and fieldwork, candidates learn how to provide students with opportunities to explore, inquire, discover, and problem-solve. Candidates apply knowledge by gradually implementing a wider range of instructional practices in the field with diverse groups of students.
3. Knowledge of pedagogical (including behavioral) approaches to working with students with special needs. Candidates, whether in special education or not, recognize that they may be called upon to work in inclusion classrooms and engage in culturally responsive teaching. As well as experiencing constructivist and inquiry models, candidates investigate complementary models for students with special needs.
4. Knowledge of the use of instructional technology for teaching, learning, and assessment. The School promotes the skillful use of instructional and communications technology with a predominantly "across the curriculum" approach based on the recognition that technology must be used to support student learning.
5. The knowledge and ability to put into practice both multiple teaching strategies and approaches to assessment that build on the knowledge and strengths that students bring to school and allow for differentiated instruction for diverse learners. Based on their knowledge and experiences with cultural differences, candidates integrate multiple strategies in the preparation of lessons and fieldwork. They are introduced to formal and informal assessment devices in foundation courses and, in succeeding course and fieldwork experiences, become comfortable with a wide range of assessment strategies.
6. Application of knowledge and skills through sequenced experiences in the field. Through sequenced fieldwork, candidates grow in their ability to apply the skills and knowledge learned. Fieldwork culminates in a carefully monitored semester of student teaching or, in the case of graduate students, a practicum in which they engage in a formal inquiry into their teaching practice.

Educating for and about Diversity

The great strength of City College is the diversity of its candidates and faculty. As a public institution, the College has in place a policy of nondiscrimination on the basis of age, color, disability, national or ethnic origin, race, religion, sex, sexual orientation, veteran or marital status. As a campus situated at the center of one of the world's most diverse metropolises, the College enjoys the opportunity of making that policy a living reality.

The School of Education subscribes wholeheartedly to the goal of full inclusion and so works continuously to ensure that the diversity of the New York City population, and particularly of the surrounding local community of upper Manhattan, is reflected in the make-up of the faculty and in the perspectives, concerns, and materials taken up throughout the curriculum. Access to education and to careers in teaching for the widest possible representation across the City's population is central to the School's mission but, at the same time, a wider variety of educational options is often available to the economically more advantaged. In this light, the School and the College seek especially to provide access to those who are economically disadvantaged. Mechanisms to provide such access include low tuition, financial aid, academic support services, and scheduling of classes to accommodate students who work.

The School views the diversity of students and faculty, defined in its widest sense, not just as an obligation but as an educational resource. While an emphasis on multiculturalism does prepare learners for the diversity of the world outside the classroom, a diverse classroom actually brings that reality into the educational process itself. In a true community of learners, where each member contributes to the learning process, it must be the case that greater diversity of lived experience among the learners results in a richer learning experience for the community. For the School of Education candidate, diversity is more than a fact of the world, something about which the candidate must learn; it is a fact of the candidate's own classroom, something through which the candidate can learn. It is the responsibility of faculty to draw upon the diversity of the school to enrich the learning processes of all candidates, a practice that serves as a model for candidates in their own teaching.

The School is continuously working towards finding ways to promote understanding across experiential divides. Particularly where native cultures, languages, and dialects differ from candidate to candidate, candidate to instructor, and faculty member to faculty member, it is a challenge to appreciate and accurately assess the value of another's contribution. It is also a challenge to prepare candidates to meet the demands of state and professional assessment instruments, which may not always be sufficiently sensitive to cultural and linguistic differences. The School strives to meet these demands without sacrificing either academic rigor or cultural and linguistic pluralism.

Nurturing Leadership for Learning

1. General preparation. Our goal is to develop the capabilities of candidates to assume leadership roles in their classrooms, schools, and communities. Whether or not candidates eventually assume formal leadership positions, the acquisition of the knowledge, skills, technology, and dispositions required for providing leadership serves to enhance their performance at the classroom, school, and community levels. Accordingly, developing the capacity to apply leadership skills that foster the development of community in multicultural, multilingual schools is a theme that is embedded and reinforced in the course content, fieldwork, research requirements, and internship experiences offered by all the programs in the School.
2. Candidates acquire the ability to lead and participate in decision-making bodies that address the academic content and management structure of the diverse programs in their schools. They are prepared to engage in collaborative processes that encourage the mutual efforts of teachers, administrators, and staff to work and learn together. They become skilled at collegial planning and evaluation, managing conflict, and reflecting and dialoging on their own professional practices. They seek to become stewards of best practice, which, by so doing, feel a responsibility for the whole school and not just the classroom.
3. Preparing candidates for formal leadership positions. Candidates learn to lead through the co-creation of a shared vision, values and goals. To accomplish this, they learn to build consensus, manage conflict, and clearly communicate the importance of the shared vision and values on an ongoing basis. They learn to create and maintain a culture of cooperation and collaboration which has teaching and learning as its central focus. They develop the value of empowering teachers and staff to act on their own ideas by involving them in decision-making processes and encouraging them to think of themselves as leaders. They demonstrate commitment to and sensitivity and respect for diverse cultures served by school communities.
4. Faculty in the leadership preparation programs utilize case study methodology, problem-based learning, and cooperative learning strategies to prepare candidates to understand the process of developing and articulating a vision and its related goals, to acquire the skills and dispositions needed to relinquish authority to teachers and staff, to appropriately involve others in decision-making processes, to delegate authority, and to share credit with others for the successes enjoyed by a school or other institutional unit.

Building Caring Communities

Community-building must be at the heart of any school improvement

effort. Caring communities are places where teachers and children support and celebrate each other's learning and general well-being. The School, in order to help candidates begin this career-long endeavor, focuses on the creation of democratic classrooms and schools and teachers' roles as models of caring, values, and moral behavior.

1. Democratic classrooms and schools. Candidates come to understand what democratic classrooms and schools look like and what values they have. Faculty strive to be examples, not as transmitters where their voices dominate, but as co-intentional learners, coaches, and facilitators. Beyond modeling, faculty explore with candidates the dynamics of democratic classrooms and emphasize why they are important. They emphasize the connection between public education and caring citizens equipped to make judgments as they participate in the decision-making processes of society.
2. Teachers as models of caring, values, and moral behavior. All teachers need to know their students well and, to the extent possible, personalize instruction and provide advice, nurturing, and counseling when needed. Faculty of the School, therefore, need to know candidates well and help them identify ways to know their students and to express interest in and caring for them. Candidates need to remember details about students' lives, keep notes, call and visit their homes, respond authentically, and ask students what they think and care about. Most of all, candidates need to learn that being a caring teacher is not playing a role. They must be authentic persons before they are caring persons. To be authentic in front of students leaves one vulnerable and candidates need to be able to deal with that vulnerability.
3. Candidates, therefore, learn how classrooms and schools become caring communities and how they become more democratic. They understand behaviors and forces that militate against caring, democratic classrooms. They exhibit caring and democratic behaviors in their education classes. Finally, they will define the values their classrooms will support and understand how these values will contribute to the building of character in their students.
4. The School continually reviews and evaluates all undergraduate and graduate programs, including the objectives, content, and learning activities of individual courses. Experimentation is sought in all aspects of the program. Through required courses, counseling, experience in community agencies, and in affiliated and other schools, students are prepared to fill their role as urban teachers.

Accreditation and Certification

The City College is accredited by the Middle States Association of Colleges and Secondary Schools. The teacher education program of the College prepares pre-school, elementary, middle school, and secondary teachers and school service personnel with the master's degree as the highest approved degree. Certificate programs beyond the master's degree are also offered in several fields. The School of Education is accredited by the National Council for Accreditation of Teacher Education (NCATE) and all of its programs are state approved. The School of Education is affiliated with the American Association of Colleges for Teacher Education.

Programs of study are designed primarily to meet State certification requirements. Candidates who at the time of receipt of an advanced certificate or master's degree and as a result of their studies at the College meet all the requirements of one of the College's teacher education programs approved by the New York State Department of Education are recommended to that Department by the Certification Officer of the School of Education for state certification. However, State requirements change from time to time. Consequently, candidates interested in State certification should inform themselves of current requirements. Candidates having questions regarding State requirements should consult the Certification Officer (NA 3/213) visit the CCNY certification website at www1.ccny.cuny.edu/prospective/education/certification.index.cfm or visit the NY State certification website at www.highered.nysed.gov/tcert.All School of Education candidates should apply, upon conferred degree, using the State Education Department's TEACH Online Services application system. Instructions for using the system are also available on the CCNY certification website.

Candidates who have completed a teacher education program at City College meet the educational requirements for certification in over 40 states through the Interstate Agreement on Qualification of Educational Personnel. Included among these are Connecticut, Delaware, Florida, Georgia, Maine, Massachusetts, New Hampshire, New Jersey, North Carolina, Rhode Island, South Carolina, Vermont, and Virginia. More information on teaching in other states is available through the Certification Officer, NA 3/213.
Students who plan to take examinations to teach in the P-12 schools of New York City are advised to obtain a copy of the certification requirements from the Office of Teaching Initiatives, State Education Department, www.highered.nysed.gov/tcert for information and updates.

New York State Certification Requirements

The graduate School of Education has programs leading to initial and professional certification in New York State. When candidates complete a certification program, the Certification Officer (NA 3/213) submits a recommendation to New York State Education Department using the TEACH system. Candidates are also required to apply online for their certificate. The Dean's Office, in conjunction with the program director and department chair, determines that all program requirements have been met.
In addition to the academic requirements of the education program, candidates must also pass the New York State Certification Examinations (NYSTCE) appropriate to the certificate they seek. The requirements for classroom teachers include a teacher performance assessment (edTPA), Educating All Students Test (EAS), and the revised Content Specialty Test(s) (CST). The new examination requirements for the School Building Leadership (SBL) certificate consist of a revised School Building Leader Assessment (SBL) and Educating All Students Test (EAS). Information about the new exam requirements can be found on the CCNY certification website. In addition, candidates enrolled in Bilingual programs are required to take the Bilingual Education Assessment (BEA).
Candidates qualify for the professional certificate after completing their master's or advance degree if they have three years of full-time, legal, and paid teaching experience.

Graduate Programs

Master of Science in Education
Bilingual Childhood Education
Bilingual Special Education
Childhood Education
Early Childhood Education
Educational Leadership
Educational Theatre
Literacy (Birth-Grade 6) or (Grades 5-12)
Mathematics Education (Grades 5-9)
Science Education (Grades 5-9): Biology, Chemistry, Earth Science, Physics
Spanish Education
Teaching Students with Disabilities in Childhood Education
Teaching Students with Disabilities Grades 7-12
Master of Science
Teaching English to Speakers of Other Languages (Grades P-12 and Adult)
Master of Arts
Art Education (Grades P-12)
English Education (Grades 7-12)

Mathematics Education (Grades 7-12)
Science Education (Grades 7-12): Biology, Chemistry, Earth Science, Physics
Social Studies Education (Grades 7-12)
Extensions to Certificate Programs
Bilingual Education
Advanced Certificate Programs for Master's Degree Holders
Art Education
Childhood Education
Early Childhood Education
Early Childhood Special Education
English Education
Mathematics Education
Science Education: Biology, Chemistry, Earth and Atmospheric Science, Physics
Social Studies Education
Spanish Education
Teaching Students with Disabilities Grades 1-6
Teaching Students with Disabilities Grades 7-12
Post Master's Advanced Certificate Program
Educational Leadership

School of Education Offices

Chairs Suite
NA 6/207B; 212-650-7262
Office of Admissions & Student Services
NA 3/223A; 212-650-5316/6296
Office of Clinical Practice
NA 6/207A; 212-650-6915
Certification Office
NA 3/213; 212-650-5590
The Office of Admissions & Student Services provides general information about the programs of study. All courses must be approved by the candidates' major field advisor before they may be credited toward the degree of Master of Arts, Master of Science, Master of Science in Education, or Advanced Certificates.

Officers of the Administration

Interim Dean
Prof. Edwin M. Lamboy
NAC 3/203; 212-650-5471

Interim Deputy Dean
Prof. Andrew Ratner
NAC 3/213; 212-650-6229

Department of Teaching and Learning Chair
Prof. Laura M. Gellert
NAC 6/207B; 212-650-5323

Department of Leadership and Human Development Chair
Prof. Hazel Carter
NAC 6/207B; 212-650-6242

Advisors for Admissions, Courses, Programs, and Registration

Art Education
Prof. Marit Dewhurst, 212-650-7433
Bilingual Education
Prof. Tatyana Kleyn, 212-650-5328
Bilingual Special Education
Prof. Christopher Yawn, 212-650-7085
Prof. Tatyana Kleyn, 212-650-5328
Childhood Education
212-650-8436
Early Childhood Education
Prof. Beverly Falk, 212-650-5182
Educational Leadership
Prof. Robert Lubetsky, 212-650-5034
Educational Theatre
Prof. Sobha Kavanakudiyil, 212-650-7681
Literacy Acquisition and Development
Prof. Nadjwa Norton, 212-650-6630
Mathematics Education
Prof. Despina Stylianou, 212-650-5037
Science Education
Prof. Richard Steinberg, 212-650-5698
Secondary English Education
Prof. Andrew Ratner, 212-650-5323
Secondary Social Studies Education
Prof. Shira Epstein, 212-650-5995
Secondary Spanish Education
Prof. Edwin M. Lamboy, 212-650-5697
Special Education
Prof. Christopher Yawn, 212-650-7085
TESOL
Prof. Tatyana Kleyn, 212-650-5328

Admission

Matriculation Status
Initial Certification Programs

Full matriculation is open to graduates of colleges of recognized standing who are qualified to undertake graduate study by reason of previous preparation in both subject matter and professional fields as listed under the several program specializations. To be admitted to an initial-certificate program in elementary or secondary education, the candidate's preparation in the liberal arts and sciences must include a liberal arts major and course work in English composition, literature, mathematics, the sciences, history, and a foreign language.

Candidates who have not completed all liberal arts requirements for initial certification may be admitted conditionally if they lack 12 credits or less, pending completion of those courses. Conditioned courses must be completed, in addition to the core education curriculum, in order for a candidate to be recommended for initial certification. For the teaching specializations, professional preparation may also be required in areas such as history of education, child development, or adolescent development. These requirements differ by program. Candidates lacking such preparation may be admitted on condition (see Matriculation with Conditions below).

Consistent with requirements for national accreditation, candidates in the School of Education will also establish an electronic portfolio account (Taskstream). This will provide prompt feedback in an aggregated fashion to instructors to maximize the effectiveness of the School's instructional programs. Additionally, this provides candidates with a highly effective tool which can showcase their technological abilities and be used for reference beyond their studies at the college.

Candidates are expected to meet acceptable standards in respect to academic record, character, and health. A candidate may be rejected if there is any doubt concerning certification or licensure by the New York State Department of Education or by the New York City Department of Education.

The number of candidates admitted to programs is necessarily determined by the needs of the schools. If the number of eligible applicants is patently in excess of the anticipated capacity of the schools to absorb them within a reasonable period subsequent to their graduation, matriculation is limited to those who offer surest promise of effectiveness in educational service.

Professional Certification Programs

Full matriculation is open to graduates of colleges of recognized standing who are qualified to undertake graduate study by reason of previous preparation in both subject matter and professional fields as listed under the several program specializations.
Candidates are expected to meet acceptable standards in respect to academic record, character, and health. Candidates must hold initial New York State certification to be admitted to a program leading to professional certification.

Matriculation with Conditions

A candidate who is otherwise qualified, but who has not completed the courses prerequisite to matriculation, may be admitted to matriculation with conditional status, provided that the deficiencies are not in excess of twelve credits of work in professional and subject matter courses combined. Candidates admitted to matriculation with conditions will be expected to remove all conditions within three semesters after their initial acceptance.

No credit toward the degree is allowed for courses taken to fulfill the requirements or conditions for matriculation.

Admissions Procedure for Matriculated Status

Candidates applying for admission to the master's degree, extension or advanced certificate programs in the School of Education must:

1. Complete an application for admission to the particular program. Applications are available on the website of the Office of Graduate Admissions, https://app.applyyourself.com/?id=cunyccnyg.
2. Possess a bachelor's degree from an accredited college or university.
3. Demonstrate an ability to pursue graduate study successfully.
4. Possess a grade point average of "B" or above.
5. Submit the application for admission and three letters of recommendation to the Office of Graduate Admissions by October 15th for the spring, and March 15th for the fall.
6. Complete an in-person written essay and interview.
7. Provide evidence of New York State initial certification, if applying to a program that leads to professional certification.
8. Submit GRE score. Applicants with a master's degree and certification are exempt from this requirement with proof.

Decisions on admissions will be made by each graduate program after consideration of all admissions materials. Decisions will be announced in early December for spring admissions and late April for fall admissions.

All credentials filed in support of an application become part of the permanent file and the property of the college. The Advanced Certificate programs are designed to accommodate candidates who already have a master's degree.

Meeting Professional Standards

As a professional school with the responsibility of recommending candidates for New York State certification, the School of Education must conduct ongoing professional evaluation of students. Programs in the Department of Teaching, Learning and Culture do not recommend candidates for certification as a teacher if they receive less than a B grade in their student teaching or practicum experience. In cases where faculty determine that an individual is inappropriate for the teaching profession, they may recommend dismissal to the Committee on Course and Standing. The findings of the Committee are final.

Admission with Advanced Standing

Up to six credits in advanced standing may be allowed for graduate work satisfactorily completed at institutions other than The City College, provided that the program director deems the work appropriate to the candidates' program of study and an official transcript is on file in the Office of the Registrar. The course or courses for which such credit is sought must have been completed within the three-year period prior to the date of matriculation in the graduate program.

Foreign Student Credentials

An applicant who files credentials from foreign institutions of higher learning in support of an application for admission to a graduate program in the School of Education must present:

1. The original of all academic records and certifications for all institutions attended.
2. Available bulletins and catalogs of the institutions attended and the curricula followed.
3. Original and copies of statements by the United States Office of Education or other agencies relative to standing, level, or validity of foreign records filed with such agencies for purposes of evaluation and certification or licensing.**Non-Degree Admissions**

The School of Education Graduate Division will accept non-degree students who seek professional growth. Taking one or a series of courses to improve teaching skills and to keep up with new developments in the candidates' area of teaching is encouraged by the College.

The School of Education may also allow degree and/or certification seeking candidates to take up to nine credits as non–degree students. If such candidates are formally accepted, the program director will decide whether any of the credits taken as a non–degree student may be applied toward the program requirements.

Those who wish to attend as non–degree students may only be admitted to courses for which they are qualified. Such candidates must file online for admission as a non–degree student by visiting https://app.applyyourself.com/?id=cunyccnyg. Candidates must also present student copies of transcripts or other credentials proving graduation from an accredited institution at that time.
Advisors in each of the several teaching and service fields are available for consultation at registration and during the regular semesters.

Non-degree students must follow the regular rules for registration and course requirements, including prerequisites.

Grading and Course Information

Grades awarded in the School of Education are:

A	Excellent (includes + and – grades)
B	Good (includes + and – grades)
C	Fair (includes + grades only) (lowest passing grade for graduate credit)
F	No credit granted. If this grade is received in a required course, the course must be repeated. This is an earned grade based on poor performance and the candidate not meeting the learning objectives/outcomes of the course throughout the entire academic term/session.
W	Withdrew without penalty

Grades awarded in the School of Education are:

WN Never Attended and did not officially withdraw.

WU Attended a minimum of one class and completely stopped attending at any time before final week.

INC Incomplete. Given by the instructor in consultation with the candidate. This is a temporary grade, authorized only where unavoidable circumstances have prevented the completion of course assignments. It is expected that candidates will complete the requirements by the date agreed upon with their instructor, but no later than the published date the following year. If extraordinary situations require a further extension, it must be obtained through the Committee on Course and Standing. Graduating candidates must complete courses before the semester's graduation date (September 1, February 1, and the official June commencement date) in order to graduate at the expected date.

An average grade of B (3.0) is required for graduation. Candidates whose academic status falls below this standard will be placed on probation. In special circumstances, with the approval of program faculty, students with a GPA between 2.75 and 3.0 may sit for a qualifying examination.

Normally, students are not permitted to repeat a course that they have already passed. If permitted to do so, the second grade is not counted in computing the scholastic average, unless the Committee on Course and Standing so authorizes.

Important Note on Restricted Courses
There are several kinds of courses which are limited in their enrollment to certain categories of candidates. These restrictions are noted in the course descriptions. Candidates who register contrary to these rules will be dropped from the course and may lose part or all of their tuition. Restrictions are as follows:
Special permission required. Permission is to be obtained in writing from the major advisor in the candidates' field or program only. This may be done at the time of registration.

Open to matriculants only. This indicates that only those persons in an approved program leading to the master's degree, post-master's, or an advanced certificate may take the course. In some instances, the course may be open only to matriculants in a particular program; if so, this restriction is stated in the course listing.
Open only to. Certain courses are restricted to special groups of candidates (e.g., science majors or those with 10 credits of graduate work). In each case, the limitation is specified in the course listing.

Advanced approval required. Candidates must receive written permission from the appropriate advisor during the preceding semester, prior to the date listed in the collegiate calendar for obtaining such permissions. This date is normally about the middle of April or November.

Prerequisite or corequisite courses. In each instance where particular courses are listed as pre- or corequisite, equivalent courses may be presented for the advisor's approval. Candidates registering without the necessary prerequisite or corequisites will be barred from such classes.

Prerequisite Education Courses
There may be courses in the foundations of education which should be taken before other education courses, unless special permission has been obtained from the program advisor to follow some other sequence. These courses differ by program.

Independent Study
Candidates can include up to 6 credits of independent study courses in their programs, as appropriate. Such work may only be embarked upon under the advisement of a program advisor. Candidates who wish to take an independent study course must do so with the agreement of the faculty member who will act as mentor for such work. This must be done in advance of registration.

Admission to Student Teaching/Practicum
Only candidates who are matriculated in graduate programs in the School of Education will be admitted to student teaching/practicum courses. Those matriculated candidates who wish to take student teaching/practicum courses must apply before the deadline announced in the preceding semester to the Office of Clinical Practice - Field Experiences and Student Teaching, NA 6/207A, 212-650-6915, www.ccny.cuny.edu/education/clinical practice for further information.

Admission Requirements for Student Teaching/Practicum
To be admitted, candidates must have:

1. A completed application submitted to the Office of Clinical Practice
2. A completed recommendation form from their program advisor
3. A successful interview with the Director of Clinical Practice
4. All prerequisite courses and no INC grades
5. GPA of 3.0 or higher
6. Satisfactory results from the tuberculin (TB) test (if not employed with the New York City Department of Education)
7. 100 hours of field experiences
8. Passing score on the Educating All Students (EAS) test or the Content Specialty Test (CST) (applicants for Mathematics Education are required to complete the CST-Mathematics to be eligible for student teaching)
9. Score of "Advanced Low" or higher on the ACTFL Oral Proficiency Interview (OPI) (for Spanish Education applicants)

Admission to student teaching/practicum requires satisfactory completion of academic requirements as well as the meeting of appropriate professional standards. Applications are reviewed by the School of Education Student Services Committee, which determines eligibility for admission to student teaching/practicum. Decisions of the Student Services Committee may be appealed to the School of Education's Committee on Course & Standing, whose decisions are final.

Courses in the Graduate Division College of Liberal Arts and Science
Matriculants for advanced certificates or a master's degree in the School of Education are afforded the opportunity of enrolling in the courses offered in the Graduate Division of the College of Liberal Arts and Science under the following conditions.

1. Not more than twelve credits taken in that division may be credited toward the graduate degree in the School of Education.
2. Each course included in a student's program of study must be approved in writing by the student's major field advisor and by the appropriate departmental advisor in the College of Liberal Arts and Science.

Except for the limitations cited above, students in a master's program will receive the same privileges accorded them in courses offered in the School of Education. Further details about courses are contained in this Bulletin.

Courses in Other Divisions of The City College
Non-Degree Students. The School of Education cannot give permission to non-degree students to take courses in other divisions of the College. Such candidates must arrange their own registration in other divisions of the College and fulfill requirements of these divisions.

Matriculants. Matriculated graduate candidates who wish to take undergraduate courses must obtain the approval of their major field advisor and must complete enrollment in courses at the time and place of School of Education registration. (See schedule of courses of the Graduate School of Education for time of registration and further information.)

Permission to register in courses of other divisions of the College is issued provisionally and subject to cancellation if the courses have reached their maximum enrollment.

Courses at Institutions other than The City College
*Advance Approva*l. A matriculated candidate who desires to take courses in an institution other than The City College must secure advance written approval for such courses from the major field advisor. If these courses are to be taken at one of the other colleges of the City University of New York, the candidate must file an e-permit prior to the registration period. No more than 6 credits of transfer courses may be applied to degree requirements.

Proof of Outside Work. The candidate is responsible for having an official transcript sent from the other institutions as soon as final grades are available. A candidate who expects to be graduated at the end of the current term should not register in courses at another institution.

Degree Requirements

Matriculated Status. Degree candidates are required to be matriculants and to complete the minimum number of graduate credits specified in an approved program of study (not less than 30), to pass a written Qualifying Examination (unless a "B" average is achieved at graduation), and to complete introduction to Educational Research (EDUC 7000l) and Individual Study in Educational Research (EDUC 7100l) or designated equivalent courses.

Approvals. All courses to be credited toward advanced certificates, the degree of master of arts, master of science, and master of science in education must be included in the program of study, approved by the major field advisor before candidates register for courses.

Enrollment Residence and Time Limitations. To be continued as a matriculant in a master's degree program, a candidate is required to take at least one approved course in each semester beginning in September and to maintain academic standards established by the Committee on Course and Standing. All requirements for the degree must be completed within a five-year period from the date of matriculation. When advanced standing has been granted, one year will be deducted from this five-year period for each six credits of such advanced standing.

Extension of Time Limitation. Requests for extension of the time for the completion of graduate work should be made in writing in advance of the termination of the four-year period and addressed to the School of Education Committee on Course and Standing. Extensions of time are given for compelling reasons.

Exceptions to Enrollment Residence. Exceptions to the above enrollment rules may be made in the case of candidates who apply in advance and are granted a maternity, military or medical leave, etc. Requests for such leaves should be made in writing and addressed to the Assistant Dean of Enrollment and Student Services.

Withdrawal from Courses. Candidates wishing to withdraw from courses must report to the Office of the Registrar to make formal application and inform their program director of their intent prior to withdrawing.

Credit Limitations. Graduates who are teaching or otherwise fully employed may not take more than six credits in any one semester, unless prior approval has been given by the program director. Full time Candidates status is established at twelve credits. However, persons who are carrying a full schedule may not take more than sixteen credits in the semester, including all courses taken in the several divisions of the College, unless written permission has been secured from the School of Education Committee on Course and Standing.

Academic Requirements. The right is reserved to ask the withdrawal of any candidate who fails to maintain a satisfactory record in graduate courses.

Professional Requirements. While physical fitness, knowledge of the subject area, and the ability to use English (and the second language, in the case of bilingual childhood education majors) skillfully in writing and speaking are important, there is another criterion for teaching which is probably the most difficult to evaluate: familiarity with professional dispositions expected of educators as delineated in professional, state and institutional standards. This is evaluated through personal interviews with the candidates throughout the progress toward the degree. Candidates who fail to meet this requirement may be subject to dismissal from the School of Education.

Applying for Graduation. Candidates for degrees and advanced certificates must apply for graduation by the deadlines sent by the Office of the Registrar (https://www.ccny.cuny.edu/registrar/aplication-for-graduation). To apply, candidates must refer to their Student Self Service accounts in CUNYfirst.

Maintenance of Matriculation. See Academic Requirements and Regulations section (p.) of this bulletin.

Graduation Honors. Candidates graduating with a GPA of 3.7 and with no grade below "B" in courses applicable to the degree and who have exhibited high personal and professional qualities may be recommended to the dean to be awarded honors.

Academic and Professional Standards

Each graduate program establishes the academic and professional standards expected of its candidates. Traditional professional standards conform to but are not limited to the codes of ethics of professional educational associations.

The right is reserved to ask for the withdrawal of any candidate who fails to meet professional standards and/or fails to maintain a satisfactory academic record in courses. Offenses include, but are not limited to, cheating, plagiarism, inappropriate behavior, and unsatisfactory grade-point average.

Jurisdiction Over Academic and Professional Standards
Department chairs have jurisdiction over offenses regarding academic and professional standards for any candidate whose field of interest is in their department.

Procedure for Handling Violations
Violations of academic and professional standards shall be reported in writing to the department chair and a copy sent to the offender as soon as possible, but no later than one week after the offense is alleged to have taken place. In any appeal, the candidate must first arrange an appeal conference with the instructor who shall arrange a conference with the candidate as expeditiously as possible in order to settle the issue informally. The decision agreed upon shall be reported in writing to all persons involved, including the Assistant Dean of Enrollment and Student Services, the department chair, and the dean.

Appeals Procedures for Academic Judgments
The School of Education Committee on Course and Standing will review only appeals that pertain to the School of Education. Candidates who wish to appeal academic judgments, including grades, begin by discussing the grades with the instructor as soon as possible after the grade is issued. Grades in courses may not be changed after the first month of the following semester without the approval of the department chair and dean, and no grade may be changed after a student has graduated.

If, after discussing the grade or other academic judgment with the instructor, a candidate wishes to pursue an appeal, he or she must discuss it with the program director. The program director will make an independent recommendation and then forward it to the department Chair and to the Committee on Course and Standing.

The candidate may pursue the appeal further to the Committee on Course and Standing, which has final jurisdiction. Such appeals are transmitted to the Committee through the Assistant Dean of Enrollment and Student Services and, in general, candidates should discuss the appeal with the Assistant Dean before submitting a formal appeal.

The Committee on Course and Standing considers appeals in writing and neither the candidate nor the instructor appears in person. The candidate's appeal should be in the form of a detailed letter accompanied by any supporting evidence the candidate wishes to

submit, including copies of papers or letters from other candidates or instructors. Appeal forms are available online and in the Office of Admissions & Student Services.

The Committee normally asks the instructor, the program director, and the department chair to comment, in writing, on the candidate's appeal. On request, the Assistant Dean will discuss these responses with the candidate before the Committee meets. The Committee's decision is sent to the candidate in writing by the Assistant Dean. Other academic appeals, such as appeals from probation, academic dismissal, and failures for poor attendance may be appealed directly to the Committee on Course and Standing. In addition, requests for waivers of degree requirements, extensions for incompletes, limitations on registration, and similar matters should be made to the Committee.

Attendance

Attendance is credited from the first session of the course. Candidates who register late incur absences for all sessions held prior to their registration.

Candidates are expected to be punctual, and to attend every session of the classes for which they are registered. It is not permissible to register for courses which cannot under normal conditions be reached at the time scheduled for the opening of the class.

Provision is made for unavoidable absence due to illness or authorized conferences by permitting two absences in a fifteen-session course, or four absences in a thirty-session course.

No credit will be granted for a course in which a candidate has incurred excess absences except that, where circumstances warrant, instructors may accept special assignments in lieu of one or two unavoidable absences. In no case will credit be granted if five absences have been incurred in a fifteen-session course.

If five absences occur prior to or by the midterm period, the instructor will forward a "W" grade to the Registrar. If the fifth absence occurs after the midterm period, the candidate must appeal to the School of Education Committee on Course and Standing in order to avoid the "F" grade.

Student Life and Services

Career Opportunities
The Office of Clinical Practice, Field Experiences, and Student Teaching regularly send emails with information about positions in local and out-of-town school systems.

Student Advisory Committee

This committee provides the opportunity for candidates to participate in standing committees of the School of Education. Its expanded aims include the conscientious desire to represent the point of view of education candidates on curriculum, policy, development and other matters of candidate interests. Candidates who wish to serve on the Committee should contact the Office of the Chairs (NA 6/207B).

Advisory Services
Members of the faculty assist candidates in choosing an appropriate curriculum and planning a program of study. They also conduct evaluation interviews for admission to the School of Education and to advanced education courses. Advisors are available throughout the year, except for intersession, the first three weeks and final examination weeks of each term. During registration, only immediate problems can be considered, since individual advisors may not be present. During the Summer session, limited advisory service is available. Advisory appointments are scheduled in the Office of Admissions & Student Services (NA 3/223A).

Education Club (Teachers of Tomorrow)
Teachers of Tomorrow offers candidates interested in teaching careers an opportunity to explore issues of common interest; to promote professional growth; to act as a service group to the School of Education, The City College, and the community; and to maintain dialogue with the faculty in matters relevant to teaching. Candidates who wish to join the club or serve as officers should contact the Director of the Learning and Technology Resource Center (NA 3/226).

Department of Teaching & Learning

Prof. Laura M. Gellert, Chair • Department Office: NA 6/207B • Tel: 212-650-5323

General Information

The Department of Teaching & Learning offers graduate programs leading to New York State initial and/or professional certification in art education, childhood education, early childhood education, educational theatre, English education, mathematics education, science education, social studies education, and Spanish education.

Initial certification programs are available at the graduate level for students with a baccalaureate degree. Professional certification programs leading to a master's degree are available to students who possess initial certification. Students already holding a master's degree in a content-related area may enroll in an advanced certificate program.

Students who are not seeking New York State certification may enroll in non-certification programs in art education, childhood education, early childhood education, and theater education.

Art Education (Pre-K-Grade 12), Master of Arts (M.A.)

The Art Education program serves graduate students who would like to teach in schools, museums, and community centers, as well as those who are currently practicing educators seeking professional development.

Initial Certification Program

This program is for graduate students seeking Initial Certification through New York State. Students in this program pursue a range of courses that prepare them for certification with New York in teaching art. This program is appropriate for anyone interested in teaching in community centers, museums, or other spaces for learning.

Required Courses

Take all the following

EDSE 4100E	Curriculum and Assessment in Art Education	4
EDSE 4200E	Identity, Community and Culture in Art Education	3
EDSE 4300F	Materials and Methods in Art Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
ARTE 3100A	Critical Perspectives in Art Education	3
ARTE 3100C	Community-Based Art Education	3
EDSE 7200I	Master's Project	3
EDSE 7800G	Student Teaching in Arts Education	4
	OR	
EDCE 7201G	Student/Supervised Teaching in the Arts P-6	2
	AND	
EDCE 7202G	Student/Supervised Teaching in the Arts 7-12	2
EDSE 7603G	Seminar on Student Teaching in	2

	Secondary Schools OR	
EDCE 7204G	Seminar in Teaching in the Arts P-6 AND	1
EDCE 7205G	Seminar in Teaching in the Arts 7-12	1
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

One of the Following Four Courses

EDUC 2100K	Developmental Issues in Early Childhood Education	3
EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7300A	Child Development	3
EDUC 7500A	Adolescent Learning and Development	3

One of the following four courses

EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 7500C	Emergent to Fluent Literacy	3
EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 1201E	Middle School Literacy	4

One of the following two courses

EDCE 4500K	Inclusive Practices for the Arts	3
SPED 5000K	Introduction to Inclusive Education	3

Art and Art Education

ARTE 3100A	Critical Perspectives in Art Education	3
ARTE 3100C	Community-Based Art Education	3

Subtotal: 41

Non-Certification Program

This program is for graduate students who do not wish to seek teaching certification.

Requirements Courses

EDSE 4100E	Curriculum and Assessment in Art Education	4
EDSE 4200E	Identity, Community and Culture in Art Education	3
EDSE 4300F	Materials and Methods in Art Education	4
ARTE 3100A	Critical Perspectives in Art Education	3
ARTE 3100C	Community-Based Art Education	3
ART B7500	Museum Education I	3
EDSE 7200I	Master's Project	3
	Four elective courses in Art or Education. Suggested Education electives include courses in literacy development, special education, bilingual education and TESOL, early childhood and/or adolescent development, and educational leadership. Courses will be selected under advisement.	12

Subtotal: 35

Professional Certification Program

This program is for graduate students who hold Initial Certification and are interested in deepening their understanding of art education.

