The City College

Graduate Bulletin

2008–2010

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

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Policies on Non-Discrimination and Sexual Harassment
The City College prohibits discrimination on the basis of age, gender, sexual orientation, transgender, disability, genetic predisposition or carrier status, alienage or citizenship, religion, race, color, nationality or ethnic origin, or veteran, military or marital status in its student admissions, employment, access to programs, and administration of educational policies. Questions, concerns, or complaints based on any of the above may be directed to the Office of Affirmative Action, Wille Administration Building, Room 200 (212-650-7331). In addition, the specific form of gender discrimination, "sexual harassment," is prohibited by the policies of the Board of Trustees of The City University of New York. Student complaints alleging sexual harassment should be directed to the Sexual Harassment Awareness and Intake Coordinator (see Appendix B, and the *Sexual Harassment* brochure for the name of the current Coordinator and a list of Committee members who may be contacted). Brochures are available in the Affirmative Action Office, the Office of Human Resources, the Office of the Vice President for Student Affairs and at the NA Information Desk. Information is also available on the City College website under Faculty/Administration.

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.

Directory

Mail Address:
The City College/CUNY
160 Convent Avenue at 138th Street
New York, N.Y. 10031
Telephone: 212-650-7000
www.ccny.cuny.edu

School and Division Offices		
Architecture (School of)	SH 03	212-650-7118
Biomedical Education		
(Sophie Davis School of)	HR 107	212-650-5275
Education (School of)	NA 3/203	212-650-7262
Engineering (School of)		
Undergraduate	ST 209	212-650-8020
Graduate	ST 152	212-650-8030
Liberal Arts and Science (College of)		
Humanities and Arts (Division of)	NA 5/225	212-650-8166
Science (Division of)	MR 1320	212-650-6849
Social Science (Division of)	NA 6/141	212-650-8156
Worker Education (Division of)	25 Broadway	212-925-6625

Other Important Numbers		
Academic Standards	NA 5/216	212-650-8113
Admissions	Admin 101	212-650-6977
Bookstore	NA 1/103	212-650-7109
Bursar	Admin 103	212-650-7218
Career Center	NA 1/116	212-650-5326
Student Disability Services	NA 1/218	212-650-5913
Financial Aid	Admin 104	212-650-5819
Finley Student Center	NA 1/210	212-650-5002
Honors Center	NA 6/293	212-650-6917
Information Center	NA Lobby	212-650-5338
Intercollegiate Athletics	MR 20	212-650-8228
International Student Services	NA 1/107	212-650-8106
Intramural Recreation	MR 27	212-650-7556
Library (Main)	NA Second Floor	212-650-7271
Architecture Library	SH 408	212-650-8766
Music Library	SH 160	212-650-7174
Science/Engineering Library	MR 29A	212-650-8242
Lost and Found	NA 4/201	212-650-6911
Ombudsperson	NA 1/106	212-650-8179
Registrar	Admin 102	212-650-7850
Security	NA 4/201	212-650-6911
Student Affairs	Admin 206	212-650-5426
Student Services	Wingate 107	212-650-5370
Graduate Student Council	NA 1/113	212-650-5319
Wellness and Counseling Center	MR 15	212-650-8222

A Message From the President

Welcome to The City College of New York! Having successfully completed your undergraduate degree, you are about to embark on a course of study that will prepare you to excel in the profession of your choice. And you have made the right choice in City College!

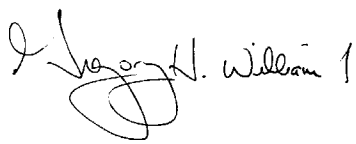
Whether you completed your undergraduate work at City College or come to us from another university, this is the point in your academic life where the depth and breadth of your program, supported by the excellence of the faculty, become the most important guarantor of your success. At CCNY, you will be taught by intensely committed faculty whose achievements in fields as diverse as molecular biology, film and video production, creative writing, urban design, biomedical engineering and psychology, to name just a few, are internationally recognized. You may find yourself working with world-renowned scholars in search of a cure for cancer, for example, or examining the best ways to "green" a city, or developing new remote sensing technologies to analyze atmospheric pollution. Whatever program you choose, you will be studying with the best.

Use this bulletin to familiarize yourself with our graduate programs. Each one will prepare you to become a leader in an increasingly complex and global world. Our rich curriculum offers you the academic foundation for future success, just as it did CCNY's earlier graduates, from Supreme Court Justice Felix Frankfurter to former Secretary of State Colin Powell, from artist Faith Ringgold to Intel co-founder Andy Grove to Judge Carol Edmead, to our nine Nobel Prize-winning scientists. As a graduate of City, you will join their company and carry on their tradition of excellence and achievement as you shape not only the career you have chosen, but also the world you live in.

Of course college—even graduate school—equals more than classes, and life at City is as varied and exciting as our student body. You will find opportunities here to join with other like-minded students to pursue your interests in more than 90 student clubs. In particular, I hope that you will bring your concerns and ideas to the graduate student government.

I look forward to welcoming you personally to City College.

Sincerely,



Gregory Williams
President


MORRIS RAPHAEL COHEN
LIBRARY
Electronic Classroom 1/270A
Demo Classroom 1/340A
Rest Rooms
EXIT ONLY

About The City College

The City College of New York

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 Social Science**
- **Division of Worker Education (undergraduate program only)**

The Professional Schools are the:

- **School of Architecture**
- **School of Education**
- **Grove School of Engineering**
- **Sophie Davis School of Biomedical Education (undergraduate program only)**

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-three 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 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.

Nearly $5 million of new construction and renovation is underway on the campus, including a new home for the School of Architecture and two advanced Science research centers on South campus.

THE TOWERS RESIDENCE HALL

The Towers, opened in 2006, is the first residence hall built on the CCNY campus in its 161-year history. It is located at the corner of 130th Street and St. Nicholas Terrace on the South Campus and provides accommodations for approximately 600 resident students. The Towers also provides a number of suites 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 Seminar room, a fitness center, a central laundry facility and a community kitchen. Staying at The Towers is all inclusive and includes internet, phone, cable and all utilities. The Towers has twenty-four hour security with cameras installed throughout the building. CCNY operates a shuttle/escort service to provide easy access to the local subway stations and to North Campus. The Residence Life Staff provides supervision of the building in accordance with CCNY policies and procedures. Resident Assistants create community through educational and social programming and serving as a resource for all residents.

Information concerning costs and the application process can be found at CCNYTowers.com or prospective students can contact the Office of Housing and Residence Life at 917-507-0070. Tours of the facility are offered throughout the year through Admissions and The Towers 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; 215-662-5606).

Additionally, professional curricula are accredited by the appropriate professional educational agency or board including the National Council for the Accreditation of Teacher Education, the National Architectural Accrediting Board, the American Society of Landscape Architects, and the Accreditation Board for Engineering and Technology.

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 eighteen 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 minority, women and economically disadvantaged students.

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, 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 15,000 men and women is drawn from eighty different countries and represents some fifty 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.

The 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 Engineering and Science should contact The City College Office of Admissions for information and requirements.

MASTER'S 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. 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) must take the TOEFL (Test of English as a Foreign Language) and are expected to have a minimum score of 61 on the new IBT TOEFL. Some departments require higher scores for admission.
- 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

To receive applications for admission to all **Liberal Arts and Science** or **Engineering** programs contact:

The City College of New York
Office of Admissions
Wille Administration Building, Room 101
160 Convent Avenue
New York, NY 10031
Telephone: 212-650-6980

Applications may be downloaded from: www.ccny.cuny.edu/admissions

Information and applications for **Architecture** and **Education** programs may be obtained from:

School of Architecture
Shepard 103, 109D
212-650-8748

School of Education
NA 3/233A
212-650-6236

To apply for admission to a City College master's program, submit the following information:

- An application for Graduate Admission with a $125 non-refundable fee.
- Official transcripts of all undergraduate and graduate work.
- Letters of recommendation.
- A personal statement.
- GRE scores.
- International students must have a minimum passing TOEFL score of 61 on the IBT TOEFL or better (please see Graduate Application for more information).

Admissions decisions are made only after receipt of all valid credentials. The Graduate Admissions Office encourages applicants to apply early. International students should apply a minimum of six months prior to the semester of enrollment.

Application Deadline Dates

	Fall	Spring
Architecture	Jan. 15	N/A
Education	April 15	Nov. 15
Engineering	May 1	Nov.15
International Relations	Mar. 1	N/A
Fine Arts (Studio Art)	Feb. 1	N/A
Music	April 1	Nov. 1
Media Arts Production	April 1	N/A
Mental Health Counseling	April 15	N/A
Psychology	April 15	Nov. 15
All other programs	May 1	Nov. 15

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 Fine Arts (Studio Art) or Media Arts Production. 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.

ADMISSION TO A MASTER'S DEGREE PROGRAM

Admissions decisions are made by the Graduate Advisory 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.

Non-Matriculated Status
The Graduate Advisory 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 Graduate Admissions Office 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 "Walk-in" application obtained from the Graduate Admissions Office and provide a transcript indicating proof of a baccalaureate degree. The student will then transmit the non-matriculant application to the department advisor or chair for approval to register. 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 to one semester of study and 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 School of Architecture does not accept non-matriculated students.

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 Graduate Admissions Office in order to have their application reviewed.

ADVANCED STANDING

Students who have completed graduate work at other regionally 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 a 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*
School of Architecture	36 (M. Arch. I)
	30 (M.L.A. I)
	0 (M.U.P, M. Arch II; M.L.A. II)
Grove School of Engineering	6
School of Education	6

**Advanced standing will be granted for graduate courses in visual arts from accredited art schools.*

COURSES AVAILABLE TO CCNY UNDERGRADUATES

Qualified City College undergraduates may take graduate courses under the same tuition conditions as undergraduate courses, with credit for such courses to count toward their undergraduate degree, provided that they have a B average, the approval of the undergraduate dean, the recommendation of their department, and approval of the dean in whose unit the course will be taken.

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 http://origin.admin.ccny.cuny.edu/student_affairs/wellness/default.asp. 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

Policies for Graduate Students

CERTIFICATION OF FULL-TIME STATUS

A full-time student is one taking twelve credits or the equivalent in equated credits. A student is eligible to enroll for equated credits when the student enrolls for a minimum of six real credits and is a matriculated student.

Equated credits include: (1) teaching assistantship - three credits (quarter-time) to six credits (half-time); (2) research assistantship - three credits (quarter-time) to six credits (half-time); (3) research for thesis - a maximum of six credits; (4) field work - a maximum of six credits; (5) preparation of thesis - a maximum of six credits. International students who are registered for certified credits are not necessarily in compliance with Immigration Service requirements. They must consult with the Foreign Student Advisor in NA 1/107 for additional information

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 theMaintenance of Matriculation fee of $750 for residents and $1,250 for non-residents. 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.

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.

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

Grading System

Grade	Explanation	Quality Points
A+		4.00
A		4.00
A-		3.70
B+		3.30
B		3.00
B-		2.70
C+		2.30
C		2.00
F		0.00
CR	Completion of thesis and research courses	—
P	Pass	—
W	Withdrew without penalty (student initiated)	—
FIN	F due to incomplete	0.00
WU	Withdrew without approval	0.00
INC	Incomplete	
SP	Satisfactory Progress (restricted to thesis and research courses requiring more than one semester for completion)	
AUD	Audit-no credit	

the first class session. They should note that an instructor may 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 field work 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 Registrar 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.

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 INC grades may be considered only by written appeal to the appropriate Committee on Course and Standing of the particular school.

WITHDRAWALS

A student may withdraw from a course during the first ten weeks of the semester by requesting a withdrawal form from the Office of the Registrar, obtaining the signature of the course instructor and the dean, and returning the card to the Office of the Dean. A course dropped during the first three weeks will not appear on the record and a grade of W will be assigned to courses dropped between the fourth and tenth week. A student who wishes to drop a course later than the tenth week must petition the appropriate Committee on Course and Standing and must present, in writing, satisfactory reasons for requesting permission to withdraw. A student who fails to appear in class for a substantial portion of the semester will be given a grade of WU by the instructor.

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 late registration. Likewise, credit status cannot be changed to auditor status after late registration.

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 if they originally applied to City College as non-matriculated students. 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.

ACADEMIC APPEALS

The faculty of each of the schools 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 has a Committee on Course and Standing charged with overseeing special cases and appeals. 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.

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.

GRIEVANCES

Students with grievances concerning classroom 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 to the Vice President for Student Affairs, who shall, if necessary, refer it to the Office of the Provost for further consideration and possible action.

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.

COURSES OUTSIDE A DEGREE PROGRAM

Students who wish to take courses that do not count toward the degree must receive permission to do so from the department and the dean of the school or division awarding the degree.

REQUIREMENTS FOR THE MASTER'S DEGREE

The master's degree is awarded three times during the year: February, 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. For graduation in May/June, students must file with the Office of the Registrar no later than March 1st, for September by July 1st, and for February by November 1st.

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 candidacy will automatically become subject to review.
5. **Comprehensive Examination**: Most 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 original and two photocopies of the approved thesis must be submitted to the office of the divisional or school dean by December 12, May 13, or August 15, 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.

   All three 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. The original and the second copy should be left unbound; the first copy is to be placed in a hardcover, springback binder. The thesis must have a title page bearing the subject, the department, the author's name, the mentor's name, and the date.
7. **Foreign Language Proficiency**: Some but not all programs leading to the master's degree require evidence of proficiency to read and utilize in research a foreign language or proficiency to use 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). Graduate students are bound by the grading policy of the school offering the course, not by the school offering the degree.

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.

The CCNY Graduate Bulletin should be consulted for additional admissions/academic policies and procedures.

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.

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.

THE RIGHT TO PRIVACY

The College complies fully with the Family Educational Rights and Privacy Act (FERPA). FERPA regulations appear in Appendix B of this bulletin.

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.

Tuition and Fees

The Bursar's Office is located in the Wille Administration Building, Room 103, and the telephone number is 650-8700.

Tuition is set by the CUNY Board of Trustees and is subject to change without notice by 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

	Flat Rate 12-18 credits	Per Credit
Master's in Architecture and in Engineering		
New York State Residents	$3,750.00	$315.00
Non-resident Students	N/A	$555.00
All other Master's Programs		
New York State Residents	$3,200.00	$270.00
Non-resident Students	N/A	$500.00
	Full-time	**Part-time**
Technology Fee	$150.00	$50.00
Student Activity Fee	$15.35	$15.35
Consolidated Fee	$15.00	$15.00

Maintenance of Matriculation Fee

A $750 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 $1,250. 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.

OTHER FEES

Application	$ 125.00
Re-entry	$ 10.00
Late Registration	$ 25.00
Change of Program	$ 18.00
Check Reprocessing	$ 15.00
Non-payment	$ 15.00
Transcript	$ 7.00
Make-up Examination	
First in semester	$ 25.00
Second in semester	$ 5.00
Duplicate Receipt	$ 5.00
Duplicate ID Card	$ 5.00

There may be other costs and fees associated with academic work, such as those for textbooks and studio or lab materials.

TUITION REFUNDS

When courses are cancelled 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. 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. Proportionate refunds of tuition will be made in accordance with the schedule below.

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 ...None

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 credit reports.

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 in 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.

Financial Aid

The Financial Aid Office is located in the Wille Administration Building, Room 104, and the telephone number is 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.

MAJOR GRANTS

Assistantships/Fellowships
A number of assistantships and fellowships, valued at a maximum of $4,000, are administered by the Financial Aid Office for the graduate departments. These academic merit-based awards usually involve 15 to 20 hours of work. Interested students should contact their departments.

The major source of financial aid for CUNY doctoral candidates is centered at The City University Graduate Center and with the individual departments in which the student is enrolled. Applications for fellowships and teaching and research assistantships should be directed to these sources.

Tuition Assistance Program (TAP)
TAP is a grant for full-time graduate students (12 credits) who are residents of New York State and who are U.S. citizens or eligible aliens. Graduate students may be eligible for grants from $75 to a maximum of $550 for the academic year.

CAMPUS-BASED AID PROGRAMS

Funds from the two federal programs—Federal Work Study (FWS) and Federal Perkins Loan—are awarded to eligible students who attend on at least a half-time basis (six credits). Graduate students who are U.S. citizens or eligible aliens may apply. These are not entitlement programs; the Free Application for Federal Student Aid (FAFSA), which is used to apply for both, should be filed by April 1st for the following academic year. Applicants for federal programs should consult the Financial Aid Office regarding academic progress standards that are required for continuing to receive aid.

Federal Work-Study Program (FWS)
Students are offered an opportunity to work on campus or at an approved off-campus public service or non-profit agency in the hope that they will gain educational and financial benefits through the FWS experience. During the academic year students work part-time; during the summer and vacation periods, part-time or full-time.

Federal Perkins Loan
Depending upon available funds, a student may receive a maximum of $5,000 for each year of graduate study. For details including repayment and interest rates, consult the Financial Aid Office.

William D. Ford Federal Direct Loan (Subsidized and Unsubsidized)
The Ford Federal Direct Loan Program enables matriculated students who are enrolled a minimum of half-time (6 cr.) to meet educational expenses. Graduate students may borrow a maximum of $8,500 per year (subsidized). Unsubsidized loans up to a maximum of $12,000 are available to students 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.

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 for more information.

OTHER FINANCIAL AID

Short-Term Emergency Loans
The College operates a small loan program that enables students to meet emergencies. These loans must be repaid during the semester and usually within two weeks of the receipt of such funds. Failure to repay on schedule can lead to debarment from classes and delay the processing of academic records. There is a $5 service charge. For further information, contact the Office of Student Affairs.

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 or through the Office of Admissions.

Research and Study Facilities

LIBRARY

The City College library system includes:

- the Morris Raphael Cohen Library (North Academic Center)
- the Music Library (Shepard 160)
- the Architecture Library (Shepard 408)
- the Architecture Visual Resources Library (Shepard 303)
- the Science/Engineering Library (Marshak 29)
- the Art Visual Resources Library (Compton Goethals 245A)
- 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, Social Science and Education materials. The collections, the largest in the CUNY system, total more than 1,447,000 volumes, 901,000 microforms, 26,600 scores and recordings, 7,400 videos and DVDs, 190,000 slides and more than one million digital images. Designated a Federal depository in 1884, the library has 232,000 government documents. The Archives and Special Collections Division contains 4,102 linear feet of official records and historical material on the College in addition to rare books and special subject collections. Digital library holdings include more than 43,600 e-books and 48,000 electronic subscriptions. The library serves instructional and research needs of undergraduate through doctoral levels and provides study areas, carrels and computer workstations for students and faculty.

The website, http://www1.ccny.cuny.edu/library/index.cfm, provides quick and easy access to digital resources – full text, indexes, dissertations and catalogs – for more than 150 databases, including Science Direct, LEXIS-NEXIS, Web of Science, EI Village, JSTOR, MathSciNet, PsycArticles. Project Muse, IEEE Xplore, the American Chemical Society, and the Avery Index to Architecture Periodicals. The CUNY+ online catalog on the web provides access to library holdings both at City College and throughout CUNY. The CCNY Alphabetical List of Journal Titles Online provides access to 48,000 digital periodicals.

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 system, 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.

Both visual resources libraries are evolving into digital resource collections through the acquisition of commercial databases such as Artstor, Saskia and Archivision, with Embark as an image cataloging tool.

The libraries host a full calendar of exhibitions, readings, lectures and programs in multiple venues.

Library faculty provide information literacy education, instruction in research methodology and resource evaluation on multiple levels, from Freshman Inquiry seminar classes through graduate courses. A listing of library faculty is located in Appendix G.

INFORMATION TECHNOLOGY AND COMPUTER SERVICES

The primary goal of Information Technology and Computer Services is to ensure that students, faculty and staff who depend upon the College's information technology services and resources have a robust, dependable and user-friendly operating environment in which to work.

Information Technology and Computer Services represents academic computing at CCNY, an increasingly complex and heterogeneous mix of technologies across many academic disciplines. The office continually evaluates its offerings and role within the College as it seeks opportunities to facilitate the goals of faculty, departments and programs. There are over 60 computer labs housing over 1500 computer systems distributed throughout the campus that are dedicated to supporting students' rigorous academic computing needs.

Underlying these computer systems is a fast, robust network with campus-wide gigabit connectivity and targeted wireless access points. The College's network comprises a 1 Gigabit per second (Gbps) link to CUNY's main circuit which provides 1.6 Gbps of bandwidth to the commercial Internet, plus 100 Mbps to Internet2 for all CUNY campuses. Internet2 is the next generation Internet connecting hundreds of research and educational institutions.

For disaster recovery purposes, the College employs a backup Ethernet connection circuit operating at 100 Mbps to CUNY.

The general-use Computer Laboratory, located on the ground floor of the North Academic Center, houses 50 Apple Macintosh and 60 Windows-compatible computers available on a walk-in basis. This lab complements a campus-wide distribution of computer labs designated to support instruction in specific disciplines, including the Economics and Psychology departments, the Division of the Humanities and the Arts, the Robinson Center for Graphic Arts, the Library facilities, and the Center for Teaching and Learning. There are also many computing and information technology facilities in the Division of Science and Schools of Architecture, Education and Engineering. These labs host a variety of specialized software applications allowing students to conduct research and produce and present their academic assignments.

Computing skills workshops are under constant development to provide students and instructional staff with the means to learn the fundamentals of using computer applications. These are provided in a variety of topics to give the college body a range of options for accessing and producing files for use on both personal computer systems and on the internet. Topics of instruction include word-processing, spreadsheets, basic database design, statistical analysis, and multimedia production.

The College's website provides topical information, including a complete listing of computing facilities and other pertinent information and services concerning information technology at CCNY.

Software Training Center

The Software Training Center (STC) was initiated in Fall 2003 by the Student Technology Intern Program (STIP) to offer software training in a friendly atmosphere with state-of-the-art technology to all CCNY students. The STC offers training in Matlab (Computational Methods), C++, AutoCab, and all Microsoft Office applications such as word processing, database design and management, electronic spreadsheets, graphical presentation and publication. Also, it offers instruction in CUNY Portal and Blackboard e-learning software, website creation and management, graphic design using Adobe Photoshop, and Pelican, the general college e-mail application. It also offers training in e-Grading, e-Permit, and e-SIMS, and how to properly configure, use, and troubleshoot our wireless system. The STC is also used to train CCNY administrators and staff in the use of Excel in preparation for the new ERP program.

iMEDIA Audio-Visual Division

The iMEDIA services and technologies support, college-wide, the delivery of content in support of research, scholarship, the curriculum, scholarly communication, appreciation of cultural diversity, information literacy, and community service. For the support of faculty, students and research staff's media needs, iMEDIA has installed select classrooms and lecture halls with LCD projectors, projection screens, and audio speakers for use with portable audio/video devices and laptops. The larger lecture halls have been equipped with permanent DVD/VHS players. iMEDIA also provides videoconferencing and distance education capabilities. iMEDIA staff offers audio and video production services in support of instruction, scholarly communications, and other activities consistent with the College's mission. iMedia provides College-wide portable technology services for classroom video or computer media presentations, classroom videoconferencing, and classroom audio support. It maintains a wide range of portable video, audio, and computer equipment for use in support of instructional programs.

Student Affairs and Student Services

The Division of Student Affairs is located in the Wille Administration Building, Room 204, and the telephone number is 212-650-5426.

The primary mission of the Division of Student Affairs is to support the academic mission of the College in ways that enable students to complete their course of study most effectively. One of the most important factors in promoting student success is the quality of campus life. The division seeks to enhance the experience of students on the City College campus through rich student life programs and vital student activities that help students achieve their academic goals and develop as a whole person. Each student affairs office plays a vital role in the overall development of students. Through these services and programs, students are afforded opportunities to strengthen academic skills, develop leadership skills, access support services, increase their social skills, and enhance their career development as they make progress towards their personal and academic goals.

The Vice President for Student Affairs has overall responsibility for the division. Additional information on services and programs may be obtained from the office.

Office of Student Services

The Office of Student Services (OSS) provides programmatic and informational supports to help students further their academic and personal growth goals. This office serves as a clearinghouse for the Division of Student Affairs, where students are given help or guidance on different types of problems, i.e., how to navigate the College bureaucracy to resolve an academic or personal dispute, where to get counseling within and without the institution; how to locate the College's programs and resources that deal with a broad range of student financial and social concerns; and similar issues that students may encounter. Hence the goal is to provide clear and accessible information to allow students to feel empowered in their interactions with the institution.

OSS administers the Student Off-campus Housing Referral Service. It is located in Wingate Hall, Room 107. The office telephone number is 212-650-5670 and the fax number is 212-650-7369. Students in need of housing must complete a Student Housing Application for appropriate referrals to housing providers. Referrals to off-campus housing providers do not constitute an endorsement or guarantee by the College of any housing offers. All contractual arrangements are the sole responsibility of the student and the housing provider.

To provide information electronically to current and prospective students, the Student Email Helpline, under the supervision of OSS and staffed solely by students, is available to receive queries at any time, seven days a week. The student staff responds (Monday through Friday) to inquiries in the order they are received. They may answer questions regarding academic and admissions procedures, college regulations, general program and course requirements, class schedules, curricula, etc. Those inquiries requiring responses from College officials are forwarded to appropriate faculty, staff or administrators. The Student Email helpline address is support@ccny.cuny.edu. Access is also available through the College's website, www.ccny.cuny.edu, and by clicking on the "Student Helpline" box.

The Campus Ministry is housed in OSS. Students in need of spiritual guidance and counseling, or who wish to engage in discussions related to spiritual development, may come to the Campus Ministry, located in Baskerville Hall, Room 204 (212-650-5866) for referrals.

Short-term loans for personal emergencies, books, carfare, and supplies, are available in OSS. If qualified, a student may receive a loan of up to $350 once a semester. Richter Tuition Loans of up to $500 are available to help qualified students complete tuition payment. The maximum loan amount is $500. All loans must be repaid within the same semester they are given.

The Director of the Office of Student Services is located in the Wille Administration Building, Room 204. The office telephone number is 212-650-5426 and the fax number is 212-650-7080. The email address is studentservices@ccny.cuny.edu.

Office of Student Disability Services

The Office of Student Disability Services (SDS) is dedicated to providing students with disabilities equal access to the College curriculum. The office ensures that, upon request, qualified students with disabilities are provided reasonable and effective accommodations as mandated by law. SDS facilitates a range of academic adjustments, reasonable accommodations, and support services for students with disabilities.

Students who contact SDS and indicate that they have a disability or believe that they might qualify for services will be asked to make an

appointment for an intake interview with SDS staff. During the intake interview, the staff member will discuss what services are available from SDS and other City College offices. In order to qualify for services, students must register with SDS by providing appropriate documentation from a qualified professional regarding the nature of their disability and functional limitations. However, though academic adjustments are mandated by law, the College is not required to alter demonstrably essential academic requirements of a course of study nor is the College mandated to lower or effect substantial modifications of reasonable academic standards.

Early planning is essential for many of the resources, adjustments and accommodations, so students are asked to contact SDS at the earliest possible date. (NA 1/218; 212-650-5913 or 212-650-6910 for TTY/TTD).

Office of International Student and Scholar Services

The Office of International Student and Scholar Services facilitates the transition, adjustment, and ongoing counseling needs of non-immigrant international students, research scholars and visiting faculty members. Services include assisting students and scholars in complying with immigration mandates of the Federal government, providing documentation necessary for foreign currency exchange applications and overseas travel and re-entry to the United States. Additionally, the office provides an orientation program for new international students every semester, monitors student academic progress and assists in coordinating the services of the other departments. The office is located in the NA 1/107, 212-650-8106.

Wellness and Counseling Center

The Wellness and Counseling Center (WCC) is an ambulatory care center for students enrolled at City College. Student fees support the operations of the WCC. Services at the WCC are therefore free of charge. The WCC employs health care practitioners who provide students with quality medical and psychiatric care.

The WCC provides condoms and certain over-the-counter medications as well as tuberculosis testing at no cost to students. Physical health services include providing immunization clinics for measles, mumps, rubella, flu and hepatitis vaccines. The Center also provides medical clearance for CCNY's physical fitness center, initial physical examinations, pregnancy testing, and diagnosis and treatment for sexually transmitted diseases at no cost to students. The WCC has on-site back-up practitioners available including an L.P.N., and an R.N. (5 days per week), and an M.D. and P.A. (2 days per week) with a late clinic on Tuesday evenings until 6:00 p.m.

The WCC also provides psychological counseling services including crisis intervention and short term counseling at no cost. Workshops in "Controlling, Managing and Overcoming Test-Taking Panic, Memory Retention and Learning Techniques", as well as "Seven Habits Of Highly Effective Students" are provided to students in order to enhance their performance and provide a rich learning environment.

When necessary, students are referred to community-based health care clinics for more comprehensive treatment and services. These community clinics provide quality health care services for a nominal fee. In an effort to expand services not available for students at the WCC, an affiliation with New York City Technical College (NYCTC) in Brooklyn was established early in 2001 for free and low-cost ophthalmic services. Local community referrals are provided through arranged affiliations for ongoing medical care and for conditions not treated at the WCC site. There is a minimal fee for these services, including laboratory work and X-rays, provided outside the WCC. The fee is collected at the referral site.

Students clear their New York State Immunization Requirements, in accordance with Public Law 2165, at the WCC. The Measles, Mumps and Rubella Vaccination (MMR) is provided free of charge on clinic days for those students, including international students, who need to meet this requirement. Students with their immunization records intact can fax their records to the WCC at 212-650-8227. The appropriate forms must be returned to the WCC prior to registration.

Recently, New York State passed Public Health Law (PHL) 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 from within 30 days of registration or at the same time they send in their MMR compliance document.

Students may download both forms from the WCC website at: http://origin.admin.ccny.cuny.edu/student-affairs/wellness/default.asp. Students can also fax these forms to 212-650-8227. The fax must include 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.

Information on providers of student health insurance as well as additional information concerning health, medical and counseling services may be obtained by calling the WCC (J-15; 212-650-8222).