Prerequisites:

Select from the following courses:

SPED 5000K	Introduction to Inclusive Education OR	3
EDCE 4500K	Inclusive Practices for the Arts AND	3
EDSE 1200E	Reading and Writing across the Curriculum OR	3
EDSE 1201E	Middle School Literacy OR	4
EDCE 1900C	Language and Literacy Development in Young Children OR	3
EDCE 7500C	Emergent to Fluent Literacy	3

Required Courses

Take all of the following

EDSE 4100E	Curriculum and Assessment in Art Education	4
EDSE 4200E	Identity, Community and Culture in Art Education	3
EDSE 4300F	Materials and Methods in Art Education	4
ARTE 3100A	Critical Perspectives in Art Education	3
ARTE 3100C	Community-Based Art Education	3

Content Electives (selected in consultation with an advisor): (9-12 credits)

EDSE 7200I	Master's Project	3

Subtotal: 32-35

Art Education (K-Grade 12), Advanced Certificate (Adv. Crt.)

Requirements

This non-degree program is for graduate students who hold a master's degree in Studio Art or Art History and are interested in teaching art.

Prerequisites

SPED 5000K	Introduction to Inclusive Education OR	3
EDCE 4500K	Inclusive Practices for the Arts AND	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education OR	3
EDUC 7200A	Psychology of Learning and Teaching OR	3
EDUC 7300A	Child Development OR	3
EDUC 7500A	Adolescent Learning and Development	3

Required Courses

EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
EDSE 4100E	Curriculum and Assessment in Art Education	4
EDSE 4300F	Materials and Methods in Art Education	4

Two of the following three courses

EDSE 4200E	Identity, Community and Culture in Art Education	3
ARTE 3100A	Critical Perspectives in Art Education	3
ARTE 3100C	Community-Based Art Education	3

One of the following two courses

EDCE 7500C	Emergent to Fluent Literacy	3
EDSE 1200E	Reading and Writing across the Curriculum	3

One of the following two student teaching course combinations

EDCE 7201G	Student/Supervised Teaching in the Arts P-6	2
EDCE 7202G	Student/Supervised Teaching in the Arts 7-12	2
EDCE 7204G	Seminar in Teaching in the Arts P-6	1
EDCE 7205G	Seminar in Teaching in the Arts 7-12	1
	OR	
EDSE 7800G	Student Teaching in Arts Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2

Childhood Education (Grades 1-6), Master of Science in Education (M.S.Ed)

The master's degree program in childhood education (grades 1-6) is designed to meet the needs of five distinct groups of graduate students: (A) students who have earned a bachelor's degree in a liberal arts or science area who wish to pursue initial certification as a teacher of childhood education (grades 1-6); (B) students who hold a teaching certification in an area other than childhood education, and seek initial certification in childhood education only; or (D) who seek both initial certification in childhood education and a master's degree; (C) students who have achieved initial teacher certification in childhood education (grades 1-6) and who wish to pursue professional certification as a childhood education teacher and a master's degree; and (E) students who are interested in earning a master's degree in childhood education, but without New York State certification.

Plan A. Initial Certification Program & Master's Program for Candidates without Certification

Plan A in the Childhood Education program is for graduate students who have earned a bachelor's degree in a liberal arts or science area, and who wish to pursue Initial Certification as a teacher of childhood education (grades 1-6) while also earning their master's degree.

Take one course from the following three options

EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
	OR	
EDUC 7200A	Psychology of Learning and Teaching	3
	OR	
EDUC 7300A	Child Development	3

Take one course from the following two options

EDCE 1800K	Family, Child and School	3
	OR	
EDCE 5700C	Education That Is Multicultural	3

Take all of the following courses

EDCE 7100A	Urban Schools in a Diverse Society	
EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6)	3
EDCE 3000F	Curriculum Development in Childhood Education	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3
EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 7510C	Literacy Strategies: From Birth to 6th grade	3

Take one course from the following three options

EDCE 4100C	Teaching Arts and Crafts in Childhood Education	3
	OR	
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
	OR	
EDCE 7100C	Creative Movement and Music in Childhood Education	3

Take the following research seminar sequence in the second half of your program

EDCE 2204I	Content Research Seminar in Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Take one course from the following two options as part of student teaching

EDCE 7401G	Student Teaching in Childhood Education I and Seminar	3
	OR	
EDCE 7403G	Supervised Teaching in Childhood Education I and Seminar	3

Take the following courses as part of student teaching and recommendation for certification

EDCE 7402G	Student Teaching in Childhood Education II and Seminar	3
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 40-46

Plan B. Initial Certification Program (No Master's) for Candidates Certified in Another Area

Prerequisites

EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6)	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
	OR	
EDUC 7200A	Psychology of Learning and Teaching	3
	OR	
EDUC 7300A	Child Development	3

Required Courses

EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 3000F	Curriculum Development in Childhood Education	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering	3

	Teaching Methods	
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3
EDCE 2100C	Teaching Social Studies in Childhood Education OR	3
EDUC 7200A	Psychology of Learning and Teaching OR	3
EDUC 7300A	Child Development	3

Take the following two courses as part of teaching practicum

EDCE 7603N	Practicum in Childhood Education (grades 1-6)	
EDCE 7402G	Student Teaching in Childhood Education II and Seminar	3

Subtotal: 18-27

Plan C. Professional Certification & Master's Program

Plan C in the childhood education program is for practicing teachers who have achieved initial teacher certification in childhood education (grades 1-6), and who wish to pursue professional teacher certification in childhood education while earning their master's degree.

Required Courses

Take one of the following two courses

EDCE 2000C	First and Second Language and Literacy Acquisition OR	3
EDCE 2700C	Literacy for Struggling Readers and Writers	3

Take one of the following two courses

EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6) OR	3
SPED 5000K	Introduction to Inclusive Education	3

Take all of the following courses

EDCE 7400F	Contemporary Problems and Issues in Childhood Education	3
EDCE 2300C	Social Studies Inquiry for Pre-K to 6 Teachers	3
EDCE 3200C	Science Inquiry for Pre-K to 6 Teachers	3
EDCE 6200C	Mathematics Inquiry for Pre-K to 6 Teachers	3
EDCE 3000F	Curriculum Development in Childhood Education	3

Take the following research seminar sequence in the second half of your program

EDCE 2204I	Content Research Seminar in Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Electives – Choose TWO courses (or other SOE graduate courses with permission from your advisor)

EDCE 5700C	Education That Is Multicultural	3
EDCE 7700A	Drama in Education	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 4500K	Inclusive Practices for the Arts	3

Total Credit Hours: 31

Plan D. Initial Certification Program & Master's Program for Candidates Certified in Another Area

This Plan D program is for graduate students who hold certification in an area other than childhood education, and seek both initial certification in childhood education and a master's degree.

Prerequisites

Complete one of the following three courses

EDCE 2100K	Development Issues in Early Childhood/Childhood Education OR	3
EDUC 7200A	Psychology of Learning and Teaching OR	3
EDUC 7300A	Child Development	3

Complete one of the following two courses

EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6) OR	3
SPED 5000K	Introduction to Inclusive Education	3

Required Courses

EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 3000F	Curriculum Development in Childhood Education	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3

Take the following research seminar sequence in the second half of your program

EDCE 2204I	Content Research Seminar in Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Take the following two courses as part of teaching practicum

EDCE 7603N	Practicum in Childhood Education (grades 1-6)	
EDCE 7402G	Student Teaching in Childhood Education II and Seminar	3

Total Credit Hours: 31

Plan E. Non-Certification Master's Program

Plan E in the Childhood Education program is for graduate students who want to earn a master's degree in Childhood Education, but who are not interested in getting certified as a classroom teacher by the state of New York.

Required Courses

Prerequisites

EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3

	OR	
EDUC 7300A	Child Development	3
	AND	
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3

Required Courses

EDCE 7100A	Urban Schools in a Diverse Society	
EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6)	3
	OR	
SPED 5000K	Introduction to Inclusive Education	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 4100C	Teaching Arts and Crafts in Childhood Education	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
EDCE 7100C	Creative Movement and Music in Childhood Education	3

Take the following research seminar sequence in the second half of your program

EDCE 2204I	Content Research Seminar in Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Subtotal: 31

Total Credit Hours: 31

Childhood Education (Grades 1-6), Advanced Certificate (Adv.Crt.)

This non-degree program is for graduate students who already have New York State teaching certification and hold a master's degree.

Prerequisites

Prerequisites

EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7300A	Child Development	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 2900F	Inclusive Practices for the General Education Classroom (Grades 1-6)	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3

Required Courses

EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 7510C	Literacy Strategies: From Birth to 6th grade	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3
EDCE 3000F	Curriculum Development in Childhood Education	3
EDCE 7402G	Student Teaching in Childhood Education II and Seminar	3

Total Credit Hours: 18-27

Early Childhood Education (Birth-Grade 2), Master of Science in Education (M.S.Ed)

The graduate program in early childhood education prepares teachers to meet national standards of excellence in teaching by supporting children's understandings of the world through inquiry and active learning. The program emphasizes deep knowledge of human development, learning processes, instructional strategies, and subject matter. All courses use technology and focus on how teaching, learning, and assessment connect. Special attention is given to how issues of diversity—of culture, language, family, and learning styles—can best be used to positively impact schools and schooling in urban settings. Both the initial and professional programs are designed to meet the New York State Education Department requirements for certification in early childhood education (birth-grade 2).

Initial Certification Program

This program is for graduate students who have earned a bachelor's degree in an area other than education and do not possess initial certification in early child-hood education at the time of entry into the program. Up to nine credits can be waived at discretion of the advisor for equivalent coursework at the graduate or undergraduate level.

Required Courses

EDUC 7100A	Urban Schools in a Diverse Society	3
	OR	
EDCE 7300F	Contemporary Problems and Issues in Early Childhood Education	3
EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7250C	Curriculum Development in ECE	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 4200C	Educating Young Children with Special Needs	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 2101C	Social Studies in the Early Childhood Curriculum	3
EDCE 3300C	How Young Children Learn Science: Implications for Teaching	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3

One of the following two

EDCE 1800K	Family, Child and School	3
	OR	
EDCE 5700C	Education That Is Multicultural	3

One of the following three

EDCE 4300C	Art and Expressive Activities in Early Childhood Education	3
	OR	
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
	OR	
EDCE 7300C	Young Children's Education in Diverse Non-School Settings	3

One of the following options

EDCE 7301G	Student Teaching and Seminar in Early Childhood Education I	3
EDCE 7302G	Student Teaching and Seminar in	3

	Early Childhood Education II OR	
EDCE 7301G	Student Teaching and Seminar in Early Childhood Education I	3
EDCE 7303G	Supervised Teaching and Seminar in Early Childhood Education AND	3
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Take the following courses

EDCE 2202I	Content Research Seminar in Early Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Subtotal: 40-49

Professional Certification Program

This program is for graduate students who already possess Initial Certification in Early Childhood Education. It emphasizes ongoing inquiry and learning and the evolving nature of the professional teacher.

Required Courses

EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7250C	Curriculum Development in ECE	3
EDCE 7300F	Contemporary Problems and Issues in Early Childhood Education	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 4200C	Educating Young Children with Special Needs	3

One of the following three

EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 2000C	First and Second Language and Literacy Acquisition	3
EDCE 2700C	Literacy for Struggling Readers and Writers	3

One of the following two

EDCE 2101C	Social Studies in the Early Childhood Curriculum	3
EDCE 2300C	Social Studies Inquiry for Pre-K to 6 Teachers	3

One of the following two

EDCE 3200C	Science Inquiry for Pre-K to 6 Teachers	3
EDCE 3300C	How Young Children Learn Science: Implications for Teaching	3

One of the following two

EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3
EDCE 6200C	Mathematics Inquiry for Pre-K to 6 Teachers	3

Take the following courses

EDCE 2202I	Content Research Seminar in Early Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Subtotal: 31-34

Initial Certification Program for Candidates Certified in Childhood Education or a Related Area

Required Courses

EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7250C	Curriculum Development in ECE	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 2101C	Social Studies in the Early Childhood Curriculum	3
EDCE 3300C	How Young Children Learn Science: Implications for Teaching	3
EDCE 4200C	Educating Young Children with Special Needs	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3

Core Courses

EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7250C	Curriculum Development in ECE	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 2101C	Social Studies in the Early Childhood Curriculum	3
EDCE 3300C	How Young Children Learn Science: Implications for Teaching	3
EDCE 4200C	Educating Young Children with Special Needs	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3

One of the following three

EDCE 4300C	Art and Expressive Activities in Early Childhood Education	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
EDCE 7300C	Young Children's Education in Diverse Non-School Settings	3

Student Teaching/Supervised Teaching (in the range of grades for which the candidate has no prior experience):

One of the following two

EDCE 7301G	Student Teaching and Seminar in Early Childhood Education I	3
EDCE 7303G	Supervised Teaching and Seminar in Early Childhood Education	3

Research

EDCE 2202I	Content Research Seminar in Early Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Subtotal: 34-37

Non-Certification Program

This program is for graduate students interested in learning about how to support the learning and development of young children but who do not want to get certified as a teacher in New York State.

Required Courses

EDUC 7100A	Urban Schools in a Diverse Society OR	3
EDCE 7300F	Contemporary Problems and Issues in Early Childhood Education	3
EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7250C	Curriculum Development in ECE	3
EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 2101C	Social Studies in the Early Childhood Curriculum	3
EDCE 4200C	Educating Young Children with Special Needs	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3

One of the following three

EDCE 2100K	Development Issues in Early Childhood/Childhood Education	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDUC 7300A	Child Development	3

ELECTIVES: (3) credits of electives or any other courses by advisement

EDCE 7500C	Emergent to Fluent Literacy	3
EDCE 3300C	How Young Children Learn Science: Implications for Teaching	3
EDCE 4300C	Art and Expressive Activities in Early Childhood Education	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
EDCE 7300C	Young Children's Education in Diverse Non-School Settings	3
EDCE 2202I	Content Research Seminar in Early Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Take the following courses

EDCE 2202I	Content Research Seminar in Early Childhood Education	2
EDCE 2900I	Seminar in Educational Research II	2

Subtotal: 31

Educational Theatre (Pre-K - Grade 12), Master of Science in Education (M.S.Ed)

The program endeavors to prepare graduate students to do work that both enriches participants' lives and provides them with the skills necessary to realize performances. The program will provide students with the training, knowledge, skills and dispositions needed to be successful as: theatre classroom teachers (grades PreK-12), classroom teachers who desire to integrate theatre into their curriculum for content knowledge and literacy development, teaching artists and theatre resource personnel working out of professional theatres and cultural arts institutes.

Initial Certification Program

Required Courses

EDCE 7700A	Drama in Education	3
EDCE 7600C	Fluent to Experienced Literacy	3
EDCE 7601A	Artistic Lab II	0
EDCE 3600C	Theatre/Performance For Young Audiences K - 12	3
EDCE 4500C	Fundamentals of Teaching Technical Theatre	
EDCE 7800A	Exploring the History of Theatre	3
EDCE 7100A	Urban Schools in a Diverse Society	
EDCE 3100F	Curriculum Development in Educational Theatre	
EDCE 7400C	Teaching Literacy Through Drama	3
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
EDCE 2206I	Content Research Seminar in Educational Theatre	2
EDCE 2900I	Seminar in Educational Research II	2
EDCE 7201G	Student/Supervised Teaching in the Arts P-6	2
EDCE 7202G	Student/Supervised Teaching in the Arts 7-12	2
EDCE 7204G	Seminar in Teaching in the Arts P-6	1
EDCE 7205G	Seminar in Teaching in the Arts 7-12	1
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3

EDCE 7700A: must be taken during the first semester of enrollment in program coursework.
EDCE 7600A: must be taken in conjunction with Drama in Education.
EDCE 7601A: must be taken in conjunction with EDCE 2900I.

Choose One Applied Theatre Course

EDCE 7500F	Special Topics in Educational Theatre	1
EDCE 4600C	Applied Theatre	3
EDCE 7600F	Conflict Resolution Through Theatre	
EDCE 7900A	Devising Theatre K-12	3
EDCE 4100F	Dvlpng Art Crrclm Ntrd Sttngs	3

Choose One Human Development and Learning Course

EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7300A	Child Development	3
EDUC 7500A	Adolescent Learning and Development	3
EDUC 2100K	Developmental Issues in Early Childhood Education	3

Choose One Disabilities Course

EDCE 4500K	Inclusive Practices for the Arts	3
SPED 5000K	Introduction to Inclusive Education	3

Subtotal: 37-46

Initial Certification Program for Candidates Certified in Another Area

This program is for graduate students who hold initial teacher certification in a subject area other than Theatre. This sequence of courses will lead to professional certification in the area of their initial certification, and initial certification in Theatre.

Choose One Combination of Two Student Teaching Courses

EDCE 7201G	Student/Supervised Teaching in the Arts P-6 AND	2
EDCE 7204G	Seminar in Teaching in the Arts P-6 OR	1

EDCE 7202G	Student/Supervised Teaching in the Arts 7-12 AND	2
EDCE 7205G	Seminar in Teaching in the Arts 7-12	1

Required Courses

EDCE 7700A	Drama in Education	3
EDCE 7600A	Artistic Lab I	0
EDCE 7601A	Artistic Lab II	0
EDCE 3600C	Theatre/Performance For Young Audiences K - 12	3
EDCE 3700C	Fundamentals of Teaching Theatre	3
EDCE 4500C	Fundamentals of Teaching Technical Theatre	
EDCE 7800A	Exploring the History of Theatre	3
EDCE 3100F	Curriculum Development in Educational Theatre	
EDCE 2206I	Content Research Seminar in Educational Theatre	2
EDCE 2900I	Seminar in Educational Research II	2
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3

EDCE 7700A: must be taken during the first semester of enrollment in program coursework.
EDCE 7600A: must be taken in conjunction with Drama in Education.
EDCE 7601A: must be taken in conjunction with EDCE 2900I.

Choose Two Applied Theatre Courses

EDCE 7500F	Special Topics in Educational Theatre	1
EDCE 4600C	Applied Theatre	3
EDCE 7600F	Conflict Resolution Through Theatre	
EDCE 7900A	Devising Theatre K-12	3
EDCE 4100F	Dvlpng Art Crrclm Ntrd Sttngs	3
EDCE 4500K	Inclusive Practices for the Arts	3
SPED 5000K	Introduction to Inclusive Education	3
EDCE 7400C	Teaching Literacy Through Drama	3

EDCE 4500K, SPED 5000K: Candidates without a comparable Special Education course from their previous certification must select either EDCE 4500K or SPED 5000K in this category to fulfill state requirements.

Subtotal: 34

Professional Certification Program

This program is for graduate students who hold initial certification in Theatre and have three years teaching experience. This sequence of courses will provide requisite advanced coursework in Educational Theatre and all requisite content pedagogy courses for professional certification.

Required Courses

EDCE 7700A	Drama in Education	3
EDCE 7600A	Artistic Lab I	0
EDCE 7601A	Artistic Lab II	0
EDCE 3600C	Theatre/Performance For Young Audiences K - 12	3
EDCE 7203G	Capstone Field Experience in Educational Theatre	3
EDCE 2206I	Content Research Seminar in Educational Theatre	2
EDCE 2900I	Seminar in Educational Research II	2
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3

EDCE 7700A: must be taken during the first semester of enrollment in program coursework.
EDCE 7600A: must be taken in conjunction with Drama in Education.
EDCE 7601A: must be taken in conjunction with EDCE 2900I.

Choose One Production Course

EDCE 3700C	Fundamentals of Teaching Theatre	3
EDCE 4500C	Fundamentals of Teaching Technical Theatre	
EDCE 7800A	Exploring the History of Theatre	3

Choose Three Applied Theatre Courses

EDCE 7500F	Special Topics in Educational Theatre	1
EDCE 4600C	Applied Theatre	3
EDCE 7600F	Conflict Resolution Through Theatre	
EDCE 4500K	Inclusive Practices for the Arts	3
EDCE 7400C	Teaching Literacy Through Drama	3
EDCE 7800A	Exploring the History of Theatre	3

Subtotal: 31

Non-Certification Program

This program is for graduate students who do not wish to obtain certification in Theatre. This sequence of courses will provide advanced coursework in Educational Theatre and all requisite content pedagogy courses for a master's level program. Students in this program will be prepared to work as teaching artists, in higher education, after school programs, community -based organizations, or other related arts field and non-profit organizations.

Required Courses

EDCE 7700A	Drama in Education	3
EDCE 7600A	Artistic Lab I	0
EDCE 7601A	Artistic Lab II	0
EDCE 3600C	Theatre/Performance For Young Audiences K - 12	3
EDCE 4100F	Dvlpng Art Crrclm Ntrd Sttngs	3
EDCE 2206I	Content Research Seminar in Educational Theatre	2
EDCE 2900I	Seminar in Educational Research II	2
EDCE 4500K	Inclusive Practices for the Arts	3
EDCE 7203G	Capstone Field Experience in Educational Theatre	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3

EDCE 7700A: Required to take First Semester of Coursework.
EDCE 7600A: must be taken in conjunction with Drama in Education.
EDCE 7601A: must be taken in conjunction with 7204G.

Choose one Production Course

EDCE 3700C	Fundamentals of Teaching Theatre	3
EDCE 7900A	Devising Theatre K-12	3
EDCE 4500C	Fundamentals of Teaching Technical Theatre	

Choose one of the following

EDCE 7500F	Special Topics in Educational Theatre	1
EDCE 4600C	Applied Theatre	3
EDCE 7600F	Conflict Resolution Through Theatre	

Choose two electives

	Elective	3
	Elective	3

Subtotal: 34

Educational Theatre (Pre-K - Grade 12), Advanced Certificate (Adv. Crt.)

This is a non-degree program for graduate students who are currently enrolled in or have completed the M.A. in Applied Theatre at Creative Arts Team (CAT)/School of Professional Studies (SPS) CUNY or an equivalent degree, who wish to be initially certified in Theatre, or for those who hold an MFA in theatre performance or related area.

Prerequisite:

EDCE 9700C: Fundamentals of Teaching Theatre

Required Courses

Requirements List

EDUC 7100A	Urban Schools in a Diverse Society	3
EDCE 3100F	Curriculum Development in Educational Theatre	
EDCE 7201G	Student/Supervised Teaching in the Arts P-6	2
	AND	
EDCE 7204G	Seminar in Teaching in the Arts P-6	1
EDCE 7202G	Student/Supervised Teaching in the Arts 7-12	2
	AND	
EDCE 7205G	Seminar in Teaching in the Arts 7-12	1
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
EDCE 7400C	Teaching Literacy Through Drama	3
EDCE 7601A	Artistic Lab II	0

EDCE 7601A: must be taken in conjunction with Seminar in Educational Theatre.

Choose One Human Development and Learning Course

Required Courses

EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7300A	Child Development	3
EDUC 7500A	Adolescent Learning and Development	3
EDUC 2100K	Developmental Issues in Early Childhood Education	3

Choose One Disabilities Course

Required Courses

EDCE 4500K	Inclusive Practices for the Arts	3
SPED 5000K	Introduction to Inclusive Education	3

Total Credit Hours: 9-21

Middle School Mathematics Education (Grades 5-9), Master of Science in Education (M.S.Ed.)

Initial Certification Program

This program is for graduate students who have completed 15 credit hours of mathematics, including a course in calculus, and are interested in teaching mathematics in grades 5-9.

Required Courses Education

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1201E	Middle School Literacy	4
EDSE 6100E	Teaching Mathematics in Middle and Secondary Schools	4
EDSE 6400E	Curriculum, Instruction, and Assessment in Middle and Secondary School Mathematics	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Required Mathemeatics Courses

MATHE 4600C	Introduction to Mathematical Thinking	3
MATHE 4700C	Modeling with Algebraic and Trigonometric Functions	3
MATHE 4800C	Foundations of Geometry	3
MATHE 4900C	Fundamental Ideas of Calculus	3
MATHE 1000E	The History of Mathematics	3

Research Course(s): (3-4 credits)

EDUC 7000I	Introduction to Educational Research	2
	AND	
EDUC 7100I	Individual Study in Educational Research	2
	OR	
EDSE 7200I	Master's Project	3
	OR	
EDSE 7201I	Action Research in Mathematics Education	3

Subtotal: 44-45

Professional Certification Program

This program is for graduate students holding Initial Certification in Middle School Mathematics Education and are interested in receiving a Master's degree with Professional Certification. It is also a program for students who have at least 15 credits in College Mathematics including Calculus and hold Initial Certification in areas other than Middle School Mathematics, and receiving Initial and Professional Certification in Middle School Mathematics Education (Grades 5-9).

Required Courses

Education

EDSE 6401E	Curriculum, Instruction, and Assessment in Mathematics Education	3
EDSE 2700E	Middle and Secondary School Mathematics: Teaching Developmentally	3

Mathematics Education

MATHE 4600C	Introduction to Mathematical Thinking	3
MATHE 4700C	Modeling with Algebraic and Trigonometric Functions	3
MATHE 4800C	Foundations of Geometry	3

MATHE 4900C	Fundamental Ideas of Calculus	3

Two of the following courses (selected in consultation with an advisor)

Mathematics and Education Electives

Candidates who have not completed a course equivalent to SPED 5000K must complete it as one of the electives. (3 credits)

EDSE 6300E	Enriching the Teaching of Secondary School Mathematics	3
EDSE 6600E	Strategies for Using Computers in the Mathematics Classroom	3
MATHE 1000E	The History of Mathematics	3
MATHE 5000C	Data Analysis, Probability and Statistics	3
SPED 5000K	Introduction to Inclusive Education	3

Research Course(s)

EDUC 7000I	Introduction to Educational Research	2
	AND	
EDUC 7100I	Individual Study in Educational Research	2
	OR	
EDSE 7200I	Master's Project	3
	OR	
EDSE 7201I	Action Research in Mathematics Education	3

Subtotal: 30-31

Middle School Science Education (Grades 5-9), Master of Science in Education (M.S.Ed.)

Initial Certification Program

Required Courses

Education

EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
EDSE 1201E	Middle School Literacy	4
EDSE 3101E	Teaching Science in Middle Schools	4
EDSE 3105E	Adolescent Learning of Science	1
EDSE 3900I	Curriculum and Instruction in Science Education	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Three of the following four courses

SCIE 1403E	Physical Sciences for Middle School Teachers I	4
SCIE 1404E	Physical Sciences for Middle School Teachers II	4
SCIE 4101E	Life Science for Middle School Teachers I	4
SCIE 4102E	Life Science for Middle School Teachers II	4
SCIE 4103E	Science Across Contexts	3
	Science electives (selected in consultation with an advisor; depend on your area of specialization)	6

Science

SCIE 4103E	Science Across Contexts	3
	Science electives (selected in consultation with an advisor; depend on your area of specialization)	6

Research Course

EDSE 7202I	Master's Project in Science Education	3

Subtotal: 48

Professional Certification Program

This program is for students who have at least 8 credits in science, hold Initial Certification in any area, and are interested in teaching science in grades 5-9.

Required Courses

Education

EDSE 3101E	Teaching Science in Middle Schools	4
EDSE 3900I	Curriculum and Instruction in Science Education	4

Science

SCIE 4103E	Science Across Contexts	3
	Science electives (selected in consultation with an advisor; depend on your area of specialization)	6

Three of the following four courses

SCIE 1403E	Physical Sciences for Middle School Teachers I	4
SCIE 1404E	Physical Sciences for Middle School Teachers II	4
SCIE 4101E	Life Science for Middle School Teachers I	4
SCIE 4102E	Life Science for Middle School Teachers II	4

Research Course

EDSE 7202I	Master's Project in Science Education	3

Subtotal: 32

Secondary English Education (Grades 7-12), Master of Arts (M.A.)

The Secondary English Education program serves both students who want to become middle or high school English teachers and those students who are currently practicing educators interested in meaningful professional development.

Initial Certification Program

Required Courses

Education

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1100E	Methods of Teaching English in Secondary Schools	4
EDSE 7300E	Curriculum Development in	4

	Secondary School English	
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Research Course

EDSE 7200I	Master's Project	3

English Education

EDSE 1202E	Teaching Reading in the Secondary School English Classroom	3
EDSE 1500E	Teaching Writing in Secondary Schools	3
ENGLE 4400E	Structure and Growth of the English Language	3
	Content pedagogy electives with advisor's approval	9

Subtotal: 43

Professional Certification Program

This program is for graduate students with a strong background in Education or English Education and who currently hold Initial Certification to teach Secondary English.

Required Courses

Education

EDSE 7300E	Curriculum Development in Secondary School English	4
SPED 5000K	Introduction to Inclusive Education	3

English Education

EDSE 1202E	Teaching Reading in the Secondary School English Classroom	3
EDSE 1500E	Teaching Writing in Secondary Schools	3
ENGLE 4400E	Structure and Growth of the English Language	3
	Content pedagogy electives with advisor's approval	6
	English electives	6

Research Course

EDSE 7200I	Master's Project	3

Subtotal: 31

Secondary English Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

This non-degree program is restricted to graduate students with both an undergraduate and advanced degree in English or Rhetoric & Composition.

Required Courses

Take all of the following

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7300E	Curriculum Development in Secondary School English	4
EDSE 1100E	Methods of Teaching English in Secondary Schools	4
EDSE 1202E	Teaching Reading in the Secondary School English Classroom	3
EDSE 1500E	Teaching Writing in Secondary Schools	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 28

Secondary Mathematics Education (Grades 7-12), Master of Arts (M.A.)

The Secondary Mathematics Education program serves both students who want to become middle or high school mathematics teachers and those students who are currently practicing educators interested in meaningful professional development.

Initial Certification Program

Required Courses

Education

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 6100E	Teaching Mathematics in Middle and Secondary Schools	4
EDSE 6400E	Curriculum, Instruction, and Assessment in Middle and Secondary School Mathematics	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
MATHE 1000E	The History of Mathematics	3
MATHE 6000C	High School Mathematics from an Advanced Perspective	3

Two of the following courses

EDSE 2700E	Middle and Secondary School Mathematics: Teaching Developmentally	3
EDSE 6200E	Teaching Problem-Solving Strategies in Mathematics	3
EDSE 6600E	Strategies for Using Computers in the Mathematics Classroom	3
EDSE 6900E	The Teaching of Calculus	3
MATHE 7400E	Foundations of Geometry	3

MATHE 7700E	Modern Algebra	3

Research Course(s)

EDUC 7000I	Introduction to Educational Research	2
EDUC 7100I	Individual Study in Educational Research	2
EDSE 7200I	Master's Project	3
EDSE 7201I	Action Research in Mathematics Education	3

Miscellaneous

Research Course(s) (3-4 credits)

Subtotal: 40-41

Professional Certification Program

This program is for graduate students who hold Initial Certification to teach mathematics in grades 7-12.

Required Courses

Education

EDSE 6401E	Curriculum, Instruction, and Assessment in Mathematics Education	3
SPED 5000K	Introduction to Inclusive Education	3

Five of the following courses (selected in consultation with an advisor; with a minimum of 2 from the MATHE category)

EDSE 2700E	Middle and Secondary School Mathematics: Teaching Developmentally	3
EDSE 6200E	Teaching Problem-Solving Strategies in Mathematics	3
EDSE 6300E	Enriching the Teaching of Secondary School Mathematics	3
EDSE 6600E	Strategies for Using Computers in the Mathematics Classroom	3
EDSE 6900E	The Teaching of Calculus	3

Algebra

MATHE 2600E	Linear Algebra	3
MATHE 2900E	Topics in Higher Algebra	3
MATHE 7700E	Modern Algebra	3

Geometry

MATHE 7400E	Foundations of Geometry	3
MATHE 7800E	Transformational Geometry	3
MATHE 1100E	Advanced Euclidean Geometry	3

Discrete Mathematics

MATHE 7700E	Modern Algebra	3
MATHE 2100E	Probability	3
MATHE 2200E	Mathematical Statistics	3

Analysis

MATHE 7500E	Classic Applications of Calculus I	3
MATHE 7600E	Classic Applications of Calculus II	3
MATHE 2800E	Numerical Analysis	3

Miscellaneous

MATHE 2700E	The Theory of Numbers	3
MATHE 3700E	Topology	3
MATHE 6000C	High School Mathematics from an Advanced Perspective	3
MATHE 6500C	Mathematical Applications in Science and Industry	3
MATHE 3200F	Indpt Study Resrch Math	1-3
	Two elective courses (selected in consultation with an advisor)	6

Research Course(s): (3-4 credits)

EDUC 7000I	Introduction to Educational Research	2
	AND	
EDUC 7100I	Individual Study in Educational Research	2
	OR	
EDSE 7200I	Master's Project	3
	OR	
EDSE 7201I	Action Research in Mathematics Education	3

Subtotal: 30-31

Secondary Mathematics Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

Required Courses

This non-degree program is for graduate students who hold an undergraduate degree in Mathematics (or its equivalent) and a master's degree in Mathematics, Statistics, Actuarial Science, or Computer Science.

Courses

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 6100E	Teaching Mathematics in Middle and Secondary Schools	4
EDSE 6400E	Curriculum, Instruction, and Assessment in Middle and Secondary School Mathematics	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2

Subtotal: 25

Secondary Science Education (Grades 7-12), Master of Arts (M.A.)

The Secondary Science Education program serves both students who want to become Biology, Chemistry, Earth Science, and Physics teachers, and those students who are currently practicing educators interested in meaningful professional development.

Initial Certification Program

This program is for graduate students with a background in Science but without any certification or master's degree.

Required Courses

Education

EDSE 1200E	Reading and Writing across the Curriculum	3
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students	0

	Act (DASA), and Other Professional Topics	
EDSE 3100E	Methods of Teaching Science	4
EDSE 3105E	Adolescent Learning of Science	1
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
EDSE 3900I	Curriculum and Instruction in Science Education	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2

Six graduate credits in required science courses (depending on your area of specialization) and six additional graduate credits in science (selected in consultation with an advisor) (12 credits)

Research Course

EDSE 7202I	Master's Project in Science Education	3

Subtotal: 38

Professional Certification Program

This program is for graduate students who are currently practicing educators interested in improving their pedagogical and content knowledge related to Science.

Required Courses

Education

EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 3100E	Methods of Teaching Science	4
	Nine graduate credits in science education plus six graduate credits in science	15
	Six additional graduate credits in science or education (selected in consultation with an advisor; depend on your area of specialization)	6

Research Course

EDSE 7202I	Master's Project in Science Education	3

Subtotal: 31

Secondary Science Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

This non-degree program is primarily intended for graduate students with a graduate degree in Science and who are seeking Initial Certification.

Requirements

Required Courses

EDSE 1200E	Reading and Writing across the Curriculum	3
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
EDSE 3100E	Methods of Teaching Science	4
EDSE 3105E	Adolescent Learning of Science	1
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDSE 3900I	Curriculum and Instruction in Science Education	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4

Subtotal: 23

Secondary Social Studies Education (Grades 7-12), Master of Arts (M.A.)

The Secondary Social Studies Education program serves both students who want to become middle or high school social studies teachers and those students who are currently practicing educators interested in meaningful professional development.

Initial Certification Program

This program is for graduate students holding a B.A. in History or who have majored in the Social Sciences, with a minimum of 21 credits in History.

Take all of the following

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 2100E	Teaching Social Studies in Secondary Schools	4
EDSE 2300E	Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary Schools	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0
	Graduate courses offered in history, economics, political science, anthropology, sociology or content-pedagogy linked courses in social studies, with advisor's approval	12

Research

One of the following: (3-4 credits)

EDSE 7200I	Master's Project OR	3
EDUC 7000I	Introduction to Educational Research	2
EDUC 7100I	Individual Study in Educational Research	2

Education content-pedagogy linked courses may be substituted for required liberal arts and social science courses with the advisor's approval.