PSYCHOLOGICAL CENTER

In association with the Psychology Department's doctoral program in clinical psychology, the Psychological Center offers counseling by supervised graduate students. Access to the service is limited and is fee based (NA 8/109; 212-650-5672).

STUDENT LIFE AND LEADERSHIP DEVELOPMENT

The role of the Office of Student Life and Leadership Development (NA 1/210; 212-650-5002) is to structure and promote out-of-classroom experiences for students. The Office interacts closely with the members of over 140 Student organizations, assisting their leaders in the areas of leadership skills training and event programming. Collaborative efforts also include working with the elected officers of the Undergraduate Student Government and the Graduate Student Council to register clubs and manage the student electoral process. The Office provides meeting space and support for more than ninety student organizations including academic, cultural, religious and social clubs.

The Office operates several spaces in the North Academic Center, including the Harold and Lillian Hoffman Student Center, the Finley Center Ballroom, the Game Room, Aronow Theater, a computer lab and various conference rooms.

Intercollegiate Athletics
The College offers an extensive sixteen-team program of varsity competitive sports for men and women. The College fully subscribes to the Division III philosophy which emphasizes the participants rather than the spectators. The program is supported by an athletic fee, which is part of the mandatory student activity fee. No athletic scholarships are offered by Division III colleges. Membership on a team is open to all qualified undergraduate students in good academic standing who meet NCAA eligibility standards. Teams compete in various local, regional, national events, and leagues, with the primary affiliation being the CUNY Athletic Conference. For more information, contact the Athletics office (MR 20; 212-650-8228).

Intramural Athletics and Recreational Sports
The Intramural Athletics and Recreation program provides the City College 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 Athletics program generally take place during club hours on Thursdays. Some of the events that take place during a given semester include basketball, volleyball, badminton, soccer, and tennis.

The recreation program offers the campus community opportunities to work out with cardiovascular equipment and weight train in the Wingate Fitness Center, which opened in 1999. Individuals can also swim, play tennis, basketball, volleyball, badminton, soccer, frisbee, touch football, or merely jog. The programs emphasize enjoyment health and wellness, social interaction, camaraderie, physical activity, and the challenge of competition with one's peers.

Information on the Athletics or Intramural and Recreation program can be obtained on the 3rd floor of Wingate Hall or from the Athletics Office (MR 20).

WHCR-FM

The College's radio station, WHCR (90.3 FM), is a professionally managed community station. Through hands-on training at the station, students and community volunteers can learn many aspects of news gathering, reporting, programming and on-air broadcasting (NA 1/108; 212-650-8171).

THE CAREER CENTER

The Career Center is dedicated to providing an extensive array of quality programs and services for the professional development and career advancement of its students. Programs and services are designed to help students prepare for the professional world of work through self-assessment, workshops and seminars and cooperative education and internship placements.

To assist students with career education and planning the Center offers workshops on resume writing, letters of inquiry, job search techniques, networking for success, and interviewing skills. Individual counseling is available by appointment to students seeking assistance in defining and planning career goals. In addition, the Career Library offers an extensive collection of reference materials, directories, career-related literature, graduate and professional information, company/organization annual reports, and recruitment literature as well as terminals where students may search for jobs or internships, type a letter of inquiry or resume, and explore internet job sites. Other services include videos on career and job search topics as well as the availability of sample resumes, cover letters, salary data market trends and GRE exam brochures.

The Career Center also oversees experiential programs, such as internships, cooperative education placements, and community/service learning opportunities designed to provide students with opportunities to apply classroom learning in a structured work environment.

Career placement programs include on-campus recruitment, career fairs, resume referral services, resume critiques, employment advising, and special events organized at the request of our participating employers.

The Center's services, unless otherwise stated, are available to all City College students and alumni (NA 1/116; 212-650-5327).

CHILD DEVELOPMENT AND FAMILY SERVICE CENTER

The Child Development and Family Services Center provides on-campus, quality childcare services to children of City College students for children between 2 and 6 years of age. The Center operates day and evening programs during the fall and spring

semesters, 7:45 a.m. – 5:30 p.m. (day) and 4:00 p.m. – 9:00 p.m. (evening). Summer care is available Monday through Thursday. Breakfast, lunch and supper snack are served during the fall and spring semesters during the day program. The current fee is $55 per week. Additionally, the Center is a site for fieldwork students from the School of Education, the Sophie Davis School of Biomedical Education, and the departments of Psychology and Sociology. For additional information, call 212-650-8615.

VETERAN'S AFFAIRS

Students who have completed active military duty within the last ten years or who qualify for a reserve educational contract may be eligible for a monthly stipend from the Veteran's Administration. The Office of the Registrar is responsible for processing veteran's benefits.

CAFETERIA

A cafeteria serving a variety of hot and cold entrees, salads, and grilled foods is located on the second floor of the North Academic Center. Vending machines carrying a variety of snacks and drinks are located throughout the campus. (NA, 2nd floor; 212-650-6771).

THE CITY COLLEGE BOOKSTORE

The CCNY bookstore stocks new and used textbooks, reference and general books, school supplies, computer software, sportswear, CCNY memorabilia, magazines, greeting cards and electronics. Major credit cards are accepted. The bookstore buys books back from students throughout the year. The bookstore is accessible to people with disabilities (NA 1/103; 212-650-7109).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The College of Liberal Arts and Science

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 20 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/.

Art (M.F.A.)
Bachelor of Fine Arts Degree (B.F.A.) from an accredited institution, or, for those holding other bachelor's degrees, a substantial number of undergraduate credits in art, preferably at least twenty-eight credits or the equivalent in studio art, and twelve credits or the equivalent in art history. Exemptions from these requirements may be made at the discretion of the Departmental Graduate Committee and the Divisional Dean. The presentation by the applicant of a portfolio of creative work judged acceptable in quality by a faculty committee is also required. Applicants may be asked to appear for a personal interview by the Departmental Graduate Committee.

Art (M.A.)
A minimum of twelve undergraduate credits in art history (or the equivalent) beyond the introductory level. Applicants may be asked to appear for a personal interview by the Departmental Graduate Committee.

Biochemistry (M.A.)
A minimum of one-year courses in each of the following: calculus, physics, organic chemistry and physical chemistry in addition to a one-semester course in biochemistry. Where there are deficiencies in background, the candidate may be required to take additional courses, without credit, for the removal of such deficiencies.

Biology (M.A.)
A minimum of twenty-four credits in advanced undergraduate work in biology or related subjects.

Chemistry (M.A.)
A minimum of one-year courses in each of the following fields: general, analytic, organic and physical chemistry, or their equivalents.

Earth and Atmospheric Sciences (M.A.) (Geology)
Qualified students with bachelor's degrees in geology, meteorology, geology, oceanography, mathematics, physics, chemistry, biology or engineering may apply. A minimum of one-year courses in college calculus, (differential and integral), physics, and chemistry are required.

Economics (M.A.)
The undergraduate record should demonstrate the ability to profit from graduate work. Where there are deficiencies in background, which would

impede the ability of the student to profit from graduate work in economics, the Graduate Committee in Economics will require additional courses for the removal of such deficiencies.

English (M.F.A.)
(Creative Writing)
An undergraduate record that would qualify the applicant for admission to the master's program in English, and, in addition, a sample of literary work consisting of the submission of 40-50 pages of fiction or several poems, and recommendations by two teachers or writers familiar with the work of the applicant.

English (M.A.)
(Literature; Language and Literacy)
An undergraduate major in English or American Literature, and other holders of undergraduate degrees at the discretion of the Graduate English Committee. An interview is required for the M.A. in Language and Literacy.

History (M.A.)
A minimum of twelve credits beyond introductory level courses in history.

International Relations (M.A.)
Substantial background of undergraduate work in the social sciences, with special emphasis in the fields of economics, political science and history.

Mathematics (M.A.)
Eighteen credits in advanced mathematics courses and at least twelve more credits in additional advanced mathematics courses or in advanced science courses of a mathematical nature. Students who do not present higher analysis or advanced calculus courses deemed equivalent to Mathematics 32300, 32400 and 32500 will be required to complete this sequence immediately upon admission. Students who do not present a satisfactory course in linear algebra will be required to complete Mathematics 34600 or its equivalent during their first semester.

Media Arts Production (M.F.A.)
(Film and Video)
Undergraduate degree in film and video production preferred, with a minimum 3.0 average in the major. If the applicant's undergraduate degree is not in the field, he or she must have completed courses in the areas of 16mm sync sound filmmaking, video production, editing, screenwriting and history/theory of film. Promising applicants who have a deficiency in a particular area will be required to take undergraduate courses in the department. A creative portfolio of film and/or video work must be submitted with the application.

Music (M.A.)
At least twenty-four credits in the field of music, including harmony and music history. The candidate must also be able to demonstrate (1) performing competence as an instrumentalist or vocalist, or the equivalent in composition or conducting; and (2) practical proficiency on the piano. Where there are deficiencies in background such as to impede the ability of the student to profit from graduate work, the Graduate Committee will require additional courses to be taken without credit for the removal of such deficiencies.

Physics (M.A.)
A sufficient number of courses in physics and mathematics to indicate the likelihood that the candidate will profit from graduate study. Where there are deficiencies in background, the candidate may be required to take additional courses for the removal of such deficiencies.

Psychology (M.A. in General Psychology)
Undergraduate work should include courses in general psychology, statistical methods, experimental psychology (a full year is recommended, but not required) and nine additional credits in psychology or cognate fields. There must be at least fifteen credits overall in psychology courses. Part of these requirements may be corequisites to graduate work. An interview may be required.

Psychology (M.A. in Mental Health Counseling)
A minimum grade point average of 3.2 with an average in psychology of 3.5. In addition, they will be required to take the Psychology subject portion of the Graduate Records Examination and score at least 600. Other requirements include an individual and/or group interview, and three letters of recommendation attesting to the applicant's strong sense of personal integrity, strong verbal and writing skills, commitment to learning, and potential to perform in an exemplary fashion in the roles of graduate student and Mental Health Counselor. The deadline for submitting an application for fall admission is April 15th 2007. Students are not admitted mid-year.

Spanish (M.A.)
An undergraduate major in Spanish. If general scholarship is superior but preparation in the literature of the specialization is found to be insufficient, or if the student has not majored in the field, the student may be admitted by approval of the Graduate Committee of the Department.

Sociology (M.A.)
A sufficient background in the social sciences or humanities to engage profitably in work on the graduate level. In addition, applicants must have completed at least one advanced undergraduate course in sociological theory and one course in statistics. Desirable fields of concentration, in addition to or in place of sociology, are anthropology, history, philosophy, psychology, government and economics. Students whose undergraduate majors have been in other fields, e.g., the physical sciences, may be admitted by special action of the Graduate Committee. Where there are serious deficiencies in background, the committee will recommend additional courses for the removal of deficiencies.


Nikon

Department of Art

(DIVISION OF HUMANITIES AND THE ARTS)

Professor Annette Weintraub, 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.

M.A.

DEGREE REQUIREMENTS FOR THE M.F.A.

Required Courses

B0100, B0200: Projects in Drawing I and II	6
B0300: Visual Concepts and Stylistic Traditions	3
B0400: Issues in Contemporary Art	3
B0500: Teaching and Professional Development	3
B0600: Thesis Preparation	3

Elective Courses

Studio electives	30
Art History and Theory Courses	6
Total Credits	**54**

Additional Requirements for the M.F.A.

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 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 5 semesters. Graduate students who take longer than 5 semesters to complete their program must consider this and plan accordingly.

Advisors

M.F.A.: Megan Foster, Lecturer; Tom Thayer, Lecturer
M.A.: Professor H. Senie

DEGREE REQUIREMENTS FOR THE M.A.

Art History Specialization

Required Courses

A1000: Research Methods of Art History	3
B9000: Master's Thesis Research	3
Graduate courses in Art History	24-27
Total Credits for M.A. in Art History	**30**

Museum Studies Concentration

Required Courses

A1000: Research Methods of Art History	3
B7000: Museology	3
B7100, B7200: Museum Apprenticeship I and II	6
B7400: Museum Exhibition Analysis Seminar	3
B9000: Master's Thesis Research	3

Elective Courses

Graduate courses in Art History or other relevant topics	12-15
Total Credits for M.A. in Museum Studies	**30**

M.A. in Art Education

See the School of Education section of this *Bulletin*.

Additional Requirements for the M.A.

Thesis: In Art History and Museum Studies candidates are required to complete a written thesis demonstrating competence in scholarly research in those fields.

Comprehensive Examination: Not required.

Foreign Language Proficiency: Candidates for the M.A. degree in Art History or Museum Studies specializations 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.

FACILITIES

Art Gallery
The Art Department's gallery space displays work of undergraduates, graduate students and 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 three 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 Media/Electronic Design & Multimedia
MFA students have access to the new Digital Output Center in CG206 that includes a small drop-in lab with facilities for publishing and imaging, digital video, web design and interactive multimedia as well as film and flatbed scanning. Through the Digital Output Center, MFA students have access to small and large-format digital printing services.

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 EDM, Photography and MFA students. The Digital Output Center is a dedicated center and only open to students currently taking EDM or specifically designated photography courses, or enrolled in the BFA program, or current MFA students.

Painting and Drawing
The painting and drawing rooms are equipped with architectural-quality drafting tables and large easels. A studio area is set aside for work in encaustic and water-based media, and for the study of painting methods, materials and techniques. 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 Slide Library maintains a collection of slides of student work for reference.

Photography
The facility houses a large, group black/white darkroom, a color darkroom and processing lab, private darkrooms, a studio, a process camera room, a mounting/finishing area, and a digital output center. Equipment includes Beseler and Omega enlargers, a Colenta processor and a NuArc process camera. The David Levy Collection of contemporary photography is available for student and faculty use. The photography facility also includes a small computer lab for digital image processing; it works in conjunction with the Digital Output Center to provide small and large-format scanning and printing services and equipment check-out.

Printmaking
The studio is equipped for the teaching of intaglio, lithography, and relief processes including woodcut and linocut, collagraph, carborundum aquatint, water-based silk-screen, photo-printmaking in etching, silkscreen and lithography, and combinations of all the print media. There are three etching, one relief and two lithography presses, a 62" x 62" NuArc plate maker with a deep well blanket, plate cutters, large hot plate, aquatint box, large aluminum bed for lithographic plates, lithographic stones in a full range of sizes, queen size drying rack, numerous rollers of various durometers and dimensions, hydrobooth and hydroblaster for silk screen and a large copy camera to facilitate the production of oversized images. The integration of equipment for 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.

Slide Library
Consisting of over 120,000 slides of works from prehistoric times to the present, the collection includes painting, sculpture and architecture of the Americas, Africa, Asia, and Europe, as well as ceramics, ivories, metalwork, manuscripts, printmaking, photography, textiles, interior design and comparative materials.