Subtotal: 40-41

Professional Certification Program

This program is for graduate candidates who possess New York State Initial Certification.

Required Courses

Take all of the following

EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 2300E	Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary Schools	4
SPED 5000K	Introduction to Inclusive Education	3
	OR	
SPED 3300K	Building Community in Inclusive Contexts	3
	OR	
SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
	Elective Courses	6
	Graduate courses offered in history, economics, political science, anthropology, sociology or content-pedagogy linked courses in social studies, with advisor's approval.	21

SPED 5000K: For students who do not have the equivalent of a state approved inclusive education class.

Research Courses

EDSE 7200I	Master's Project	3
	OR	
EDUC 7000I	Introduction to Educational Research	2
EDUC 7100I	Individual Study in Educational Research	2

Education Electives

Choose two courses, under advisement, from within the School of Education.

Content Electives

Choose four courses, under advisement, in history or social science.

Subtotal: 31-32

Secondary Social Studies Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students who hold an M.A. in one of the social science disciplines, have a minimum of 21 credits in History, either at the undergraduate or graduate level, and are seeking Initial Certification.

Required Courses

Take all of the following

EDUC 7500A	Adolescent Learning and Development	3
EDSE 7600A	Issues for Secondary School Teachers: Second Language Acquisition and Literacy	2
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 2100E	Teaching Social Studies in Secondary Schools	4
EDSE 2300E	Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary Schools	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 25

Secondary Spanish Education (Grades 7-12), Master of Science in Education (M.S.Ed)

The Spanish Education Program serves graduate students with an undergraduate degree in Spanish or another field and candidates who are currently practicing educators interested in meaningful professional development. It focuses on the teaching of Spanish as a non-native, native, and heritage language.

Initial Certification Program

This program is for graduate students with a B.A. in Spanish.

Required Courses

Education

EDUC 7500A	Adolescent Learning and Development	3
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1104E	Methods of Teaching Spanish in Secondary Schools	4
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Spanish

	One Spanish linguistics graduate course	3
	One Spanish literature graduate course	3

Research Course

EDSE 7200I	Master's Project	3

Subtotal: 38

Initial Certification for Candidates Certified in Another Area

This program is for graduate students who hold New York State certification in an area other than Spanish and wish to teach Spanish in grades 7-12.

Required Courses

Education

SPED 5000K	Introduction to Inclusive Education	3
EDSE 1104E	Methods of Teaching Spanish in Secondary Schools	4
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4

Spanish

	Two Spanish linguistics graduate courses	6
	Three Spanish literature graduate courses	9

Research Course

EDSE 7200I	Master's Project	3

Subtotal: 38

Initial Certification for Candidates with a B.A. in a Field other than Spanish

This program is for graduate students with an undergraduate degree in an area other than Spanish with a minimum of 15 upper-level credits in Spanish (including a Spanish grammar course and a Spanish composition course).

Required Courses

Education

EDUC 7500A	Adolescent Learning and Development	3
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1104E	Methods of Teaching Spanish in Secondary Schools	4
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Spanish

	Two Spanish linguistics graduate courses	6
	Three Spanish literature graduate courses	9

Research Course

EDSE 7200I	Master's Project	3

Subtotal: 47

Professional Certification Program

This program is for graduate students who hold 7-12 Spanish Initial Certification and are seeking meaningful professional development opportunities.

Required Courses

Take all of the following

EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4
EDCE 5800C	Theories of Second Language Acquisition	3

One of the following four courses

EDSE 1200E	Reading and Writing across the Curriculum	3
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDCE 2000C	First and Second Language and Literacy Acquisition	3
EDCE 2700C	Literacy for Struggling Readers and Writers	3

One of the following three courses

EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3

One of the following two courses

SPED 5000K	Introduction to Inclusive Education	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3

Spanish

	Two Spanish linguistics graduate courses	6
	One Spanish literature graduate course	3

Research Course

EDSE 7200I	Master's Project	3

Subtotal: 34

Transitional B Certificate Program for New York City Teaching Fellows

This program is restricted to graduate students who have been accepted to the New York City Teaching Fellows Program.

Required Courses

EDUC 7500A	Adolescent Learning and Development	3
EDSE 1104E	Methods of Teaching Spanish in Secondary Schools	4
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
SPED 5000K	Introduction to Inclusive Education	3
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDUC 1200N	Workshops on Use of Data and Technology	1
EDUC 1300N	Workshops on Differentiated Instruction and Assessment	1
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3

Subtotal: 32

Secondary Spanish Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students with a post-baccalaureate degree in Spanish, Hispanic Linguistics, or other related fields.

Prerequisites

Prerequisites

EDUC 7500A	Adolescent Learning and Development	3
SPED 5000K	Introduction to Inclusive Education	3

Required Courses

EDSE 1104E	Methods of Teaching Spanish in Secondary Schools	4
EDSE 1204E	The Teaching of Reading and Writing across the Curriculum in Spanish in Secondary Schools	3
EDSE 1304E	The Teaching of Spanish to Heritage Language Learners in Secondary Schools	3
EDSE 6804E	Spanish Grammar and its Pedagogy	3
EDSE 7304E	Curriculum Development in Secondary Spanish	4
EDSE 7600G	Student Teaching in Middle and Secondary Education	4
EDSE 7603G	Seminar on Student Teaching in Secondary Schools	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 23-29

Teaching Young Children with Special Needs (Birth-Grade 2) for Childhood Special Education Certified Teachers, Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students with New York State certification in Students with Disabilities, Grades 1-6.

Requirements

Required Courses

EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3
EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7306G	Supervised Practicum and Seminar in Early Childhood Special Education	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education OR	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 4700K	Early Intervention for Infants and Toddlers with Special Needs	3

Subtotal: 18

Teaching Young Children with Special Needs (Birth-Grade 2) for Early Childhood, Childhood, and Bilingual Education Certified Teachers, Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students with New York State certification in Early Childhood Education, Childhood Education, and/or Bilingual Education.

Requirements

Required Courses

EDCE 4200C	Educating Young Children with Special Needs	3
SPED 4600A	Foundations in Early Childhood Special Education	3
SPED 7306G	Supervised Practicum and Seminar in Early Childhood Special Education	3
SPED 4700K	Early Intervention for Infants and Toddlers with Special Needs	3
SPED 4800K	Managing the Environment for Young Children with Special Needs	3
SPED 4900K	Assessment of Young Children with Special Needs: B-2nd grade	3

Subtotal: 18

Faculty

Megan Blumenreich, Professor
B.A., Colby College; M.A., Teachers College, Columbia Univ., Ed.M., Ed.D.

Randy Brozen, Lecturer
B.S., Empire State College, SUNY; MFA, City College, CUNY

Nancy Cardwell, Assistant Professor
B.A., St. John's University; M.S., Bank Street College of Education; Ed.M., Harvard University, Graduate School of Education; Ph.D., The Graduate Center, City University of New York

David Crismond, Associate Professor
B.A., Rutgers College, Ed.M.; Massachusetts Institute of Technology, M.S.; Harvard Graduate School of Education, Ed.M., Ed.D.

Elizabeth Dunn-Ruiz,

Shira Eve Epstein, Associate Professor
B.A., Rutgers College, Rutgers Univ.; M.A., Teachers College, Columbia Univ., Ed.D.

Beverly Falk, Professor
B.A., Sarah Lawrence College; M.S.Ed, The City College; Ed.D., Teachers College, Columbia Univ.

Catherine Franklin, Associate Professor
B.A., Univ. of Rhode Island; M.A., Leslie College Graduate School; Ed. D., Teachers College, Columbia Univ.

Laura Gellert, Associate Professor
A.B., Bryn Mawr College; M.S., New York Univ.; Ph.D., The Graduate Center, CUNY

Amita Gupta, Professor
B.Ed., Univ. of Delhi, B.Sc.; M.A., Columbia Univ.; Ed.D., Teachers College, Columbia Univ.

Sobha Kavanakudiyil, Lecturer
B.A., Fordham University; M.A., New York University

Edwin M. Lamboy, Associate Professor
B.A., Universidad de Puerto Rico, Recinto de Rio Piedras; M.Ed., Lehman College; Ph.D., The Pennsylvania State Univ.

Andrew Ratner, Associate Professor and Chair
B.A., Brown Univ.; M.A., Teachers College, Columbia Univ., Ed.D.

Richard N. Steinberg, Professor
B.S., SUNY Binghamton; M.S., Yale Univ., Ph.D.

Despina A. Stylianou, Professor
B.S., Boston Univ., M.ED.; M.A., Mathematics, Univ. of Pittsburgh; Ed.D., Univ. of Pittsburgh

Jan Valle, Professor
B.A., Furman Univ., M.A.; Teachrs College, Columbia Univ., Ed.D.

Ann Wilgus, Associate Professor
B.L.A., Sarah Lawrence College; M.F.A., Univ. of North Carolina-Greensboro; M.S.Ed., Bank Street College; Ph.D., CUNY

Yael Wyner, Associate Professor
B.S., Yale Univ.; Ph.D. New York Univ ./American Museum of Natural History

Affiliate Faculty

Marit Dewhurst, Associate Professor
B.A, Univ. of Michigan; Ed.M., Harvard University, Ed.D.

Issa I. Salame, Lecturer, and Master Teaching Fellow
B.S., The City College; M.Ph., Ph.D., The Graduate Center of the City University of New York

Professors Emeriti

Ruth R. Adams
Bernard Bernstein
Augustine Brezina
Hubert Dyasi
Shirley Feldman
Ruth Grossman
Elizabeth S. Hirsch
Robert Lento
Joel Mansbach
Martin Marin
Harold J. McKenna
James L. Neujahr
Oliver Patterson
Julius Pastor
Alfred S. Posamentier
Anne S. Peskin
Howard Sasson
Madelon D. Stent

Department of Leadership and Human Development

Prof. Hazel Carter, Chair • Department Office: NA 6/207B • Tel: 212-650-6242

General Information

The Department of Leadership and Human Development offers graduate programs leading to New York State initial and/or professional certification in administration and supervisions, bilingual education, bilingual childhood education, literacy, teaching students with disabilities (grades 1-6 and grades 7-12), and TESOL.

Initial certification programs are available at the graduate level for students with a baccalaureate degree. Professional certification programs leading to a master's degree are available to students who possess Initial Certification.

The department also offers advanced certificate programs in administration and supervision, bilingual education, teaching students with disabilities (grades 1-6 and 7-12), and TESOL.

Bilingual Childhood Education, Master of Science in Education (M.S.Ed)

The aims of this program are to develop an academically, linguistically, and culturally enriching environment where the fields of bilingual and childhood education come together to develop skilled childhood education teachers, quality bilingual programs, and related exceptional teaching and learning practices; and to validate and build upon the linguistic and cultural strengths of diverse student populations.

Initial Certification Program

This program is for graduate students who hold a B.A. degree outside of education while seeking an initial New York State certification (Childhood Education) and a bilingual extension.

Prerequisite Corequisite

EDUC 7200A	Psychology of Learning and Teaching	3
	OR	
EDUC 7300A	Child Development	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3

Required Courses

EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
	OR	
EDCE 5203C	Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)	3
	OR	
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for	3

	Emergent Bilingual Students	
SPED 5000K	Introduction to Inclusive Education OR	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDCE 2600C	Linguistics for Teachers	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
EDCE 4100C	Teaching Arts and Crafts in Childhood Education OR	3
EDCE 7100C	Creative Movement and Music in Childhood Education	3
EDCE 6600C	Assessment for Multilingual Learners	3
Student Teaching		
EDCE 2207I	Research into Teaching: Bilingual Education	2
EDCE 7502G	Student Teaching in Bilingual Education	4
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 44-50

Professional Certification Program

This program is for students who hold who hold initial or professional NYS certification in any area except English Language Arts, World Languages and TESOL and leads to a master's degree and a bilingual extension. Upon completion of the program and with three years teaching experience (including one year of mentored teaching), graduates are eligible for professional certification in their original certification area.

Choose two of the following

EDCE 7200F	Contemporary Problems in Bilingual Education	3
EDCE 2600C	Linguistics for Teachers	3
EDCE 4100C	Teaching Arts and Crafts in Childhood Education	3
EDCE 5100C	Teaching Foreign Languages in Elementary Education	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
EDCE 5203C	Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)	3
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
EDCE 5500C	Children of the Caribbean Cultures & Curriculum	3
SPED 5000K	Introduction to Inclusive Education OR	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDCE 6100K	Assessing the Educational Needs of Language Minority Students with Disabilities	3
EDCE 6700C	Contrastive Phonology of English and Other Languages for Teachers	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 7100C	Creative Movement and Music in Childhood Education	3

Research Sequence

EDCE 2205I	Research Seminar in Teaching Multilingual Learners	3
EDCE 2905I	Research Seminar II in Teaching Linguistically and Culturally Diverse Students	

Required Courses

EDCE 2300C	Social Studies Inquiry for Pre-K to 6 Teachers	3
EDCE 2400C	Development & Evaluation of Materials in Bilingual Education	3
EDCE 3200C	Science Inquiry for Pre-K to 6 Teachers	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6200C	Mathematics Inquiry for Pre-K to 6 Teachers	3

*Candidates without a comparable special education course on their previous credential transcript must select EDCE 6000K or SPED 5000K to meet the state requirements regarding students with disabilities.

Subtotal: 31

Professional Certification with Bilingual Extension Program

This is for students who hold initial or professional NYS certification in any area except English Language Arts, World Languages and TESOL and leads to a master's degree and bilingual extenstion. Upon completion of the program and with three years teaching experience (including one year of mentored teaching), graduates are eligible for professional certification in their original certification area.

Choose One Course

EDCE 6700C	Contrastive Phonology of English and Other Languages for Teachers	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities OR	3
SPED 5000K	Introduction to Inclusive Education	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 5800C	Theories of Second Language Acquisition	3

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6) OR	3

EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
	OR	
EDCE 5203C	Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)	3
	OR	
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
	OR	
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
EDCE 2205I	Research Seminar in Teaching Multilingual Learners	3
EDCE 6600C	Assessment for Multilingual Learners	3

Subtotal: 30

Non-Certification Program

This program is for graduate students who are not seeking New York State certification.

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
	OR	
EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
	OR	
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
	OR	
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
EDCE 2205I	Research Seminar in Teaching Multilingual Learners	3

Choose Two Courses

EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDCE 2100C	Teaching Social Studies in Childhood Education	3
EDCE 6700C	Contrastive Phonology of English and Other Languages for Teachers	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 7700A	Drama in Education	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
	OR	
EDCE 4000F	Arts Integration: Theatre and Related Arts in the Curriculum (Grades 7-12)	3
EDCE 6600C	Assessment for Multilingual Learners	3

Other electives in education and/or the target language by advisement.

Subtotal: 30

Transitional B Certificate Program for New York City Teaching Fellows

This program is restricted to graduate students who have been accepted to the New York City Teaching Fellows Program.

Required Courses

EDCE 7401A	Introduction to Urban Schools for Teachers of English to Speakers of Other Languages	3
EDCE 7402A	Introduction to Teaching English to Speakers of Other Languages	3
EDCE 2600C	Linguistics for Teachers	3
EDCE 3100C	Elementary Science & Engineering Teaching Methods	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
	OR	
EDCE 5203C	Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)	3
	OR	
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 5950C	Mathematics Knowledge for Teachers (Birth to Grade 6)	3
EDCE 6100C	How Children Learn Mathematics: Grades 1-6	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
EDCE 7405G	Student Teaching in Childhood Education and Seminar	0

EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDCE 2207I	Research into Teaching: Bilingual Education	2

Subtotal: 41

Bilingual Extension, Advanced Certificate (Adv. Crt.)

Extension in Bilingual Education only for graduate students who hold initial or professional certification in early childhood/middle or adolescent education while seeking a bilingual extension.

Requirements

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
	OR	
EDCE 5203C	Teaching Language Arts & Reading to Bilingual-Bicultural Students (Haitian)	3
	OR	
EDCE 5204C	Teaching Language Arts in Chinese to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3

Subtotal: 15

Educational Leadership

The Educational Leadership program offers a master's degree in School Building Leadership and Advanced Certificates in Entry-Level Leadership and School District Leadership.

School Building Leader, Master of Science in Education (M.S.Ed.)

This program leads to a master's degree and is designed to prepare candidates for New York State initial certification as School Building Leader (SBL) and for such positions as elementary school principal, intermediate school principal, secondary school principal, department chair, supervisor (curriculum specialty), team leader, mini-school director, project coordinator, and assistant principal (all levels). All candidates must pass the New York State examination for School Building Leader to be certified.

Matriculation Requirements

Candidates seeking matriculation must (1) possess a bachelor's degree from an accredited institution, (2) possess a master's degree with a minimum 3.0 grade point average, (3) hold state certification as a teacher, guidance counselor, school psychologist, school social worker, or other appropriate certification, (4) have three years teaching or relevant educational work experience, including demonstrated success in fulfilling leadership roles in school or district, (5) submit three letters of recommendation and official transcripts, and (6) satisfactorily complete an interview and an on-site essay. In addition, candidates will be judged on the basis of superior references and evidence of strong potential for professional work in administration.

Requirements

Required Courses

Core A: Human, Foundational, and Structural Elements of Education

EDLS 7101G	Dynamics of Educational Organizations	3
EDLS 7201G	Moral Dimensions of Leadership	3
EDLS 7401G	Instructional Leadership	3
EDLS 6701G	School Management	3
EDLS 8801G	School-Community Building	3
EDLS 8601G	School Law	3

Core B: Building Level Application

EDLS 7001G	Foundations of Educational Policy-Making	3
EDLS 2501I	Research and Assessment Seminar in Educational Leadership	2
EDLS 8501I	Field Problem Seminar in Educational Leadership	2
EDLS 7301G	Curriculum Development	3
EDLS 7904G	Internship and Seminar	3

Electives

Optional: If needed to complete required internship hours.

Optional: If needed to complete required internship hours - EDLS 7905G: Internship & Seminar II.

Total Credit Hours: 31-33

Entry Level Leader, Advanced Certificate (Adv. Crt.)

The Entry Level Leadership Certification Program (ELLC) is a fast-track twenty-one (21) credit hour program that prepares candidates for certification as entry-level School Building Leader positions. All candidates must pass the New York State examination to be certified. Addressing the need for "front-line" leaders (i.e. assistant principals, content coaches, department heads) who deal daily with "on the ground" issues of educational policy, practice, curriculum and instruction, and management and operations. The ELLC Program is a certification-only program that involves Core A courses plus three semester internships. Beginning in the first semester of the program, the courses will have a field experience component. All courses in the programs integrate the use of technology as a tool, are problem-based, and utilize case studies and data-based decision-making instructional strategies.

Matriculation Requirements
Candidates must be nominated by their principal or other school leader. In addition, candidates must (1) posses a bachelor's degree from an accredited institution; (2) posses, a master's degree with a minimum 3.0 G.P.A.; (3) hold state certification as a teacher, guidance counselor, school psychologist, school social worker, or other appropriate certification; (4) have three years teaching or relevant educational work experience, including demonstrated success in fulfilling leadership roles in school or district; (5) submit, three letters of recommendation and official transcripts; and (6) satisfactorily complete an interview and on-site essay. In addition, candidates will be evaluated on the basis of references, interviews, and potential for professional work in administration.

Requirements

Core A Human Foundational and Structural Elements of Education

EDLS 7101G	Dynamics of Educational Organizations	3
EDLS 7201G	Moral Dimensions of Leadership	3

EDLS 7401G	Instructional Leadership	3
EDLS 6701G	School Management	3
EDLS 8801G	School-Community Building	3
EDLS 8601G	School Law	3
EDLS 7904G	Internship and Seminar	3

Optional: If needed to complete required internship hours - EDLS 7905G: Internship & Seminar II

Total Credit Hours: 21-23

School District Leader, Advanced Certificate (Adv. Crt.)

The School District Leader Program (SDL) is an advanced certificate program targeting district or central office leader positions. Candidates are prepared for New York State certification as a School District Leader (SDL). All candidates must pass the New York State examination for School District Leader to be certified. The Program prepares candidates for a number of roles including but not limited to:

- Superintendent
- Deputy Superintendent
- Assistant Superintendent
- Executive Assistant to the Superintendent
- Director of Instruction
- Director of Personnel
- District Educational Planning
- District Finance and Business Management

Matriculation Requirements
Candidates seeking matriculation must (1) possess a bachelor's degree from an accredited institution; (2) possess a master's degree with a minimum 3.0 grade point average; (3) hold state certification as a teacher, guidance counselor, school psychologist, school social worker, or other appropriate certification; (4) have three years teaching or relevant educational work experience, including demonstrated success in fulfilling leadership roles in school or district; (5) submit three letters of recommendation and official transcripts; and (6) satisfactorily complete an interview and an on-site essay. In addition, candidates will be evaluated on the basis of superior references and evidence of strong potential for professional work in administration.

Required Courses

Core A: Human, Foundational, and Structural Elements of Education

EDLS 7101G	Dynamics of Educational Organizations	3
EDLS 7201G	Moral Dimensions of Leadership	3
EDLS 7401G	Instructional Leadership	3
EDLS 6701G	School Management	3
EDLS 8801G	School-Community Building	3
EDLS 8601G	School Law	3

Core C: District Level Application

EDLS 8103G	Management and Organizational Leadership at the District Level	3
EDLS 8604I	Social Responsibility, Politics, and Education	3
EDLS 5607G	Leadership at the District Level: Roles and Responsibilities	3
EDLS 7904G	Internship and Seminar	3

Total Credit Hours: 30

Literacy Acquisition and Development, Master of Science in Education (M.S. Ed.)

This 32-credit master's degree is designed to develop excellent literacy professionals based on the standards of the International Reading Association and the National Council for Accreditation of Teacher Education. Participants will learn how to teach literacy to students from culturally, linguistically, socio-economically, and developmentally-diverse backgrounds. Graduate students will integrate in-depth knowledge of current research with active inquiry into literacy methodologies. Admission requires candidates to be initially certified by New York State in early childhood, childhood, or secondary education, ESL, bilingual education or special education. Students should select preparation for either the Birth to 6th Grade or the 5th-12th Grade literacy certificate.

Birth–6th Grade

Prerequisites

EDCE 7500C	Emergent to Fluent Literacy	3
SPED 5000K	Introduction to Inclusive Education	3
	OR	
EDCE 4500K	Inclusive Practices for the Arts	3
	OR	
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3

Required Courses

EDCE 7510C	Literacy Strategies: From Birth to 6th grade	3
EDCE 2000C	First and Second Language and Literacy Acquisition	3
EDCE 1300E	Negotiating Curriculum Standards, Children's Inquiries and Appropriate Multicultural Materials for Children from Birth to Grade 6	3
EDCE 1700G	Home-School Partnerships for Literacy Development	3
EDCE 2700C	Literacy for Struggling Readers and Writers	3
EDCE 1400E	Writing for Teachers	2
EDCE 1700E	Critical Use of Technology for Literacy Instructors of Children Birth to 6th Grade	2
EDCE 1500C	Linking Literacy, Assessment, Instruction and Learning-Birth to 6th Grade	3
EDCE 1600C	Literacy Inquiry Practicum-Birth to 6th Grade	3
EDCE 1600E	Small Group Literacy Inquiry Practicum - Birth to 6th Grade	3
EDCE 7801C	Beginning Literacy Research Seminar	2
EDCE 7802C	Literacy Research Seminar II	2
EDCE 7803C	Literacy Research Seminar III	2
EDCE 7804C	Literacy Research Seminar IV	1

Subtotal: 35-41

5th - 12th Grade

Prerequisites

EDCE 7600C	Fluent to Experienced Literacy	3
SPED 5000K	Introduction to Inclusive Education	3
	OR	
EDCE 4500K	Inclusive Practices for the Arts	3
	OR	

EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3

Required Courses

EDCE 7610C	Literacy Strategies and Resources in the Content Areas (5th-12th)	3

Initial State Certification

EDCE 2000C	First and Second Language and Literacy Acquisition	3
EDCE 1301E	Negotiating Curriculum Standards, Children's Inquiries, and Appropriate Multicultural Materials for 5th to 12th Grade	3
EDCE 1700G	Home-School Partnerships for Literacy Development	3
EDCE 2700C	Literacy for Struggling Readers and Writers	3
EDCE 1400E	Writing for Teachers	2
EDCE 1501C	Linking Literacy, Assessment, Instruction and Learning-5th to 12th Grade	3
EDCE 1601C	Literacy Inquiry Practicum - 5th to 12th Grade	3
EDCE 1601E	Small Group Literacy Inquiry Practicum - 5th to 12th Grade	3
EDCE 7801C	Beginning Literacy Research Seminar	2
EDCE 7802C	Literacy Research Seminar II	2
EDCE 7803C	Literacy Research Seminar III	2
EDCE 7804C	Literacy Research Seminar IV	1

Subtotal: 35-41

Special Education

The School of Education offers four graduate programs in special education: Students with Disabilities in Childhood Education (Grades 1-6) (master's degree and advanced certificate) and Students with Disabilities in Adolescent Education (Grades 7-12) (master's degree and advanced certificate). The master's degree program tracks require 32-46 credit hours (depending on previous coursework). The master's degree fulfills the education requirements for the professional certification in either special education or childhood education if the candidate already holds initial certification. The Special Education Program also offers two Advanced Certificate programs for New York State teachers who already hold classroom teacher certification: Students with Disabilities-Generalist (Grades 1-6) and Students with Disabilities-Generalist (Grades 7-12). The inclusion model of delivering special education services in an urban environment is emphasized, but candidates will be prepared to work in self-contained environments as well.

Teaching Students with Disabilities in Childhood Education-Generalist(Grades 1-6), Master of Science in Education (M.S.Ed.)

1. Prerequisites for all candidates: bachelor's degree with a major or concentration in one of the liberal arts or sciences with study in a foreign language (two semesters of ASL accepted). Candidates with deficiencies in any of these areas may be conditionally accepted.
2. Prerequisites for candidates seeking Provisional New York State Certification (credit may be given for these courses or their equivalents if taken elsewhere on the graduate or undergraduate level, but they are not counted toward the master's degree): bachelor's degree with a major or concentration in one of the liberal arts or sciences with study in a foreign language (two semesters of ASL accepted). Candidates with deficiencies in any of these areas that can be made up within two semesters may be conditionally accepted.

Prerequisites

Credit may be given for these courses or their equivalents if taken elsewhere on the graduate or undergraduate level but is not counted toward the master's degree:

Courses

EDUC 7100A	Urban Schools in a Diverse Society	3
EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7300A	Child Development	3
SPED 5000K	Introduction to Inclusive Education	3

Requirements for Initial or Professional New York State Certification

This program listed below fulfills the education requirements for initial or professional (for those who hold initial) New York State certification in special education. It will also fulfill the education requirements for professional certification in childhood education (for those who hold initial certification in that area). Note: those taking courses requiring fieldwork or practica may do it in their own workplaces if they are employed as special education teachers or have major responsibility in inclusion classrooms. All others will be placed in fieldwork situations taking place within the normal school day.

One of the following options

SPED 2600I	Content Research Seminar in Special Education	2
SPED 2900I	Seminar in Educational Research	2
	OR	
EDUC 7000I	Introduction to Educational Research	2
EDUC 7100I	Individual Study in Educational Research	2

Required Courses

SPED 3300K	Building Community in Inclusive Contexts	3
SPED 3600K	Reading and Writing Instruction for Students with Disabilities in Childhood Education I	3
SPED 3700K	Reading and Writing Instruction for Students with Disabilities in Childhood Education II	3
SPED 3800K	Assessment for Students with Disabilities in Childhood Education I	3
SPED 3900K	Instructional Methods for Students with Disabilities in Childhood Education II	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
SPED 6100I	Building Connections: Disabilities, Families, Schools, and Communities	3

One of the following two series

SPED 5700G	Practicum in Teaching Special Education	2
	AND	
SPED 5701G	Special Education Practicum Seminar	2
	OR	
SPED 7701G	Internship in Special Education	4
	AND	
SPED 7702G	Special Education Student Teaching Seminar	2

SPED 5700G: For those who hold a teaching certificate.
SPED 7701G: For those who do not hold a teaching certificate.

Total Credit Hours: 32-34

Teaching Students with Disabilities in Adolescent Education-Generalist (Grades 7-12), Master of Science in Education (M.S.Ed.)

1. Prerequisites for all candidates: bachelor's degree with a major or concentration in one of the liberal arts or sciences with study in a foreign language (two semesters of ASL accepted). Candidates with deficiencies in any of these areas may be conditionally accepted.
2. Prerequisites for candidates seeking Provisional New York State Certification (credit may be given for these courses or their equivalents if taken elsewhere on the graduate or undergraduate level, but they are not counted toward the master's degree):

Prerequisites

Credit may be given for these courses or their equivalents if taken elsewhere on the graduate or undergraduate level but is not counted toward the master's degree:

Courses

EDUC 7100A	Urban Schools in a Diverse Society	3
EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7500A	Adolescent Learning and Development	3
SPED 5000K	Introduction to Inclusive Education	3

Requirements for Initial or Professional New York State Certification

This program listed below fulfills the education requirements for initial or professional New York State certification in Students with Disabilities. Note: those taking courses requiring fieldwork or practica may do it in their own workplaces if they are employed as special education teachers or have major responsibility in inclusion classrooms. All others will be placed in fieldwork situations taking place within the normal school day.

Required Courses

SPED 3300K	Building Community in Inclusive Contexts	3
SPED 3601K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education I	3
SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
SPED 3801K	Assessment for Students with Disabilities in Adolescent Education I	3
SPED 3901K	Instructional Methods for Students with Disabilities in Adolescent Education II	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
SPED 6100I	Building Connections: Disabilities, Families, Schools, and Communities	3

One of the following two series

SPED 5700G	Practicum in Teaching Special Education	2
	AND	
SPED 5701G	Special Education Practicum Seminar	2
	OR	
SPED 7701G	Internship in Special Education	4
	AND	
SPED 7702G	Special Education Student Teaching Seminar	2

SPED 5700G: For those who hold a teaching certificate.
SPED 7701G: For those who do not hold a teaching certificate.

One of the following options

SPED 2600I	Content Research Seminar in Special Education	2
SPED 2900I	Seminar in Educational Research	2
	OR	
EDUC 7000I	Introduction to Educational Research	2
EDUC 7100I	Individual Study in Educational Research	2

Total Credit Hours: 32-34

Transitional B Certificate Program (Bilingual Special Education, Grades 7-12) for New York City Teaching Fellows

This program is restricted to graduate students who have been accepted into the New York City Teaching Fellows Program.

Requirements

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5202C	Teaching Language Arts in Spanish to Multilingual Students	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
SPED 3300K	Building Community in Inclusive Contexts	3
SPED 3601K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education I	3
SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
SPED 3801K	Assessment for Students with Disabilities in Adolescent Education I	3
SPED 3901K	Instructional Methods for Students with Disabilities in Adolescent Education II	3
SPED 6100I	Building Connections: Disabilities, Families, Schools, and Communities	3
SPED 2600I	Content Research Seminar in Special Education	2
SPED 2900I	Seminar in Educational Research	2
SPED 7701G	Internship in Special Education	4
SPED 7702G	Special Education Student Teaching Seminar	2

Total Credit Hours: 46

Transitional B Certificate Program (Teaching Students with Disabilities in Adolescent Education [Grades 7-12]) for New York City Teaching Fellows

This program is restricted to graduate students who have been accepted into the New York City Teaching Fellows Program.

Requirements

Required Courses

SPED 3300K	Building Community in Inclusive Contexts	3
SPED 3601K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education I	3
SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
SPED 3801K	Assessment for Students with Disabilities in Adolescent Education I	3
SPED 3901K	Instructional Methods for Students with Disabilities in Adolescent Education II	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
SPED 6100I	Building Connections: Disabilities, Families, Schools, and Communities	3
SPED 2600I	Content Research Seminar in Special Education	2
SPED 2900I	Seminar in Educational Research	2
SPED 7701G	Internship in Special Education	4
SPED 7702G	Special Education Student Teaching Seminar	2

Total Credit Hours: 34

Teaching Students with Disabilities in Childhood Education (Grades 1-6), Advanced Certificate (Adv. Crt.)

The advanced certificate program serves certified New York state teachers at the childhood level who wish to develop more effective inclusion settings for all of their learners. Specifically, this is a 16-19 credit program (depending on prior completion of an Introduction to Special Education course) for childhood education teachers who wish to have more background with respect to students with disabilities and be eligible for certification as a teacher of students with disabilities, generalist (grades 1-6). This program is offered in two modalities: face-to-face and online.

The advanced certificate is for teachers who already possess initial, provisional, permanent, or professional certification as a classroom teacher at the elementary school level. The program leads to certification to become the teacher of record in a special education setting, the special educator within an integrated co-teaching (ICT) classroom, or the special education; consultant, and/or case manager in a collaborative school-based context. This program does not lead to a degree.

Requirements

Only Students in the Advanced Certificate Program may complete the following courses without having taken the respective prerequisite courses SPED 3600K and SPED 3800K

SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
SPED 3901K	Instructional Methods for Students with Disabilities in Adolescent Education II	3
SPED 5701G	Special Education Practicum Seminar	2

Required Courses

SPED 5000K	Introduction to Inclusive Education	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
SPED 6100I	Building Connections: Disabilities, Families, Schools, and Communities	3
SPED 5700G	Practicum in Teaching Special Education	2

Total Credit Hours: 16-19

Teaching Students with Disabilities in Adolescent Education (Grades 7-12), Advanced Certificate (Adv. Crt.)

The advanced certificate program serves certified New York state teachers at the secondary level who wish to develop more effective inclusion settings for all of their learners. Specifically, this program is a 13-16 program (depending on prior completion of an Introduction to Special Education course) for high school teachers who wish to have more background with respect to students with disabilities and be eligible for certification as a teacher of students with disabilities, generalist (grades 7-12). This program is offered in two modalities: face-to-face and online.

The advanced certificate is for teachers who already possess initial, provisional, permanent, or professional certification as a classroom teacher at the high school level. The program leads to certification to become the teacher of record in a special education setting, the special educator within an integrated co-teaching (ICT) classroom, or the special education consultant; and/or case manager in a collaborative school-based context. This program does not lead to a degree.

Requirements

Only Students in the Advanced Certificate Program can take the following courses without having taken the respective prerequisite courses SPED 3601K and SPED 3801K:

SPED 3701K	Reading and Writing Instruction for Students with Disabilities in Adolescent Education II	3
SPED 3901K	Instructional Methods for Students with Disabilities in Adolescent Education II	3

Required Courses

SPED 5000K	Introduction to Inclusive Education	3
SPED 5300K	Positive Approaches to Challenging Behaviors	3
SPED 5700G	Practicum in Teaching Special Education	2
SPED 5701G	Special Education Practicum Seminar	2

Total Credit Hours: 13-16

Teaching Young Children with Special Needs (Birth-Grade 2) for Childhood Special Education Certified Teachers, Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students with New York State certification in Students with Disabilities, Grades 1-6.

Requirements

Required Courses

EDCE 1900C	Language and Literacy Development in Young Children	3
EDCE 6000C	How Children Learn Mathematics: Birth - Grade 2	3
EDCE 7150C	Fundamentals of Teaching and Learning in Early Childhood Contexts	3
EDCE 7306G	Supervised Practicum and Seminar in Early Childhood Special Education	3
EDCE 2100K	Development Issues in Early Childhood/Childhood Education OR	3
EDCE 3500C	Education in the Early Years: Infants, Toddlers, and Preschoolers	3
EDCE 4700K	Early Intervention for Infants and Toddlers with Special Needs	3

Total Credit Hours: 18

Teaching Young Children with Special Needs (Birth-Grade 2) for Early Childhood, Childhood, and Bilingual Education Certified Teachers, Advanced Certificate (Adv. Crt.)

This non-degree program is for graduate students with New York State certification in Early Childhood Education, Childhood Education, and/or Bilingual Education.

Requirements

Required Courses

EDCE 4200C	Educating Young Children with Special Needs	3
SPED 4600A	Foundations in Early Childhood Special Education	3
SPED 7306G	Supervised Practicum and Seminar in Early Childhood Special Education	3
SPED 4700K	Early Intervention for Infants and Toddlers with Special Needs	3
SPED 4800K	Managing the Environment for Young Children with Special Needs	3
SPED 4900K	Assessment of Young Children with Special Needs: B-2nd grade	3

Total Credit Hours: 18

Teaching English to Speakers of Other Languages, Master of Science (M.S.)

The mission of the TESOL program is to successfully combine academic rigor with innovative pedagogical training that develops knowledge of and respect for the linguistic, social, and cognitive needs of all learners, and the complexity of the ENL teaching and learning environment. The program aims to develop teachers who are committed to promoting equity and excellence in urban public education, particularly for emergent bilinguals.

Initial Certification Program

This program is for graduate students holding a B.A. degree outside Education who seek initial New York State certification in TESOL.

Prerequisite/Corequisites:

EDUC 7200A	Psychology of Learning and Teaching OR	3
EDUC 7300A	Child Development OR	3
EDUC 7500A	Adolescent Learning and Development	3

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities OR	3
SPED 5000K	Introduction to Inclusive Education	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 7200C	Field-based Inquiry: TESOL	3
EDCE 2208I	Research into Teaching: TESOL	2
EDCE 6600C	Assessment for Multilingual Learners	3
EDCE 7503G	Student Teaching in TESOL (Grades Pre-K - 12)	4
EDCE 7504G	Seminar in TESOL	2
EDUC 1900G	Workshops on Child Abuse Identification, School Violence Prevention, Dignity for All Students Act (DASA), and Other Professional Topics	0

Subtotal: 44-47

Professional Certification Program

This program is for graduate students who hold initial or provisional teaching certification in another area and seek to earn NYS certification in TESOL.

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6) OR	3
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6) OR	3

EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 2205I	Research Seminar in Teaching Multilingual Learners	3
EDCE 6600C	Assessment for Multilingual Learners	3
EDCE 6601C	Practicum I in TESOL	3
EDCE 6602C	Practicum II in TESOL	1

Subtotal: 31

Non-Certification Program

This program is for graduate students seeking employment outside the United States, in private schools, in adult education, or in English language institutes.

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 4500A	Teaching English to Adult Speakers of Other Languages	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 6700C	Contrastive Phonology of English and Other Languages for Teachers	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
	OR	
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 2205I	Research Seminar in Teaching Multilingual Learners	3

Choose two of the following electives

EDCE 5300C	Theories, Policies, and Programs for Emergent Bilingual Students	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDUC 7200A	Psychology of Learning and Teaching	3
EDUC 7500A	Adolescent Learning and Development	3
EDCE 6400C	Teaching Content (Math, Science, Social Studies) with Language Arts in English and an Additional Language	3
EDCE 4400C	Arts Integration: Theatre and Related Arts in the Curriculum	3
	OR	
EDCE 4000F	Arts Integration: Theatre and Related Arts in the Curriculum (Grades 7-12)	3
EDCE 6600C	Assessment for Multilingual Learners	3

Subtotal: 30

Total Credit Hours: 30

Transitional B Certificate Program for New York City Teaching Fellows

Requirements

Required Courses

EDCE 7401A	Introduction to Urban Schools for Teachers of English to Speakers of Other Languages	3
EDCE 7402A	Introduction to Teaching English to Speakers of Other Languages	3
EDCE 2600C	Linguistics for Teachers	3
EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
	OR	
EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
	OR	
EDCE 5401C	Methods of Teaching English to Speakers of Other Languages	3
	OR	
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3
EDCE 5700C	Education That Is Multicultural	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3
EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
EDCE 2208I	Research into Teaching: TESOL	2
EDCE 2905I	Research Seminar II in Teaching Linguistically and Culturally Diverse Students	

Total Credit Hours: 33

Teaching English to Speakers of Other Languages, Advanced Certificate (Adv. Crt.)

This program is for students who hold teaching certification and a master's degree, seeking certification in TESOL.

Requirements

Prerequisites

EDCE 6000K	Introduction to the Education of Emergent Bilingual Students with Disabilities	3
	OR	
SPED 5000K	Introduction to Inclusive Education	3

Required Courses

EDCE 2600C	Linguistics for Teachers	3
EDCE 5800C	Theories of Second Language Acquisition	3
EDCE 6800C	Grammar and its Pedagogy: English and Other Languages	3

Choose one of the following two

EDCE 5400C	Methods of Teaching English to Speakers of Other Languages I (Pre K-grade 6)	3
EDCE 6900C	Methods of Teaching English to Speakers of Other Languages II (Grade 7 - 12)	3

Choose one of the following two

EDCE 5201C	Methods of Teaching English Language Arts to Bilingual English Language Learners (P-Grade 6)	3
EDCE 6500C	Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult)	3
EDCE 6601C	Practicum I in TESOL	3
EDCE 6602C	Practicum II in TESOL	1

Total Credit Hours: 19-22

Faculty

Hazel Carter, Associate Professor and Chair
B.A., Univ. of the West Indies (Trinidad), Graduate Diploma; M.S., New School Univ.; Ph.D., New York Univ.

Maria Castiglioni, Lecturer
B.A., Hunter College, M.A.; Ph.D., CUNY

Yvel C. Crevecoeur, Associate Professor
B.A., Central Connecticut State Univ.; M.S., Univ. of Bridgeport; C.A.S., C.A.S., Fairfield Univ.; Ph.D., Univ. of Connecticut

Joseph Davis, Professor
B.S. Wake Forest Univ.; M.S.P.H., Univ. of North Carolina; M.A., Columbia Univ., M.Phil., Ph.D.

Jesús Fraga, Lecturer
B.S., The City College, CUNY; M.S., Bank Street College of Education; M.A., Adelphi Univ.

Carol Huang, Assistant Professor
B.A., Tamkang Univ. (Taiwan); M.A., Michigan State Univ.; M.Ed., New York Univ.; Ph.D., Univ. of Illinois, Urbana-Champaign

Tatyana Kleyn, Associate Professor
B.S., Ohio State Univ., M.E.; Ed.D., Teachers College, Columbia Univ.

Dina López, Associate Professor
B.A., Brown University; M.S. Fordham University; Ed.D., Teachers College, Columbia Univ.

Robert Lubetsky, Clinical Professor
A.B., Syracuse University; M.A., University of Manchester; Professional Diploma, Fordham University; Ed.D., New York University.

Nadjwa Norton, Associate Professor
B.A., Yale Univ.; M.Ed., Teachers College, Columbia Univ., Ed.D.

Laura Rader, Assistant Professor
B.A., Univ. of Connecticut; M.Ed., Univ. of Hartford; Ed.D., Teachers College, Columbia Univ.

Susan Semel, Professor
B.A., Wheaton College; M.A., MAT, Ed.M., Ed.D., Teachers College, Columbia Univ.

Nancy Stern, Associate Professor
B.A., The College of William and Mary; M.Phil. (Linguistics), Ph.D., CUNY

Terri Watson, Associate Professor
B.A., St. John's College, St. John's Univ.; M.A., Teachers College, Columbia Univ.; Ph.D., Florida Atlantic Univ.

Christopher Yawn, Associate Professor
B.A., Hampton Univ.; M.S., Mercy College; Ph.D., The Ohio State Univ.

Grove School of Engineering

Graduate courses are offered in engineering and computer science. Doctoral and Master's degrees are awarded for satisfactory completion of approved work in these disciplines. In addition, the Grove School of Engineering offers twelve credit (four-course) programs leading to Advanced Certificates in Special Topics in Civil Engineering.

The engineering departments have enlarged their curricula with new state-of-the-art courses in emerging fields and added a number of applied engineering courses to fill the needs of industry-oriented engineers.

The Professional Master's programs lead to the M.E. degree, and are available to students who enter with a B.E. or a B.S. degree from an accredited engineering curriculum.* Qualified students with other B.S. degrees will be awarded M.S. (Engineering) degrees upon completion of 30 credits of approved work.

David B. Steinman Hall (coded ST on maps) is the primary engineering building. Admissions information and online application forms are available on our website: www.ccny.cuny.edu. For additional information visit or write the Graduate Office, Grove School of Engineering.

The Associate Dean of Academic Affairs, Professor Ardie D. Walser, is responsible for the administration of the doctoral and master's programs in Biomedical, Chemical, Civil, Electrical, and Mechanical Engineering as well as the master program in Computer Science and Information Systems.

The doctoral degree in Computer Science is administered by the Graduate Center of the City University of New York (CUNY). Professor R.Haralick, whose office is located at the Graduate Center, is the Executive Officer.

For information regarding the Advanced Certificate in Special Topics contact Dr. Edward Camp, NA 8/207.

The Grove School of Engineering is an institutional member of the American Society for Engineering Education. It participates in the Society's Engineering College Administrative Council and in its Engineering College Research Council.

The College reserves the right to change curricular requirements and offerings subject to fiscal and/or resource constraints. Inquire at the Graduate Office for specific information on current requirements.
* Some courses taken for the Professional Master's degree may not be transferable to the Ph. D. degree.

Accreditation

All undergraduate engineering curricula leading to the baccalaureate degree are fully accredited by the Accreditation Board for Engineering and Technology (ABET). The undergraduate curricula leading to the bachelor's degree in engineering are registered by the N.Y. State Department of Education as meeting educational requirements for eligibility to take the Fundamentals of Engineering Examination. The graduate curricula leading to the master's degrees in engineering are registered by the N.Y. State Department of Education as meeting educational requirements which serve as the equivalent of one year of engineering experience for eligibility to take the examination for the license of Professional Engineer in the State of New York. The doctoral programs in Engineering have been approved by N.Y. State Department of Education. The City College as a whole is also accredited by the N.Y. State Department of Education and by the Middle States Association of Colleges and Secondary Schools.

Graduate Degrees Offered

Doctor of Philosophy (M.Phil./Ph.D.)
Biomedical Engineering (p. 208)
Chemical Engineering (p. 212)
Civil Engineering (p. 215)
Electrical Engineering (p. 228)
Mechanical Engineering (p. 231)
Computer Science (through the Graduate Center)

Master of Engineering (M.E.)
Chemical Engineering (p. 212)
Civil Engineering (p. 214)
Electrical Engineering (p. 227)
Mechanical Engineering (p. 230)

Master of Science (M.S.)
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Science
Earth Systems and Environmental Engineering (interdisciplinary)
Electrical Engineering
Information Systems
Mechanical Engineering
Translational Medicine

Advanced Certificate in Special Topics
Civil Engineering (p. 215)

In addition, the School offers along with the Spitzer School of Architecture and the Division of Science a joint program:
Sustainability and the Urban Environment

Requirements for Enrollment in Graduate Courses

Graduate courses are open to everyone who, in the opinion of the Associate Dean for Graduate Studies and the department concerned, is qualified by education and experience to benefit from them. Where specific courses are listed as prerequisites, equivalent knowledge or experience may be accepted instead. In general, any applicant for admission to the engineering program should possess as a minimum qualification a degree of Bachelor of Engineering, Bachelor of Science, or the equivalent obtained with a minimum GPA of 3.0. Applicants for the computer science masters degree should possess a Bachelor of Arts or Science degree with a major in computer science. Applicants for the master's in information systems should possess a Bachelor degree in an engineering or science discipline.

It should be clearly understood that admission to graduate courses is not equivalent to matriculation for a graduate degree, nor does it carry with it any presumption of subsequent matriculation.

An applicant who has specific background deficiencies may be admitted as a matriculated student with conditions. These conditions must be met before student can register for graduate courses. Students who do not satisfy the imposed admissions conditions may be dismissed from the program.

An applicant who has missed the application deadline or who does not desire a degree, but who wishes credit for one or more courses may, by permission of the Associate Dean of Academic Affairs, enroll as a non-matriculated (non-degree) student. Non-Degree students must meet the same admissions criteria as matriculated students.

Non-matriculated students may enroll for a maximum of six credits. All students must maintain at least a B average. Non-matriculated students

may apply for admission if they complete all entrance deficiencies. It is therefore necessary that students who are interested in applying for admission meet with a departmental advisor to devise a planned program.

Applicants interested only in specific courses of special interest to practicing engineers may also be admitted as a special student or may enroll in the Advanced Certificates in Special Topics program.

An applicant who does not desire credit for graduate courses may be enrolled as an auditor. Enrollment as an auditor must be approved by the Chair of the department or his or her authorized representatives and the Associate Dean of Academic Affairs. The decision to enroll as an auditor must be made at the time the applicant registers. Auditors will not be required to take any examinations, and the amount of problem work, reports, and other formal preparation they may do is discretionary. No quality grade will be awarded for audited courses and a grade of AUD will be assigned. Audited courses cannot be used for credit. An auditor will pay the same fees as a non-degree student.

Students who have taken graduate work at other institutions may receive up to six transfer credits (nine with the approval of the Committee on Course and Standing) provided that the material is equivalent to a graduate course taught at the College and that it was completed with a grade of B or better within a five-year period preceding matriculation at The City College.

Registration for any course in the graduate program may be permitted only with the specific approval of the department concerned.

Grades Assigned to Graduate Courses

For graduate courses the following grades will be assigned:

A, B, C	passing grades (includes + and – grades)
P	passing, with credit (for graduate seminars or noncredit report)
AUD	auditor, no credit
F	failure
W	resignation without penalty (Not assigned by instructor. Registrar assigns this grade with Dean's approval and recommendation of instructor.)
WU	failure due to excessive absences
INC	incomplete (temporary grade)
FIN	F due to unresolved INC
SP	Satisfactory Progress, a temporary grade for dissertation (thesis) supervision or certain research courses, like projects and reports, requiring more than one semester for completion. **For Master's level** courses that carry credits (e.g., Master's thesis, 3 credit report, 3 credit project), the SP must be changed to a letter grade (e.g., A, B, C) upon course completion. **For Ph.D.** requirements (e.g., Dissertation Research, Dissertation Supervision), the SP grades are changed to "P" upon completion of the work
NRP	No record of Progress. The grade may be assigned by dissertation supervisors only to students in 90000 courses (Dissertation Supervision), if the student has done little or no work on the dissertation over the course of the semester.

If a student is absent from the final examination (whether oral or written) in any course, a special examination may be granted only by the engineering faculty Committee on Course and Standing, and normally is granted by that committee only upon the submission of written evidence showing that the student was physically unable to be present at the stated examination.

Such application is to be made directly following the absence, and the special examination must be taken in the Fall term by October 15th and in the Spring term by March 15th.

An INC will become a FIN if the work is not completed by ten weeks into the second semester following the INC grade. These grades are treated the same as F.

For example, if a student receives an incomplete grade (INC) for a fall 2013 course, the work must be completed and the final grade submitted before the end of the tenth week of the fall 2014 semester, otherwise the INC grade becomes a FIN.

The grade of SP, when assigned for a research course, shall stand until the research is completed to the satisfaction of the department concerned and a grade assigned.

Application

The City College of New York application process is self-managed. Responsibility for gathering the required documents such as official transcripts and letters of recommendation rests with the applicant. The applicant (this includes students who are attending or have attended City College) must submit these supporting items as a package to the Office of Admissions, including official documents in their original sealed envelopes.

The applicant must submit the following material to the Office of Admissions, The City College of New York, Wille Administration Building, Room 101, 160 Convent Avenue, New York, NY 10031:

1. Online application (available on the City College website).
2. Two letters of recommendation from faculty members personally acquainted with the applicant's academic achievement.
3. Official transcripts from college/universities attended, submitted in sealed envelopes.
4. A personal statement.
5. An official GRE score report should be sent to The City College of New York, institution code 2083. More information on the GRE can be found at www.gre.com.

All documents become the property of The City College and cannot be returned. No original foreign documents can be returned unless accompanied at the time of filing by photostatic copies that have been verified by admissions personnel. All foreign documents must be accompanied by official English translations.

Application Deadline Dates: February 1st for the Fall semester and Nov. 15th for Spring semester.

The Doctor of Philosophy Degree

The City College of New York offers the Doctor of Philosophy Degree in Biomedical, Chemical, Civil, Electrical and Mechanical Engineering. Admissions and financial assistance forms are available online at www.ccny.cuny.edu in the Graduate Admissions section. For further information, consult with or write to the Associate Dean of Academic Affairs, Grove School of Engineering ST-209, The City College, New York, NY 10031.

Application Deadline Dates: February 1st for the Fall semester and Nov. 15th for the Spring semester.

Requirements for Admission to the Ph.D. Programs

A bachelor's or master's degree in a branch of engineering, or a closely related area, appropriate to the applicant's intended field of study, from

an accredited institution whose requirements for the degree are substantially equivalent to those of CCNY is required. The academic record must demonstrate promise of superior performance and the ability to carry out research. Adequate preparation in specific courses may be required by the individual department.

International Students

Graduates of foreign institutions who meet standards of admission equivalent to those described above may be considered for admission to the Engineering doctoral programs. The applicant must present authoritative evidence of sufficient competence in the English language to pursue a regular course of study at The City College. An applicant who has not studied in an English-speaking country and who is not a permanent resident (green-card holder) must take the Test of English as a Foreign Language (TOEFL), administered internationally by Educational Testing Service (ETS), and request ETS to report examination results directly to the Admissions Office, The City College of New York, Wille Administration Building, Room 101, 160 Convent Avenue, New York, NY 10031, Institution Code 2083. Inquiries concerning this examination may be made to: Test of English as a Foreign Language (TOEFL), Box 6151, Princeton, New Jersey 08540, U.S.A. or to most American embassies and consulates. A minimum score of 73 (79 for Biomedical Engineering) on the Internet Based Test (IBT) is required.

Requirements for the Doctor of Philosophy Degree

The degree of Doctor of Philosophy in Engineering is awarded for mastery of subject matter and demonstration of research ability. It is given in recognition of the candidate's superior attainments and ability in his or her field. A student must maintain high academic standards to retain matriculated status in the doctoral program. Normally four or more years of full-time study and research beyond the bachelor's degree are needed to complete the doctoral program. See section on time limits for degree.

Credits

At least 60 credits of approved graduate work, consisting of 48 credits course work and 12 credits Dissertation Research, including the course requirements in the field of specialization, are required for the degree.

Transfer of Credit

A maximum of 30 acceptable graduate credits taken prior to admission to the doctoral program at The City College may be applied toward the degree provided the courses were completed with a grade of B or higher within an appropriate period preceding the time of application and are equivalent to comparable courses at City College. Exceptions to the above regulations may be considered under special circumstances. An evaluation of previously earned credits will usually be made before the end of the student's first year in residence by the student's program.

Residence

At least 30 of the credits required for the degree must be taken in residence at The City College. Doctoral students are expected to spend at least one year in full-time residence at The City College. Full-time residence consists of a schedule of no fewer than 12 credits or the equivalent for each of two consecutive semesters.

First Examination (Qualifying Exam)

Each student must pass a First Examination in his or her field. The examination shall be written and/or oral and may be administered within a narrow time period or may be administered in parts over a more extended time period. A student may continue in the doctoral program after completing 45 credits only if he or she has passed this examination.

Choice of Mentor

Soon after having completed 30 credits and, in any case, shortly after having passed the qualifying examination, a student must obtain the consent of a member of the doctoral faculty to act as mentor. A memo to this effect will be sent by the faculty member to the Graduate Engineering Office (room: ST -209, phone: 212 – 650 - 8030) for inclusion in the student's file. Finding a mentor is the responsibility of the student.

The Guidance Committee

After a subject for the dissertation has been agreed on, the student, with the approval of the mentor, will solicit the consent of members of the faculty with expertise in the various aspects of his/her research to act as his/her Guidance Committee. In general the Guidance Committee, including the mentor, should number three (3) or four (4) and should include no more than one non-tenured faculty on it. The student will then request the Executive Officer or his/her designee to appoint the Guidance Committee.

The student is required to keep the Guidance Committee informed of the progress of his/her research: as a minimum, a one-page summary must be provided once a year.

The Examining Committee

The Examining Committee will have no less than five (5) members; it will consist of the Guidance Committee (3 to 4 members) and at least two faculty members or recognized experts in the field, of which at least one should be from outside of the Grove School of Engineering and, preferably, outside of CUNY. The mentor will serve as chair of the Examining Committee.

Tools of Research

Students must qualify in such tool subjects (computer languages, novel experimental techniques, statistics, etc.) as are necessary to conduct research in his/her field.

After approval of the research proposal, the Guidance Committee will determine what special tools of research the student needs and will communicate this to the Executive Officer.

Proficiency in the use of this tool of research will be attested by the mentor, on the basis of observation or, if necessary, after a special examination.

Second Examination

A research proposal outlining the dissertation research will be prepared as soon as possible and distributed to the Guidance Committee for its approval. Substantial changes to the dissertation aims will be described in amendments to the proposal, which must be approved by the Guidance Committee.

After the Guidance Committee has approved the original research proposal, the mentor will request the Office of Graduate Affairs (room: ST -209, phone: 212 - 650 - 8030) to schedule the Second Examination.The request to schedule the Second Exam must be submitted four (4) weeks before the proposed exam date.

A student must prepare a research proposal and present it orally to his/her Examining Committee. The Second Examination is usually taken after the completion of course requirements. A student may be admitted to the Second Examination only upon recommendation of his/her mentor and Guidance Committee.

The Second Examination is expected to test the student's preparation to conduct research in his/her chosen area; the aim is to ensure that the student's preparation is adequate both for the task of completing his/her dissertation research and to allow him/her initial entry as a professional in his/her specialization.

Advancement to Candidacy

Before a student can be certified as a candidate for a doctoral degree, he or she must have completed the following requirements: all required course work (of which at least 30 credits must be taken at the City University) with at least an overall B average; the First and Second Examinations; tools of research; and any special departmental requirements for certification.

Third or Final Examination (Defense)

The defense will be scheduled only after the Examining Committee has given preliminary approval of the draft dissertation. Like the Second

Examination, the Third Examination is a public event open to all faculty of the school. Notices announcing them must be circulated among the faculty at least two weeks before the examination date. The request to schedule the Final Exam must be submitted to the Office of Graduate Affairs (room: ST -209, phone: 212 - 650 - 8030) at least four (4) weeks before the proposed examination date..

Doctoral students may attend at the discretion of the chair of the Examining Committee and then only during the presentation by the candidate. Questions by faculty other than those on the Examining Committee will be entertained at the discretion of the chair of the Examining Committee.The deliberations and voting of the committee are private; besides the committee members, only the Executive Officer may attend (with voice but no vote)..

The deliberations and voting of the committee are private; besides the committee members, only the Executive Officer may attend (with voice but no vote).

A passing vote can contain no more than one negative vote or abstention. Absent members are deemed to have abstained. If two or more members are absent, the examination will be postponed.

Scheduling of the Third Examination during summer recess should be avoided.

Satisfactory Academic Progress
Students must be making satisfactory progress toward the degree in order to maintain status at the City College of New York, Grove School of Engineering and to be eligible for any student financial assistance. A student is deemed not be making satisfactory progress if he/she has a grade point average below 3.00, has accumulated more than two open grades (INC, INP, NGR, ABS, and ABP), has completed 45 credits without having passed the First Examination, has completed 8 semesters without having passed the Second Examination, has received two "NRP" grades in succession, or has exceeded the time limit for the degree.

Levels: Doctoral Students
Doctoral tuition charges are based on student's "level," which is determined by a combination of the number of graduate credits completed (including, in the case of transfer students, credits accepted by the Grove School of Engineering) and specific academic accomplishments.

Level I – Students who have completed fewer than 45 credits of graduate work (including approved transfer credits) or who have not passed the First Examination.

At Level I only, students who are New York State residents and enrolled on a part-time basis (total of credits and Weighted Instructional Units or WIUs do not exceed 6) are billed on a per-credit basis. In addition, at Level I, both full-time and part-time out-of-state and international students are billed at the per-credit rate for all credits/WIUs.

Note: For billing purposes, courses taken by Level I student on an audit basis will be treated the same as courses taken for credit and will be included in the assessment of tuition charges.

Level II – From the semester following the completion of 45 credits (fully earned and evaluated and including approved transfer credits) and passing of the First Examination, to advancement to candidacy.

Level III – From the semester following advancement to candidacy.
Level III students registering for courses for credit other than 90000 will be charged additional tuition on a per credit basis. Level III students do not incur additional tuition charged for courses audited.

Petition for a Change of Level
Students are responsible for ascertaining that their tuition level had been properly established. Students who believe they have been billed inappropriately because of an inaccurate level designation must petition the Office of Graduate Affairs for a reassessment of their level by the second week of classes for a re-assessment of their level. Unless such a petition is filed by the dead-line, no retroactive changes in level can be made. Special problems should be referred, in writing, to the Associate Dean of Academic Affairs prior to the stated deadline..

Full Time Status: Doctoral Students
A student may attain full-time status for financial-aid purposes either by registering for a minimum of 7 academic units (doctoral degree students) or for a minimum of 12 academic credits (master's degree students) or by receiving certification for an equivalent academic commitment composed, in part or entirely, of Weighted Instructional Units (WIUs), which are assigned for such activities as teaching, exam preparation, and research. Level I doctoral students whose combined total of course credits and WIUs is 7 or greater are required to pay full-time tuition.

Dissertation
The student must complete a dissertation that embodies original research. The dissertation must be defended at an oral Final Examination and be deposited in The City College library before the degree is granted. In order to defend the dissertation, the student must have been advanced to candidacy. The dissertation must be microfilmed or published. Instructions for preparing the dissertation may be secured from the library at The City College.

The preparation of a dissertation and a defense of it constitute the final evaluation of a candidate's qualification for the Ph.D. degree in Engineering. Approval by the Grove School of Engineering is typically confirmed by action of The City College Faculty Senate and the City University's Board of Trustees.

Graduate office will announce to the Provost and, by posting and/or other means, to the general public and the members of the committee, the time and date of the defense. Additional examining member(s) may be invited to the Final Examination.

Time Limits for Doctoral Degree
The First Examination is typically completed within 2 – 4 semesters after admission to the program. Students must complete the Second Examination within 8 - 9 semesters after admission. All requirements for the degree must be completed no later than six years (12 semesters) after matriculation. A student who is admitted after the completion of 30 credits of acceptable work must complete all requirements within five years.

Immunization Requirement
In accordance with New York State Public Health Law, Article 21, Title VI, Section 2165, all full- and part-time students born on or after January 1, 1957, must present proof of immunization against measles, mumps, and rubella. The City College will be forced to bar registration or administratively withdraw (with tuition liability) students who do not comply. Health records will be kept confidential and will be available for reference only to those college personnel whose job duties require information from those records. Some students may be exempt from this requirement. A copy of Public Health Law 2165 is available in the Student Services Offices as well as in the Office of the Vice President for Student Affairs.

Schedule Changes
Schedule changes must be approved by the student's adviser or the Office of Graduate Affairs. The change in schedule must be done in accordance with the deadlines published each semester.

Withdrawal
Written notice of voluntary withdrawal from the program must be approved by the Associate Dean for Graduate Studies.

Readmission
Readmission following a withdrawal is at the discretion of the student's department and Associate Dean for Graduate Studies. A special Application for Readmission must be filed in the Office of the Registrar. It will be forwarded to the appropriate academic office for consideration. A $10 readmission fee will be assessed.

Leave of Absence
A leave of absence will be granted to a student deemed to be in good standing who wishes to interrupt doctoral study. The leave request should be made in writing prior to the semester during which the leave will be taken. Each request for leave must be approved by the department's Ph.D. advisor and the Associate Dean for Graduate Studies. Requests must be cleared by the Office of Financial Aid, the Library, the Bursar, the Business Office, the Office of International Students (if applicable), and the Office of Residence Life (if applicable). Requests for an extension of a leave of absence, for no more than one additional year, must follow the same procedure. A student cannot be granted a total of more than two years (four semesters) leave of absence during his/her entire period of matriculation. Official leave of absence time is not counted toward the time limit for completion of degree requirements. Any student subject to induction or recall into military service should contact the veterans' certifying officer before applying for an official leave. A $10 readmission fee will be assessed.

During the period of a leave of absence, no changes in academic status, including such matters as the scheduling and taking of qualifying examinations and advancement to candidacy, may be effected.

En-Route Master's Degree
The master's degree is awarded to enrolled doctoral students who have fulfilled appropriate requirements. The requirements include a minimum of 45 credits with an average grade of B (courses taken for P credit ordinarily cannot be included), passing of the First Examination, and satisfactory completion of a major research paper. Transferred credits from other master's programs cannot be used.

Master's of Philosophy
The City College awards the Master of Philosophy degree (M.Phil.) to doctoral students who are advanced to candidacy. It is the responsibility of any student wishing this degree to file an application for the degree with the Registrar. Please note that the date of filing for the degree determines the date upon which the degree will be conferred.

Awarding of Degrees
Degrees are awarded three times per academic year. In order for the degree to be awarded (and for the dissertation to be deposited, if applicable) the candidate must meet academic degree requirements in their program of study and the following enrollment requirement:

For the degree to be awarded in February, candidates must be enrolled the proceeding Fall semester; for May/June, the concurrent Spring semester; for September 30, the preceding Spring semester.

The Master's Degree Program

The programs of course offerings at the master's level fulfill three vital current needs:

To provide qualified graduates of accredited undergraduate engineering and computer science programs with an opportunity to continue their professional training at an advanced level.

To allow engineers and computer scientists currently employed in industry to enhance their professional training by bringing to them the latest developments in theory and their applications to industrial practice.

To provide graduate students working toward the doctorate and a career in research with a firm grounding in the theoretical foundations necessary for such work.

Requirements for Admission to the Master's Programs
For matriculation, the undergraduate record shall be in an accredited scholastic curriculum or in one acceptable to the Chair of the department concerned. The applicant's scholastic record must show a minimum average of B. Applicants are required to complete the Graduate Admissions Application which shall be accompanied by official transcripts from all colleges/universities attended, proof of degree, and two letters of recommendations from faculty. The application can be obtained by visiting the City College website at www.ccny.cuny.edu.

Applicants to the Chemical Engineering program are required to take the Graduate Record Examination (verbal, quantitative and analytical sections). Official transcripts of graduate work completed at other institutions, if any, are also required and will be evaluated. All international students with baccalaureate degrees from non-English speaking countries must submit a TOEFL score to be considered for admission. At present, a minimum score of 73 (79 for Biomedical Engineering) is required for admission.

Requirements for the Master's Degree
Each candidate for a master's degree must complete at least 30 credits as approved by the department and the Dean. Some students may be required to complete satisfactorily more than 30 credits because of a lack of specific courses or inadequate preparation in a particular area of study. No course may be credited toward a degree unless specifically approved for that purpose. It is expected that graduate students will maintain a high scholastic standing. Irregularity in attendance or failure to maintain satisfactory scholastic standing will be sufficient grounds for asking a student to withdraw. Satisfactory scholastic standing will be interpreted to mean at least a B average.

The master's candidate must complete the required course work within a period of five years from the date of admission.

The department Chair will appoint departmental graduate advisors who will make recommendations for the courses to be taken for the degree. These recommendations will be subject to the approval of the department Chair and the Dean of the Grove School of Engineering or their appointed representatives. Students will be required to complete one of the following non-course options within the approved program for the degree:

1. a master's thesis carrying six credits;*
2. a project carrying three credits;**
3. a report carrying no credit;**
4. a seminar carrying one credit.**

* generally reserved for Ph.D. preparation
** for Professional Master's degree

Thesis and project credits will be counted towards the 30-credit degree requirement. The seminar credit may be counted towards the 30-credit degree.

The master's thesis, project or report must be completed before the scheduled final examination week so that a proper grade may be assigned at the end of the final examination period.

Respective departments may prescribe these options in greater detail as a part of their respective degree requirements.

Any student working toward a master's degree must be matriculated for the last 12 credits toward the degree.

Effective current academic rules, requirements and procedures governing transfer credits, program adjustments, and course grade corrections will be available from the Grove School of Engineering , Office of Graduate Affairs, ST-209.

In addition, regulations governing certification of full-time status, leaves of absence, readmission, and en-route master's degrees are described elsewhere in this bulletin.

If a student expects to be graduated at the end of a given term, he/she must file an "Application for Degree" at the Registrar's office on or before the date set for this purpose during the given term.

Graduate Citation
Master's graduates who have attained a GPA of 3.90 or better for the required 30 credits (taken at City University) will receive the Grove School of Engineering Graduate Citation.

Advanced Certificates in Special Topics

The Grove School of Engineering offers 12 credit (four-course) programs leading to Advanced Certificates in Special Topics in Civil Engineering and Engineering Management. These programs are organized for

degreed practicing engineers who may be entering disciplines requiring knowledge beyond their previous education, and for which they wish to prepare in a short time. Acceptable undergraduate preparation is, of course, required to enter the program.

An Advanced Certificate in Special Topics is awarded by the Grove School of Engineering on satisfactory completion of the course work (minimum GPA of 3.00). In Civil Engineering, students completing an advanced certificate program are eligible to enter the master's program and apply the twelve (12) certificate credits towards a Master's degree. The specializations offered are:

Civil Engineering
Four courses are required in any one of the following concentrations (courses are described under Civil Engineering section):
Structures
Environmental Engineering
Water Resources
Transportation

School of Engineering

Engineering Management

The Advanced Certificate in Special Topics in Engineering Management makes it possible for the practicing engineer to acquire fundamental business skills and managerial knowledge.

Choose any four of the following:

ENGR H3800	Management Concepts for Engineers	3
ENGR H7600	Engineering and Business Law	3
ENGR H8000	Decision and Planning Techniques for Engineering Management	3
ENGR H8500	Project Management	3
ENGR H9300	Economics and Investment Analysis of Engineering Projects	3

With the approval of the advisor and the Associate Dean for Graduate Studies, students may substitute CE H0200 (Transportation Economics) and CE I2400 (Analytical Techniques in Transportation) for ENGR H9300 and ENGR H8000, respectively.

Requirements for Admission to the Advanced Certificate in Special Topics Programs
The requirements for admission to the Advanced Certificate in Special Topics programs are similar to those required for admissions to the Professional Master's degree. Application for the program shall be made by way of The City College Graduate Studies Application, indicating the field of study and the specific certificate desired. The application shall be accompanied by an official transcript from the college awarding the bachelor's degree. The undergraduate record shall be from an accredited scholastic curriculum in the appropriate field.

All international students with baccalaureate degrees from non-English speaking countries must submit a TOEFL score of at least 500, if paper based, and of 61, if computer based, to be considered.

Time for Completion of Advanced Certificate Work
While subject to enrollment, it is expected that a sufficient number of classes will be offered each term so that the certificate work can be completed in 2 semesters.

Course Designations
Courses are listed under the Grove School of Engineering Departments of Biomedical, Chemical, Civil, Electrical and Mechanical Engineering, and Computer Science. Courses with a departmental designation will usually be taught by a member of that department and the class will usually consist of students associated with that department. Courses with the designation "Engineering" are expected to be of interest to more than one of the conventional branches and are listed both in the following group and by departments. The instructor may be drawn from among the several departments and the students may comprise a group associated with several departments.

Foooo series: Advanced senior-first year graduate courses. No more than two such courses may generally be credited toward a graduate degree.

Goooo series: Special or experimental courses offered a limited number of times prior to approval by the faculty for inclusion in one of the series below.

Hoooo series: Courses in terminal programs generally credited only toward a master's degree after approval by the student's advisor and the department.