Visual Resources Library
The Art Visual Resources Library serves the imaging needs of the Art Department. It provides images for teaching and studying, projectors for classroom presentation, equipment for scanning images, and instructions on the use of image database and presentation software. The Library maintains a growing collection of images consisting of licensed images from commercial vendors, subscribed images from ARTstor, which contains 500,000 art images, and locally-produced images requested by art professors. All the images are available online through ARTstor hosting service. Projectors and computers can be checked out for classroom presentation. In addition, slide projectors, carousel trays, and laser pointers can be borrowed from the Library. A public scanning station is available for faculty and student to scan images from books. Individual sessions on image databases, scanning, PowerPoint, and art history research can be arranged with the Library staff. Slide and digital projectors should be reserved at least one week in advance of use. Contact the Slide Library Staff for assistance at

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 Popper Scholarship
For an outstanding female graduate of the CCNY Art Department to study in the College's M.F.A. program.

Ralph Fabri Scholarship
For the outstanding M.F.A. thesis exhibition.

Seymour Peck Scholarships and Creative Awards in the Arts
To outstanding undergraduate and graduate majors in the arts.

COURSE DESCRIPTIONS

Courses Required of All M.F.A. Candidates

B0100, B0200: Projects in Drawing I and II
Investigation of various drawing media and techniques for the purpose of enlarging the student's conceptual scope and professional skills. 4 HR./WK.; 3 CR. EACH

B0300: Visual Concepts and Stylistic Traditions
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. 3 HR./WK.; 3 CR.

B0400: Issues in Contemporary Art
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. 3 HR./WK.; 3 CR.

B0500: Teaching and Professional Development
This course is designed to introduce the student to the practice of teaching studio art and professional practices in his/her field. Prereq.: 6 credits in his/her area of specialization. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

Elective Courses in Studio Art

B1100: Individual Projects in Painting
Intensive work under faculty supervision. Individual and group critiques. This course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B1200: Individual Projects in Sculpture
Intensive work under faculty supervision. This course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B1300: Individual Projects in Printmaking
Intensive work under faculty supervision. This course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B1400: Individual Projects in Electronic Design and Multimedia
Intensive work under faculty supervision, of which a part shall be scheduled class hours. This course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B1500: Individual Projects in Photography
Intensive work under faculty supervision. This course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B1600: Individual Projects in Ceramic Design
Intensive work under faculty supervision. his course may be taken five times for credit. 4 HR./WK.; 3 CR. EACH

B8051-8099: Selected Topics in Studio Art
Advanced study in selected subjects outside of the regular curriculum. Course announcements will be made in the preceding semester. 4 HR./WK.; 3 CR. EACH

B8400-B8700: Independent Study in Studio Art
Enrollment with permission of the graduate advisor. Hrs. to be arranged; 3 CR. EACH

Courses in the History, Theory, and Criticism of Art

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

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. 3 HR./WK.; 3 CR.

A6000: Egyptian Art and Architecture
Painting, sculpture, architecture and decorative arts of Egypt from pre-dynastic times through the Ptolemaic period. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

A6300: Baroque and Rococo Art in Europe
Seventeenth and eighteenth century art in Italy, France, Spain, and Holland. Artists include Bernini, Poussin, Caravaggio, Artemisia Gentileschi, Velazquez, Rubens, Rembrandt and Vermeer. 3 HR./WK.; 3 CR.

A6400: Nineteenth Century Art in Europe
The art of western Europe, primarily France, including Romanticism, Realism, Impressionism and Post-Impressionism. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

A6430: 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. 3 HR./WK.; 3 CR.

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, feminist and other issue-based art. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

A6500: Art Since 1980
Art since 1980 taught from a global perspective. Includes visits to galleries, conversations with artists. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

A6610: North American Indian Art
A survey of select artistic traditions of native North American Indian art including Aleut and Inuit. Emphasis on artistic context as a synthesis of regional and cultural-historical phenomena. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

A6800: Islamic Art
Architecture and decorative arts of the Islamic world including Syria, Egypt, Persia, Turkey, Spain, and northern India. 3 HR./WK.; 3 CR.

A6810: Art of India, Southeast Asia, and Indonesia
Buddhist, Jain and Hindu art in India; Buddhist and Hindu art in Southeast Asia and Indonesia. 3 HR./WK.; 3 CR.

A6820: Art of China, Japan, and Korea
The art and architecture of China, Japan, and Korea from prehistoric times to the nineteenth century. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

Courses in Museum Studies

B7000, B7100, B7200, and 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.

B7000: Museology
Introduction to history of museums and current issues. Four sessions taught by museum professionals in local institutions. 3 HR./WK.; 3 CR.

B7100, B7200: Museum Apprenticeship I and II
Supervised internships at local museums, galleries or other art institutions. Two days work per week each course; 3 CR. EACH

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 substance and installation of a major exhibition. Prereq: graduate standing or permission of the instructor.
3 HR./WK.; 3 CR.

B7500: Museum Education
Techniques and methods of museum education. Regular meeting in museums with working professionals. Prereq: graduate standing or permission of the instructor. 3 HR./WK.; 3 CR.

B7600: Urban Museum Studies
Introduction to the use of the urban environment and its history as a subject for museum interpretation. Prereq: graduate standing or permission of the instructor. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

B9000: Master's Thesis Research
Enrollment by permission of the graduate advisor. Hrs. to be arranged; 3 CR.

B9800, B9900: Independent Study in Art History
Enrollment by permission of the graduate advisor. Hrs. to be arranged; 3 CR. EACH

FACULTY

Becca Albee, Assistant 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, Associate Professor
A.A.S., Fashion Institute of Technology; B.F.A., Cooper Union; M.F.A., Univ. of Michigan

Joel Wellington Fisher, Lecturer
B.A., Univ. of New Hampshire; M.F.A., Rhode Island School of Design

Megan Foster, Lecturer
B.F.A., Rhode Island School of Design; M.F.A., Columbia Univ.

Leopoldo Fuentes, Assistant Professor
B.F.A., California State Univ. (Los Angeles); M.F.A., Northwestern Univ.

Ethan Ham, Assistant Professor
B.A., Univ. of California; M.F.A., Portland State Univ.

Geoffrey Han, Assistant Professor
B.A., McGill Univ.; M.F.A., Yale Univ.

Ellen Handy, Associate Professor
B.A., Barnard College; Ph.D., Princeton Univ.

Anna Indych-López, Assistant Professor
B.A., New York Univ., M.A., Ph.D.

Catti James, Associate Professor
B.F.A., Boston Univ.; M.A. Columbia Univ.

Hajoe Moderegger, Assistant Professor
M.F.A, Bauhaus-University Weimar (Germany)

Sylvia Netzer, Professor
B.A., The City College; M.F.A., Columbia Univ.

Ina Saltz, Associate Professor
B.F.A., The Cooper Union

Harriet F. Senie, Professor
B.A., Brandeis Univ.; M.A., Hunter College; Ph.D., New York Univ.

Tom Thayer, Lecturer
B.F.A., Northern Illinois Univ., M.F.A.

Annette Weintraub, Professor and Chair
B.F.A., Cooper Union; M.F.A., Univ. of Pennsylvania

PROFESSORS EMERITI

Robert E. Borgatta
Sherman Drexler
Madeleine Gekiere
Michi Itami
Irving Kaufman
Jacob Landy
Jay Milder
Seong Moy
Juan Nickford
George Nelson Preston
Joan Webster Price
Annie Shaver-Crandell
William Spinka
Stanley Wyatt

Department of Biology

(DIVISION OF SCIENCE)

Professor Christine Li, Chair • Department Office: MR 526 • Tel: 212-650-6800

GENERAL INFORMATION

The City College offers the following master's degree in Biology:

M.A.

PROGRAMS AND OBJECTIVES

Areas of specialization include Molecular, Cellular, and Developmental Biology, Ecology, Evolution and Behavior, and Neuroscience.

DEGREE REQUIREMENTS

A student may elect one of two routes to the M.A. Degree in Biology: either writing a thesis or passing a Comprehensive Examination.

Thesis Option

Required Courses

V9100: Colloquium (1 CR. each term)	2
B9901: Thesis Research	3
B9902: Thesis Research	3

Elective Courses

Graduate courses in an approved area of specialization	12
Additional elective courses	10
Total Credits for Thesis Option	**30**

Comprehensive Exam Option

Required Courses

V9100: Colloquium (1 CR. each term)	2

Elective Courses

Graduate courses in an approved area of specialization	12
Additional elective courses	20

(may include up to 6 credits of V9200: Tutorial, or V9201: Advanced Study)

Total Credits for Comprehensive Exam Option **34**

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.

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 three. 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. Students are permitted to take the first doctoral examination in lieu of the Comprehensive Exam. An advisory committee of three faculty will serve to advise the student.

TOEFL Requirements: Foreign students must submit a minimum TOEFL score of 550.

Foreign Language Proficiency: Not required.

Application Deadlines: Completed applications must be sent by Admissions to the Department no later than May 1 for the Fall Semester and Dec. 1 for the Spring Semester.

AFFILIATED PROGRAMS

City College has a long-standing affiliation with curators at the American Museum of Natural History for graduate education in systematics. 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.

ADVISEMENT

Students interested in entering the M.A. 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.A. Candidates
Professor Paola Bellosta

Ph.D. Candidates
Professor Amy Berkov

COURSE DESCRIPTIONS

Courses for Non-majors

B2700: Principles of Ecology
Structure and function in ecological systems and the effects of human activities on their biotic and abiotic components. Required for landscape architects. Education students may register by permission of the Biology Department. Not open to students in the Science Division. 3 LECT. HR./WK.; 3 CR.

B4700: Botany for Landscape Architects
Study and identification of local flora and their possible use in urban landscaping. The structure, function, growth and propagation of plants will be considered to their natural habitats. Botanical gardens and arboreta will be visited. Required for landscape architects. Education students may register by permission of the Biology

Department. Not open to students in the Science Division. 2 LECT., 2 LAB. or field HR./WK.; 3 CR.

B0627: Ecology for Landscape Architects
This course addresses structure and function in ecological systems and the effects of human activities on their biotic and abiotic components. The ecological and ethical implications of global or local alterations of natural systems are explored to present the larger context in which landscape architecture is practiced. Prereq: admission to the Graduate Programs in Landscape Architects or Education. This course is not open to students in the Science Division. 3 LECT. HR./WK.; 3 CR.

Courses for Biology Majors

Ecology, Evolution, and Behavior

B5800: Microbial Ecology
Interrelations of microorganisms with other organisms and the abiotic environment. 2 lect, 4 LAB HR./WK., or a fieldtrip; 4 CR.

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. Prereq: course in genetics, vertebrate or invertebrate zoology, botany or permission of instructor. 3 LECT. HR./WK.; 3 CR.

V0507: Fossil Record
3 LECT. HR./WK.; 3 CR.

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. 3 LECT. HR./WK., PLUS CONF.; 4 CR.

V0611/12: 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. 2 LECT. HR./WK., 2 CR.; 4 LAB HR./WK., 2 CR.

V0733/34: 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. Prereq: course in vertebrate comparative anatomy. 2 LECT. HR./WK., 2 CR.; 5 LAB HR./WK., 2 CR.

V0743/44: Zoology and Phylogeny of Chordata (Birds)
Lecture, laboratory, special topics in the evolution of birds. Prereq: permission of the instructor. 2 LECT. HR./WK., 2 CR.; 4 LAB HR./WK., 2 CR.

V0901/02: Population Genetics
Lecture, laboratory. The Hardy-Weinberg law, gene pools, gene frequencies, and gene migration. Prereqs: a course in genetics, a course in organic chemistry. 3 LECT. HR./WK., 3 CR.; 6 LAB HR./WK., 3 CR.

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. Prereq: an undergraduate course in animal behavior/comparative psychology or permission of the instructor. 3 LECT. HR./WK.; 3 CR.

V2404: Biological Basis of Animal Behavior Laboratory
Apprenticeship training in the laboratories of behavioral scientists. Prereqs: undergraduate laboratory course in animal behavior (Bio 46000 or equivalent) and permission of the instructor. 6 LAB HR./WK.; 3 CR.

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. Prereq: an undergraduate course in animal behavior, evolution or ecology. 3 hr./wk; 3 CR.

V6003/04: Community Ecology
Lecture, laboratory. Structural attributes, growth, and regulation of plant and animal communities. Prereq: a course in either ecology or field biology. 3 LECT. HR./WK., 3 CR.; 6 LAB HR./WK., 3 CR.

V6005/06: 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. 3 LECT. HR./WK., 3 CR.; 6 LAB HR./WK., 3 CR.

V6101/02: Ecology of Marine Plankton
Lecture, laboratory. Biology, productivity and trophic dynamics of marine plankton. Prereqs: a course in biological oceanography, a course in organic chemistry. 3 LECT. HR./WK., 3 CR.; 6 LAB. HR./WK., 3 CR.

V6200/01: Physiological Ecology
Comparative study of physiological mechanisms important in adaptation to different environments. Focus is on the biotic and abiotic factors in the habitat and the adaptations that determine an animal's ability to survive. Prereq: a course in physiology or cell biology. 3 LECT. HR./WK., 3 CR.; 6 LAB HR./WK., 3 CR.

V6701/02: Biology of Fishes
Lecture, laboratory. 3 LECT. HR./WK., 3 CR.; 6 LAB. HR./WK., 3 CR.

V9001: Seminar in Evolution
Topics relating to the general subject of evolution. 2 HR./WK., PLUS CONF.; 3 CR.

V9006: Seminar in Ecology
The conservation ecology seminar will focus on genetic problems and implications of wildlife management programs. Prereq: permission of the instructor. 3 HR./WK.; 3 CR.

V9012: Seminar in Zoogeography
Special topics are discussed and reviewed. Prereq: permission of the instructor. 2 HR./WK., PLUS CONF.; 3 CR.

V9030: Seminar in Ecology, Evolution, and Behavior
AMNH (Alternate weeks). 2 HR./WK.; 1 CR.

Molecular, Cellular, and Developmental Biology

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. 2 LECT. HR/WK, 6 LAB HR/WK; 5 CR.

V0005: Genetics
Prokaryotic and eukaryotic genetics; organization of DNA, replication, repair, mutagenesis, recombination, control of gene

expression, genetic engineering and molecular techniques. Prereq: undergraduate genetics and molecular biology or biochemistry. 4 LECT. HR./WK.; 4 CR.

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. Prereq: V0005 or equivalent. 3 LECT. HR./WK.; 3 CR.

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. 3 LECT. HR./WK.; 3 CR.

V1401: Cell Biology
Cells will be studied with special emphasis placed on organization, molecular structure/function relationships of organelles, and energetics and metabolism. Prereqs: a course in organic chemistry and a course in biochemistry or permission of the instructor. 4 LECT. HR./WK.; 4 CR.

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. Prereq: Cell and Molecular Biology & undergraduate genetics. 3 LECT. HR./WK.; 3 CR.

Neuroscience

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. Prereq: students with no background in physiology must meet instructor before course begins. 4 LECT. HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

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. Prereq: an undergraduate course in animal behavior/comparative psychology or permission of the instructor. 3 LECT. HR./WK.; 3 CR.