Ioooo series: Master's and doctoral courses.

Joooo series: Advanced courses.

Note: The five-digit courses occasionally referred to as prerequisites are undergraduate courses in the Grove School of Engineering. Full descriptions of these may be found in the Undergraduate Bulletin of The City College.

Department of Biomedical Engineering

Professor Mitchell B. Schaffler, Chair • Department Office: Steinman 564• Tel: 212-650-5070

General Information

The City College offers the following graduate degrees in Biomedical Engineering:
M.S. (BME) (p. 207)
Ph.D. (BME) (p. 208)

Biomedical Engineering, Master of Science (M.S.)

M.S. Degree Requirements

To obtain the M.S. degree in Biomedical Engineering, a student must complete the 30-credit course program described below. The courses span four areas: biomedical engineering (at least 12 credits required), mathematics (at least 3 credits required), biomedical science, and traditional engineering. Students must also complete a Master's thesis or project (3-6 credits). The courses are distributed as follows:

Courses within BME (at least 12 credits required)

Choose from the following:

BME I6000	Advanced Biomaterials	3
BME I2000	Cell and Tissue Engineering	3
BME I2200	Cell and Tissue Transport	3
BME I3000	Neural Engineering and Applied Bioelectricity	3
BME I3110	Biofluid Mechanics	3
BME I4200	Organ Transport and Pharmacokinetics	3
BME I5000	Medical Imaging and Image Processing	3
BME I5100	Biomedical Signal Processing	3
BME I7000	Laboratory in Cellular and Molecular Engineering	3
BME I7100	Cell and Tissue Mechanics	3
BME I7300	Cell and Tissue-Biomaterial Interactions	3
BME I7700	Microfluidic Devices in Biotechnology	3
BME I8000	Bone Physiology and Biomechanics	3
BME I9000	Skeletal Soft Tissue Physiology and Biomechanics	3
BME I9400	Special Topics in Machine Learning	3
ENGR I7500	Poroelasticity	3
BME I9300	Scientific Ethics	1
BME I6000	Advanced Biomaterials	3

ENGR I4200	Continuum Mechanics	3
BME I0000	Biomedical Engineering Seminar	1, repeatable up to 3 times
BME	Any new or once-offered graduate course with the "BME" course code	

ENGR I4200: may also count as a Math course

BME 10000: Required course - must attend for at least one (1) semester

Mathematics (at least 3 credits required)

Choose from the following:

ENGR I1100	Introduction to Engineering Analysis	3
ENGR I1400	Applied Partial Differential Equations	3
ENGR I1500	Introduction to Numerical Methods	3
ENGR I1700	Finite Element Methods in Engineering	3
ENGR I4200	Continuum Mechanics	3
BIO V8201	Biostatistics I	6

Biomedical Science Electives

If desired, students may elect to take biomedical science courses related to the research effort. Choose from the following courses:

BME I4300	Physiology for Biomedical Engineers	6
BIO V1401	Cell Biology	4
PHYS V3800	Biophysics	4
BIO V2301	Neuroscience I	4
BME I6400	Translational Challenges in Diagnostics, Devices and Therapeutics	3
MEDS I7100	Translational Challenges in Medicine	3
MEDS I8200	Translational Research Design	2

I). Students should check relevant CUNY listings for additional courses and consult the M.S. advisor to confirm whether a specific course will satisfy the degree requirements. Note that course pre-requisites must be satisfied.

Non-BME Engineering Electives

If desired, students may elect to take other engineering courses in any of the traditional engineering disciplines (ChE, EE, ME, etc.) or computer science. BME I6100 (p. 18) can also be taken to fulfill this requirement. Engineering management courses are not accepted.

Master's Thesis or Project (3-6 credits)

With approval of the M.S. advisor, students may complete a 6-credit thesis (BME I9906: Thesis Research) on an approved topic. It is anticipated that the 6-credit thesis will report on research in biomedical engineering conducted at City College or at a local research hospital with affiliated faculty. The written thesis must be defended orally and approved by a thesis committee consisting of at least three faculty members, with two of the members from the BME department. With approval of the M.S. advisor, a student may replace the 6-credit thesis by a 3-credit project (BME I9800: Project) and an additional course.

Note: With approval of the M.S. advisor, students may register for one 50000-level undergraduate course towards the M.S. degree. This undergraduate course will not be included in the calculation of the G.P.A.

Biomedical Engineering, Doctor of Philosophy (Ph.D.)

Ph.D. Degree Requirements

To complete the Ph.D. degree in the Biomedical Engineering (BME) program, the student must satisfy the following requirements:

1. Satisfactory completion of 36 credits of approved graduate coursework and 24 credits of Dissertation Research. A minimum 3.3 grade point average in five core BME courses must be achieved before scheduling the First (Qualifying) Examination.
2. Satisfactory completion of the First (Qualifying) Examination, which is a presentation of the dissertation research area that highlights key problems in the field.
3. Satisfactory completion of the Second Examination, which is a defense of the research proposal.
4. Satisfactory completion of the Final Examination, which is a defense of the Ph.D. dissertation.

Ph.D. Coursework

Once any necessary undergraduate courses are completed, students must complete 36 credits of graduate coursework in four areas, as outlined below. Students who have transferred credits from a master's degree may use equivalent courses taken as part of their master's degree to satisfy the requirements. Students are expected to have completed at least 30 credits after their 5th semester (or after the 2nd semester if they entered the program with an M.S. degree).

Biomedical Engineering Courses (at least 12 credits)

While students are encouraged to take as many BME courses as possible, a minimum of 12 credits of BME courses must be taken. See the BME core course requirements below for the GPA requirement.

BME I2000	Cell and Tissue Engineering	3
BME I2200	Cell and Tissue Transport	3
BME I3000	Neural Engineering and Applied Bioelectricity	3
BME I3110	Biofluid Mechanics	3
BME I4200	Organ Transport and Pharmacokinetics	3
BME I5000	Medical Imaging and Image Processing	3
BME I5100	Biomedical Signal Processing	3
BME I5600	Cell Mechanotransduction	3
BME I6000	Advanced Biomaterials	3
BME I6100	Intellectual Property, Regulation and Quality Assurance	3
BME I7000	Laboratory in Cellular and Molecular Engineering	3
BME I7100	Cell and Tissue Mechanics	3
BME I7300	Cell and Tissue-Biomaterial Interactions	3
BME I7700	Microfluidic Devices in Biotechnology	3
BME I8000	Bone Physiology and Biomechanics	3
BME I9000	Skeletal Soft Tissue Physiology and Biomechanics	3
BME I9300	Scientific Ethics	1
BME I9400	Special Topics in Machine Learning	3
ENGR I7500	Poroelasticity	3
BME I9500	Entrepreneurship and Financial Economics	2
BME	Any new or once-offered graduate course with the "BME" course code	

Students are required to take BME I9300: Scientific Ethics. Every semester, students are also required to attend BME I0000: Biomedical Engineering Seminar, which consists of weekly speakers from the BME field; students must register for this course at least once.

Biomedical Sciences (at least 6 credits)

BME I4300	Physiology for Biomedical Engineers	6
BIO V1401	Cell Biology	4
PHYS V3800	Biophysics	4
BIO V2301	Neuroscience I	4
BME I6400	Translational Challenges in Diagnostics, Devices and Therapeutics	3
MEDS I7100	Translational Challenges in Medicine	3
MEDS I8200	Translational Research Design	2

Mathematics Courses (at least 6 credits)

At least two math-related courses must be taken, to be chosen from the following partial listing:

ENGR I1100	Introduction to Engineering Analysis	3
ENGR I1400	Applied Partial Differential Equations	3
PHYS V0100	Mathematical Methods in Physics	4
BIO V8201	Biostatistics I	6
	OR	
BIO V8101	Mathematical Biology	3
ENGR I1500	Introduction to Numerical Methods	3
ENGR I1700	Finite Element Methods in Engineering	3
ENGR I4200	Continuum Mechanics	3

Engineering Courses Other than Biomedical

At least one engineering course in a field other than BME must be completed. This may include however:

BME I6100	Intellectual Property, Regulation and Quality Assurance	3

Elective Courses

Any graduate courses can be taken from the categories above to complete a total of 36 course credits.

Subtotal: 9

Completion of 24 Credits of Doctoral Dissertation Research

Each student must complete 24 credits of the course BME J9900 Doctoral Dissertation Research. The instructor for this course should be the student's Ph.D. mentor.

BME Core Course Requirements

In order to take the First Examination (the Qualifying Exam), students must obtain a minimum grade point average of 3.3 in the core graduate courses described below. This GPA requirement is designed to insure that all Ph.D. students have sufficient understanding of the core biomedical engineering fundamentals to pursue advanced study and professional career opportunities. These credits are not in addition to but inclusive of the 36 course credits listed above.

At least one course must be taken from each of the groups 1-4 below:

ENGR I1100	Introduction to Engineering Analysis	3
ENGR I1400	Applied Partial Differential Equations	3
PHYS V0100	Mathematical Methods in Physics	4
BME I5000	Medical Imaging and Image Processing	3
BME I5100	Biomedical Signal Processing	3
BME I9400	Special Topics in Machine Learning	3
BME I7100	Cell and Tissue Mechanics	3
BME I2200	Cell and Tissue Transport	3
BME I8000	Bone Physiology and Biomechanics	3
BME I9000	Skeletal Soft Tissue Physiology and Biomechanics	3
BME I7300	Cell and Tissue-Biomaterial Interactions	3
BME I2000	Cell and Tissue Engineering	3
BME I4300	Physiology for Biomedical Engineers	6
BME I9300	Scientific Ethics	1

BME I4300 and BME 9300 are required.

Advisement

Ph.D. students are required to serve as a Teaching Assistant (TA) at least once as part of the first year Fellowship. Typically, Ph.D. students serve as TA several times over the five years of their Ph.D. training.

Advisement

Master's Program
Professor Bingmei Fu

Doctoral Program
Professor Lucas Parra

Facilities

The Biomedical Engineering research laboratories at City College are described below. These CCNY facilities are amplified by the extensive laboratories at our hospital partners where many of our students do experimental and translational research.

Cardiovascular Dynamics and Biomolecular Transport Laboratory
The Wallace Coulter Laboratory for Cardiovascular Dynamics and Biomolecular Transport studies the role of fluid mechanics and transport processes in the physiological and pathophysiological functions of the cardiovascular system. One of our major efforts is to understand the influence of fluid dynamics in the initiation and progression of atherosclerosis, a degenerative disease of the large human arteries which leads to heart attacks and strokes. We are investigating the fluid mechanics of arteries and the response of arterial cells (endothelial and smooth muscle cells) to fluid mechanical forces using cell culture models in vitro and computer simulations. We were the first group to compute the fluid flow shear stresses on smooth muscle cells (SMC's) induced by transmural flow and have subsequently exposed cultured SMC's to similar stress environments in defined flow fields to determine their biomolecular responses. In complementary research, we have pioneered in vitro studies of convection and diffusion of macromolecules across monolayers of endothelial cells which form the blood contacting surface of all blood vessels. We were the first group to clearly demonstrate that the transport properties of the endothelial layer are very sensitive to their fluid mechanical environment and will respond to changes in fluid shear stress. Studies of the biomolecular mechanisms underlying these responses are in progress.

Microcirculation Laboratory
In the microcirculation laboratory we perform in vivo permeability measurements on intact single microvessels to investigate the mechanisms of microvessel permeability related diseases such as tumor metastasis, thrombosis, strokes, brain injuries and Alzheimer's disease. We use cutting-edge fluorescence image techniques such as in vivo intracellular calcium concentration imaging to explore signal transduction events. We use quantitative fluorescence video, confocal and photometer microscopy to measure microvessel permeability and cell migration rate change caused by mechanical, physical and chemical stimuli. Information obtained from the experiments serves to develop and test mathematical models of microvascular transport based on fundamental principles of biomechanics, in order to advance basic understanding of the role of the microcirculation in maintaining life. The analysis forms the basis to understand various diseases from a cellular and molecular point of view. It also provides information to design new drugs and drug delivery methods.

Applied Bioelectricity, Neurophysiology, and Medical Devices Laboratory
Neural engineering includes the application of engineering principles to solve fundamental problems in neuroscience and to produce practical solutions to human neurological problems. The aims of this laboratory include: 1) establishing the mechanisms by which weak (e.g. power line, mobile phone) and strong (electrical prosthesis, deep brain stimulation) electric fields modulate brain function; 2) elucidating the neuronal network dynamics, including non-synaptic mechanisms, facilitating emergent physiological ("gamma"/cognition) and pathological (epilepsy) network oscillations; and 3) rapid-prototyping and validation

of innovative therapeutic and diagnostic technologies. The Neurophysiology Laboratory is equipped with state-of-the-art electrophysiology/microscopy equipment which allows the monitoring of bioelectrical activity generated by populations of neurons and by single visualized neurons. The lab also employs shared resources of the Neural Engineering Group for whole-brain electrophysiology (EEG), eye tracking, electrical circuit design, and high-end computing resources.

Signals and Computation Laboratory
Current experimental techniques focus on interpreting and modulating brain activity in humans non-invasively using electro-encephalography and trans-cranial electrical stimulation, or in short, "reading" and "writing" the brain with electric fields. The work is often coupled with auditory and visual psychophysics and always incorporates computational or mathematical models, or in short, "modeling" the brain. To establish basic cellular mechanism it also relies on in-vitro electrophysiology. For the work with human subjects, the laboratory has a sound-damped electromagnetically shielded room, a portable 128-channel system and eye tracker with drivers for real-time analysis, and closed-loop stimulation and adaptive displays. Research grade audio equipment is available to perform auditory perception experiments. Our custom equipment for trans-cranial electric stimulation (AC and DC) with simultaneous EEG recording is unique in the world. In addition to data collection, the laboratory performs data analysis of brain signals and images as well as computational modeling of spiking networks using a variety of computational tools. The lab leverages shared resources of the Neural Engineering Group for electrophysiology on the single-neuron, population and whole-brain levels, microscopy, eye tracking, electrical circuit design, and high-end computing resources with modeling software.

Brain Decoding and Stimulating Laboratory

This laboratory develops novel techniques for (i) non-invasively stimulating the brain and (ii) decoding neural signals. We are testing the transcranial application of ultrasound and near-infrared lasers to restore or enhance physiological activity in the central nervous system. Our efforts in neural decoding adopt a machine learning approach to infer brain states from neuroimaging data collected in naturalistic settings. We make extensive use of biophysical modeling of the human head as well as multivariate statistical techniques to optimize interventions and increase the sensitivity of our decoding methods. The research is expected to translate to new treatments for psychiatric and neurological disordersOur

Tissue Mechanics Laboratory
The focus of the Tissue Mechanics Laboratory is to understand the adaptive response of bone to altered physiological conditions. The lab uses a combined experimental and computational approach to investigate interstitial fluid flow around osteocytes, which is believed to play a role in the mechanism by which bone tissue detects external mechanical stimuli and deposits or resorbs bone as needed. A major thrust of the current research effort is to understand how bone mechanotransduction is altered in postmenopausal and disuse osteoporosis. An ongoing project involves relating bone microstructure and cellular-level changes to alterations of interstitial fluid flow in osteoporotic bone. Another current project investigates whether reduced mechanical loading causes changes in the bone microporosities and osteocyte environment that diminish bone's ability to detect mechanical loading. Techniques developed in the lab are also being applied to the field of cancer drug delivery in a project with collaborators at Memorial Sloan-Kettering Cancer Center that investigates the efficacy of applying mechanical loading to enhance delivery of therapeutic agents to bone tumors.

Multiscale Biomechanics and Functional Imaging Laboratory
The Laboratory of Multiscale Biomechanics and Functional Imaging aims to integrate biomechanics, bioinstrumentation, signal and image processing to study health disorders in the osteoarticular and cardiovascular fields. Our laboratory is involved in developing experimental, theoretical and numerical multiscale approaches to determine the biomechanical and functional competence of living tissues before and after their degeneration occurs (i.e., bone fragility, osteoarthritis and rupture of thin caps on atherosclerotic blood vessels). To integrate these interdisciplinary goals, our laboratory is equipped with a new Phased Array Ultrasound System, electronics and machine shop, computational infrastructure for three-dimensional imaging processing and Finite Element Modeling, and a wet lab for basic histology processing. Furthermore we are developing an Acoustic Microscope and a small animal facility that will include an operating room, anesthesia machine and a PC-controlled Continued Passive Motion device.

Bone and Joint Laboratory
The major emphasis of the Bone and Joint Laboratory is to understand how skeletal tissues (bone, ligament, cartilage) develop, maintain and repair themselves in order to meet mechanical demands throughout life. We focus on the cellular processes that control characteristic architectural features of these tissues, and how they respond to physical and metabolic challenges in aging and in diseases such as osteoporosis, genetic defects and diabetes. We are currently investigating fatigue and repair in bone and tendon, with specific emphasis on discovering how living cells in these tissues detect and repair wear and tear damage before it accumulates to the point of tissue failure. We are also examining how osteocytes (the tissue-resident bone cells) influence bone's mechanical function, both directly by controlling local matrix composition, and indirectly by governing local bone remodeling activity. In related studies, we are examining how ostecytes function as mechanosensors that allow bone to perceive and react to mechanical stimuli. Experimental approaches used in the Bone and Joint Laboratory focus on both the cell and tissue levels, and include mechanical loading studies, finite element and mathematical modeling, microscopy and other imaging modalities, cell culture and molecular biology.

Multiscale Biomechanics and Mechanobiology Laboratory

The research focus of this laboratory is to provide a comprehensive understanding of mechanics and adaptation of biological tissues and organs, such as bone, joints and ears, in health, aging and disease so to aid in the development of new treatment strategies for health disease and disorders. For this purpose we use a multidisciplinary and multiscale approach involving experimental and computational mechanical engineering methods, material science approaches, high-resolution imaging, clinical data and biological analyses to reveal how abnormalities in the multiscale hierarchy of biological tissues can cause whole failure, and how mechanical forces influence tissue growth, shape and function. Our research aims to inform clinicians on ways to correct or prevent failure and abnormalities in biological tissues, such as bone fragility and deformities, before they become debilitating.

Microfluidic HTS Technology and Tissue Engineering Laboratory
One focus of this laboratory is directed at the development of microfluidic cell arrays to study sigaling pathways, such as apoptosis and inflammation, for the high throughput screening (HTS) of drugs using current discoveries in biomedical sciences and advanced technologies in BioMEMS. The long term collaboration with Memorial Sloan-Kettering Cancer Institute facilitates the development of microfluidic 3D cell arrays for HTS. Another focus of the lab is to investigate thermal effects on 3D tissue regeneration in synthetic extracellular matrices using stem cells and explore the role of heat shock proteins in the tissue development, injury protection and repair. Bone marrow mesenchymal stem cell isolation and characterization are routinely performed in the lab. Currently we are focused on bone and cartilage regeneration.

Connective Tissue Engineering Laboratory
Research in the Connective Tissue Engineering Laboratory incorporates the principles of cell and molecular biology, materials science, and mechanical engineering toward the development of living tissue

surrogates for connective tissue restoration. A prevailing theme in each of the major research thrusts is understanding how environmental stimuli (i.e., mechanical forces and biochemical mediators) direct the differentiation of novel progenitor cells (i.e., human dermal fibroblasts, fetal cells) toward specialized lineages, including cartilage and bone cells. Efforts are also focused on the design of new biomaterials, such as photo-crosslinked cellulosic hydrogels, to modulate cellular phenotype and functional tissue growth.

Immune Nanomedicine Laboratory
The Immune Nanomedicine Laboratory designs, characterizes, and deploys novel nanotechnologies to treat and diagnose diseases. Specifically, the lab focuses on disrupting and detecting immune and inflammatory processes in kidney disease and cancer. One focus of the lab is to develop kidney-targeted polymeric nanoparticles as therapeutic tools for renal diseases. Another area of concentration is developing ex vivo and implantable optical nanosensor devices using single-walled carbon nanotubes (SWCNT) as diagnostic tools for cancers and related diseases. Each of these areas of concentration combine rational material design, using materials as tools to understand biological processes in disease, and translational aspects including efficacy, pharmacology, and safety.

Faculty

Marom Bikson, Harold Shames Professor
B.S. (BME), Johns Hopkins Univ.; Ph.D. (BME), Case Western Reserve Univ.

Luis Cardoso, Professor
B.E. (BME), National Polytechnic Institute (Mexico); M.S. (BME), , Ph.D. (BME) Univ. of Paris

Alessandra Carriero, Assistant Professor
B.S., M.Sc. (BME) Biomedical Engineering, Politecnico di Milano (Italy); PhD (Biomechanics), Imperial College London (UK)

Jacek P. Dmochowski, Assistant Professor
B.E. (EE), Carleton University (Canada), M.A.Sc.; Ph.D. (Telecommunications), Institute National de la Recherche Scientifique (Canada)

Susannah P. Fritton, Herbert G. Kayser Professor
B.S. (BME), Tulane Univ., M.S., Ph.D. (BME)

Bingmei Fu, Herbert G. Kayser Professor
B.S. (Mechanics), Univ. of Science and Technology (China), M.Eng.; Ph.D. (ME), CUNY

Jeffrey S Garanich, Assistant Professor
B.S. (ME), PhD (Bioengineering), Penn State Univ.

Steven B. Nicoll, Professor
B.S. (BME) Univ of Penn.; Ph.D. (BME) Univ. of California (Berkeley & San Francisco)

Lucas Parra, Harold Shames Professor
B.S. (Physics), Ludwig Maximilian Univ. (Germany), Ph.D. (Physics)

Mitchell B. Schaffler, CUNY Distinguished Professor and & Wallace H. Coulter Professor
B.S. (Biological Sciences) Stony Brook Univ.; Ph.D. (Orthopaedics), West Virginia Univ.

Sihong Wang, Associate Professor
B.S. (BME), Shanghai (China); Ph.D. (BME), Univ. of Texas (Austin)

Ryan M. Williams, Assistant Professor
B.A. (Biology), Univ. of Virginia; Ph.D. (Pharmacological Sciences), West Virginia Univ.

Professors Emeriti
John M. Tarbell, Research Distinguished Professor
Sheldon Weinbaum, Research Distinguished Professor

Institute for Biomedical Engineering

Professor Mitchell Schaffler, Director • Institute Office: Steinman 401 • Tel: 212-650-6707

The CUNY Institute for Biomedical Engineering, or New York Center for Biomedical Engineering (NYCBE), is a consortium of the Grove School of Engineering at The City College and several of the prominent health care institutions in New York City. It was formed in 1994 with the support of the Whitaker Foundation.

A unique feature of this effort is that it involves a synergistic cooperation between the nation's largest urban public university and numerous world-class research medical centers in New York City. The NYCBE provides a unique partnership where CCNY undergraduate and graduate students are actively engaged in research.

The current NYCBE medical center partners are:

- Albert Einstein College of Medicine
- Cardiovascular Research Foundation
- Columbia College of Physicians and Surgeons
- Hospital for Special Surgery
- Mount Sinai School of Medicine
- New York University School of Medicine
- Memorial Sloan-Kettering Cancer Center
- Weill Medical College of Cornell University

The NYCBE has internationally recognized researchers (from CUNY and eight affiliated institutions) in the areas of arterial fluid mechanics and transport, cartilage and intervertebral disc biomechanics, tissue engineering and biomaterials, microvascular exchange, bone biomechanics and remodeling, biomedical imaging and instrumentation, and neural engineering. The outstanding quality and diversity of the NYCBE member faculty are reflected in their society affiliations, membership on select panels of the National Institutes of Health, National Research Council, NASA, and editorships and associate editorships of major journals.

Faculty

In addition to the Department of Biomedical Engineering faculty listed in the previous section of this Bulletin, the NYCBE faculty includes more than thirty members from CCNY and its affiliated institutions. With the rapid growth of Biomedical Engineering research and development in New York City, the NYCBE members list is rapidly evolving. Please see the NYCBE link on the CCNY Biomedical Engineering website for the most up-to-date list of NYCBE members.

Department of Chemical Engineering

Professor Ilona Kretzschmar, **Chair** • Department Office: Steinman 322 • Tel: 212-650-6769

General Information

The City College offers the following graduate degrees in Chemical Engineering:
M.E. (Ch.E.) (Professional Master's Degree) (p. 212)
M.S. (Engineering) (p. 212)
Ph.D. (Ch.E.) (p. 212)

Chemical Engineering, Master of Engineering (M.E.) (Professional Master's Degree)

Degree Requirements

Engineering Core Courses: (6 credits)

ChE I3300	Advanced Chemical Reaction Engineering	3
ChE I4100	Chemical Process Economics	3

Engineering Management (6 credits)

Two of the following:

ENGR H3800	Management Concepts for Engineers	3
ENGR H7600	Engineering and Business Law	3
ENGR H8000	Decision and Planning Techniques for Engineering Management	3

Focus Areas in Chemical Engineering (9 credits)

Three courses in one of the following focus areas:

A. Polymers and Materials

ChE I5500	Interfacial Phenomena	3
ChE I5700	Advanced Materials Engineering	3
ChE I6100	Polymer Science and Engineering	3
ChE I6200	Polymer Surfaces and Interfaces	3
ChE I6300	Thin Organic Films and Their Analysis	3
ChE I6400	Rheology of Soft Materials	3
ChE I6500	Mechanics of Polymer Melt Processing	3
ChE I8900	Nanotechnology	3
ENGR I9100	Mass Transfer	3
ChE I9200	Soft Materials Lab	3

B. Solids Processing

ChE I5200	Powder Science and Technology	3
ChE I6500	Mechanics of Polymer Melt Processing	3
ChE I8100	Fluid Particle Systems	3

C. Systems Engineering

ChE I3000	Chemical Process Simulation	3
ChE I5800	Molecular Simulation	3
ChE I7700	Process Dynamics and Control	3
ChE I8600	Equilibrium Staged Separations	3
ChE I8800	Bioseparations	3
ChE I9000	Bioprocess Engineering: Mammalian Cell Biotechnology	3

Technical Electives (9 credits)

Any other three courses in Chemical Engineering. Courses in other areas by approval of the department.

Report (0 credits)

ChE I9700	Report	0

Subtotal: 30

Chemical Engineering, Master of Science (M.S.) (Engineering)

Degree Requirements

Required Courses (16-19 credits)

ENGR I1100	Introduction to Engineering Analysis	3
ChE I0000	Seminar	1
ChE I2800	Advanced Chemical Thermodynamics	3
ChE I3300	Advanced Chemical Reaction Engineering	3

Two of the following three courses:

ENGR I0800	Foundations of Fluid Mechanics I	3
ME I3700	Convection Heat Transfer	3
ENGR I9100	Mass Transfer	3

Elective Courses (9-15 credits)

Three to five additional courses in Chemical Engineering

One of the following:

ChE I9700	Report	0
ChE I9900	Research for the Master's Thesis	Variable cr., up to 6 cr.
ChE I9800	Master's Project	3

Subtotal: 30

Additional Requirements

All full-time graduate students are expected to engage in research.

Thesis: Optional. Requires prior departmental approval.

Chemical Engineering, Doctor of Philosophy (Ph.D.)

Degree Requirements

Required Courses:

ChE I0000	Seminar	1
ENGR I1100	Introduction to Engineering Analysis	3
ChE I2800	Advanced Chemical Thermodynamics	3
ChE I3300	Advanced Chemical Reaction Engineering	3
ChE J9600	Introduction to Research Fundamentals	3

Two of these three courses:

ENGR I0800	Foundations of Fluid Mechanics I	3
ChE I9100	Mass Transfer	3
ME I3400	Advanced Heat Transfer	3

Elective Courses:

as well as other graduate level science and engineering courses (after approval by ChE PhD committee)

One of these two courses:

ChE I0000	Seminar	1
ChE J9900	Research for the Doctoral Dissertation	Variable cr., up to 12 cr.
ChE K9000	Doctoral Supervision	1

The following electives have been offered through the ChE Department.

Please, check the current schedule for information as to which courses are offered in which semester.

ChE I3200	Statistical Mechanics I	3
ChE I3000	Chemical Process Simulation	3
ChE I5200	Powder Science and Technology	3
ChE I5500	Interfacial Phenomena	3
ChE I5700	Advanced Materials Engineering	3
ChE I5800	Molecular Simulation	3
ChE I8900	Nanotechnology	3
ChE I6100	Polymer Science and Engineering	3
ChE I8600	Equilibrium Staged Separations	3
ChE I6400	Rheology of Soft Materials	3
ChE I8800	Bioseparations	3

ChE I8900	Nanotechnology	3
ChE I9000	Bioprocess Engineering: Mammalian Cell Biotechnology	3
ChE I9200	Soft Materials Lab	3
ChE I6500	Mechanics of Polymer Melt Processing	3

To advance to level 3, a student must pass the Second Exam and complete a total of 60 credits, at least 33 of which are course credits and at least 12 of which are research credits, i.e.,

Total Course Credits: a minimum of 33 Credits
Total Research Credits: a minimum of 12 Credits
Additional credits that can be any combination of course and/or research credits: a minimum of 15 Credits

Total Credits to advance to Level 3: 60 Credits

Additional credits taken post-candidacy: K9000: 1 Credit

Total credits for graduation in addition
to successful thesis defense: a minimum of 61 Credits

Advisement

Masters Program
Professor C. Steiner

Doctoral Program
Associate Professor Elizabeth J. Biddinger

Department Facilities

In addition to the laboratories operated by the Grove School of Engineering in Steinman Hall, the Department of Chemical Engineering provides separate teaching laboratories for the study of powder technology and soft materials. In addition, it has facilities for a number of advanced experiments in materials science, a virtual computation center as well as numerous laboratories for advanced research.

Powder Science and Technology Laboratory
This laboratory is attached to the course with the same name (ChE I5200) and is given together with it as demonstration of theoretical principles presented in class. The students are first introduced to powder characterization such as particle size, size distribution (using standard sieves and a light scattering instrument) and shape and surface structure using optical and electron microscopes. Instruments to measure powder specific surface area and pore volume using gas adsorption (BET and gas pycnometry) and mercury intrusion are also presented. Characterization of bulk powders properties is achieved in the Jenike Shear Cell used to measure powder-yield loci at different initial compression levels. This is a special instrument, characteristic of powder engineering, used to determine powder flowability as well as for the design of powder storage vessels such as hoppers and bins. Finally, the MikroPul Hosokawa Micron Powder Characteristics Tester provides six mechanical measurements with one easy-to-use instrument, including 1) angle of repose, 2) compressibility, 3) angle of spatula, 4) cohesiveness, 5) angle of fall and 6) disperse-ability. Measuring such properties has great importance in the design of storage hoppers, feeders, conveyors and other powder processing equipment. The laboratory also has a significant research component dedicated to the measurement of dry powder flows in different geometries and the study of powder granulation (size-enlargement). Principles of these processes are also demonstrated to students using the existing research equipment.

Soft Materials Laboratory
The course provides students with exposure to surface modification chemistry and the standard techniques used for the characterization of surface properties. Written and verbal reports are required. In addition to use of instrumentation, students will familiarize themselves with surface preparation and modification techniques, including self-assembly, evaporation, spin coating, and Langmuir-Blodgett techniques. The modules currently available are:

- Contact angle goniometry, which will be used to measure the surface energy for various materials. Students will compare the surface properties of hydrophilic and hydrophobic surfaces and mixed surfaces prepared via self-assembly and Langmuir-Blodgett transfer techniques and/or plasma or corona treatment.
- Air-liquid and liquid-liquid interfacial tension measurement using shape characterization (pendant drop and bubble techniques) and the interfacial balance (Kahn Balance). The effects of surfactants present at these interfaces will be investigated, as well as surfactant transport to the interfaces.
- Fluorescence imaging and Brewster Angle Microscopy (BAM) investigation of surfactant phase behavior at fluid-fluid interfaces and its effect on the interfacial properties of the system.
- Spectroscopy (reflection infrared spectroscopy) will be used to determine the surface coverage and ordering of surfaces prepared by the students.
- Ellipsometric measurement of thin films fabricated by the students via evaporation, spin coating, Langmuir-Blodgett films, and self-assembly.
- Students will utilize atomic force microscopy (AFM) characterization of surfaces, and compare the constant force, lateral force, and tapping modes.
- Colloidal particle size distributions and particle stability measurements will be made using light backscattering.

Materials Science Facilities
State-of-the-art equipment is available for advanced materials science laboratory experiments. These include two Fourier-Transform Infra-Red spectrometers, a Differential Scanning Calorimeter, a Thermal Mechanical Analyzer, an Atomic Force Microscope, Single-wavelength Ellipsometer, three Langmuir-Blodgett Troughs, a Fluoroscence Microscope, High-Speed Video Cameras (up to 100000 fps), three high resolution optical microscopes with image analysis capabilities, a Contact Angle Goniometer, an Argon Plasma Cleaner, a Light Scattering instrument, a UV-spectrometer, an Atomic Absorption Spectrometer, a Refractometer, a Confocal Microscope, and a Scanning Electron Microscope. For soft materials studies, two research-grade rheometers are available, a Texture Analyzer, and a bubble tensiometer are all available.

The A.X. Schmidt Virtual Computer Laboratory
The Chemical Engineering Department is equipped with a Citrix Server System that can be used by students for their coursework. All students have access to the Internet and E-mail. Application software available on the network includes ASPEN, Mathematica, Matlab, COMSOL, and Visio, Super- Pro Designer. Many courses make use of the Citrix network and software. The virtual laboratory is available for unlimited student use including external access. All students are expected to become proficient in its use.

Faculty

Sanjoy Banerjee, Distinguished Professor
B.S. (Ch.E.), Indian Institute of Technology; Ph.D. (Ch.E.), Univ. of Waterloo (Canada)

Elizabeth Biddinger, Assistant Professor
B.S. (Ch.E.), Ohio University, Ph.D. (Ch.E.) Ohio State University

Marco Castaldi, Associate Professor
B.S. (Ch.E.), Manhattan College; Ph.D. (Ch.E.), UCLA

Xi Chen, Assistant Professor
B.S. (M.E.), Tsinghua University (China); Ph.D. (M.E.), Stevens Institute of Technology

Alexander Couzis, Herbert G. Kayser Professor
B.S. (Ch.E.), National Technical Univ. (Greece); M.S. (Ch.E.), Univ. of Michigan, Ph.D (Ch.E.)

M. Lane Gilchrist, Jr., Assistant Professor

B.Ch.E., Louisiana State Univ.; Ph.D., Univ. of California (Davis)

Ilona Kretzschmar, Professor and Chair
Diploma (Chemistry) Technical Univ. of Berlin (Germany);, Sc.D. (Chemistry)

Charles Maldarelli, Professor
B.S. (Ch.E.), Columbia Univ., M.S. (Ch.E.), D.Eng.Sc. (Ch.E.)

Robert J. Messinger, Assistant Professor
B.S. (Ch.E.), Ohio State University; Ph.D. (Ch.E.), Univ. of California (Santa Barbara)

Jeffrey Morris, Professor
B.Ch.E., Georgia Institute of Technology; M.S., California Institute of Technology, Ph.D. (Ch.E.)

Vincent O. Pauchard, Associate Professor
B.S. (Mat. Sci.), INSA de Lyon (France); M.S. (Mat. Sci.), Ph.D. (Mat. Sci.), Ecole Centrale de Lyon (France)

David S. Rumschitzki, Professor
B.S. (Math/Ch.E.), Cooper Union; M.S. (Ch.E.), Univ. of California (Berkeley), Ph.D. (Ch.E.)

Carol A. Steiner, Professor
B.S. (Chem.), M.I.T.; M.S. (Chem./Biochem. Engr.), Univ. of Pennsylvania, Ph.D. (Ch.E.)

Gabriel Tardos, Professor
Dipl. Eng., Polytech. Bucharest, Roumania; M.Sc. (M.E.), Technion, Israel, D.Sc.

Raymond S.Tu, Associate Professor
B.S. (Ch.E.), Univ. of Florida; Ph.D. (Ch.E.), Univ. of California (Santa Barbara)

Rosemarie Wesson, Professor & Associate Dean for Research
B.S. (Ch.E.), M.I.T.; M.S. (Ch.E.), Univ. of Michigan, Ph.D. (Ch.E.)

Professors Emeriti

Andreas Acrivos, Albert Einstein Professor Emeritus

Morton M. Denn, Albert Einstein Professor Emeritus

Robert A. Graff

Leslie Issacs

Morris Kolodney

Harvey L. List

Robert Pfeffer

Irven Rinard

Herbert Weinstein

The Energy Institute

Professor Sanjoy Banerjee, Director • Institute Office: Steinman 3rd Floor • Tel: 212-650-5728

The Energy Institute, formerly the Clean Fuels Institute, is a new research center whose mission is to advance the science and engineering of sources of sustainable energy. It is a CUNY-wide multidisciplinary institute which includes faculty from CCNY's Grove School of Engineering as well as other CUNY Colleges and Departments. Its top priority at present is the development of energy storage systems that will allow the large-scale utilization of excess night-time electrical capacity and energy from renewable, but intermittent, sources such as the sun and the wind. Several major projects are underway. One is to develop solid-state and flow batteries for load leveling/peak shaving and plug-in hybrids and electric vehicles that are cost effective, reliable, and long-lived. Another is the advancement of thermal storage systems for concentrated solar power. Each of these projects involves a blend of fundamental research, empirical development, and process systems engineering. The work of the Energy Institute is part of the CUNY sustainability program. It also involves extensive collaboration with industry including such organizations at The Solar Energy Consortium (TSEC). Other areas of active research include energy storage in gas hydrates and flow assurance for oil-gas pipelines.

The Benjamin Levich Institute for Physico-Chemical Hydrodynamics

Professor Morton Denn, Director • Institute Office: Steinman 1M • Tel: 212-650-8157

Benjamin Levich Institute for Physico-Chemical Hydrodynamics, an internationally recognized research center for the study of fundamental problems of flow and transport in complex fluids, fluid-like media and interfaces headed by Albert Einstein Professor Morton Denn, includes faculty from the Departments of Chemical Engineering and Physics. The current scope of the Institute's research is in five major areas: granular flows, low Reynolds number hydrodynamics, non-Newtonian fluid mechanics, computational fluid mechanics, and transport along interfaces. Examples include experimental granular kinetic theory, granular compaction, particle migration in concentrated suspensions undergoing shear, the influence of surfactants on the motion of drops and bubbles, microscopic fluid mechanics using molecular dynamics simulations, and droplet mechanics in liquid-crystalline polymer blends. The Institute has excellent laboratory and computational facilities.

Department of Civil Engineering

Professor Ann E. (Beth) Wittig, Chair • Department Office: Steinman 119• Tel: 212-650-8000

General Information

The City College offers the following graduate degrees in Civil Engineering:
M.E. (C.E.) (Professional Master's Degree) (p. 214)
M.S. (Engineering) (Degree is awarded to students who do not have a bachelor's degree in engineering)
Ph.D. (C.E.) (p. 215)

Programs and Objectives

For both Master's and Ph.D. degrees, the Department of Civil Engineering offers program of graduate study in the following areas:

Environmental Engineering and Water Resources

Structural Engineering and Mechanics

Transportation Engineering

Civil Engineering, Master of Engineering (M.E.)

M.E. Degree Requirements

Required Courses by Specialization

Structural Engineering and Mechanics

CE H1000	Analytical Methods in Civil Engineering	3
CE I3000	Structural Dynamics	3
CE I7000	Wastewater Treatment Plant Design	3
CE I3500	Applied Elasticity and Plasticity	3

Environmental Engineering and Water Resources

CE H1000	Analytical Methods in Civil Engineering	3
	Select three of the following four courses	
CE H0700	Advanced Hydraulics	3
CE H6600	Engineering Hydrology	3

CE H8300	Air Pollution and Control	3
CE H7200	Principles of Water and Waste Water Quality	3

Transportation Engineering

CE H1000	Analytical Methods in Civil Engineering	3
CE H0200	Transportation Economics	3
CE H2000	Traffic Engineering	3
CE I2400	Analytical Techniques in Transportation	3
CE I2600	Urban Transportation Planning	3

Elective Courses

	Other graduate courses	9-18
	Report/Project/Thesis	0-6

At least one of the following courses:

CE I9700	Report	0
CE I9800	Project	3
CE I9900	Research for the Master's Thesis	6

Subtotal: 30

Note: With departmental approval, students may register for two 50000-level undergraduate courses towards the master's degree (grades of B or better only). These undergraduate courses will not be included in the calculation of the G.P.A.

Civil Engineering, Doctor of Philosophy (Ph.D.)

Ph.D. Degree Requirements

Requirements for Admission

To be eligible for admission, an applicant must possess a bachelor's degree in Civil Engineering or in a closely related area appropriate to the intended field of study from an accredited institution. The applicant's academic record must demonstrate promise of superior performance in advanced study and research. The general Graduate Record Examination is recommended, and International students from non-English speaking countries must submit a TOEFL (Test of English as a Foreign Language) score of 550 or better to be considered for admission.

Requirements for the Ph.D.

Candidates for the Ph.D. degree must:

1. Obtain, by completion of 30 credits of graduate work, the consent of a faculty member to act as his/her research mentor
2. Satisfactorily complete 60 credits of approved graduate work (30 credits beyond the masters degree), of which at least 30 must be taken at the City University; (up to 12 of these credits may be in research).
3. Pass a qualifying examination in Civil Engineering, consisting of tests in mathematics and specialization topics from first year graduate civil engineering curriculum, with a grade of excellent or high pass (First Examination)
4. Demonstrate proficiency in those research tools considered appropriate by the faculty in the field of specialization
5. Present orally and in writing and defend a plan of proposed research (Second Examination)
6. Satisfactorily complete, not later than 8 years after matriculation, a dissertation which embodies original research and is a publishable contribution to engineering and/or science; for a student who is matriculated after the completion of at least 30 credits of acceptable work, this time will be reduced to 7 years
7. Present and orally defend the dissertation (Third Examination).

Advisement

For Master's Program

Water Resources and Environmental Engineering

Professor H. Tang

Structural Engineering and Mechanics
Professor F.B. Lin

Transportation Engineering
Professor M. Allahviranloo

For Doctoral Program in all three areas
Professor N. Krakauer

Civil Engineering, Advanced Certificate in Special Topics, Advanced certificate (Adv. Crt.)

The Department of Civil Engineering offers Advanced Certificates in Special Topics in the seven areas listed below. For more information contact the Chair of the Department.

Certificate Requirements

A. Structural Engineering

CE H5300	Advanced Structural Design	3
CE H5000	Advanced Reinforced Concrete	3
CE I5400	Linear and Nonlinear Analysis of Structures	3

And one of the following:

CE H5200	Bridge Engineering	3
CE H5100	Prestressed Concrete	3
CE H9000	Foundation Engineering	3

B. Environmental Engineering

CE H7100	Water Quality Analysis	3
CE H7500	Principles of Drinking Water Treatment	3
CE H7600	Principles of Biological Wastewater Treatment	3

And one of the following:

CE H7400	Industrial Wastewater Treatment	3
CE I7000	Wastewater Treatment Plant Design	3

C. Water Resources Engineering

CE H6300	Groundwater Hydrology and Contamination	3
CE H0700	Advanced Hydraulics	3
CE H6600	Engineering Hydrology	3

And one of the following:

CE H6100	Water and Environmental Resources Systems Analysis	3
CE H0800	Applied Hydraulics in Engineering	3

D. Transportation Engineering

Three courses from the following list:

CE H0200	Transportation Economics	3
CE H2000	Traffic Engineering	3
CE H4500	Urban Transportation	3
CE H4700	Urban Freight and City Logistics	3
CE H4800	Transit Systems: Planning and Operations	3
CE I2600	Urban Transportation Planning	3

One additional elective

Laboratories

Computational Facilities

The Department has two instructional laboratories with PCs.

Materials of Engineering Laboratory

The Materials of Engineering Laboratory houses an Instron 8500 series Testing Machine. This is a computer controlled servo–hydraulic machine

and capable of applying 55 kips (250 kN) dynamic loads. Supporting electronic control, data acquisition and computer software systems are available. Additional equipment for the static, dynamic and fatigue testing of materials include testing machines for tension, compression, transverse-bending and torsion investigation. The laboratory contains hardness testing machines, impact testers, strain signal conditioning consoles, and assorted peripheral equipment. Facilities for preparing and curing concrete include walk-in temperature humidity control chambers. Optical Systems for surface strain measurements using digital image correlation are available. Electrochemical facilities for determining the rate of corrosion of steel allow for potentiostatic, galvanostatic and frequency response analysis. Nondestructive testing facilities include 4-channel acoustic emission system for early detection of incipient defect growth, ultrasonic V-meter, ultrasonic signal generation, digitalization and analysis capacities.

Soil Mechanics Laboratory
The Soil Mechanics Laboratory is equipped to perform standard identification tests of soils, such as grain size distribution, liquid and plastic limits and compaction properties. In addition, facilities to perform detailed testing of undistributed samples (consolidation and triaxial shear) are available. A moist room is available for long term sample storage.

Fluid Mechanics Laboratory
The Fluid Mechanics Laboratory is equipped for studying both compressible and incompressible fluid media. Flow rates of up to 5 cubic feet per second of water are provided by each of the three independent high-pressure systems equipped with constant head controls. Two constant-head supply tanks located in the laboratory provide needed discharge capacities. The laboratory contains a tilting flume 52 ft. long, a water tunnel, pumps, turbines, a hydraulic bench, and various units for the study of frictional phenomena involving water and oil. A one-dimensional Laser Doppler Anemometer is used for the study of flow velocities in pipes and near boundaries. In addition, the Lab has a state-of-the-art wave tank. This tank is 6 feet wide by 4 feet high and 40 feet long. It is equipped with computer controlled five-paddle generator. This system can produce single waves, random waves, and angle waves. A two-dimensional Laser Doppler Velocimeter (LDV) equipped with computer controlled 3-D traverse and fully automated data acquisition system are used in the wave tank for studying beach hydraulics and off-shore similitudes. In addition, a Particle Image Velocimeter (PIV) is available for analysis of particles in a flow field. The Lab is also equipped with a titling sand flume for studying flow through porous media and groundwater contamination. A fully automated freeze and thaw machine is also available for graduate research work.

Environmental Engineering Laboratory
The Environmental Engineering Laboratory is equipped for experimental evaluation of unit processes and operations in water and wastewater treatment as well as analysis of all physical, chemical and microbiological water quality parameters. The experimental facilities include settling columns, suspended and attached growth biological reactors, computer controlled bioreactors for kinetic studies, a bench scale UV chamber, a 12 gpm 15-foot bubble contactor for ozone studies complete with ozone generator, gas and liquid phase ozone residual monitors and off-gas destructor, TOC/TN Analyzer, BIOFLO 310 Autoclavable Benchtop Fermentation System, IMAG System MULTIDOC-IT/LM-263, TF-7300 RT PCR System for DNA/RNA Analysis and all conventional experimental devices used in determination of chemical dose requirements for water and wastewater processing. An environmental chamber for temperature controlled experiments is also available.

The analytical capabilities of the laboratory include gas chromatograph-mass spectrometer/ECD with purge/ trap, inductive coupled plasma spectrometer (ICP) gas chromatograph with EC and FID detectors, total organic carbon analyzer, Dionex, dual channel ion chromatography system, water quality autoanalyzer, UV-visible double beam spectrophotometer with stopped-flow device, and phase contrast/epiflouresence research microscope. Field monitoring equipment include water quality monitors with multiple probes and flourometers.

Dynamics and Structural Control Laboratory
The Dynamics and Structural Control Laboratory (DSCL) facilitates advanced research in earthquake engineering, and the developmental of smart and intelligent structural systems. A smart and intelligent structural system has in–built capability to sense the vibration due to natural hazards such as earthquakes and extreme wind loads, and modify its behavior to minimize vibration, damage and discomfort to occupants of the structure. The DSCL is equipped with a 30 feet by 15 feet strong floor system with 100 kips inserts for static and dynamic testing of structures, a state-of-the-art 10,000 lb one directional (horizontal) shaking table system capable of simulating near-field ground motions with velocities up to 2 meters per second, a 6 story building frame model with replaceable elements to simulated nonlinear response of structures, 24 channel 2 MHz simultaneous data acquisition system, 24 channel d-space controller for real time implementation of controllers using MATLAB, and a computer based visualization and image correlation system for damage detection in structural systems being tested on the strong floor.

Faculty

Anil Agrawal, Professor
B.Tech., IIT (India); M.E., Univ. of Tokyo; Ph.D., Univ. of California (Irvine); P.E. (New York)

Mahdieh Allahviranloo, Associate Professor
B.E., Sharif Univ. of Tech.; M.S., Iran Univ. of Science and Tech.; Ph.D., Univ. of California (Irvine)

Alison Conway, Associate Professor
B.S., Univ. of Delaware; M.S. Ph.D., Univ. of Texas (Austin)

Julio Davalos, Professor
B.S., M.S., Ph.D. (Structural Mechanics), Virginia Tech.

Naresh Devineni, Associate Professor
B.E., Osmania University, India; M.S., Ph.D., North Carolina State University (Raleigh)

Vasil Diyamandoglu, Assistant Professor
B.S., Bogazici Univ. (Istanbul, Turkey); M.S., Ph.D., Univ. of California (Berkeley)

Balazs M. Fekete, Associate Professor
M.S., Technical Univ. of Budapest (Hungary); Ph.D. (Earth Sciences), Univ. of New Hampshire

John Fillos, Professor
B.E., CCNY; M.S., Ph.D., New York Univ.; P.E. (New York)

Michel Ghosn, Professor
B.S., M.S., Ph.D., Case Western Reserve Univ.

Camille Kamga, Associate Professor
B.S., Univ. of Moncton (Canada); M.E., CCNY; Ph.D., City Univ. of New York

Reza M. Khanbilvardi, Professor
B.S., Pahlavi Univ. (Iran); M.S., Ph.D., Pennsylvania State Univ.; P.E. (New York, Connecticut)

Nir Krakauer, Associate Professor
B.S.E. (Engr. Physics), Univ. of Michigan (Ann Arbor); M.S. (Geochemistry), Ph.D. (Geochemistry), California Inst. of Technology

Feng–Bao Lin, Associate Professor
B.S., National Taiwan Univ.; M.S.; Ph.D., Northwestern Univ.; P.E. (New York, Connecticut)

Robert E. Paaswell, Distinguished Professor
B.E., Columbia Univ.; M.S., Ph.D., Rutgers Univ.; P.E. (New York)

Michael Piasecki, Associate Professor
Engr. Dipl., Univ. of Hanover (Germany); Ph.D., Univ. of Michigan (Ann Arbor)

Hansong Tang, Associate Professor
B.S. (M.E./E.E.), Wuhan Univ.; M.S., D.Sc. (Math), Peking Univ.; Ph.D., Georgia Tech.

Charles Vörösmarty, Professor
B.S. (Biological Sciences), Cornell Univ.; M.S., Ph.D. (Engineering Systems Design), Univ. of New Hampshire

Ann E. (Beth) Wittig, Associate Professor and Chair
B.S. (Chem. E.), Univ. of California (Los Angeles); Ph.D. (Chem. E.), Univ. of Texas (Austin); P.E. (New York); L.E.E.D. A.P.

Ardavan Yazdanbakhsh, Associate Professor
B.S., Azad Univ. (Central Branch); M.S. (C.E./Structural Engr.), Univ. of Sharjah (UAE); Ph.D., Texas A&M Univ.

Professors Emeriti

J. E. Benveniste

G. Donald Brandt

Carl J. Costantino

Norman C. Jen

Claire E. McKnight

Norbert Oppenheim

Gerald Palevsky

George Papoulas

Neville Parker

Ming L. Pei

Joseph Pistrang

Eli Plaxe

Morris D. Silberberg

James R. Steven

Computer Engineering Program

Professor M. Ümit Uyar, Program Director • St 672 • Tel: 212-650-5632

Dr. Samuel Fenster, Associate Director • St 617 • Tel: 212-650-6594

General Information

The City College offers the following graduate degree in Computer Engineering:

M.S. (p. 217)

Course descriptions can be found in the sections of this Bulletin for the Computer Science and Electrical Engineering Departments.

Computer Engineering, Master of Science (M.S.)

An Interdisciplinary Program offered jointly by the Departments of Computer Science and Electrical Engineering

Objectives

Computer engineering seeks to integrate the concepts and techniques from electrical engineering and computer science that are required to develop computer hardware and software. The program trains students in hardware-software integration as well as methods in software and electrical engineering. The training encompasses the design, development, testing, and evaluation of components, systems, and networks. Emphasis is placed on current state-of-the-art applications such as networks, computer architecture, image processing, VLSI, assistive technologies, robotics, cloud computing, and embedded computing. Students are expected acquire the knowledge and skill that enables them to undertake hardware and software projects encompassing the design of individual microprocessors, personal computers, supercomputers, and networked computers and circuit design.

Admission Requirements
Graduate study is open to qualified students who possess a bachelor's degree in computer engineering, computer science, or electrical engineering.
GRE Required: No
Minimum TOEFL/IELTS Scores: 533 (PBT), 73 (IBT) or 6
Supporting Documents Required:

- Official transcripts from all post-secondary institutions attended
- 2 letters of recommendation
- Resume/CV
- Personal Statement

Eligibility:

- Candidates must have a 3.00 undergraduate GPA
- A course covering computer organization and microprocessors
- A lab course in microprocessors
- An analog electrical engineering lab
- A course in electronics
- A course in algorithms
- A course in software engineering or team-based software design

M.S. Degree Requirements

A minimum GPA of 3.0 is required for graduation.

Focus Areas (12 credits)

One course from each of the four focus areas below (3 cr. each).

Hardware

CSc I4200	Computer Architecture	3
EE I5700	Digital Integrated Circuits	3
EE I5400	Physical Electronics I	3

Networks & Security

CSc I4300	Computer Communications	3
CSc I4330	Advanced Topics in Internet Programming	3
CSc I4900	Computer Security	3
EE I6600	Communications Protocol Engineering	3
EE I6700	IP Routing	3
EE I6800	Telecommunication Network Element Engineering	3
EE I7000	Network and Security	3
EE I5200	Fiber Optic Communications I	3
EE I7500	Advanced Wireless Networks	3

Software Applications

CSc I0400	Operating Systems	3
CSc I0500	Computer Graphics	3
CSc I0600	Fundamental Algorithms	3
CSc I0800	Topics in Software Systems	3
CSc I1000	Database Systems I	3
CSc I1500	Artificial Intelligence	3
CSc I1600	Natural Language Processing	3
CSc I1800	Topics in Artificial Intelligence	3
CSc I1900	Pattern Recognition and Machine Learning	3
CSc I4330	Advanced Topics in Internet Programming	3
CSc I6400	Topics in System Simulation	3
CSc I6730	Data Reduction in the Physical Sciences	3
EE I2200	Image Processing	3
EE I6600	Communications Protocol Engineering	3

Theory

CSc I0700	Compiler Construction	3
CSc I2000	Introduction to Theoretical Computer Science	3
CSc I2400	Formal Language Theory	3
CSc I4900	Computer Security	3
EE I0100	Probability and Stochastic Processes	3
EE I0500	Theory of Linear Systems	3

Supervised 0-credit report, 3-credit project or 6-credit thesis (0-6 credits)

Electives (6-12 credits)

Two to four additional courses from the above focus groups, bringing the total for the degree to 30 credits (3 cr. each).

Additional Requirements

At least 12 credits from the focus areas and electives must be from an engineering discipline (courses prefixed EE or Engr).

Required Courses (6 credits)

CSc I0600	Fundamental Algorithms	3

Subtotal: 30

Faculty

Peter Brass
Professor, Computer Science

Michael Conner
Professor, Electrical Engineering

Roger Dorsinville
Professor, Electrical Engineering (Co-Chair)

Izidor Gertner
Professor, Computer Science

Irina Gladkova
Associate Professor, Computer Science

Michael D. Grossberg
Associate Professor, Computer Science

Leonid Gurvits
Professor, Computer Science

Ibrahim W. Habib
Professor, Electrical Engineering

Akira Kawaguchi
Professor, Computer Science (Co-Chair)

Bruce Kim
Associate Professor, Electrical Engineering

Abbe Mowshowitz
Professor, Computer Science

Truong-Thao Nguyen
Associate Professor, Electrical Engineering

Zheng Peng
Assistant Professor, Computer Science

Kaliappa Ravindran
Professor, Computer Science

Tarek N. Saadawi
Professor, Electrical Engineering

Sang-Woo Seo
Associate Professor, Electrical Engineering

YingLi Tian
Professor, Electrical Engineering

M. Ümit Uyar
Professor, Electrical Engineering

Jie Wei
Professor, Computer Science

George Wolberg
Professor, Computer Science

Jizhong Xiao
Professor, Electrical Engineering

Jianting Zhang
Associate Professor, Computer Science

Zhigang Zhu
Herbert G. Kayser Professor, Computer Science

Department of Computer Science

Professor Akira Kawaguchi, Chair • Department Office: NAC 8/206 • Tel: 212-650-6631

General Information

The City College offers the following Master's degrees in Computer Science:
M.S. (C.Sc.) (p. 218)
M.I.S. (p. 219)

Computer Science, Master of Science (M.S.)

Admission Requirements

1. Applicants should have a Computer Science background. If there are certain deficiencies in your undergraduate study that can be made up by taking undergraduate courses, conditional admission may be extended to those qualified candidates.
2. Applicants should have a solid background in mathematics, i.e, Calculus 1-3, Linear Algebra, Discrete Mathematics.
3. Programming background and programming language is also looked for when reviewing candidates for admission.
4. Candidates must have a 3.00 undergraduate GPA.

M.S. Degree Requirements

Required Courses (18 credits)

Choose six courses (3 cr. each) from those listed below with at least two courses in each area.

Computation Theory

CSc I0600	Fundamental Algorithms	3
CSc I0900	Graph Theory and Algorithms	3

CSc I1200	Topics in Algorithms	3
CSc I1400	Parallel Algorithms	3
CSc I2000	Introduction to Theoretical Computer Science	3
CSc I2100	Finite Automata and Models of Computation	3
CSc I2200	Theory of Computability	3
CSc I2400	Formal Language Theory	3
CSc I2600	Computational Complexity	3
CSc I2800	Topics in the Theory of Computing	3
CSc I4800	Codes, Cryptography, and Secure Communication	3
CSc I4900	Computer Security	3
CSc I6000	Mathematics for the Analysis of Algorithms	3

CSc I1200: Topics in Algorithms, including any course numbered I12XX

Computer Organization and Software

CSc I0400	Operating Systems	3
CSc I0700	Compiler Construction	3
CSc I0800	Topics in Software Systems	3
CSc I1000	Database Systems I	3
CSc I1100	Database Systems II	3
CSc I2300	Symbolic Computation	3
CSc I4200	Computer Architecture	3
CSc I4300	Computer Communications	3
CSc I4330	Advanced Topics in Internet Programming	3
CSc I4600	Topics in Computer Architecture	3
CSc I4700	Topics in Computer Communications	3

CSc I0800: Topics in Software Systems, including any course numbered I08XX

CSc I4700: Topics in Computer Communications, including any course numbered I47XX

Computing Methodologies and Mathematical Computing

CSc I0500	Computer Graphics	3
CSc I1500	Artificial Intelligence	3
CSc I1600	Natural Language Processing	3
CSc I1800	Topics in Artificial Intelligence	3
CSc I1900	Pattern Recognition and Machine Learning	3
CSc I3100	Seminar in Information Systems	3
CSc I6100	Mathematical Programming I	3
CSc I6200	Mathematical Programming II	3
CSc I6300	Decision Analysis	3
CSc I6400	Topics in System Simulation	3
CSc I6600	Probabilistic Models in Computer Science	3
CSc I6700	Topics in Scientific and Statistical Computing	3

CSc I3100: Seminar in Information Systems, including any course numbered I31XX

CSc I6700: Topics in Scientific and Statistical Computing, including any course numbered I67XX

Additional Requirements (12 credits)

Students must either:

- complete 3 graduate courses in Computer Science **and** one course with number I96XX and its associated zero-credit report I9700;
- with permission of the department, complete 3 graduate courses in Computer Science **and** a 3 credit project (CSc I9800) under the direction of a member of the faculty;
- or with permission of the department, complete 2 graduate courses in Computer Science **and** a 6 credit thesis (CSc I9900) under the direction of a member of the faculty

With the approval of the student's graduate advisor, one course in another Engineering discipline may be substituted for one of the Computer Science courses used to fulfill the Additional Requirements.

Subtotal: 30

Information Systems, Master of Science (M.S.)

Admission Requirements

Students entering the program are expected to have a technical or scientific bachelor's degree from an accredited institution. Specifically, a B.A. or B.S. degree in science or a B.S. or B.E. degree in engineering with a minimum GPA of 3.00 is essential for admission. Provision is made for students with a strong background in an area related to Computer Science.

Admission to the program is for the fall term only, and limited to 35 students. Selection is made through the careful evaluation of the academic background and work experience of each applicant. This program does not admit international applicants.

M.S. Degree Requirements

Required Courses (24 credits)

Students must complete the following eight courses (with permission of the department, up to two courses may be replaced by graduate courses in Computer Science, Economics, or Psychology). All courses are 3 credits each unless otherwise specified.

MIS H1010	Statistics and Decision Making	3
MIS H2011	Trends in Information Technology	3
MIS H2020	Database Management	3
MIS H2030	Networking and Security	3
MIS H4010	System Analysis and Design	3
MIS H3010	Managerial Economics	3
MIS H3020	Developing Management Skills	3
MIS H3030	Organization and Management	3
MIS G5010	Seminar in Information System Management	3

MIS G3010: Economics B9513

MIS G3030: Economics B9514

Additional Requirements (6 credits)

Students must complete two of the following 3 credit courses in the same semester:

MIS H5020	Project in Information System Management	3

Subtotal: 30

Computing Facilities

An extensive array of computing facilities is available to Computer Science students. The Department has several laboratories equipped with state-of-the-art computers and workstations which support teaching and research. These computers are connected to the Grove School of Engineering network which is linked to the Internet.

Faculty

Ronak Etemadpour, Assistant Professor
B.S. (Soft. Engr.), The Islamic Azad University (Iran); M.S. (C.Sc.), Int. Univ. Sains Malaysia; Ph.D. (C.Sc.), Jacobs Univ. Bremen (Germany)
Peter Brass, Professor
Dipl. Math, Dr. Rer. Nat. (Math), Technical Univ. of Braunschweig
Nelly Fazio, Associate Professor
Laurea (C.Sc.), Universita di Catania (Italy); M.S. (C.Sc.), Ph.D. (C.Sc.) New York University
Rosario Gennaro, Professor
Laurea (C.Sc.), Universita di Catania (Italy); M.S. (C.Sc.), Massachusetts Inst. of Technology, Ph.D. (C.Sc.)

Izidor Gertner, Professor
M.S. (E.E.), KPI, Kaunas, Lithuania; Ph.D. (ECE), Technion (Israel)
Irina Gladkova, Associate Professor
B.S. (Mathematics), Donetsk State Univ.; Ph.D. (Mathematics) CUNY
Michael D. Grossberg, Associate Professor
B.A., Univ, of Penn.; Ph.D., MIT
Leonid Gurvits, Professor
M.S. (Math), Chernivtsi State Univ., USSR; Ph.D. (Math), Gorky State Univ., USSR
Akira Kawaguchi, Professor and Chair
B.S. (Admin. Engr.), Keio Univ. (Japan), M.S.; M.S. (C.Sc.), Columbia Univ., Ph.D. (C.Sc.)
Devendra Kumar, Associate Professor
B.Tech. (E.E.), Indian Institute of Technology (Kanpur); M.A. (C.Sc.), Univ. of Texas at Austin, Ph.D.
Stephen Lucci, Associate Professor
B.S. (Math), SUNY (Stony Brook); M.S. (C.Sc.), The City College; Ph.D. (C.Sc.), CUNY
Abbe Mowshowitz, Professor
B.S. (Math), Univ. of Chicago; M.S. (Math), Univ. of Michigan, Ph.D. (C.Sc.)
Zheng Peng, Assistant Professor
B.S. (C.Sc. Tech.), B.S. (Contr. Sc. Engr.), Zhejiang Univ. (China); M.E. (C.Sc. Engr.), Univ. of Electronic Science and Tech. (China); Ph.D. (C.Sc. Engr.), Univ. of Connecticut
Kaliappa Ravindran, Professor
B.E. (E.E.), Indian Institute of Science, M.E. (C.Sc.); Ph.D. (C.Sc.), Univ. of British Columbia
William E. Skeith, Associate Professor
B.S. (Math), Pepperdine Univ., BA (C.Sc.); Univ. of California, Los Angeles, MA (Math), Ph.D.
Douglas R. Troeger, Professor
A.B. (Phil), Brown Univ., Sc. B. (Chem); M.Sc., Ph.D. (Math), Stevens Inst. of Tech.
Huy T. Vo, Assistant Professor
B.S. (C.Sc.), University of Utah, Ph.D. (C.Sc.)
Michael Vulis, Associate Professor
B.S. (Math), Leningrad State Univ. (Russia); M.S. (C.Sc.), CUNY, Ph.D. (Math)
Jie Wei,Professor
B.S. (C.Sc.), Univ. of Sci. & Tech. of China (China); M.S. (C.Sc.), Chinese Academy of Sciences (China); Ph.D. (C.Sc.), Simon Fraser Univ. (Canada)
George Wolberg, Professor
B.E. (EE), Cooper Union, M.E. (EE); Ph.D. (C.Sc.), Columbia Univ.
Jianting Zhang, Associate Professor
B.S. (Water Resources and Environment), Nanjing Univ. (China); M.S. (Physical Geography), Nanjing Univ. (China); M.S. (CSC), Univ. of Oklahoma; Ph.D. (CSC), Univ. of Oklahoma
Zhigang Zhu, Herbert G. Kayser Professor
B.S., (CSC.), Tsinghua Univ., M.E., Ph.D.

Professors Emeriti

Michael Anshel

Octavio Betancourt

Stefan A. Burr

Stanley Habib

Cybersecurity Program

Professor Rosario Gennaro, Program Co-Director • SH 279 • Tel: 212-650-5153
Professor Tarek Saadawi, Program Co-Director • St 529 • Tel: 212-650-7263
Jonathan Akeley, Associate Director • St 530 • Tel: 212-650-7171

General Information

The City College of New York offers the following graduate degree in Cybersecurity: M.S.

Course descriptions can be found in the sections of this Bulletin for the Computer Science and Electrical Engineering Departments.

Cybersecurity, Master of Science (M.S.)

An interdisciplinary program offered jointly by the Departments of Computer Science and Electrical Engineering

Objectives

The Cybersecurity Master's degree program is jointly administered by the Computer Science and Electrical Engineering Department at the Grove School of Engineering at City College. The goal of the program is to give students a solid foundation in the core cybersecurity disciplines together with a set of hands-on learning opportunities that will provide graduates with the skills needed to fill critical electronic security roles protecting systems from malicious attacks.

Admission Requirements
Graduate study is open to qualified students who possess a bachelor's degree.

GRE Required: No

Minimum TOEFL/IELTS Scores: 550 (PBT), 79 (IBT) or 6.5

Supporting Documents Required:

- Official transcripts from all post-secondary institutions attended
- 2 letters of recommendation
- Resume/CV
- Personal Statement
- Statement of Purpose

Eligibility:

- Candidates must have a 3.00 undergraduate GPA
- Candidates should demonstrate a working knowledge of:
- Calculus
- A Programming Language
- Algorithms/Data Structure
- Computer Organization and Microprocessors

MS Degree Requirements

Required Core Courses (12 credits)

CSc I4900	Computer Security	3
EE I7000	Network and Security	3
CSc I0400	Operating Systems	3

Cybersecurity Electives (6-15 credits)

CSc I4800	Codes, Cryptography, and Secure Communication	3
EE I7600	Secure Internet of Things Design Laboratory	3

Complementary Electives (0-9 credits)

EE G6400	5G Mobile Technologies and IoT	3
CSc I1500	Artificial Intelligence	3
EE I6600	Communications Protocol Engineering	3
CSc I1000	Database Systems I	3
CSc I1100	Database Systems II	3
CSc I0600	Fundamental Algorithms	3
EE I9400	High Speed Networks	3
EE I6700	IP Routing	3
CSc I1900	Pattern Recognition and Machine Learning	3

EE I6300	Wireless Communications	3

Capstone Design Project (3 credits)

Students will work with faculty/industry mentors to create their own Capstone Design projects focused on one or more sub-fields within cybersecurity.

Total Credit Hours: 30

Faculty

Peter Brass
Professor, Computer Science

Michael D. Grossberg
Associate Professor, Computer Science

Ibrahim W. Habib
Professor, Electrical Engineering

Nelly Fazio, Ph.D.
Associate Professor, Computer Science

Akira Kawaguchi
Professor, Computer Science (Chair)

Myung Lee, Ph.D.
Professor of Electrical Engineering

Stephen Lucci, Ph.D.
Associate Professor of Computer Science

Abbe Mowshowitz
Professor, Computer Science

Kaliappa Ravindran
Professor, Computer Science

Samah Saeed, Ph.D.
Assistant Professor of Electrical Engineering

William Skeith, Ph.D.
Assistant Professor of Computer Science

YingLi Tian
Professor, Electrical Engineering

M. Ümit Uyar
Professor, Electrical Engineering

Data Science and Engineering Program

Herbert G. Kayser Professor Zhigang Zhu, Program Co-Director • NAC 8/211 • Tel: 212-650-8799

Associate Professor Michael Grossberg, Program Co-Director • NAC 7/311 • Tel: 212-650-6166

Professor Akira Kawaguchi, Chair • NAC 8/206 • Tel: 212-650-6631

General Information

This program offers Master's Degree in Data Science and Engineering (DSE).

Data Science and Data Engineering are multidisciplinary fields that apply tools and methods drawn from computer science and statistics to other knowledge domains to make predictions and decisions as well as to derive insights from both structured and unstructured data. The Data Science and Engineering (DSE) program will provide a solid foundation in the core data science and engineering skills, which will allow students to analyze, process, visualize and apply machine learning and computational statistics to problems in engineering, scientific and other disciplines. It is targeted at students with a background in science, engineering or mathematics who wish to learn data science methodology. The core data science methodology covered in the DSE program will provide students with fundamental data science and engineering computational and statistical skills. They will apply these skills to domain by combining the core knowledge with domain knowledge acquired through two or more electives taken that domain. Finally, students will complete a mandated capstone project or thesis demonstrating their mastery of the methodology.

Requirements for Admission to the DSE Program

Students are admitted to the DSE program after completing a Bachelor's degree with at least 3.0 average in Mathematics, Science or Engineering. Applicants with degrees in other fields may qualify for admission to the program depending on their experience and academic background. The general requirements are:

- Two semesters of Calculus (preferably 3 including Vector Calculus)
- Probability and Statistics (preferably 2 semesters)
- Linear Algebra
- Programming course (preferred knowledge of Python)

Applicants are encouraged to identify CCNY DSE mentors in a domain of their interest. Evidence of a potential match will be considered during admission. Include domain interest and mention any communication with a potential CCNY mentor in the personal statement. Students with baccalaureate degrees from non-English-speaking countries must submit TOEFL/IELTS Scores: the minimum is 533 (PBT), 73 (IBT) or 6. GRE submission is optional.