V2404: Biological Basis of Animal Behavior Laboratory
Apprenticeship training in the laboratories of behavioral scientists. Prereqs: undergraduate laboratory course in animal behavior (Bio 46000 or equivalent) and permission of the instructor. 6 LAB HR./WK.; 3 CR.

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. Prereq: an undergraduate course in animal behavior, evolution or ecology. 3 hr./wk; 3 CR.

V9101: Colloquium in Ecology, Evolution and Behavior
AMNH (Alternate weeks). 2 LECT. HR./WK.; 1 CR.

General

B9700: Special Topics
3 LECT HR./WK., 3 CR.; 6 LAB HR./WK., 3 CR.

V4103: Radiation Biology
A broad unified coverage of the effects of ionizing radiation and the application of tracer techniques in biological systems at the molecular, cellular, organ, organism, and community levels. Pre- or coreq: Cell Physiology. 2 LECT. HR./WK., 2 CR.

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. 2 LECT., 4 LAB HR./WK., plus 3 HR. TBA; 4 CR.

V8101: Mathematical Biology
3 LECT. HR./WK.; 3 CR.

V8201: Biostatistics I
Univariate statistics of biological systems (theory and application). Topics include: probability, descriptive statistics, correlation, analysis of variance, and regression. Prereq: permission of instructor. 3 LECT., 6 LAB HR./WK.; 6 CR.

V9100: Colloquium
Recent developments and trends in the field of biology. Required of all candidates for the M.A. degree. 2 HR./WK.; 1 CR./SEM.

V9200: Tutorial
1-4 CR.

V9201: 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. Prereq: permission of instructor. 1-4 CR.

V9302: Molecular Biology Journal Club
1 CR.

V9303: Seminar Special Topics
Specialized seminars in diverse fields, depending upon the needs of specific students. 2 HR./WK., PLUS CONF.; 3 CR.

GRADUATE COURSES OPEN TO UNDERGRADUATES

The following graduate courses are available to undergraduate students who have completed the appropriate prerequisites. Permission to take these courses must be obtained from the Biology Department Graduate Deputy Chairman and course instructor.

V0901/02: Population Genetics Lecture, Laboratory

V4103: Radiation Biology Lecture, Laboratory

V2800: Field Studies in Animal Behavior

V5303: Molecular Basis of Development

V6003/04: Community Ecology Lecture, Laboratory

V6005/06: Population Ecology

V6107/08: Marine Microbiology Lecture, Laboratory

V7200: Biological Electron Microscopy

V8101: Mathematical Biology

V2403: Animal Behavior I

V2407: Animal Behavior II

V2301: Neuroscience I

V2302: Neuroscience II

FACULTY

Mary Alpaugh, Assistant Professor
B.S., King's College; Ph.D., Univ. of Houston

Robert P. Anderson, Assistant Professor
B.A., Kansas State Univ.; Ph.D., Univ. of Kansas

Paola Bellosta, Associate Professor
Ph.D., Univ. of Milan

Amy Berkov, Assistant Professor
BFA., Univ. Colorado; Ph.D., CUNY

Avrom Caplan, Professor
Bsc., University of Sussex (U.K.); Ph.D., Univ. of London (U.K.)

Jay A. Edelman, Assistant Professor
A.B., Univ. of California (Berkeley), Ph.D. (Berkeley/San Francisco)

Jane C. Gallagher, Professor
B.S.–A.M., Stanford Univ.; Ph.D., Univ. of Rhode Island

Shubha Govind, Professor
B.S., M.S., Delhi Univ.; Ph.D., Univ. Illinois (Urbana-Champaign)

Jerry Guyden, Professor
B.A., North Texas State, M.S.; Ph.D., Univ. of California (Berkeley)

Sally Hoskins, Professor
B.S., Univ. of Illinois; Ph.D., Univ. of Chicago.

Karen Hubbard, Professor
B.A., Barat College; Ph.D., Illinois Inst. of Tech.

Anuradha Janakiraman, Assistant Professor
B.Sc., Presidency College; M.Sc. Univ. of Calcutta; M.S. Kent State Univ.; Ph.D. Univ. of Illinois (Urbana-Champaign)

John J. Lee, Distinguished Professor
B.S., Queens College; M.A., Univ. of Mass.; Ph.D., NYU

Daniel Lemons, Professor and Dean, Division of Science
B.A., Goshen College; M.S., Portland State Univ.; Ph.D., Columbia Univ. Medical School

Jonathan B. Levitt, Associate Professor
B.A., Univ. of Pennsylvania; M.A., New York Univ., Ph.D.

Christine Li, Professor and Chair
A.B., Columbia Univ. M.S.; Ph.D., Harvard Univ.

Mark Pezzano, Associate Professor
B.S., William Paterson; Ph.D., CUNY

Robert Rockwell, Professor
B.S., Wright State, M.S.; Ph.D., Queen's Univ., Kingston (Canada)

Adrian Rodriguez-Contreras, Assistant Professor
B.Sc., Universidad Nacional Autonoma de Mexico; Ph.D., University of Cincinnati

Shireen Saleque, Assistant Professor
B.Sc., Univ. of Calcutta, M.Sc.; Ph.D., Albert Einstein College of Medicine

Sudha Sharma, Assistant Professor
B.Sc., M.Sc., Banaras Hindu Univ., Ph.D.

Gillian M. Small, Professor and University Dean for Research, CUNY
B.Sc. Wolverhampton Univ. (U.K), Ph.D.

Ofer Tchernichovski, Associate Professor
B.Sc., Tel Aviv Univ.; DVM, The Hebrew Univ.; Ph.D., Tel Aviv Univ.

Tadmiri R. Venkatesh, Professor
B.S., Univ. of Mysore, India; M.S., Birla Institute of Technology and Science, India, Ph.D.

Joshua Wallman, Professor
A.B., Harvard Univ.; Ph.D., Tufts Univ.

Ralph C. Zuzolo, Professor
A.B., New York Univ., M.S., Ph.D.

PROFESSORS EMERITI

Donald Cooper
Lawrence J. Crockett
Rose R. Feiner
Robert P. Goode
Joseph Griswold
Kumar Krishna
Linda H. Mantel
Olivia Mckenna
James A. Organ
Robert A. Ortman
Joseph Osinchak
Gerald S. Posner
Janis A. Roze
Norman M. Saks
Robert J. Shields
Carol Simon
William N. Tavolga
John H. Tietjen
Aaron O. Wasserman
Stanley C. Wecker

Department of Chemistry
(DIVISION OF SCIENCE)

Professor Simon Simms, Chair • Department Office: MR 1024 • Tel: 212-650-8402

GENERAL INFORMATION

The City College offers the following master's degree in Chemistry:

M.A.

PROGRAMS AND OBJECTIVES

The Chemistry Department, established in 1849, offers rigorous and up-to-date graduate level instruction and research training in the following areas:

Analytical Chemistry
Biochemistry
Environmental Chemistry
Inorganic Chemistry
Organic Chemistry
Physical Chemistry

The M.A. curriculum is 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 degree is offered by The City University. The office of the Ph.D. program is at The City University Graduate Center, 365 Fifth Avenue, New York, N.Y. 10016.

DEGREE REQUIREMENTS

The Graduate Committee may waive any required course. Graduate courses from other departments may be taken if approved by the advisor.

Chemistry Option

Required Courses

Chemistry:

B1000: Inorganic Chemistry 5
B5000: Organic Mechanisms 5

Elective Courses

Twenty credits chosen from the following: 20

A1100: Environmental Chemistry (3 CR.)
A1101: Environmental Chemistry Lab (2 CR.)
A1200: Environmental Organic Chemistry (3 CR.)
A1400: Chemical Information Sources (1 CR.)
A8200: Chemistry-Physics-Engineering Seminar I (1 CR.)
A8300: Chemistry-Physics Engineering Seminar II (1 CR.)
B3000: Polymer Chemistry (5 CR.)
B5100: Organic Synthesis (5 CR.)
B5200: Spectroscopy and Structure Proof in Organic Chemistry (5 CR.)
B5300: Organometallics (5 CR.)
B6000: Quantum Chemistry (5 CR.)
B7200: Surface Chemistry and Colloids (5 CR.)
B7300: Computers in Chemistry (5 CR.)
B8900: Introduction to Research Methodology (5 CR.)
B9100: Basic Lab Techniques (5 CR.)

Total Credits 30

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 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 Chemistry B1000 and Chemistry B5000.

Biochemistry Option

Required Courses

CHEM A8005: Biochemistry II 3
BICM 71010: Advanced Biochemistry I 3
BICM 71020: Advanced Biochemistry II 3
BICM 71110: Research Techniques in Biochemistry I 4

Two of the following four: *2*

BICM 72010: Basic Seminar in Biochemistry I (1 CR.)
BICM 72020: Basic Seminar in Biochemistry II (1 CR.)
BICM 81000: Seminar in Biochemistry (1 CR.)
CHEM B9800: Seminar in Biochemistry (1 CR.)

One of the following two: *3-5*

CHEM B5000: Organic Mechanisms (5 CR.)
BICM 75000: Bioorganic Chemistry (3 CR.)

One of the following two: *3-4*

BICM 77000: Physical Biochemistry (3 CR.)
PHYS V3800: Biophysics (4 CR.)

Elective Courses

Two approved graduate courses in Biology
(One course should be in molecular genetics) 8

Total Credits 29-32

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.

ADVISEMENT PROCEDURES AND SERVICES

All students wishing to pursue master's work in Chemistry should consult with one of the advisors listed below:

Chemistry
Professor B. Zajc
MR 1234; 212-650-8926

Biochemistry
Professor K. Ryan
MR 1337, 212-650-8132

SEMINARS

The Chemistry Department sponsors weekly seminars on topics of current interest. Advance abstracts of these seminars will be posted in the vicinity of MR 1024, and 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
Donald Sloan Scholarship
James A. Whittam Award

COURSE DESCRIPTIONS

Basic Courses in Chemistry

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. 3 HR./WK.; 3CR.

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. 3 HR./WK.; 2 CR.

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. 3 HR./WK.; 3 CR.

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. Spring semester only. 3 HR./WK.; 1 CR.

A8200: Chemistry-Physics-Engineering Seminar I
Topics in physical chemistry, inorganic chemistry and organic chemistry. Fall semester only. 1 CR.

A8300: Chemistry-Physics-Engineering Seminar II
Topics in physical chemistry, inorganic chemistry and organic chemistry. Spring semester only. 1 CR.

B1000: Inorganic Chemistry
Theories of chemical bonding and molecular structure applied to inorganic compounds; stereochemistry; compounds of the non-transition elements; transition metal complexes. Spring semester only. 5 HR./WK.; 5 CR.

B3000: Polymer Chemistry
Fundamentals of polymer science; polymerization, solution properties, and solid state properties. 5 HR./WK.; 5 CR.

B5000: Organic Mechanisms
The basic methods of studying organic reaction mechanisms and their application to specific reactions. Fall semester only. 5 HR./WK.; 5 CR.

B5100: Organic Synthesis
A critical and mechanistic evaluation of synthetic methods. Spring semester only. Prereq: Chemistry B5000. 5 HR./WK.; 5 CR.

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. 5 HR./WK.; 5 CR.

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. 5 HR./WK.; 5 CR.

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. Hrs. TBA; 5 CR.

B9100: Basic Laboratory Techniques for Research in Physical, Analytical and Inorganic Chemistry
Electronics, principles of instrumentation, application of some modern instruments, and instrumental techniques. Spring semester only. 2 LECT., 6 LAB. HR./WK.; 5 CR.

Basic Courses in Biochemistry

BICM courses are offered through the Biochemistry Program of the Graduate School of the City University of New York.

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. Prereq: a one semester undergraduate biochemistry course. Spring semester only. 3 HR./WK.; 3 CR.

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. 1 HR./WK.; 1 CR.

BICM 71010: Advanced Biochemistry I
Topics of current importance in biochemistry, including protein structure, enzymology, immunology and regulation of metabolism. Prereq: Chem A8005. 3 HR./WK.; 3 CR.

BICM 71020: Advanced Biochemistry II
Topics of current importance in biochemistry, including bioenergetics, membrane biochemistry, and synthesis of nucleic acids and proteins. Prereq: Chem A8005. 3 HR./WK.; 3 CR.

BICM 71110: Research Techniques in Biochemistry I
Laboratory work dealing with modern approaches in the solution of biochemical problems. The student will work in at least two research laboratories. Pre- or coreq: Chem A8005. 1 class, 7 LAB. HR./WK.; 4 CR.

BICM 72010: Basic Seminar in Biochemistry I
Each student will make at least one presentation of published work. The course complements and supplements the Advanced Biochemistry I lecture (BICM 71010). Prereq: Chem A8005. 1 CR.

BICM 72020: Basic Seminar in Biochemistry II
Each student will make at least one presentation of published work. The course complements and supplements the Advanced Biochemistry II lecture (BICM 71020). Prereq: Chem A8005. 1 CR.

BICM 75000: Bioorganic Chemistry
Organic reaction mechanisms with emphasis on biochemical reactions. Chemistry of amino acids, sulfur compounds, and phosphates. Catalysis: acid-base, nucleophilic, electrophilic, metal-ion, intramolecular, multiple and complexation. 3 HR./WK.; 3 CR.

BICM 77000: Physical Biochemistry
Kinetics, thermodynamics and spectroscopy as applied to biochemical systems. 3 HR./WK.; 3 CR.

BICM 81000: Seminar in Biochemistry
(see B9800)

Additional Courses

B5300: Organometallics
5 HR./WK.; 5 CR.

B7200: Surface Chemistry and Colloids
5 HR./WK.; 5 CR.

B7300: Computers in Chemistry
5 HR./WK., 5CR.

B8000: Special Topics in Chemistry
4 HR./WK.; 5 CR.

B8001: Special Topics in Inorganic Chemistry

B8002: Special Topics in Analytical Chemistry

B8003: Special Topics in Organic Chemistry

B8004: Special Topics in Physical Chemistry

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. 10 CR.

BICM 71120: Research Techniques in Biochemistry II
Laboratory work in one biochemical research laboratory. Prereq: BICM 71110. 1 class, 7 LAB. HR./WK.; 4 CR.

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. Those courses are described in the bulletin of The Graduate School of The City University of New York.

FACULTY

Daniel L. Akins, Professor
B.S., Howard Univ.; Ph.D., Univ. of California, Berkeley

Valeria Balogh-Nair, Professor
B.Sc., Univ. of Louvain (Belgium), Ph.D.

Teresa Bandosz, Professor
B.S., M.S., Univ. of Mining Metallurgy (Cracow, Poland); Ph.D., Technical Univ. of Cracow

Ronald Birke, Professor
B.S., Univ. of North Carolina; Ph.D., M.I.T.

David H. Calhoun, Professor
B.A., Birmingham-Southern College; Ph.D., Univ. of Alabama

Marco Ceruso, Assistant Professor
Diplome d'Ingénieur Chemiste, CPE Lyon (France); Ph.D., SUNY (Stonybrook)

Ranajeet Ghose, Assistant Professor
B.Sc., Presidency College (India); M.S., Yale Univ., Ph.D.

David K. Gosser, Professor
B.S., St. Joseph's Univ.; Ph.D., Brown Univ.