Data Science and Engineering, Master of Science (M.S.)

Required Courses

Elective Courses

	Two to three additional courses from domain knowledge courses listed below or any course approved by the program (3 cr. each).	6-9

Six courses (3 credits each)

DSE I1020	Introduction to Data Science	3
DSE I1030	Applied Statistics	3
DSE I2100	Applied Machine Learning and Data Mining	3
DSE I2400	Data Engineering: Infrastructure and Applications	3
DSE I2450	Big Data and Scalable Computation	3
DSE I2700	Visual Analytics	3
		Subtotal: 18

Supervised 3-credit Project or 6-credit Thesis Course

DSE I9800	Capstone Project	3
DSE I9900	Capstone Thesis	6
		Subtotal: 3-6

Additional Requirements

The students must take a minimum of 30 credits. A minimum GPA of 3.0 is required for graduation.

Currently Approved Electives

BME I5100	Biomedical Signal Processing	3
BME I5000	Medical Imaging and Image Processing	3
BME I4200	Organ Transport and Pharmacokinetics	3
ChE I5500	Interfacial Phenomena	3
ChE I5700	Advanced Materials Engineering	3
ChE I8900	Nanotechnology	3
CE H6600	Engineering Hydrology	3
CSc I0600	Fundamental Algorithms	3
CSc I0500	Computer Graphics	3
CSc I1100	Database Systems II	3
CSc I1900	Pattern Recognition and Machine Learning	3
CSc I4633	Multimedia	3
CSc I6730	Data Reduction in the Physical Sciences	3
EE I2200	Image Processing	3
EE I6400	Computer-Aided Digital VLSI Circuits Design	3

Subtotal: 30

Faculty

Asohan Amarasingham, Associate Professor, Mathematics
M.S., Ph.D. (Applied Mathematics), Brown University; BSc (Mathematics, Cognitive Science), U. Virginia
Marom Bikson, Professor, Biomedical Engineering and Bioinformatics
Ph.D. (BME), Case Western Reserve University; B.S. (BME), Johns Hopkins University
Peter Brass, Professor, Computer Science
Dipl. Math, Dr. Rer. Nat. (Math), Technical Univ. of Braunschweig
Shirshendu Chatterjee, Assistant Professor, Mathematics
M.S., Ph.D. (Operations Research & Information Engineering), Cornell Univ.; B.Stat, M.Stat (Statistics), Indian Statistical Institute, India
Alexander Couzis, Professor, Chemical Engineering
Ph.D., M.S. (ChemEng), Univ. Michigan; B.S. (ChemEng) NTU Athens (Greece)
Ronak Etemadpour, Assistant Professor, Computer Science
M.S. (C.Sc.), Universiti Sains Malaysia (Malaysia); Ph.D. (C.Sc.), Jacobs University Bremen (Germany)
Nelly Fazio, Associate Professor, Computer Science
Laurea (C.Sc.), Universita di Catania (Italy); M.Sc. (C.Sc.), New York University, Ph.D. (C.Sc.)
Balazs Fekete, Assistant Professor, Civil Engineering
M.Sc. (Civil Engr), Budapest Univ.; Ph.D. (Earth Sciences), Univ. New Hampshire
Bingmei Fu, Professor, Biomedical Engineering and Bioinformatics
B.S., M.Eng. (Modern Mechanics), Univ. of Sci. & Tech. of China; Ph.D. (Mechanical Engineering), The City University of New York
Rosario Gennaro, Professor, Computer Science
Laurea (C.Sc.), Universita di Catania (Italy); M.S. (C.Sc.), Massachusetts Institute of Technology, Ph.D. (C.Sc.)
Lane Gilchrist, Associate Professor, Chemical Engineering
Ph.D., UC Davis; B.S., Louisiana State Univ.
Irina Gladkova, Associate Professor, Computer Science
B.S. (Mathematics), Donetsk State Univ.; Ph.D. (Mathematics) CUNY
Michael D. Grossberg, Assistant Professor, Computer Science
B.A., Univ., of Penn.; Ph.D., MIT
Akira Kawaguchi, Professor and Chair, Computer Science
B.S. (Admin. Engr.), Keio Univ. (Japan), M.S.; M.S. (C.Sc.), Columbia Univ., Ph.D. (C.Sc.)
Nir Krakauer, Assistant Professor, Civil Engineering
Ph.D. (Geochemistry), California Institute of Technology
Ilona Kretzschmar, Professor, Chemical Engineering
Ph.D. (Gas Phase Chemistry), TU Berlin; Diploma (Chemistry), TU Berlin (Germany)
Charles Maldarelli, Professor, Chemical Engineering
DSE, M.S., B.S., Columbia University
Abbe Mowshowitz, Professor, Computer Science
B.S. (Math), Univ. of Chicago; M.S. (Math), Univ. of Michigan, Ph.D. (C.Sc.)
Lucas C. Parra, Professor, Biomedical Engineering and Bioinformatics
B.S. (Physics and CS), Ph.D. (Physics), Ludwig Maximilian University, Munich
Sang-Woo Seo, Associate Professor, Electrical Engineering
B.S., Ajou Univ. (S. Korea); M.S., Kwangju Inst. Of Sci and Tech. (S. Korea); Ph.D. (ECE), Georgia Tech.
William E. Skeith, Associate Professor, Computer Science
B.S. (Math), Pepperdine Univ., BA (C.Sc.); Univ. of Cal. Los Angeles, M.A. (Math), Ph.D.
Hansong Tang, Associate Professor, Civil Engineering
D.Sc. Peking Univ.; Ph.D. Georgia Inst. Tech
YingLi Tian, Professor, Electrical Engineering
B.S., Tian Jin Univ. (China); M.S., Ph.D. (EE), Univ. of Hong Kong
Raymond Tu, Associate Professor, Chemical Engineering
B.S., U Florida; Ph.D., UC Santa Barbara
M. Ümit Uyar, Professor, Electrical Engineering
B.S., Istanbul Teknik Univ. (Turkey); M.S., Ph.D. (EE), Cornell Univ.
Huy T. Vo, Assistant Professor, Computer Science
B.S. (C.Sc.), University of Utah, Ph.D. (C.Sc.)
Jie Wei, Professor, Computer Science
B.S. (C.Sc.), Univ. of Sci. & Tech. of China (China); M.S. (C.Sc.), Chinese Academy of Sciences (China); Ph.D. (C.Sc.), Simon Fraser Univ. (Canada)
George Wolberg, Professor, Computer Science
B.E. (EE), Cooper Union, M.E. (EE); Ph.D. (C.Sc.), Columbia Univ.
Jizhong Xiao, Professor, Electrical Engineering
B.S., East China Inst. of Tech. (China); M.S. (EE), Nanyang Tech. Univ. (Singapore); Ph.D. (ECE), Michigan State Univ.
Bo Yuan, Assistant Professor, Electrical Engineering
B.S., M.E., Nanjing University (China); Ph.D., University of Minnesota
Jianting Zhang, Associate Professor, Computer Science
B.S. (Water Resources and Environment), Nanjing Univ. (China); M.S. (Physical Geography), Nanjing Univ. (China); M.S. (CSc), Univ. of Oklahoma; Ph.D. (C.Sc.), Univ. of Oklahoma
Zhigang Zhu, Herbert G. Kayser Professor, Computer Science
B.S., (C.Sc.), Tsinghua Univ., M.E., Ph.D.

Earth Systems and Environmental Engineering Program

An Interdisciplinary Program between the Grove School of Engineering and the Division of Science

Professor Marco Castaldi, Program Director • MR932 • Tel: 212-650-5609

Professor Pengfei Zhang, Deputy Director • MR834 •Tel 212-650-8218

Dr. Liubov Kreminska, Program Administrator • Program Office: ST-421 • Tel: 212-650-8299

General Information

The City College offers the following master's degree in master's degree:
M.S. in Earth Systems and Environmental Engineering (p. 223)

Objectives

This program will prepare students of diverse backgrounds with the science and engineering skills needed to understand and develop solutions to solve complex environmental problems. Current and emerging challenges such as climate change, coastal flooding, energy production and pollution requires a training approach that includes both program breadth and depth and moves beyond the narrow disciplinary

perspectives of the past. While our program will focus on specific knowledge and skills, the real-world applications and highlight interconnections across environmental science and engineering fields will be incorporated.

Students entering this program are offered two tracks:

Master of Science

The Professional Science Master which is affiliated with the Professional Science Master's National Office and is designed to be a terminal degree.

Our diverse multidisciplinary curriculum gives us the flexibility to offer research training in the following concentration areas:

Water Resource Engineering Management (WREM)

Climate and Remote Sensing (CRS)

Geoinformatics and GIS (GIS)

Energy and Environment

Earth Systems and Environmental Engineering, Master of Science (M.S.)

Degree Requirements

For the Master's degree in ESEE, a student must complete the 30-credit course program described below.

4 required courses covering core topics	12
2 distribution courses (6 credits)	6
3 courses in a specific area of concentration	9
ENGR I9900: Final project, a research project with a faculty member. (3 credits)	3

The PSM Degree in ESEE requires minimum 30 credits, including

4 required courses covering core topics	12
1 distribution course and Internship	6
3 courses in a specific area of concentration	9
Final project: Internship with an employer in industry, government, or non-profit organization (3 credits).	3

Students will be required to take four core courses for a total of 12 credits:

EE G6904	Adv Stat & Non Linr An	3
ENGR G6601	Environmental Modeling for Earth Systems Sciences and Engineering	3
SUS 7200C	Sustainable Aquatic, Terrestrial and Atmospheric Systems	3
	OR	
EAS B4800	Sustainability of Terrestrial, Aquatic and Atmospheric Systems	4

And One approved Non-STEM course from the list:

PSM B1600	Strategic Management of Public Organizations	3
ECO B6000	Introduction to Economic Development	3
UD 61004	Urban Ecologies I	3
ENGR H7600	Engineering and Business Law	3
SUS 7100A	Environmental Planning	3
SUS 7300C	Industrial Ecology and Life Cycle Analysis	3
SUS 7600C	Environmental Policymaking	3
SUS 8300A	Applied Resilience by Design	3
PSM B1700	Public Policy	3
SUS 7400C	Economics of Sustainability	3

Areas of Concentration

In the second semester of the program, students will begin taking a series of three courses in their specific area of concentration, for a total of 9 credits. At least two of these courses must be an engineering course. Enrollment in these specialized courses will be dependent on specific course offerings based on availability. Appropriate course sequences will be selected in conjunction with the program advisor.

For students with an interest in Water Resource Engineering Management, the following list of courses is recommended:

For students with an interest in Climate and Remote Sensing, the following list of courses is recommended:

EE G6800	Earth Surveillance	3
EE G6902	Optical Remote Sensing	3
EE G6903	Remote Sensing	3
EE I0100	Probability and Stochastic Processes	3
CSc I0807	Image Processing	3
EE I2200	Image Processing	3
EAS B8800	Climate and Climate Change	3
EAS B3090	Fundamentals of Atmospheric Science	3

EE G6800, EE G6903, EAS B8800: These courses are also distribution courses described in the next section.

For students with an interest in Geoinformatics and GIS, the following list of courses is recommended:

CE G0800	Geogrph Info Sys Ce	3
CE G0801	GIS Water Resources	3
EE G6902	Optical Remote Sensing	3
EAS B9012	Adv Geog Info System	
CSc I6730	Data Reduction in the Physical Sciences	3
EAS B4400	Global Environmental Hazards	3
EAS A4170	Satellite Meteorology	3
CSc I0802	Web/Geograph Info Sys	3

CE G0800/1, CSc 16730, EAS B4400: These courses are also distribution courses described in the next section.

For students with an interest in Energy and Environment, the following list of courses is recommended:

SUS 7300A	Low-Energy Buildings	3
SUS 7900B	Sustainable Energy Conversion Systems	3
SUS 7600B	Design of Mechanical Systems for Sustainable Buildings	3
ME G2300	Heating, Ventilating and Air Conditioning	3
ME G3300	Solar Energy	3
SUS 7200B	Energy Systems Engineering for Global Sustainability	3

SUS 7600B, ME G3300: These courses are also distribution courses described in the next section

Distribution Courses

Distribution courses are designed to provide students with introductory knowledge of concentration areas other than their chosen one. Students must take distribution courses (marked with D*) from areas outside of their chosen concentration. At least one of these courses must be an engineering course. Student can take ENGR G6610: Independent Study and/or Engr I9500: Professional Seminar and Special Topics in Earth Systems & Environmental Engineering for Distribution courses

CE G8100	Macro-Scale Hydrology	3

EE G6800	Earth Surveillance	3
EE G6903	Remote Sensing	3
EAS B8800	Climate and Climate Change	3
CE G0800	Geogrph Info Sys Ce	3
CE G0801	GIS Water Resources	3
CSc I6730	Data Reduction in the Physical Sciences	3
EAS B4400	Global Environmental Hazards	3
SUS 7600B	Design of Mechanical Systems for Sustainable Buildings	3
ME G3300	Solar Energy	3
CE G1101	Advanced Data Analysis	3
EAS B3300	Phase I Environmental Site Assessments	3
EAS B3400	Phase II Environmental Site Assessments	3
EAS B9036	Statistics in Earth and Env	3
EAS B9039	Introduction to Scientific Computing	3

Additional Requirements

All courses are to be chosen in consultation with the student's advisor and are subject to the approval of the Program's Graduate Studies Committee. Any course substitution must be approved by the faculty advisor.
Student must take at least 6 courses (equivalent to 18 credits) with engineering designator: Engr; EE; CE; ME or ChE.
MS students are not allowed to take courses which are cross-listed with the undergraduate courses, if the student took corresponding course as an undergraduate student.
A maximum of six credits in other departments or divisions of the College, units of CUNY or external universities may be transferred toward the M.S. degree in ESEE unless waived by the program director.

Advisement
For general academic advisement for all program options:

Professor Barry Gross
ST-416; 212-650-5325.

Student Pathways
Full-time students in the ESEE master's program will typically earn their degrees in 2-3 academic semesters. Full-time students following the PSM ESEE curriculum will typically earn their degrees in 2 academic semesters (1 year) and one summer. For those who prefer to earn their degree part-time, a part-time pathway requiring 4 academic semesters and one summer is available.

Faculty

Samir Ahmed
Herbert Kayser Professor, Electrical Engineering

Teresa Bandosz
Professor, Chemistry

Sanjoy Banerjee
Distinguished Professor, Chemical Engineering Director of CUNY Energy Institute

Karin Block
Associate Professor, Earth and Atmospheric Sciences

James Booth
Associate Professor, Earth & Atmospheric Sciences

Marco J. Castaldi

Professor, Chemical Engineering

Naresh Devineni
Associate Professor, Civil Engineering

Vasil Diyamandoglu
Associate Professor, Civil Engineering

Balaz M. Fekete
Associate Professor, Civil Engineering

John Fillos
Professor, Civil Engineering

Alexander Gilerson
Professor, Electrical Engineering

Irina Gladkova
Professor, Computer Science

Jorge Gonzalez
Presidential Professor, Mechanical Engineering

Barry Gross
Professor, Electrical Engineering

Michael Grossberg
Associate Professor, Computer Science

Urs Jans
Professor, Chemistry

Patricia Kenyon
Associate Professor, Earth and Atmospheric Sciences

Reza Khanbilvardi
Professor, Civil Engineering
NOAA Chair

Nir Krakauer
Associate Professor, Civil Engineering

Angelo Lampousis
Lecturer, Earth and Atmospheric Sciences

Jae Lee

Associate Professor, Chemical Engineering

Z. Johnny Luo
Professor, Earth and Atmospheric Sciences

Kyle McDonald
Terry Elkes Professor, Earth and Atmospheric Sciences

Fred Moshary
Professor, Electrical Engineering

Prathap Ramamurthy
Assistant Professor, Mechanical Engineering

Hansong Tang
Associate Professor, Civil Engineering

Maria Tzortziou
Associate Professor, Earth and Atmospheric Sciences

Charles Vörösmarty
Presidential Professor, Civil Engineering

Zhengroy Wang
Professor, Earth and Atmospheric Sciences

Beth Wittig
Associate Professor, Civil Engineering

Pengfei Zhang
Professor, Earth and Atmospheric Sciences

Environmental Science and Engineering Institute

Institute Office: Steinman 107 • Tel: 212-650-8010

General Information
The Institute for Municipal Waste Research, a University-wide institute chartered in 1991, is headquartered in the Grove School of Engineering. It was formed to mobilize the intellectual resources of the university to assist New York City and other urban communities across the nation in finding and implementing solutions to the problems of municipal waste. It conducts research on the generation, treatment, processing, recycling, and disposal of municipal waste, as well as on other related topics. The research encompasses both technical and federal agencies having responsibility for municipal waste, as well as organizations representing the public interest. Areas of current technical interest include improved methods for water and waste treatment, heat treatment of sewage sludge to increase methane production, ground water contamination, incinerator modeling and simulation, and alternatives to landfill disposal (e.g., utilization of incinerator ash in concrete).

Current Research Areas
The Institute is currently involved in several projects that are funded by federal, state and city agencies. These projects are primarily involved with water quality issues. Water disinfection and biostability of drinking water systems are of primary concern. Different disinfection alternatives using chlorine and ozone are being considered. By-product formation and identification during disinfection is an additional area of interest in on-going and proposed projects.

Water pollution control represents another active area of research that is currently funded. As a result of the Long Island Sound Study, nitrogen has been identified as the limiting nutrient of concern in the Sound. A mass balance performed on the Sound indicated that point sources such as discharges from wastewater treatment plants are significant contributors of nitrogen. The Institute, working with the New York City Department of Environmental Protection, is developing and testing innovative technologies that can be implemented at existing treatment plants to improve nitrogen removal from municipal wastewaters. The studies involve bench-scale experiments and demonstration of selected technologies in full scale treatment facilities.

Graduate Study in Environmental Engineering and Water Resources
Graduate programs in environmental engineering and water resources are offered by the Department of Civil Engineering. Students with a Bachelor of Engineering or Bachelor of Science degree can enroll in the graduate program and earn either a Master of Science or a Master of Engineering degree. Professionals who are currently practicing in different disciplines of Engineering may also enroll in the Department and earn a Certificate of Advanced Study in environmental engineering or water resources.

Further information may be obtained from the Civil Engineering Department (p. 214).

Institute for Transportation Systems

Professor Neville Parker, Director • Institute Office: Marshak 910 • Tel: 212-650-8050

General Information

The CUNY Institute for Transportation Systems is a multi-disciplinary inter-college effort which addresses transportation issues affecting the economic and social life of the city, state, and region. Institute activities include pure and applied research, policy analysis, analysis of urban transportation systems, pavement and bridge asset management systems, intelligent transportation systems, transportation economics, modeling, forecasting, professional training and development, outreach to inform and attract students to careers in engineering and transportation, and outreach to inform and empower the public concerning transportation issues.

Founded in 1985, the Institute conducts research on all forms of surface transportation including the movement of people and goods, and the provision of services. Among the objectives of the Institute are to disseminate research findings and to serve as a resource to New York City and New York State agencies involved with transportation issues. Some of the current research topics are recycled and composite materials for pavements, life cycle cost analysis of new and rehabilitated pavements, non-destructive testing of urban street pavements, utility cut restoration techniques, urban pavement management systems, transit management, incident management and urban goods movement. Several laboratories are affiliated with the Institute, including Transportation Engineering (Civil Engineering), Powder Technology (Chemical Engineering), and Materials Characterization (Mechanical Engineering).

The Institute's current outreach efforts include the Transportation Careers (TRAC) program and the Federal Highway Administration-sponsored Summer Transportation Institute (STI) targeting high school students; and the development of a plain English transportation empowerment guide for grass roots community dissemination. Past outreach efforts included the U. S. Department of Transportation Office of Small Business Development Utilization-sponsored Electronic Training and Technical Assistance Program (ETTAP) targeting S/DBE's, and the Metranet Project (1986 to 1990), a program which fostered communication between public officials and private providers of transportation. The Metranet project sponsored forums, conferences and workshops, and published a newsletter. Over 5,000 people were involved in the Metranet programs, which were sponsored by the Urban Mass Transportation Administration of the U. S. Department of Transportation.

The Institute offers an ongoing professional training program for foreign transportation professionals in cooperation with the International Road Federation, with funding from such multinational agencies as the World Bank and the African Development Bank. These programs are normally intensive menus of coursework, individualized instruction and on-site exposure and training, specifically tailored to the needs of one or more individuals from a designated highway or road authority, and extend from 12 weeks to 18 months. To date these professionals have included officials from Korea, Japan, West Bank, Ethiopia, China, Taiwan, Eritrea, Ghana, Zambia, Tanzania, Lesotho and Syria. Professional training is also offered to city, state and regional agency/industry professionals in the form of both short and "long" courses, some of which are tailored to the specific needs of a requesting agency.

The CUNY Institute for Transportation Systems is the lead institution for a consortium of twelve universities that have been designated as a federally sponsored University Transportation Research Center (Region II). The Center serves New York, New Jersey, Puerto Rico, and the Virgin Islands. Consortium members include: Princeton, Cornell, New York University, Polytechnic University, Rensselaer Polytechnic Institute, New Jersey Institute of Technology, Rutgers University, University of Puerto Rico, and University of the Virgin Islands. Participating CUNY colleges in the Institute are City, Baruch, Bronx Community, the Graduate School, Hunter, John Jay, LaGuardia Community and New York City Technical. The Institute also includes Hostos and Lehman colleges in its outreach programs. The Institute is located at The City College.

The Institute is an active member in a number of professional associations such as the American Road and Transportation Builders Association, the International Road Federation, New York Public Transit Association, the American Public Transit Association, and the Women's Transportation Seminar.

Center for Water Resources and Environmental Research (International Center for Environmental Resources and Development)

Professor Reza M. Khanbilvardi, Director • Office: Steinman 107 • Tel: 212-650-8200

General Information
The Center for Water Resources and Environmental Research (CWRER) coordinates the resources of the College's world-class engineering and science faculty as well as those at other CUNY campuses and professional communities to address a broad array of environmental problems.

CWRER is tackling the diverse problems of water resources and environmental issues with broad approaches beginning with research on the sources of natural hazards, pollution movement, surface water and groundwater cleanup, wetland preservation, reservoir protection, environmental remote sensing, hydraulics and hydrology of natural flow systems, non-point source pollution, preservation of ecology, and related topics. Included are both technical and social/political issues arising from these problems.

The Center's objectives are:

To conduct multi-disciplinary research on protection of the environment and minimization of pollution hazards to water resources, hydrological and ecological systems;

- To develop and demonstrate new technologies for the treatment and disposal of natural water supplies and waste water;
- To develop robust remote sensing to manage and protect our nation's national resources;
- To cooperate on a global scale to protect the precious resources that sustain human life;
- To educate and train personnel for management, supervision and operation of environmental and water resources management systems;
- To develop and execute training programs in corporate and community communications, marketing and international business and financial management.

CWRER comprises two divisions:

Water Resources and Environmental Research
In addition to water resources and environmental research, this division focuses on air and water pollution crisis management, remote sensing and global change impact, environmental technology and research, and education and training programs within economic, political and social contexts.

The division also offers educational course work in water resources, environmental engineering and ecology for career development, operator training and public information.

Remote Sensing Science and Technology
A program which provides scholarships to recruit and educate students from underrepresented minorities for professional opportunities within the National Oceanic and Atmospheric Administration, and to conduct research consistent with NOAA's mission: environmental assessment; prediction; and stewardship. A multi-institutional center (NOAA-CREST) led by The City University of New York (CUNY), including The City College, Lehman College, the CUNY Graduate Center and Bronx Community College, in collaboration with Hampton University in Virginia, the University of Puerto Rico at Mayaguez, the University of Maryland Baltimore County, Bowie State University in Maryland and Columbia University.

CWRER activities cover the following areas:

Groundwater Problems
Pore-scale and field-scale modeling of contaminant transport in unsaturated and saturated soils

Experimental studies for parameter estimation in porous media

Development of technology for contaminant detection and monitoring in groundwater systems

Waste Treatment Problems
Treatment and disposal of municipal and industrial wastewater and solid waste

Alternative disinfection in wastewater treatment

Surface Water Problems
Application of advanced technology, such as Geographic Information Systems and remote sensing, for hydrological evaluation of watersheds

Development of mathematical models for prediction and evaluation of non-point source pollution

Development of alternatives for proper water resources planning and management

Effect of climate changes on hydraulics and hydrology of water resources

Environmental Remote Sensing
Assessment of regional air quality

Monitoring diverse conditions of coastal and inland waters

Improve climate and environmental observation to predict changes in the Earth's environment

Land and Coastal Problems
Development of technology for beach protection

Mathematical modeling for evaluation and protection of tidal wetlands

Theoretical and experimental studies of beach erosion

Studies of soil erosion and its control

Land loss processes, such as landslides: study and control

Water Treatment Problems
Chemistry of ozonation and chloramination in combined application

Application of aeration processes for the removal of volatile organics

Removal of lead

Ecological and Health Problems
New methods and technologies of detecting contaminates in the air

Job-related solid particles in the air and their health importance

Studying the fate of radioactive wastes

Pollution ecology of water bodies

Relationship between aquaculture and environment

Geographically, the Center is not only active in the USA, but foreign countries as well. Agreements on multi-national cooperation have been reached with some former republics of the USSR and Macedonia.

Facilities Available for the Center

Hydraulics Laboratory

Soil Mechanics Laboratory
Environmental Engineering Laboratory
Experimental Fluid Mechanics and Aerodynamics Laboratory
Weather Station
Photonics Engineering Laboratories

Environmental Remote Sensing Laboratory
Biology Department Facilities:
- Laboratory for Invertebrate Ecology
- Laboratory for Microbial Ecology
- Laboratory for Genetics of Phytoplankton
- Laboratory for Wetland Ecology
- Biomathematical Laboratory
- Electron Microscope Laboratory
- Radiobiology Laboratory
- Biological Media and Sterilization Center
- Biosolid Mechanics Laboratory
- Computing Facilities

New Facilities

Recently three major facilities have been implemented: (a) a state-of-the-art wave tank with fully automated 2-D Laser Doppler Anemometer and Particle Image Velocimetry devices, (b) a mobile laboratory equipped with laser and electronic sensors for field monitoring and pollution detection in natural water bodies, and (c) Geographical Information Science (GIS) laboratory, funded by NASA, with a multimedia classroom facility and computational facilities for remote sensing and GIS applications. These two last additions are believed to be the only ones in the Northeast.

Funding Agencies

Below is a list of some agencies providing funding for the projects carried out by faculty members of the CWRER:
US Department of Agriculture
US Agency for International Development
US Department of Defense
US Department of Transportation
US Army Corps of Engineers
National Science Foundation
NASA
NOAA
EarthWatch
New York City Department of Environmental Protection
New York City Department of Sanitation
New York State Energy Research and Development Authority
New York State Institute for Solid Waste Combustion
Suffolk County Department of Public Works
Civilian Research and Development Corporation
Sloan Foundation

Department of Electrical Engineering

Professor Roger Dorsinville, Chair • Department Office: Steinman 602 • Tel: 212-650-7248

General Information

The City College offers the following graduate degrees in Electrical Engineering:
M.E. (E.E.) (Professional Master's Degree) (p. 227)
M.S. (Engineering) (p. 228) **(For students preparing for the Ph.D. program; Degree is also awarded to students who do not have a bachelor's degree in engineering)**
Ph.D. (E.E.) (p. 228)

Electrical Engineering, Master of Engineering (M.E.)

Degree Requirements

Professional Master's Degree

Engineering Core Courses (12 credits)

Four courses from one of the following concentrations (all courses are three credits):

A. Computer Engineering

EE I2200	Image Processing	3
EE I2300	Digital Computers I	3
EE I2400	Digital Computers II	3
EE I2700	Parallel Comp Arch	3
EE I4700	Introduction to Neural Networks	3
EE I5500	Introduction to Robotics	3
EE I5600	Advanced Mobile Robotics	3
EE I5700	Digital Integrated Circuits	3
EE I6000	Computer Communication Systems	3
EE I6100	Integrated Circuits: Design and Fabrication I	3
EE G6400	5G Mobile Technologies and IoT	3
EE I6530	Artificial Intelligence for Engineering Applications	3
EE I6600	Communications Protocol Engineering	3
EE I7000	Network and Security	3
EE I7600	Secure Internet of Things Design Laboratory	3
EE I9400	High Speed Networks	3

B. Systems Engineering

EE F5600	Elements of Control Theory	3
EE G6800	Earth Surveillance	3
EE I0100	Probability and Stochastic Processes	3
EE I0500	Theory of Linear Systems	3
EE I1600	Digital Signal Processing Algorithms	3
EE I2200	Image Processing	3
EE I4100	Intro Modern Control Theory	3
EE I4500	Direct Energy Conversion	3
EE I4700	Introduction to Neural Networks	3
EE I5300	Digital Signal Processing	3

C. Telecommunications Engineering

EE I0100	Probability and Stochastic Processes	3
EE I5100	Communication Electronics	3
EE I5200	Fiber Optic Communications I	3
EE I6000	Computer Communication Systems	3
EE I6300	Wireless Communications	3
EE G6400	5G Mobile Technologies and IoT	3
EE I6530	Artificial Intelligence for Engineering Applications	3
EE I6600	Communications Protocol Engineering	3
EE I6700	IP Routing	3
EE I6800	Telecommunication Network Element Engineering	3
EE I7000	Network and Security	3
EE I7100	Statistical Communication Theory	3
EE I7300	Digital Communication I	3
EE I7400	Digital Data Communications II	3
EE I7500	Advanced Wireless Networks	3
EE I7600	Secure Internet of Things Design Laboratory	3
EE I8300	Fiber Optic Communications II	3
EE I9400	High Speed Networks	3

D. Photonics Engineering

EE G6800	Earth Surveillance	3
EE G6902	Optical Remote Sensing	3
EE I0300	Electrodynamics	3
EE I4500	Direct Energy Conversion	3
EE I5200	Fiber Optic Communications I	3
EE I5400	Physical Electronics I	3
EE I5800	Introduction to Lasers	3
EE I6200	Principles of Photonics Engineering	3
EE I8200	Electro-Optics	3
EE I8300	Fiber Optic Communications II	3

EE I8500	Optical Signal Processing	3

E. Electronics/Communication

EE I0100	Probability and Stochastic Processes	3
EE I3200	Analog Integrated Circuits	3
EE I3600	Mos Dvices & Circts	3
EE I5100	Communication Electronics	3
EE I5200	Fiber Optic Communications I	3
EE I5400	Physical Electronics I	3
EE I5700	Digital Integrated Circuits	3
EE I6100	Integrated Circuits: Design and Fabrication I	3
EE I6300	Wireless Communications	3
EE G6400	5G Mobile Technologies and IoT	3
EE I6400	Computer-Aided Digital VLSI Circuits Design	3
EE I7100	Statistical Communication Theory	3
EE I8300	Fiber Optic Communications II	3

Engineering Management Courses (3 credits)

One course from the following:

ENGR H3800	Management Concepts for Engineers	3
ENGR H7600	Engineering and Business Law	3
ENGR H8000	Decision and Planning Techniques for Engineering Management	3
ENGR H8500	Project Management	3
ENGR H9300	Economics and Investment Analysis of Engineering Projects	3

Technical Electives: (9-15 credits)

Take courses from any of the above concentration areas, or any Goooo, Iooo0 and Joooo course that may be offered except Engineering Management courses.

Report/Project/Thesis: (0-6 credits)

At least one of the following courses:

EE I0000	Seminar	1 (Repeatable).
EE I9600	Report	0
EE I9700	Master's Project	3
EE I9900	Research for the Master's Thesis	6

Total credits 30

Note: A minimum GPA of 3.0 is required for graduation.

Electrical Engineering, Master of Science (M.S.)

M.S. (Engineering) Degree

At least four courses from one of the specific concentration areas A, B, C, D, E or F from the M.E. in Electrical Engineering: (12 credits)

At least two of the following courses: (6 credits)

Electrical Engineering:

EE I0100	Probability and Stochastic Processes	3
EE I0500	Theory of Linear Systems	3

Engineering:

ENGR I0600	Applied Algebra	3
ENGR I1100	Introduction to Engineering Analysis	3
ENGR I1200	Functions of a Complex Variable	3

At least one of the following courses: (0-6 credits)

Electrical Engineering:

EE I0000	Seminar	1 (Repeatable).
EE I9600	Report	0
EE I9700	Master's Project	3
EE I9900	Research for the Master's Thesis	6

Elective Courses (6-12 credits)

Additional Graduate Electrical Engineering courses (from EE Goooo, Iooo0, and Joooo sequence) except Engineering Management Courses. Prior approval of master's advisor is needed for non-EE electives.

Note: A minimum GPA of 3.0 is required for graduation.

Subtotal: 30

Electrical Engineering, Doctor of Philosophy (Ph.D.)

Ph.D. (E.E.) Degree

Upon completion of the Ph.D. Program in Electrical Engineering, students should be able to:

1. Apply knowledge of mathematics, science, and engineering to solve engineering problems and undertake teaching and research
2. Assume leadership roles in academia, industry and government
3. Plan and conduct scholarly activities that make original contributions to the knowledge base in one or more areas of specialization within Electrical Engineering discipline
4. Communicate effectively both as individuals and leaders of multidisciplinary and multicultural teams in a diverse global economy
5. Recognize the need for and engage in life-long learning as independent professional scholars
6. Understand the importance of the ethical, safety, socio-economic, and environmental issues related to the Electrical Engineering profession.

Requirements for Admission to the Ph.D. Programs

1. A bachelor's degree from a college or university of accredited standing in a branch of engineering, or a closely related area, appropriate to the applicant's intended field of study.
2. An academic record demonstrating promise of superior performance in advanced study and research.
3. Adequate preparation in specific courses as may be required by the individual departments.

Additional Requirements for the Ph.D.

Guidance and Program Planning

- Soon after being notified of admission, and preferably before registration, the student should arrange for an appointment with a departmental advisor. This can be done through the Graduate Engineering Office. This advisor will help the student plan an approved sequence of courses.
- Soon after completing 30 credits, or soon after admission with this level of work, a student must obtain the consent of a faculty member to act as his or her research mentor and must then request the Dean to assign a guidance committee. The student's planned program of courses and research program must be submitted to the guidance committee for approval.

University Requirements

The student will be required to comply with the University Requirements for Admission and for Graduate Degrees as printed in the bulletin of The Graduate School of The City University of New York. It is also helpful to consult the Graduate School Student Handbook. These requirements include the following:

- A student may continue in a doctoral program in The City University after he or she has completed 45 credits only if he or she has passed a First Examination in the area of specialization with a grade of excellence or high pass.
- Satisfactory completion of 60 credits of approved graduate work, of which at least 30 must be taken at The City University.
- Completion of the course requirements in the field of specialization.
- Satisfactory completion of a Second Examination of at least two hours duration usually taken after the completion of course requirements. The student may be admitted to the second examination only upon the recommendation of a mentor.

- The student shall demonstrate proficiency in those research tools considered appropriate by the faculty in the field of specialization.
- Satisfactory completion, not later than eight years after matriculation, of a dissertation which embodies original research. For a student who is matriculated after the completion of at least 30 credits of acceptable work, this time will be reduced to seven years.
- The dissertation will be defended at an oral final examination.

Advisement

Master's Program
Professor Barry Gross

Doctoral Program
Associate Professor Ahmed Mohamed

Department Facilities

Current EE Research Laboratories include:

Sponsored Centers:

- Cooperative Remote Sensing Science and Technology (CREST) Center sponsored by National Oceanographic and Atmospheric Administration (NOAA). CREST is a consortium of five universities led by CCNY.