Michael E. Green, Professor
A.B., Cornell Univ.; M.S., Yale Univ., Ph.D.

Urs Jans, Associate Professor
Diploma in Chemistry, Swiss Federal Institute of Technology, Ph.D.

George John, Associate Professor
B.S., Univ. of Kerala (India), Ph.D.

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.; Ph.D., University 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.

Kevin Ryan, Assistant Professor
B.S., Providence College; M.S., Univ. of Rochester, Ph.D.

Issa Salame, Assistant Professor
B.S., The City College; M. Phil., CUNY, Ph.D.

Simon A. Simms, Associate Professor and Chair
B.S., The City College; Ph.D., Princeton Univ.

Ruth Stark, Distinguished Professor
A.B., Cornell University; 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., Johns Hopkins Univ., Ph.D.

Zhonghua Yu, Assistant Professor
B.S., Univ.of Science and Technology (Hefie, China); Ph.D., Columbia Univ.

Barbara Zajc, Associate Professor
B.S., Univ. of Ljubljana, M.S., Ph.D.

PROFESSORS EMERITI

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Vernon G. S. Box
Thomas Haines
Neil McKelvie
Herbert Meislich
Jack I. Morrow
Stanley R. Radel
Henri L. Rosano
Charlotte S. Russell
Horst Schulz
Leonard H. Schwartz
Amos Turk
Michael Weiner
Arthur E. Woodward

Department of Earth and Atmospheric Science

(DIVISION OF SCIENCE)

Professor Jeffrey Steiner, Chair • Department Office: MR 106 • Tel: 212-650-6984

GENERAL INFORMATION

The City College offers the following master's degree in Earth and Atmospheric Science:

M.A. in Geology

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:

Environmental Studies
Earth Systems Science
Remote Sensing/Geographic Information Systems

Students who receive an M.A. 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 houses a Weather/Remote Sensing Laboratory with computer links to Unidata. The IBM RISC 6000 and Sun Sparc workstations permit access to national data banks and are networked via direct satellite link to Internet Sources. Through collaboration with the NOAA CREST Center, EAS has access to the 2.4m Dual X/L-Band Satellite Acquisition.

System operating from the North Academic Center rooftop, with capabilities to download data from various satellites (Terra; Aqua; OceanSat-1) and sensors (MODIS; AIRS; AMSU; AMSR-E; Ocean Color Monitor) from X-band. The Satellites on L-Band include; NOAA Polar Orbiters; FY-ID and Orbview-2 and sensors are; (AVHRR; DCS; ATOV; TOV; SeaWIFS; MVSIR). Additional EAS satellite data archives include 14 years of cross-Atlantic aircraft and CloudSat data. The Department also maintains well equipped hydrology, geophysics and geochemistry laboratories. Equipment includes Panalytical x-ray fluorescence and diffraction stations, Thermo Scientific flame and graphite furnace atomic absorption facilities, Thermo Finnigin Trace DSQ Gas Chromatogrpahy/Mass Spectrometry station with chemical ionization and auto-sampler, Glas-Col Soxhlet extraction system, Milestone Microwave digestion unit, Dionex Suymmit HPLC with gradient pump and UV detector, and a Dionex ASE 100 Accelerated Solvent Extraction System and an Applied Biosystems Q-TRAP 4000LC/MS/MS. For digital imaging, the Department owns a high performance Multi-Modal Kodak Image Station 2000MM for quantitative hydrology experiments. The High Pressure Laboratory includes a 0-100,000 PSI Harwood Intensifies, a Honeywell temperature regulating system a Zeiss petrographic microscope fitted with a SPOT CCD camera and NIKON Phase Contrast Microscope fitted with Optronics CCD camera.The Geophysics Laboratory is equipped wsith a 24-channel Strataview engineering seismograph system, and EM-31 electromagnetic ground conductivity meter, a Syscal Kid Switch 24 automated resistivity system, a Soiltest resistivity meter, a Worden student gravimeter and a GSM-19T proton precession magnetometer. Additional equipment available to EAS includes access to a ZEISS SUPRATM SERIES ultra high resolution SEM WITH GEMINI® COLUMN which will be installed summer 2008.

RESEARCH

Qualified students are encouraged to become research assistants to faculty. Many are assisted in their research with support from the CCNY National Oceanic and Atmospheric Administration Cooperative Remote Sensing Science and Technology Center (CREST) and the CCNY National Aeronautical and Space Administration University Research Center for Optical Sensing and Imaging of the Earth and Environment (COSI), or through other resources provided by the faculty.

DEPARTMENTAL ACTIVITIES

The Green Planet Student Society 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.

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 a maximum of 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:

A1300: Environmental Geochemistry
A2300: Subsurface Remediation
B4500: Hydrology
B4600: Ground Water Hydrology
B6500: Environmental Geophysics
B8800: Climate and Climate Change
B4400: Global Environmental Hazards
A7200: Environmental Project or
A2400: GIS
B9503: Thesis Research

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 A0000-level or advanced undergraduate courses may be taken toward the M.A. degree. A maximum of nine credits in other departments or divisions of the College or units of CUNY may be taken toward the degrees in Earth Systems Science.

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 Jeffrey Steiner
MR 106; 212-650-6984.

COURSE DESCRIPTIONS

A0000-Level Courses

No graduate student may take more than three A0000-level courses for credit.

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. 3 LECT., 1 LAB HR./WK.; 3 CR.

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. Prereqs.: EAS 41300 and EAS 44600 or equivalent or permission of instructor. 3 HR./WK.; 3 CR.

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. 5 HR./WK.; 4 CR.

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. 4 weeks in field plus LAB. analyses; 4 CR.

B0000-Level Courses

B1000: Structural Geology
Physical properties of rocks in different tectonic environments; deformation; petrofabric analysis. Geotectonics; orogenesis, earthquakes, interpretation of geologic maps and mapping techniques. 3 LECT., 2 LAB. HR./WK.; 4 CR.

B1100: Geotectonics
This course treats the processes that change the face of the earth. It includes the concepts of mantle convection and continental drift, leading to the modern theory of plate tectonics. The perspective is global and process-oriented, with examples from nearby active plate boundaries. The plate tectonic model explains global distributions of earthquakes, volcanoes, mineral deposits, and long- term climate patterns. 3 LECT. HR./WK. 3 CR.

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. 3 LECT. HR./WK.; 3 CR.

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. 2 LECT., 4 LAB HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

B4500: Hydrology
Introduction to hydrological data, the hydrologic cycle. Precipitation, streamflow, evaporation, and runoff. Emphasis is on their interactions and processes. Prereq: Math 20300 or Math 20800, Physics 20800 or permission of the instructor. 2 LECT., 2 LAB HR./WK.; 3 CR.

B4600: Ground-Water Hydrology
Occurrence of ground water. Basic equations and concepts of ground water flow. Flow nets. Methods of ground water investigation. 2 LECT., 2 REC. HR./WK.; 3 CR.

B6500: Environmental Geophysics
Advanced work in 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. Prereqs.: EAS B1400 or permission of instructor. 3 HR. LECT., demonstration, or group field work/wk.; 3 CR.

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, sealevel change, wave formation, temperature, salinity, and density of the ocean water. 3 LECT. HR./WK.; 3 CR.

B7000: Principles of Geochemistry
Deep earth involvement in Earth Systems Science: plutonism and volcanism; isotopic age dating; non-radiogenic isotope systematics; and trace metal characteristics of evolving earth systems. Course includes petrography and x-ray fluorescence. 3 LECT. HR./WK.; 3 CR.

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. Prereq: EAS 10600 or 10100; one semester of college math. 3 LECT., 2 LAB HR./WK.; 4 CR.

B9001, B9002: Selected Topics in Earth Systems Science
Current topics and problems with emphasis on aspects not treated in regular courses. Department permission required. 1-2 LECT. and/or LAB. HR./WK.; 1-2 CR./sem.

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. 1-3 HR./WK.; 1-3 CR./sem.

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. 1-3 HR./WK.; 1-3 CR./sem.

B9500: Thesis Research
Preparation of a thesis under the guidance of a faculty mentor. HRS. TO BE ARRANGED. 1-3 CR./SEM. MAY BE TAKEN FOR TOTAL OF 6 CR.

B9600: Independent Study
Individual laboratory, field, or library investigation of a problem in Earth Systems Science. Approval of instructor required. 1-3 CR./SEM. UP TO 6 CR. CAN BE APPLIED TO MASTER'S DEGREE.

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

Stanley Gedzelman, Professor
B.S., The City College; Ph.D., M.I.T.

Patricia Kenyon, Associate Professor
B.S., Rensselaer Polytechnic Inst.; Ph.D., Cornell Univ.

Johnny Luo, Assistant Professor
B.S., Peking Univ. (China); M.Phil., Columbia Univ., Ph.D.

Federica Raia, Associate Professor
B.S., Univ. of Naples, Ph.D.

Jeffrey Steiner, Professor and Chair
B.S., Washington State Univ.; Ph.D., Stanford Univ.

Marco Tedesco, Assistant Professor
B.S. University of Napoli "Federico II", Ph.D.

Margaret Anne Winslow, Professor
B.S., Columbia Univ. M.A., M. Phil., Ph.D.

Pengfei Zhang, Associate Professor
B.S. Univ. of Science & Technology of China; M.S., Montana Tech of the Univ. of Montana; Ph.D., Univ. of Utah

PROFESSORS EMERITUS

Edward Hindman

Department of Economics

(DIVISION OF SOCIAL SCIENCE)

Professor Joseph Berechman, Chair • Department Office: NA 5/144 • Tel: 212-650-5700

GENERAL INFORMATION

The City College offers the following master's degree in Economics:

M.A.

DEGREE REQUIREMENTS

Students may pursue one of two options:

Option A–No Thesis: 36 credits.

Option B–Thesis: 33 credits and a thesis.

Required Courses

B0000: Microeconomic Analysis	3
B1000: Macroeconomic Analysis	3
B2000: Statistics and Introduction to Econometrics	3
B2100: Foundations of Empirical Research	3

Elective Courses

Option A–No Thesis

Additional graduate courses	24

Option B–Thesis

B9900: Thesis Research	3
Additional graduate courses	21
Total Credits	**36**

Additional Requirements

GPA: Course work must be completed with a grade average of B or better.

Comprehensive Examinations: Comprehensive examinations cover microeconomics, macro-economics and statistics.

ADVISEMENT

Graduate Advisor
Professor Mitchell Kellman
NA 5/103A, 212-650-6203

COURSE DESCRIPTIONS

B0000: Microeconomic Analysis
Supply and demand; economics of households and firms; determination of product and factor prices under varying market structures. 3 HRS./WK; 3 CR.

B0100: Advanced Microeconomic Theory
General equilibrium theory, capital theory, welfare economics, mathematical models in microeconomics, game theory. 3 HRS./WK; 3 CR.

B1000: Macroeconomic Analysis
Factors determining level of national income, output and employment, business cycle theories and policies to stabilize employment and price level. 3 HRS./WK; 3 CR.

B1100: Advanced Macroeconomic and Monetary Theory
Monetary theory, macroeconomic models, growth theory, capital markets, business cycle theory. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

B4000: Labor Economics
Problems and issues in wages, hours and working conditions; wage policy; relation of labor organizations to management decisions and economic change. 3 HRS./WK; 3 CR.

B4300: Economic Policies of Trade Unions
Evolution of trade unionism in the U.S. Analysis of union government, strategy, economic objectives and political action. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

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. Prereq: Eco B9514. 3 HRS./WK; 3 CR.

B6000: Introduction to Economic Development
Theories, models, and strategic factors of development, domestic and international policy. 3 HRS./WK; 3 CR.

B6100: Theories and Models of Economic Growth
Theories and models of economic growth under varying structural and behavioral assumptions. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

B7700: Banking and the Financial Services Industry
Contemporary practices, policies and issues involving commercial banks, other depository institutions and non-deposit financial intermediaries. Prereq: Eco B9511. 3 HRS./WK; 3 CR.

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. Prereqs: Eco B9510 and B2200. 3 HRS./WK; 3 CR.

B8000: Advanced Options and Futures
Option pricing models; Binomial approach. Black-Scholes models, extensions, applications, and empirical work. Determination of future prices, relationship between spot and future prices, economic function and contribution of futures markets. Prereqs: Eco B9510 and B9512. 3 HRS./WK; 3 CR.

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. Prereq: EcoB1000. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

B9300: Area Seminar in Development
A research seminar for candidates specializing in development, with particular reference to a specific region or area. Prereq: permission of instructor. 2 HR./WK., PLUS CONF.; 3 CR.

B9501-B9522: Seminars
Oral reports and written exercises will be required. Hrs. to be arranged; 3 CR.

B9501: Economic Development and Economic History

B9502: Urban Economics

B9503: Labor

B9504: Statistics and Mathematical Economics

B9505: Geography

B9506: Economic Thought

B9507: International Economics

B9508: Microeconomic Analysis

B9509: Macroeconomic Analysis

B9510: 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.

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.

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. Prereq: ECO B9510.

B9513: Managerial Economics
Integration of microeconomics and quantitative methods so as to make sound managerial decisions.

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.

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.

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.

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.

B9519: Introduction to SAS Statistical Package
Drill applications to economic problems.

B9520: Accounting Cycle
Concepts and techniques of accounting for business transactions and preparation of financial statements.

B9521: International Business

B9900: Thesis Research
Individual research under faculty guidance. 3 CR.

FACULTY

Joseph Berechman, Professor and Chair
B.A. Hebrew Univ., M.B.A.; Ph.D., Univ. of Pennsylvania

Adib Birkland, Assistant Professor
B.A., Univ. of Minnesota, Ph.D.

Maria C. Binz-Scharf, Assistant Professor
M.A., Bocconi Univ.; Ph.D., Univ. of St. Gallen, Switzerland

Nusret Cakici, Professor
B.S., Istanbul Univ. M.B.A.; Ph.D., CUNY

Peter Chow, Professor
B.A., National Taiwan Univ.; M.S., Southern Illinois Univ., Ph.D.

Kevin Foster, Assistant Professor
B.A., Bard College; M.A., Yale Univ., Ph.D.

Malcolm Galatin, Professor
B.Sc. (Econ.), London School of Economics and University College London; Ph.D., M.I.T.

Prabal K De, Assistant Professor
B.Sc., Presidency College; M.A., Jawaharlal Nehru Univ.; M.A., New York Univ., Ph.D.

Mitchell H. Kellman, Professor
B.A., Univ. of Pennsylvania, M.A., Ph.D.

Zhou Lu, Assistant Professor
B.A., Zhejiang Univ.; B.A., Foreign Affairs College; M.A., Univ. of California (Davis); M.A., Johns Hopkins Univ., Ph.D.

Matthew Nagler, Associate Professor
B.A., Cornell Univ.; Ph.D., Univ. of California (Berkeley)

Sonia Oreffice, Assistant Professor
B.A., Univ. of Venice (Italy); Ph.D., Univ. of Chicago

Gokce Sargut, Assistant Professor
B.S., Bilkent Univ. (Turkey); M.B.A., Univ. of Illinois at Urbana-Champaign; M.Phil., Columbia Business School

Jenny Schuetz, Assistant Professor
B.A., Univ. of Virginia (Charlottesville); M.C.P., M.I.T.; Ph.D., Harvard Univ.

Yochanan Shachmurove, Professor
B.A., Tel Aviv Univ., M.B.A.; M.A., Univ. of Minnesota, Ph.D.

Kameshwari Shankar, Assistant Professor
B.A., Delhi Univ., M.A.; Ph.D., Cornell Univ.

Ross Weiner, Assistant Professor
B.A., Univ. of Massachusetts (Amherst), M.A., Ph.D.

PROFESSORS EMERITI

Stanley L. Friedlander
William I. Greenwald
Eric Isaac
Benjamin Klebaner
Marvin Kristein
Abraham Melezin
Edwin P. Reubens
Morris Silver
Gerald Sirkin

Department of English

(DIVISION OF HUMANITIES AND THE ARTS)

Professor Paul Oppenheimer, Chair • Department Office: NA 6/219 • Tel: 212-650-5407

GENERAL INFORMATION

The City College offers the following master's degree in English:

M.A. in English

M.A. in Language and Literacy

M.F.A. in Creative Writing

DEGREE REQUIREMENTS

Literature

Required Courses

Literature courses	27
B2800: Thesis Research	3
Total Credits	**30**

Additional Requirements

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.

Foreign Language Proficiency: A reading knowledge of Spanish, French, Latin, German or another approved language is required.

Comprehensive Examination: Students will be required to take one general examination, testing breadth of knowledge as a whole.

Creative Writing

Required Courses

Critical Practice courses	9
Literature courses	15
Workshops in creative writing	12
B3800: Thesis Tutorial	3
Thesis Workshop	3
Total Credits	**42**

Additional Requirements

Thesis: Degree candidates must submit a publishable full-length manuscript, to be so judged by their mentor and at least one other member of the faculty.

Foreign Language Proficiency: A reading knowledge of an appropriate foreign language is required. Students who pass a course in literary translation with the grade of A or B may apply for a waiver of the language exam at the office of the Dean of Humanities (NA 5/225).

Language and Literacy

Required Courses

B6000: Introduction to Language Studies	3
B6400: Theories and Models of Literacy	3
B8100: Second Language Acquisition	3
B8200: Teaching Adult Literacy	3
Other Language and Literacy courses (in consultation with an advisor)	6
Four Additional Electives	12

(Electives may be selected from English Department course offerings. Courses from other departments are subject to the program director's approval. Credit-bearing internships count toward elective course credits.)

Total Credits	**30**

Additional Requirements

No more than 12 approved graduate credits may be taken outside the Department of English. No more than six credits may be transferred from another college.

Students demonstrating appropriate previous teaching experience may substitute three credits of elective for B5100 (Supervised Team Teaching).

Foreign Language Proficiency: A reading knowledge of an appropriate foreign language is required.

ACTIVITES

Publications

Fiction, edited by Professor Mark Mirsky, is published at The City College, and anyone is welcome to submit material. *Global City Review*, edited by Professor Linsey Abrams, encourages students to participate in its production. *Promethean* is the City College literary magazine.

Readings

A series of readings of work by students in the program and by prominent authors is presented throughout the year.

ADVISEMENT

Director of Graduate Programs
Professor Linsey Abrams
NA 6/210; 212-650-6694

Literature
Professor Renata K. Miller
NA 6/234; 212-650-6391

Creative Writing
Professor Linsey Abrams

Language and Literacy
Professor Barbara Gleason
NA 6/333A; 212-650-6329

AWARDS

Creative Writing Awards

- The Doris Lippman Prize in Creative Writing
- The Jerome Lowell DeJur Award in Creative Writing
- The Henry Roth Memorial Scholarship
- The Adria Schwartz Award in Women's Fiction
- The Geraldine Griffin Moore Award in Creative Writing

- The Goodman Fund Grants
- The Irwin and Alice Stark Short Fiction Prize
- The Laskin Award for Children's Writing
- The Malinche Prize for Literary Translation
- The Stark Award in Drama in Memory of Ross Alexander

Poetry Awards

- The Poetry Outreach Graduate Poet Award
- The Laskin Award for Children's Poetry
- 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 Marilyn Sternglass Writing Award
- The Marilyn Sternglass Overall Merit Award
- The Sydney Jacoff Graduate Fellowship

Teaching Awards

- Rifkind Outstanding Teaching Award
- The Teaching Plus Award/ Teacher-Author Career Prize

COURSE DESCRIPTIONS

MAJOR AUTHORS

B0000: Chaucer: The Canterbury Tales
2 HR./WK., PLUS CONF.; 3 CR.

B0001: Chaucer II
Troilus and other writings.
2 HR./WK., PLUS CONF.; 3 CR.

B0100: Shakespeare I
The comedies and history plays.
2 HR./WK., PLUS CONF.; 3 CR.

B0200: Shakespeare II
The tragedies and late romances.
2 HR./WK., PLUS CONF.; 3 CR.

B0300: Milton
Paradise Lost and Paradise Regained. A critical study of Milton's epics.
2 HR./WK., PLUS CONF.; 3 CR.

PERIOD COURSES IN ENGLISH AND AMERICAN LITERATURE

Courses in all major periods of English and American literature will be offered as seminars of specialized study. The exact emphasis of each seminar will vary from semester to semester. See regularly published description of graduate English offerings. Recent offerings include:

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.
2 HR./WK., PLUS CONF.; 3 CR.

B0900: English Literature of the Restoration and Early Eighteenth Century
Studies in Defoe, Dryden, Pope, Swift and others. 2 HR./WK., PLUS CONF.; 3 CR.

B1000: English Romantic Poetry and Prose
Studies in Blake, Wordsworth and Coleridge; the Shelleys, Byron, Keats and DeQuincey. 2 HR./WK., PLUS CONF.; 3 CR.

B1100: English Literature of the Nineteenth Century
Studies in the Brontes, Hardy, Dickens, Eliot, Tennyson, Browning, etc. 2 HR./WK., PLUS CONF.; 3 CR.

B1200: Literature of the Twentieth Century
2 HR./WK., PLUS CONF.; 3 CR.

B1300: Twentieth Century Irish Literature
2 HR./WK., PLUS CONF.; 3 CR.

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. 2 HR./WK., PLUS CONF.; 3 CR.

B1500: American Literature from 1890 to the Present
Textual analysis, with collateral study of the social, psychological and philosophical context. 2 HR./WK., PLUS CONF.; 3 CR.

SEMINARS IN SPECIAL SUBJECTS

Seminars on a variety of special topics. Subjects will vary from semester to semester. See the description of graduate offerings.

B1600: The History of Ideas
2 HR./WK., PLUS CONF.; 3 CR.

B1700: Literary Criticism
2 HR./WK., PLUS CONF.; 3 CR.

B1800: Studies in Major Authors
2 HR./WK., PLUS CONF.; 3 CR.

B1900: Literary Genres
2 HR./WK., PLUS CONF.; 3 CR.

B2000: Studies in Literary and Historical Backgrounds
2 HR./WK., PLUS CONF.; 3 CR.

B2100: Studies in Themes and Motifs
2 HR./WK., PLUS CONF.; 3 CR.

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. 3 CR.

B2800: Thesis Research Tutorial
Independent research for the Master's thesis under the supervision of a mentor. 3 CR.

COURSES IN AMERICAN STUDIES

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. 2 HR./WK., PLUS CONF.; 3 CR.

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. 2 HR./WK., PLUS CONF., 3 CR.

CREATIVE WRITING WORKSHOPS

Students may not register for more than one writing workshop per semester.

B3000: Workshop in Fiction
Intensive work in the genre. *May be taken twice for credit.* Minimum 2 HR./WK., PLUS INDIVIDUAL CONF.; 3 CR.

B3200: Workshop in Poetry
Intensive work in the genre. *May be taken twice for credit.* Minimum 2 HR./WK., PLUS INDIVIDUAL CONF.; 3 CR.

B3400: Workshop in Drama
Intensive work in drama. *May be taken twice for credit.* Minimum 2 HR./WK., PLUS INDIVIDUAL CONF.; 3 CR.

B3600: Workshop in Nonfiction
Intensive work in narrative, autobiography, criticism, reviewing and other forms of exposition. *May be taken twice for credit.* Minimum 2 HR./WK., PLUS INDIVIDUAL CONF.; 3 CR.

B3800: Thesis Tutorial
Writing of a publishable book-length manuscript under the supervision of a mentor. Required for the M.A.; 3 CR.

B3901: Workshop in Translation
Intensive work in translation from other languages into English. *May be taken twice for credit.* Minimum 2 HR./WK., PLUS INDIVIDUAL CONF.; 3 CR.

LANGUAGE AND LITERACY

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. 2 HR./WK., PLUS CONF.; 3 CR.

B5000: Introduction to Teaching Writing and Literature
Explorations of pedagogical theories and practical strategies for classroom use. 2 HR./WK., PLUS CONF.; 3 CR.

B5100: Supervised Team Teaching
Work with a master teacher of basic writing or ESL; auditing a basic writing course, teaching, preparing syllabi. 3 CR.

B5200: Thesis Research
Independent research for the Master's thesis under the supervision of a mentor. 3 CR.

B5300: Examining Reading and Writing Processes
Designed to make students more aware of reading and writing strategies. 2 HR./WK., PLUS CONF.; 3 CR.

B5400: TESOL: Materials and Testing
Approaches to the use and creation of instructional materials in the Teaching of English as a Second Language. 2 HR./WK., PLUS CONF.; 3 CR.

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. 2 HR./WK., PLUS CONF.; 3 CR.

B6000: Introduction to Language Studies
An introduction to various current language issues. 2 HR./WK., PLUS CONF.; 3 CR.

B6100: Sociolinguistics
Variation in language from a social, linguistic and cultural orientation. 2 HR./WK., PLUS CONF.; 3 CR.

B6300: Contrastive Written Language
Focuses on the relationship between language background and production of written text, with particular emphasis on contrastive analysis, discourse analysis, and second language learning. 2 HR./WK., PLUS CONF.; 3 CR.

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. 2 HR./WK., PLUS CONF.; 3 CR.

B8000-8500: Special Topics in Language and Literacy
Variable credits, 1-4.

FACULTY

Salar Abdoh, Assistant Professor
B.A., U.C. Berkeley; M.A. City College

Linsey Abrams, Professor
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Doris Barkin, Lecturer
B.A., Queens College; M.A., CUNY

Felicia Bonaparte, Professor
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Leon Guilhamet, Professor
B.A., Syracuse Univ.; M.A., Rutgers Univ.; Ph.D., Harvard Univ.

Marilyn Hacker, Professor
B.A., New York University

Jo-Ann W. Hamilton, Lecturer
B.A., Univ. of Pennsylvania; M.F.A, The City College; Ed.D., Teachers College, Columbia University

Laura Hinton, Professor
B.A., Univ. of Arizona, M.A.; Ph.D., Stanford Univ.

Pamela Laskin, Lecturer
B.A., Harper College, M.A.

Jane Marcus, Distinguished Professor
A.B., Radcliffe College; M.A., Brandeis Univ.; Ph.D., Northwestern Univ.

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Renata K. Miller, Associate Professor
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Mark Mirsky, Professor
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Geraldine Murphy, Professor
B.A., Boston Univ.; M.A., Columbia Univ., Ph.D.

Paul Oppenheimer, Professor and Chair
B.A., Princeton Univ.; M.A., Columbia Univ., Ph.D.

Emily Raboteau, Assistant Professor
B.A., Yale Univ.; M.F.A, New York Univ.

Fred Reynolds, Professor and Dean, Division of Humanities and the Arts
B.A. Midwestern State Univ.; M.A., M.A. (Speech), Univ. of Oklahoma, Ph.D.

Gordon Thompson, Assistant 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 A. Veeser, Associate Professor
B.A., Columbia Univ., M.A., Ph.D.

Michele Wallace, Professor
B.A., The City College, M.A.

Joshua Wilner, Professor
B.A., Cornell Univ.; M. Phil., Yale Univ., Ph.D.

PROFESSORS EMERITI

Marcia Allentuck
Ilona Anderson
Nathan Berall
Malcolm J. Bosse
Saul N. Brody
David P. Buckley
Roger Boxill
Arthur K. Burt
Alice Chandler
Morton Cohen
James A. Emanuel
Barbara Fisher
Byrne R. S. Fone
Arthur Ganz
Robert Ghiradella
Arthur Golden
Frederick Goldin
Ralph Gordon
Theodore Gross
James Hatch
William Herman
Mary V. Jackson
Frederick R. Karl
Norman Kelvin
Leonard Kriegel
Valerie Krishna
Patricia Laurence
Daniel Leary
Irving Malin
Karl Malkoff
Philip Miller
Samuel Mintz
Robert K. Morris
Stephen Merton
Nathaniel Norment, Jr.
William L. Payne
Beatrice Popper
Edward Quinn
Betty Rizzo
Irving Rosenthal
Earl Rovit
Paul Sherwin
Robert Silber
Frederic Tuten
Geoffrey Wagner
Arthur Waldhorn
Barry Wallenstein
Barbara Bellow Watson
Robert Wilson
John D. Yohannon

Department of Foreign Languages and Literatures

(DIVISION OF HUMANITIES AND THE ARTS)

Professor Richard Calichman, Chair • Department Office: NA 5/223 • Tel: 212-650-6731

GENERAL INFORMATION

The City College offers the following master's degree in Foreign Languages and Literatures:

M.A. in Spanish

PROGRAMS AND OBJECTIVES

The M.A. degree in Spanish is offered by The City College. The M.A. Program in French is now part of a consortium based at Hunter College, the administrative center for the program. For information, contact the Foreign Languages and Literatures Department of Hunter College, 695 Park Avenue, New York, NY 10021.

DEGREE REQUIREMENTS

Required Courses

One of the following two:	3
V0100: History of the Spanish Language (3 CR.)	
V0600: Morphology and Syntax (3 CR.)	
V0300: Introduction to Methods of Research	3
Graduate Electives	27
Total Credits	**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 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.

COURSE DESCRIPTIONS

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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 "Clarín" and Galdos. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

V7200: Contemporary Spanish-American Poetry
Examination of poetic trends through the reading of representative works of Huidobro, Guillén, Mistral, Neruda and Paz, among others. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

B7600: Spanish-American Theatre
Study of representative plays reflecting significant literary trends and social developments in contemporary Spanish America. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

B9800-B9805: Special Topics in Language and Literature
3 hr./3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

FACULTY

Carole Berger, Associate Professor
B.S., The City College, M.S.; Ph.D., Yeshiva Univ.

Maxime Blanchard, Associate Professor
B.A., Univ. de Montreal; M.A., Univ. of Minn.; D.E.A., Univ. De Paris-IV; Ph.D., Harvard Univ.

Silvia Burunat, Professor
B.A., Boston Univ., M.A.; Ph.D., CUNY

Richard Calichman, Associate Professor and Chair
B.A, Colby College; Ph.D., Cornell Univ.