CCNY Centers:

- Center for Information Networking and Telecommunications (CINT)
- Institute for Ultrafast Spectroscopy and Lasers (IUSL)
- International Center for Environmental Resources and Development (ICERD)
- Photonics Engineering Center

Research Laboratories
Advanced Wireless Networks Laboratory, Media Lab, Optical Networking Laboratory, Photonics Applications Lab, Photonics Simulations Lab, Metamaterials Laboratory, Nonlinear Optics Laboratory, Optical Remote Sensing Laboratory, Remote Sensing/Geographical Information Systems Lab, Advanced Integrated Photonics Lab, Robotics and Intelligence Systems Lab, Smart Grid Lab.

Other Research Facilities
Multi-wavelength Laser Radar (LIDAR) observatory, mobile remote sensing facility, pico and femtosecond laser facilities, semiconductors diode lasers, streak cameras, spectrophotometers and multichannel optical analyzers, IC probe stations, and darkroom and mask fabrication facilities, digital pattern generator and error detector, network analyzer, 60 GHz communication signal analyzer, multimedia communication facilities, wireless sensor network test bed, wireless network sniffer, imbedded system programming tools, robotics platforms, fast prototyping machine, Mask aligner, Photo-resist spinner, Thermal evaporator, Sputtering system, Dry etch system, Surface profiler, Digital triple grating spectrometer, NEXUS 670 FTIR, Continuum IR microscope with camera.

Major computational facilities in the department include a network of 150 workstations. In addition, a network of PC computers is used by graduate students and faculty researchers in the telecommunications and remote sensing areas. These networks are connected to other research facilities located on campus and to the CUNY Computational Center, as well as the National Computational Facilities through the Internet.

Faculty

Mohamed A. Ali, Professor
B.S., Azar Univ. (Egypt); M.S., The City College; Ph.D., CUNY

Joseph Barba, Professor, School of Engineering
B.E., The City College, M.E.; Ph.D., CUNY

Roger Dorsinville, Herbert Kayser Professor and Chair
B.S., Moscow State Univ. (Russia), M.S., Ph.D.

Alexander Gilerson, Professor
B.S., Technical Univ. (Kazan, Russia), M.S. , Ph.D.

Barry M. Gross, Professor
B.A. (Physics/Math), Yeshiva Univ.; M.S. , The City College; Ph.D. , CUNY

Ibrahim W. Habib, Professor
B.S., Ain Shams Univ. (Egypt); M.S., Polytechnic Univ. of New York; Ph.D., CUNY

Ping-Pei Ho, Professor
B.S., Tsing-Hun Univ.(Taiwan); M.B.A., Kent State Univ.; Ph.D., CUNY

Alexander Khanikaev, Professor
B.S., Moscow State Univ. (Russia), M.S., Ph.D.

Bruce Kim, Associate Professor
B.S., Univ. of California, Irvine; M.S., Univ. of Arizona; Ph.D. (ECE), Georgia Inst. of Technology

Myung Jong Lee, Professor
B.S., Seoul National Univ. (Korea), M.S.; Ph.D., Columbia Univ.

Nicholas Madamopoulos, Associate Professor
B.S., University of Patras (Greece); M.S., CREOL/School of Optics, Ph.D.

Jamal T. Manassah, Professor
B.S., American Univ. of Beirut (Lebanon); M.A., Columbia Univ., Ph.D.

Ahmed Mohamed, Associate Professor
B.S, Minia University (Egypt); M.S., Florida International University, Ph.D.

Fred Moshary, Professor
B.S. (Applied Physics), Cornell Univ., M.S. ; Ph.D. (Applied Physics), Columbia Univ.

Truong-Thao Nguyen, Associate Professor
M.Sc., Princeton Univ.; Ph.D., Columbia Univ.

Leonid Roytman, Professor
B.S., Moscow Polytechnical (Russia), M.S.; Ph.D., Novosibirsk Polytechnical Inst. (Russia)

Tarek N. Saadawi, Professor
B.Sc., Cairo Univ. (Egypt), M.Sc.; Ph.D., Univ. of Maryland

Samah Saeed , Assistant Professor,
B.Sc., Kuwait Univ. (Kuwait), M.Sc.; Ph.D., New York Univ.

Sang-Woo Seo, Associate Professor
B.S., Ajou University (Korea); M.S., Kwanju Institute of Science and Technology (Korea); Ph.D., Georgia Institute of Technology

Aidong Shen, Professor
B.S., Xiamen Univ. (China); Ph.D., SIOFM (China)

Kenneth Sobel, Professor
B.E., The City College; M.E., Rensselaer Polytechnic Inst., Ph.D.

Yi Sun, Associate Professor
B.S., Shanghai Jiao Tong Univ. (China), M.S.; Ph.D., Univ. of Minnesota

Yingli Tian, Distinguished Professor
B.S.,Tianjin Univ.(China), M.S.; Ph.D., Chinese Univ. of Hong Kong

M. Ümit Uyar, Professor
B.S., Istanbul Teknik Univ. (Turkey); M.S., Cornell Univ., Ph.D.

Ardie D. Walser, Professor and Associate Dean
B.E., The City College, M.E.; Ph.D., CUNY

Professors Emeriti

Samir Ahmed

Micheal Conner

Demos Eitzer

Irving Meth

Donald L. Schilling

Norman Scheinberg

Fred Thau

Richard Tolimieri

Center for Information Networking and Telecommunication (CINT)

Professor Tarek Saadawi, Director • Institute Office: Steinman 529 • Tel: 212-650-7263

General Information

The CINT Center represents the culmination of approximately fifteen years of research cooperation of faculty members from the Departments of Computer Science and Electrical Engineering in the fields of high speed, multimedia, multiservice, integrated wired and mobile wireless networks. Necessary experimentation is performed in a well–equipped Networking Systems Laboratory.

The Center's present research work on telecommunications and information distribution is largely supported by the U.S. Army Research Laboratory (ARL) by way of the "ARL Collaborative Technology Alliance on Communications and Networks." A part of this CINT research aims to overcome the severe bandwidth and energy constraints of the mobile wireless environment of battlefield command and control, while providing secure, jam–resistant communications in noisy, hostile surroundings.

Previous sponsors included various U.S. Army organizations (ARL, Communications-Electronics Command, Army Research Office), the National Science Foundation, and the New York State and the New York City Departments of Transportation. Industry is represented by Telcordia, Panasonic, AT&T, and Lockheed-Sanders.

The group's faculty members play a major part in teaching the undergraduate and graduate networking courses offered by the Electrical engineering and Computer Science departments at The City College.

Current Research Areas

CINT areas of research cover many aspects of mobile communications and information distribution. CINT faculty have recently made a number of contributions in the area of AD-HOC mobile Networking. These networks provide the capability to establish communications between various heterogeneous mobile users without the need to involve the wire/wireless infrastructure network. Routing algorithms as well as new transport protocols and MAC layer protocols are being developed for AD-HOC mobile networks.

This research has a great impact on military networking as well as on commercial applications. Further research concerns:

- Qos Support for Real-Time Services such as video, voice, and data
- Probabilistic Reasoning Mobile Agent System for Network Testing
- Mobile IPSystems
- MPEG-4 and MPEG-2 Video over ATM synchronization
- Adaptive Multimedia Synchronization for Teleconferencing
- Empirical Qos Study of Hybrid Terrestrial-Satellite ATM Network
- Core-Manager Based Multi-Cast Routing (CMMR)
- Mobility Support for CMMR
- Multimedia Conferencing System with Multi-Casting
- Optimal Buffer Allocation in ATM Switches
- Use of Genetic Algorithms in Mobile Agent Generation for Network Security
- Conformance Testing and Verification of Communication Protocols
- Artificial Intelligence in Telecommunications
- Neural Network Applications in ATM Resource Allocations
- Optical Communications
- Wireless Communications
- Policy-Driven Networks
- Network Infrastructures for Bio-Medical Applications
- User-Centered Mechanisms for Distributed Collaborations

Facilities of the Networking Systems Laboratory

The networking Systems Laboratory has the following facilities:

- Heterogeneous Network Testbed: ATM Switches, Wireless LAN, Router, PCNet
- Simulation Software: OPNET, NS-2, COMNET, MODSIM
- ATM Test Equipment: ATM Generator and Analyzer
- IP Telephony Gateway
- 20 + Ultra Workstations (with Enterprise Server), PC Network

Plans for the Future of CINT

The Center plans to pursue three additional major areas of activity in the near future:

1. A program of cross-disciplinary research which stresses the theoretical, analytical and experimental aspects of telecommunications and information networking, consisting of high-speed multimedia networking, next generation internet protocols, mobile communications, photonics engineering, optical communications and information distribution. Key areas of research include quality of service requirements, mobility and wireless networking, optical Communications and optical switching, video and image communications, and internet protocols. In addition, considerable attention is to be paid to the economics pricing/business aspects of telecommunications and information services. Research with respect to network security will play a considerable part.
2. An expanded program of education for City College Master's and doctoral students will involve the development of new advanced courses in networking and information distribution.
3. A program of industry/university/ government cooperation which will stress the importance of knowledge and technology transfer between these entities. This implies the exploration of similarities between military command and control systems and such civilian applications as traffic control, emergency management, and the security of financial institutions.

Department of Mechanical Engineering

Professor Feridun Delale, Chair • Department Office: Steinman 235 • Tel: 212-650-5224

General Information

The City College offers the following graduate degrees in Mechanical Engineering:
M.E. (M.E.) Professional Master's Degree (p. 230)
M.S. (Engineering) (p. 231)
Ph.D. (M.E.) (p. 231)

Mechanical Engineering, Master of Engineering (M.E.)

Degree Requirements

Professional Master's Degree

Engineering Core Courses (9 credits)

Mechanical Engineering:

ME I0200	Applied Fluid Mechanics	3
ME I4200	Applied Stress Analysis	3
	OR	
ME I5400	Advanced Stress Analysis	3

Engineering:

ENGR I1100	Introduction to Engineering Analysis	3

Technical Electives (15-21 credits)

Five to seven courses from the following list:

ME G0600	Thermal Systems Design	3
ME G2300	Heating, Ventilating and Air Conditioning	3
ME G4300	Non-Newtonian Fluid Mechanics	3
ME G4900	Advanced Topics in Fluid Dynamics	
ME G5100	Vehicular Power Systems	
ME I3100	Steam and Gas Turbines	3
ME I3400	Advanced Heat Transfer	3
ME I4400	Nano/Micromechanics	3
ME I4500	Mechanics and Physics of Solids	3
ME I4800	Accidental Injury Biomechanics	3
ME I4900	Vehicle Safety Design and Biomechanics	3
ME I5000	Advanced Computational Fluid Mechanics	3
ME I5800	Trajectories and Orbits	3
ME I6100	Wind Energy Fundamentals and Applications	3
ME I6200	Mechanical Vibration	3
ME I6500	Computer Aided Design	3
ME I6600	Boundary Element Method	3
ME I6700	Composite Materials	3
ME I6800	Nonlinear Dynamics and Chaos	3
ME I6900	Experimental Methods in Fluid Mechanics & Combustion	3

Engineering:

ENGR G5200	Nuclear Reactor Physics and Engineering	
ENGR G5300	Nuclear Reactor Thermal Hydraulics	
ENGR G5600	Nuclear Reactor Design, Operation and Safety	
ENGR I1700	Finite Element Methods in Engineering	3
ENGR I1400	Applied Partial Differential Equations	3
ENGR I1500	Introduction to Numerical Methods	3
ENGR I2400	Turbulent Flows	3
ME I4200	Applied Stress Analysis	3
ENGR I5200	Behavior of Inelastic Bodies and Structures	3
ENGR I6400	Wave Propagation in Fluids and Solids	3
	Any graduate course in the Grove School of Engineering with the approval of the departmental advisor.	

One course from list below may be taken in place of a technical elective:

Engineering Management Courses

ENGR H3800	Management Concepts for Engineers	3
ENGR H7600	Engineering and Business Law	3
ENGR H8000	Decision and Planning Techniques for Engineering Management	3
ENGR H8500	Project Management	3
ENGR H9300	Economics and Investment Analysis of Engineering Projects	3

Report/Project/Thesis: (0 -6 credits)

ME I9700	Report	0
ME I9800	Project	3
ME G0400	Industry Oriented Design Project	
ME I9900	Research for the Master's Thesis	6

Subtotal: 30

Note: With departmental approval, students may register for two 50000-level undergraduate courses towards the Master's degree. However, students must receive a grade of B or better and these courses will not be included in their G.P.A.

Mechanical Engineering, Master of Science (M.S.)

M.S. Degree

The M.S. degree is awarded to students who do not have a bachelor's degree in engineering.

Mechanical Engineering, Doctor of Philosophy (Ph.D.)

Ph.D. Requirements

Requirements for Admission

To be eligible for admission, an applicant must possess a bachelor's degree in Mechanical Engineering or in a closely related area appropriate to the intended field of study from an accredited institution. The applicant's academic record must demonstrate promise of superior performance in advanced study and research. The general Graduate Record Examination is recommended, and International students from non-English speaking countries must submit a TOEFL (Test of English as a Foreign Language) score of 550 or better to be considered for admission.

Requirements for the Ph.D.

Candidates for the Ph.D. degree must:

1. Obtain, by completion of 30 credits of graduate work, the consent of a faculty member to act as their research mentor
2. Students enrolled are required to take ME I0000: Seminars for 3 semesters.
3. Satisfactorily complete 60 credits of approved graduate work (30 credits beyond the masters degree), of which at least 30 must be taken at the City University; (up to 12 of these credits may be in research).
4. Pass a qualifying examination in Mechanical Engineering, consisting of tests in three general subjects from first year graduate mechanical engineering curriculum, with a grade of excellent or high pass (First Examination)
5. Demonstrate proficiency in those research tools considered appropriate by the faculty in the field of specialization
6. Present orally and in writing and defend a plan of proposed research (Second Examination)
7. Satisfactorily complete, no later than 8 years after matriculation, a dissertation which embodies original research and is a publishable contribution to engineering and/or science; for students who are matriculated after the completion of at least 30 credits of acceptable work, this time will be reduced to 7 years
8. Present and orally defend the dissertation (Third Examination).

Advisement

Master's Program

Professor N. Elvin
ST-228, 212-650-8468

Doctoral Program

Professor T.Lee
ST-250, 212-650-6122

Laboratories

In addition to the undergraduate laboratories, the Department has established specialized laboratories to carry out research in advanced materials and fracture mechanics, environmental and fluid sciences, aerosciences, and bioengineering.

Experimental Fluid Mechanics and Aerodynamics Laboratory
Turbulent flows encountered in engineering applications is the focus of research carried out in this laboratory. In particular the behavior of small scales of turbulence is studied by carrying out measurements with high spatial and temporal resolution. The facilities and equipment in this lab include a 4 ft. x 4 ft. x 25 ft. low speed wind tunnel; a large scale compressible flow shock tube of 12 in. diameter, 74 ft. length and 3,000 psi maximum pressure; a YAG laser and other accessories for Rayleigh scattering; an Argon laser for laser Doppler anemometry; 2 CCD cameras sensitive in the ultraviolet range; fast data acquisition systems; and a stereo particle image velocimeter.

Biomechanics Laboratory
The Biomechanics Laboratory is engaged in research investigating bone mechanics, bone implant interaction and mechanisms of sport or accidental injuries. Current areas of research include modeling, simulation and analysis of traumatic brain injury (TBI) caused by non-contact (angular acceleration) or blunt head impacts, mainly due to vehicular collisions, contact sports or falls; damping characteristics of subarachnoid space through invivo and invitro experiments; investigating cervical spine injuries and instabilities due to contact sport and automobile accidents; and biodynamic modeling and simulations to access human and machine interaction.

Solid Mechanics/Materials Research Laboratory
This laboratory is devoted to research involving solid mechanics and materials processing, testing and evaluation, with emphasis on the study of fracture and damage mechanics, composite and nanocomposite materials, high and low temperature behaviors, and micro- and nanomechanics for micro- and nanostructural design. Various modern testing and processing techniques, such as micromechanical in situ testing, static, fatigue, vibration and impact testing at high, low and room temperatures, non-destructive evaluation and digital image processing are used. Currently, it has a very high-speed digital camera, a servo-hydraulic universal testing machine with an environmental chamber, a computer controlled drop weight impact tester with an environmental chamber, two gas guns for high-speed ballistic impact, a split Hopkinson bar, a computer-controlled vibration shaker system with a precision temperature/humidity chamber, an immersion and a spray ultrasonic scanning system, a compression/transfer molding hydraulic press, a universal measuring microscope, and a microhardness tester.

Ferroelectric and Active Materials Research Laboratory
The major goal of this laboratory is to conduct experimental and analytical research on active materials such as ferroelectric materials, shape memory alloys, and their composites. It also provides students opportunities to have hands-on and research experiences on active materials and structures. Currently the lab is equipped with an electro-mechanical coupling testing machine, a high voltage amplifier, a displacement sensor machine, a vacuum bagging system and a custom built autoclave for polymer-matrix composites processing, a refrigerated circulating digital liquid bath, and a piezo-d33 tester.

Microelectromechanical Systems (MEMS) Laboratory
In the Microelectromechanical Systems (MEMS) Laboratory, miniature sensor and actuator systems made using microfabrication processes, especially Complementary Metal Oxide Semiconductor (CMOS) processes are being developed. Research in this area is motivated by the potential to produce high-performance, low-cost, miniature sensors and actuators. Smart sensors are made by combining microstructures and circuits on a single silicon chip. Specific research areas of interest include nano and micro cantilever beams, biosensors based on porous silicon, single walled carbon nanotubes (SWCT) sensors and microfluidic channels for electrophysiological studies of single cells.

Computer Aided Design and Engineering (CAD/CAE) Facilities
The Department of Mechanical Engineering maintains a Computer Aided Design Laboratory which is used for engineering analysis and design. It consists of twenty-six Dell Optiplex 9020 MT computers, two HP Color LaserJet 4700dn printers, one HP LaserJet P4015dn printer, a Sony LCD projector and computerized whiteboard. The Department has established a Nuclear Engineering Computer Laboratory containing twenty Dell Optiplex computers for running specialized nuclear engineering software. The Department also has a Multimedia Facility which includes twenty-six Dell PC's, document camera, LCD projector, computerized whiteboard, and two HP LaserJet P4015dn printers. In addition, the Department shares a VDI Computer Laboratory equipped with forty-five Dell Wyse 5050 terminals, LCD projector and document camera. When any of these laboratories are being used for classroom instruction, students may use an additional computer laboratory containing fifteen Dell Optiplex PCs,and two HP LaserJet printers. These systems are equipped with mechanism design, mathematics, finite element, boundary element and computer-aided manufacturing and simulation software including, SolidWorks, ANSYS, Fluent, Comsol, Matlab, Mathcad, Mathematica, Working Model, EES (Engineering Equation Solver), and
STK (Systems Tool Kit).

Faculty

Yiannis Andreopoulos, Michael Pope Chair and Professor
Diploma in Mech. & Elec. Engr., Nat'l Tech. Univ. of Athens; M.Sc. & D.I.C. (Aeronautics), Imperial College, London, Ph.D. (Aero. Engrg.)

Charusheel N. Bapat, Associate Professor
B.E., Poona College of Engineering (India); M.Tech., Indian Inst. Of Technology; Ph.D., Univ. of Manitoba

Zeev Dagan, Professor
B.E. (ME), The City College, M.E. (ME); Ph.D., CUNY

Feridun Delale, Herbert G. Kayser Professor and Chair
B.S. (CE), Istanbul Tech. Univ., M.S. (CE); Ph.D., Lehigh Univ.

Niell Elvin, Professor
B.S. (CE), University of Witwatersrand (South Africa); M.S. (CE), M.S. (Aeronautics and Astronautics), Ph.D. (CE), M.I.T.

Jing Fan, Assistant Professor

B.E. (Thermal Engr.), Shandong Univ.; M.E.(Engr. Thermophysics), Shandong Univ., Ph.D, (Thermofluids), Univ. of Hong Kong

Peter Ganatos, Professor
B.E. (ME), The City College, M.E. (ME); Ph.D. (Eng.), CUNY

Jorge Gonzalez-Cruz, Professor
B.S. (ME), Univ. of Puerto Rico, Mayaguez, M.S.(ME); Ph.D., Georgia Institute of Technology

Masahiro Kawaji, Professor
B.S. (ChE), Univ. of Toronto; M.S. (ME), Univ. of California, Berkeley, Ph.D.

Taehun Lee, Associate Professor
B.S. (ME), Seoul National University, M.S. (ME); Ph.D., Univ. of Iowa

Jacqueline Jie Li, Professor
B.S. (Mech), Peking Univ.; M.E. (Applied Mech), Beijing Inst. of Technology; Ph.D. (ME), Rutgers Univ.

Rishi Raj, Professor
B.S., Punjab Univ.; B.S., P.F. Univ., Moscow, M.S.; Ph.D., Penn State Univ.

Prathap Ramamurthy, Assistant Professor
B.E.(ME), Madras Univ., M.S.(ME) Univ. of Utah, Ph.D., Univ. of Utah

Ali M. Sadegh, Professor
B.S. (ME), Arya-Mehr Univ. of Technology; M.S., (ME), Michigan State, Ph.D.; P.E. (Michigan); CmfgE

Hao Su, Assistant Professor

B.S. (Control Sci. and Eng'g.) Harbin Inst. Of Tech.; M.E. (ME), SUNY Buffalo; PhD (ME), Worcester Poly. Inst.

Ioana R. Voiculescu, Associate Professor
M.S. (ME), Technical University (Romania), Ph.D. (ME); Ph.D., George Washington Univ.

Honghui Yu, Associate Professor
B.S. (Applied Math), Tsinghua Univ., M.E. (Solid Mech.); Ph.D., Princeton Univ.

Professors Emeriti

Gary F. Benenson

Been-Ming Benjamin Liaw

Latif M. Jiji

Myron Levitsky

Charles B. Watkins

Sheldon Weinbaum

Sustainability in the Urban Environment

Dr. Latif Jiji, Founding Program Director
Prof. Hillary Brown, Current Director
George Smith, Program Manager
Steinman 301B• Tel: 212-650-6974

General Information
This program offers the Master of Science in Sustainability degree.

This innovative, interdisciplinary program draws upon emerging approaches in each of the disciplines of architecture, engineering, and science, and prepares students for the burgeoning field of sustainability. The program's goal is to train current, emerging, and next-generation professionals to solve pressing local, regional, and global sustainability problems. The curriculum is designed to prepare students to plan and implement strategies for sustainable development of buildings, open spaces and infrastructure, energy, water resources, air quality, land use, waste management, transportation, urban planning, and construction. The curriculum enables students to acquire experience in interdisciplinary analysis of advanced concepts, principles, and methodologies for solving a wide range of challenging sustainability problems. Graduates are trained to work in diverse professional settings involving collaboration, interaction, and communication with teams of scientists, engineers, architects, and others.

Requirements for Admission to the Master's Program
Students are admitted to the Master of Science in Sustainability program after completing a Bachelor's degree in Architecture, Sciences, or Engineering. Applicants with degrees in other fields —especially Social Sciences—may qualify for admission to the program depending on their experience and academic background. Applicants must have achieved at least a 3.0 average in their undergraduate work. Applicants are required to complete the Graduate Admissions Application (online) and provide an official transcript from the college awarding the Bachelor's degree and three letters of recommendation. The application package can be obtained online from www.ccny.cuny.edu. Students with baccalaureate degrees from non-English-speaking countries must submit an IBT TOEFL score of at least 79.

Sustainability in the Urban Environment, Master of Science (M.S.)

Requirements for the Master's Degree
Each candidate for a master's degree must complete at least 30 credits: 18 in the Core Curriculum, and 12 from a diverse collection of Architecture or, Engineering-Science, and Social Sciences elective courses. The core includes a key sequence of courses, the Capstone Interdisciplinary Team Project (I and II), which accounts for 6 credits and involves diverse teams of students who will cooperate to solve real-world sustainability problems.

Faculty

Yiannis Andreopoulos, Michael Pope Chair and Professor, Mechanical Engineering
Diploma in Mech. & Elec. Engr., Nat'l Tech. Univ. of Athens; M.Sc. & D.I.C. (Aeronautics), Imperial College, London, Ph.D. (Aeronautical Engineering).

Amy Berkov, Assistant Professor, Biology
BFA., Univ. Colorado; Ph.D., CUNY.

Karin Block, Assistant Professor, Earth and Atmospheric Science
A.B., Univ. of Michigan; Ph.D., CUNY.

Hillary Brown, Professor, Architecture
M. Arch., Yale Univ.; F.A.I.A.

Lance J. Brown, ACSA Distinguished Professor, Architecture
B.Arch., Harvard Univ., M.Arch. (Urban Design); R.A., A.I.A., A.C.S.C., D.P.

Matthew W. Daus, Esq., CUNY Distinguished Lecturer
B.A. Brooklyn College, M. Law, NYU; J.D., Touro College.

Vasil Diyamandoglu, Assistant Professor, Civil Engineering
B.S. (C.E.), Bogazici Univ. (Istanbul, Turkey), M.S. (C.E.); Ph.D. (C.E.), Univ. of California (Berkeley).

Kevin Foster, Associate Professor, Economics
B.A., Bard College; M.A., Yale Univ., Ph.D.

Jane Gallagher, Professor, Biology
B.S.-A.M., Stanford Univ., Ph.D., Univ. of Rhode Island.

Gordon A. Gebert, Professor, Architecture
B.Arch., M.I.T.; M.Arch., Princeton Univ.; R.A.

Peter Gisolfi, Professor and Chair, Architecture
B.A., Yale Univ.; M.Arch., M.L.A., Univ. of Pennsylvania; R.A.; R.L.A.

Jorge E. Gonzalez-Cruz, Professor, Mechanical Engineering
B.S. (ME), Univ. of Puerto Rico, Mayaguez, (ME); Ph.D., Georgia Institute of Technology.

Toni L. Griffin, Director, J. Max Bond Architectural Center; Professor, Architecture
B.Arch., Notre Dame; Loeb Fellow, Harvard Univ.; R.A.

Barry Gross, Associate Professor, Electrical Engineering
B.A. (Physics/Math), Yeshiva Univ.; M.S., The City College; Ph.D., CUNY.

Denise Hoffman-Brandt, Associate Professor, Architecture
B.A., Univ. of Pennsylvania; M.F.A., Pratt Institute.

George John, Associate Professor, Chemistry
B.S., Univ. of Kerala (India), Ph.D.

Nir Y. Krakauer, Assistant Professor, Civil Engineering
Ph.D., Cal Tech.

Johnny Luo, Assistant Professor, Earth and Atmospheric Science
B.S., Peking Univ. (China); M.Phil., Columbia Univ., Ph.D.

Kyle McDonald, Terry Elkes Professor, Earth and Atmospheric Sciences
B.S.(E.E.), Georgia Inst. of Tech.; M.S., Johns Hopkins Univ.; M.S. (E.E.), Univ. of Michigan, Ph.D.

Nicholas Madamopoulos, Associate Professor, Electrical Engineering
B.S., University of Patras (Greece), M.S., CREOL/School of Optics, PhD.

Fred Moshary, Professor, Electrical Engineering
B.S. (Applied Physics), Cornell Univ., M.S.; Ph.D. (Applied Physics), Columbia Univ.

Robert E. Paaswell, Distinguished Professor, Civil Engineering
B.A., Columbia Univ., B.S., M.S.; Ph.D, Rutgers Univ.; P.E. (New York).

Michael Piasecki, Associate Professor, Civil Engineering
Diploma (C.E.), Univ. of Hannover, Germany; Ph.D. Univ. of Michigan.

Federica Raia, Associate Professor, Earth and Atmospheric Science
B.S., Univ. of Naples, Ph.D.

Ali Sadegh, Professor, Mechanical Engineering
B.S. (ME), Arya-Mehr Univ. of Technology; M.S., (ME), Michigan State, Ph.D.; P.E. (Michigan); CmfgE.

Michael Sorkin, Distinguished Professor, Architecture
B.A., Univ. of Chicago; M.A., Columbia Univ., M.Arch., M.I.T.

Achva Benzinberg Stein, Professor, Architecture
B.L.A., Univ. of Calif. (Berkeley); M.L.A., Harvard Univ., F.A.I.A.

Hansong Tang, Assistant Professor, Civil Engineering
B.S. (M.E.) Wuhan Univ., M.S. (C.E.); D.Sc. (Math), Peking Univ.; Ph.D. (C.E.), Georgia Tech.

Christian Volkmann, Associate Professor, Architecture
Dipl. Arch. ETH, Eidgenossische Technise Hochschule (Switzerland).

June Williamson, Associate Professor, Architecture
B.A., Yale Univ.; M.Arch., M.I.T.; M.U.P., The City College of New York.

Ann E. (Beth) Wittig, Assistant Professor, Civil Engineering
B.S., Univ. of California (L.A.); Ph.D., Univ. of Texas (Austin).

Yael Wyner, Assistant Professor, Secondary Education/Biology
B.S. (Biology), Yale Univ.; Ph.D. (Biology), New York University.

Pengfei Zhang, Associate Professor, Earth and Atmospheric Sciences
B.S. Univ. of Science & Technology of China; M.S., Montana Tech of the Univ. of Montana, Ph.D., Univ. of Utah.

Translational Medicine Program, Master of Science (M.S.)

Jeffrey S. Garanich, Ph.D., Director

Department Office: Steinman 503• Tel: 212-650-5330

General Information

The City College offers the following graduate degrees in Translational Medicine:

M.S. (p. 234)

Translational Medicine, Master of Science (M.S.)

To obtain the M.S. degree in Translational Medicine, a student must complete the 30-credit course program described below. Core courses (24 credits) are concentrated in three areas: (1) Biomedical and Clinical Sciences and Engineering, (2) Clinical Evaluation, and (3) Business Principles and Entrepreneurship. In addition to core requirements, students are required to enroll in 6 credits of technical elective courses.

Degree Requirements

Requirements List

BME I6100	Intellectual Property, Regulation and Quality Assurance	3
BME I6200	Cost Analysis and the business of translation	1
BME I6300	Engineering, Entrepreneurship and Business Leadership	3
BME I6400	Translational Challenges in Diagnostics, Devices and Therapeutics	3
BME I6500	Capstone Design I: Identifying the Problem	2
BME I6600	Capstone design 2: Conceptual Innovation	3
BME I6700	Capstone Design 3: Translational solutions	3
MEDS I7100	Translational Challenges in Medicine	3
MEDS I8100	Biomedical Ethics and Responsible Conduct of Research	1
MEDS I8200	Translational Research Design	2

Elective Courses (6 credits from the list below)

Note: A student may take, at most, three (3) elective credits from Business Principles and Entrepreneurship course(s). The remaining three (3) elective credits must be taken from one (1) of the following categories: Biomedical Engineering Courses, Chemical Engineering Courses, Engineering Courses, Mechanical Engineering Courses, or Biomedical Sciences Courses.

BME I2000	Cell and Tissue Engineering	3
BME I2200	Cell and Tissue Transport	3
BME I3000	Neural Engineering and Applied Bioelectricity	3
BME I3110	Biofluid Mechanics	3
BME I4200	Organ Transport and Pharmacokinetics	3
BME I4300	Physiology for Biomedical Engineers	6
BME I5000	Medical Imaging and Image Processing	3
BME I5100	Biomedical Signal Processing	3
BME I6000	Advanced Biomaterials	3
BME I7000	Laboratory in Cellular and Molecular Engineering	3
BME I7100	Cell and Tissue Mechanics	3
BME I7300	Cell and Tissue-Biomaterial Interactions	3
BME I7700	Microfluidic Devices in Biotechnology	3
BME I8000	Bone Physiology and Biomechanics	3
BME I9000	Skeletal Soft Tissue Physiology and Biomechanics	3
BME I9400	Special Topics in Machine Learning	3
BME I9800	Project	3

Chemical Engineering Courses

ChE I5700	Advanced Materials Engineering	3
ChE I8900	Nanotechnology	3
ChE I9000	Bioprocess Engineering: Mammalian Cell Biotechnology	3

Engineering Course

ENGR I1100	Introduction to Engineering Analysis	3

Mechanical Engineering Courses

ME I4800	Accidental Injury Biomechanics	3

Biomedical Sciences Courses

BIO A2000	Virology	3
BIO A4250	Cancer Biology	3
BIO A4510	Movement and Muscle: The Neuroscience of Motor Control	3
BIO A4810	Introduction to Epigenetics	3
BIO A8000	Current Topics in Microbiology	3
BIO B4540	Sensory Perception	3
BIO C0300	Molecular Biology	4
BIO V1401	Cell Biology	4
BIO V1800	Immunology	3
BIO V2301	Neuroscience I	4
BIO V2301	Neuroscience I	4
BIO V2302	Neuroscience II	4
BIO V5003	Developmental Biology	3
CHEM A8005	Biochemistry II	3
PHYS V3800	Biophysics	4

Business Principles and Entrepreneurship Courses

MCA B2001	Strategy & Measurement	3
PSM B1720	The Economics for Public Policy	3

Subtotal: 30

Advisors

Jeffrey S. Garanich, Ph.D., Director

Faculty

Jeffrey S. Garanich, Ph.D., Director, Master's in Translational Medicine
B.S. (Mechanical Engineering), Penn State University; Ph.D. (Bioengineering), Penn State University

Mitchell Schaffler, Ph.D., CUNY and Wallace Coulter Distinguished Professor, Biomedical Engineering Chairman, Biomedical Engineering
B.S. (Biology), SUNY Stony Brook; Ph.D. (Anatomy), West Virginia University

Amr Soliman, M.D., Ph.D., MPH, Medical Professor, CUNY School of Medicine
M.D., Cairo University; MPH; Cairo University; Ph.D., (Nutritional Sciences/Epidemiology-Educational Psychology), University of Arizona, Tucson

Sabriya Stukes, Ph.D., Adjunct Assistant Professor, Biomedical Engineering
B.S. (Biological Sciences with a Concentration in Microbiology and Immunology), Virginia Polytechnic Institute and State University; Ph.D. (Biomedical Sciences), Albert Einstein College of Medicine

Ashiwel Undieh, MPharm, PhD, Medical Professor, CUNY School of Medicine
B.Pharm. (Pharmacy), University of Nigeria; M.Pharm. (Pharmacology), University of Nigeria; Ph.D. (Pharmacology), Medical College of Pennsylvania

John A. Blaho, Ph.D., Director, Industrial-Academic Research, CUNY Central Office of Research, Adjunct Professor, Biomedical Engineering
B.E. (Chemical Engineering), Manhattan College; Ph.D. (Biochemistry), University of Alabama School of Medicine

Abhishek Datta, Ph.D., Scientist/Chief Technology Officer, Soterix Medical, Adjunct Professor, Biomedical Engineering
M.S. (Electrical Engineering), Stony Brook University; Ph.D. (Biomedical Engineering), City University of New York

Katherine Mendis, M.Phil., Adjunct Lecturer, CUNY School of Medicine
A.B. (History), The University of Chicago; M.A. (Philosophy)

Institutional Policies

Campus and Workplace Violence Policy

Computer Use

CUNY Board of Trustees By-Laws

CUNY Policy on Admission of Students Who May Pose a Risk to the College

CUNY Policy on Sexual Misconduct

Drug/Alcohol Use - Amnesty Policy

Equal Opportunity and Non-Discrimination

FERPA

Freedom of Information Law (FOIL)

Health Statement and Immunization Requirements

Immunization Requirements

Information Security

Policy Against Drugs and Alcohol

Reasonable Accommodations and Academic Adjustments

Returning from/Leaving for Active Duty

Rules and Regulations for the Maintenance of Public Order Pursuant to Article 129-A of the Education Law

Student Complaints about Faculty Conduct in Academic Settings

Students' Bill of Rights

Index