Laura Callahan, Associate Professor
B.A., San Jose State Univ., M.A.; Ph.D., Univ. of California (Berkeley)

Raquel Chang-Rodríguez, Distinguished Professor
B.A., Montana State Univ.; M.A., Univ. of Ohio; Ph.D., New York Univ.

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Angel Estévez, Assistant Professor
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Dulce María García, Assistant Professor
B.A., Barry Univ.; M.S., Georgetown Univ., Ph.D.

Amy Kratka, Lecturer
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Bettina Lerner, Assistant Professor
B.A., Yale Univ., Ph.D.

Juan Carlos Mercado, Professor and Acting Dean, Division of Worker Education
B.A., Univ. del Comahue (Argentina); M.A., Queens College; Ph.D., CUNY

Roy Mittelman, Lecturer
B.A., Univ. of Pennsylvania; M.A. Temple Univ., Ph.D.

Jennifer Roberts, Professor
B.A., Yale College; M.A., Yale Univ., Ph.D.

Eve Sourian, Professor
Licence-es-Lettres, Sorbonne; M.A., Bucknell Univ.; Ph.D., Univ. of Colorado (Boulder)

Elizabeth D. Starcevic, Professor
B.A., The City College, M.A.; Ph.D., CUNY

Mary Ruth Strzeszewski, Associate Professor
B.A., Columbia Univ., M.A., Ph.D.

Devid Paolini, Assistant Professor
M.A., Univ. of Bologna; Ph.D., CUNY

Araceli Tinajero, Associate Professor
B.A., Rutgers Univ., M.A., Ph.D.

Vanessa J. Valdes, Assistant Professor
B.A., Yale Univ.; M.A., Vanderbilt Univ.; Ph.D.

PROFESSORS EMERITI

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
Zvi Henri Szubin
Renée Waldinger
Sharifa M. Zawawi
Jacques Zéphir

Department of History

(DIVISION OF HUMANITIES AND THE ARTS)

Professor Darren Staloff, 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.

DEGREE REQUIREMENTS

Requirements for the M.A. degree in History are as follows:

Required Courses

B0000: Historical Methods and Historiography	3
B9900: Thesis Research	3

Elective Courses

Approved graduate courses in History	24
Total Credits	**30**

Additional Requirements

Students will be required to have a concentration in both a major and a minor area, to be determined in consultation with the departmental graduate advisor.

Up to twelve credits of course work in other graduate programs may be accepted for the degree in History. Approval for such courses must be secured in advance from the Graduate History Committee.

Thesis: Normally required for the M.A. Degree. Students interested in a non-thesis option must consult the graduate program director.

Comprehensive Examination: A three-hour written comprehensive examination will cover the student's major field of concentration.

Foreign Language Proficiency: The student will be expected to demonstrate a reading knowledge of an approved foreign language before completing fifteen credits of graduate work.

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 Susan Semel, Department of Secondary Education. History M.A. candidates must consult with the History departmental advisor about their programs.

ADVISEMENT

It is essential that all students consult with the Director of Graduate Studies, Professor Andreas Killen (NA 5/119; 650-7454), before beginning work in the program and each semester thereafter.

COURSE DESCRIPTIONS

The following selection represents courses offered in recent semesters, and it is intended to provide an indication of typical offerings. a publication describing the graduate program is available in December for spring semesters and in May for fall semesters.

B0000: 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. (Required for all students.) 2 HR./WK.; 3 CR.

B2925: The Historian and the Computer

A "hands-on" course in using computers in historical research: accessing information, analyzing historical data, and word processing. No experience in computers necessary. (Required for all students.) 3 HR./WK.; 3 CR.

LECTURE/DISCUSSION COURSES

All courses are 3 HR./WK.; 3 CR.

Studies in Ancient and Medieval History

B0101: The Ancient Near East and Greece

The cultural legacy of the Egyptian, Mesopotamian, Hebrew and Hellenic civilizations in classical antiquity.

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.

Studies in Modern European History

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.

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.

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.

B0304: 20th Century Europe
Political, social, economic, and intellectual developments in fin de siE8cle 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 dE9tente, and the emergence of East and West Europe as vital forces in the world today.

Studies in American History

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.

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.

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.

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.

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.

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.

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.

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.

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.

Studies in Latin American History

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.

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.

Studies in Asian History

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.

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.

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.

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.

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.

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.

Studies in African History

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.

Studies in Middle Eastern History

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.

Comparative History

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.

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.

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.

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.

COLLOQUIA AND SEMINARS

All courses 2 HR./WK., PLUS CONF.*; 3 CR.*

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.

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.

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.

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.

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.

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.

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.

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.

B9900: Thesis Research
The thesis is required for the M.A. degree. Each candidate will prepare a thesis under the guidance of a faculty advisor. Arrangements for thesis work should commence as soon as the candidate has completed 15 graduate credits. Completion of the foreign language requirement is advisable prior to starting work on the thesis. (Required of all students.)

FACULTY

Harriet Alonso, Professor
B.S., New York Univ.; M.A., Sarah Lawrence; Ph.D., SUNY (Stony Brook)

Beth Baron, Professor
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Susan K. Besse, Associate Professor
Certificat, Institut d'Etudes du Developpement, Geneva, Switzerland; B.A., Smith College; Ph.D., Yale Univ.

Barbara Brooks, Associate Professor
B.A., Yale Univ.; Ph.D., Princeton Univ.

Craig Daigle, Assistant Professor
B.A., Univ. of Maryland; M.A., James Madison Univ.; Ph.D., George Washington Univ.

Gregory P. Downs, Assistant Professor
B.A., Yale Univ.; M.F.A., Univ. of Iowa; M.A., Northwestern Univ.; Ph.D., Univ. of Pennsylvania

Venus Green, Associate Professor
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Danian Hu, Assistant Professor
B.E., Beujung Jiaotong Univ.; M.A., Case Western reserve Univ.; Ph.D., Yale Univ.

David Johnson, Associate Professor
B.A., Univ. of Sussex, England, M.A., Univ. of London, Ph.D.

Ravi Kalia, Professor
B.A., Univ. of Delhi, M.A.; Ph.D., Univ. of California (Los Angeles), M.B.A.

Andreas Killen, Associate Professor
B.A., Reed College (English); M.A., New York Univ., Ph.D.

Anne M. Kornhauser, Assistant Professor
B.A., Barnard College; M.A., Columbia Univ., Ph.D.

Barbara Naddeo, Assistant Professor
B.A., Univ. of Chicago; Ph.D. Princeton Univ.

Adrienn Petty-Roberts, Assistant Professor
B.S., Northwestern Univ.; Ph.D., Columbia Univ.

Gerardo Renique, Associate Professor
B.S., Universidad Nacional Agraria (Peru); M.A., Columbia Univ., Ph.D.

Clifford Rosenberg, Associate Professor
B.A., Carleton College; M.A., Princeton Univ., Ph.D.

Darren Staloff, Professor and Chair
B.A., The City College; M.A., Columbia Univ., Ph.D.

Judith Stein, Professor
B.A., Vassar College; Ph.D., Yale Univ.

PROFESSORS EMERITI

Bernard Bellush
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

International Relations Program

(DIVISION OF SOCIAL SCIENCE)

Professor Bruce Cronin, 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.A.

PROGRAMS AND OBJECTIVES

The program covers the following areas:

International Relations
International Economics
International Organization and Law
Diplomacy
Foreign Policy of Selected Regions

DEGREE REQUIREMENTS

Required Courses

International Relations:

B4100: Seminar in International Relations	3
B6100: Theory of International Relations	3
B6200: International Organization	3
B6300: International Law	3
B6800: Research Methods	3
B9900: Thesis Research	3
One of the following two:	3
ECO B8400: International Economic Policy (3 CR.)	
IR B6927: International Political Economy (3 CR.)	

Elective Courses
Four classes chosen from the list of graduate level courses offered in International Relations. Courses may also be taken, by permission, at the Graduate School of CUNY or other graduate departments at City College. 12

Total Credits 33

Additional Requirements
Thesis: Required.
Foreign Language Proficiency: Students must demonstrate reading proficiency in a language approved by the graduate advisor.

ADVISEMENT

Professor Sherri Baver, Political Science
Professor Vince Boudreau, Political Science
Professor Jacqueline Braveboy-Wagner, Political Science
Professor Bruce Cronin, Political Science
Professor Jergen Dedring, MPIR
Professor David Johnson, History
Dr. Jean Krasno, Colin Powell Center
Professor Mitchell Kellman, Economics

COURSE DESCRIPTIONS

International Relations

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. 2 HR./WK. PLUS CONF.; 3 CR.

B4100: Seminar in International Relations
Explores issues in the practice of international relations by applying various theories and approaches to contemporary global issues. In doing so, the course examines concepts such as hegemony, the post-Cold War system, nationalism, sovereignty, the "democratic peace," and globalization. 2 HR./WK. PLUS CONF.; 3 CR.

B6100: Theories of International Relations
Offers an introduction to contemporary theories and concepts in the discipline of international relations. In particular, the course examines the competing paradigms offered by realism, liberalism, globalism, 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 states and other international actors. 2 HR./WK. PLUS CONF.; 3 CR.

B6200: International Organization
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. 2 HR./WK. PLUS CONF.; 3 CR.

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, the laws of warfare, the use of force, refugees, and international criminal tribunals. 2 HR./WK. PLUS CONF.; 3 CR.

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 at the agency. 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. Prerequisite: B4100, B6100, B6200, B6300 and permission of the program director. 3 CR.

B6800: Research Methods
Provides an introduction to social science research and writing as it applies to the study of international relations. This course helps prepare students to write their master's thesis. As part of this class, each student develops a research proposal for his or her thesis. Prerequisite: At least 18 CR. completed prior to beginning the course. Prerequisite: successful completion of 18 credits including IR B6100, B4100, B6200, B6300. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

B6917: Africa in World Affairs
Analyses the political relations among black African states and between such states and the Western powers. Topics include: imperialism, slavery, and colonialism; wars of independence; inter-state relations and economic cooperation; and the role of international organizations in promoting human rights and the resolution of conflicts. 2 HR./WK. PLUS CONF.; 3 CR.

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. In doing so, the course provides students with an understanding of the principles that underlie the practice of diplomacy in bilateral and multilateral settings and the concrete tools and processes utilized by diplomats in the course of their work. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

B6927: International Political Economy
Explores the theories that attempt to explain the dynamics of the international economy, and examines the institutions that provide for cooperation in facilitating international trade, monetary exchange, and investment. It pays particular attention to the role of the World Trade Organization, the World Bank, the International Monetary Fund, and U.N. development agencies. Finally, it examines the debates around globalization. 2 HR./WK. PLUS CONF.; 3 CR.

B6928: Human Rights in World Politics
Explores the development and implementation of human rights norms within the international system. It also discusses the debates surrounding the concept of 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 international levels. 2 HR./WK. PLUS CONF.; 3 CR.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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 destructions. 2 HR./WK. PLUS CONF.; 3 CR.

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.

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. 2 HR./WK. PLUS CONF.; 3 CR.

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. 1-3 CR.

B9900: Thesis Research
Prerequisite: successful completion of 24 credits including IR B6100, B4100, B6200, B6300, B6800 and approval of the program director.

Economics

B8400: International Economic Policy
Focuses on the analytic foundations underlying international economic policymaking with particular attention to competitiveness, the institutions affecting them, foreign exchange markets, and major trade policies of various countries. 2 HR./WK. PLUS CONF.; 3 CR.

Department of Mathematics

(DIVISION OF SCIENCE)

Professor Thea Pignataro, Chair • Department Office: NA 8/201 • Tel: 212-650-5173

GENERAL INFORMATION

The City College offers the following master's degree in Mathematics:

M.A.

PROGRAMS AND OBJECTIVES

Candidates for the M.A. degree in Mathematics choose one of the following specializations:

Pure Mathematics
Probability and Statistics

PREREQUISITES

Students who have not completed higher analysis or advanced calculus courses deemed equivalent to Math 32300, 32400, and 32500 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 34600 or its equivalent during their first semester. No credit toward the M.A. is given for any of these courses.

DEGREE REQUIREMENTS

Candidates for the M.A. degree in Mathematics must choose one of the following two options:

Option A: Pure Mathematics

Required Courses

Three B0000-level courses in Pure Mathematics	12

Elective Courses

Additional graduate courses in Mathematics	6-18
Graduate courses in other mathematically based disciplines*	0-12
Total Credits	**30**

Option B: Probability and Statistics

Required Courses

Three B0000-level courses in Probability and Statistics	12
Two graduate courses in Computer Science*	6

Elective Courses

Additional graduate courses in Mathematics	6-12
Graduate courses in other mathematically based disciplines*	0-6
Total Credits	**30**

**Prior approval for such courses must be secured from the Graduate Mathematics Advisor.*

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.

ADVISEMENT

Professor Sean Cleary, Graduate Advisor
NA 6/274, (212) 650-5122

SCHOLARSHIPS

The Dr. Barnett and Jean Hollander Rich Mathematics Scholarships
Awarded annually to talented graduate students who have demonstrated superior ability in mathematics.

COURSE DESCRIPTIONS

Group I

Option A: Pure Mathematics

A3200: Theory of Functions of a Complex Variable
A rigorous treatment of complex variables. Cauchy-Riemann equations, conformal mapping, elementary, entire, meromorphic, multiple-valued functions, Cauchy integral theorems, series expansion. 4 HR./WK.; 4 CR.

A3400: Theory of Functions of a Real Variable
Lebesgue measure and integration on the real line, differentiation of real functions and the relation with integration, classical Lp spaces. 4 HR./WK.; 4 CR.

A3500: Partial Differential Equations, Integral Equations, Boundary Value Problems
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. 4 HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

A4400: Mathematical Logic
The propositional calculus, the sentential calculus, normal forms, first order theories, consistency, categoricity, decidability, Godel's Completeness Theorem, the Loewenheim-Skolem Theorem. 4 HR./WK.; 4 CR.

A4900: Introduction to Modern Algebra
Groups, rings, fields. 4 HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

A6300: Topology
A course in general topology. Sets of points on the real line and in general abstract spaces, relations between sets of points and between a set and the space containing it, operations with sets, open sets, countability, compactness, connectedness, maps, continuity, metric spaces, general topological spaces. 4 HR./WK.; 4 CR.

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. Prereq: Math A3200. 4 HR./WK.; 4 CR.

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. Prereq: Math A3400. 4 HR./WK.; 4 CR.

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. Prereq: Math A3500. 4 HR./WK.; 4 CR.

B4900: Introduction to Modern Algebra II
Field extensions, Galois theory, vector spaces and modules, category theory, special topics. Prereq: Math A4900. 4 HR./WK.; 4 CR.

B6300: Topology II
An introduction to algebraic topology, following a review of general topology. Homeomorphism, compactness, connectedness, arcwise connectedness, new topological properties in terms of groups, homotopy, homotopy classes, fundamental group, homology groups, simplexes, boundaries, cycles, barycentric subdivision, excision theorem, exact sequence, complexes. Prereqs: Math A4900 and A6300. 4 HR./WK.; 4 CR.

Option B: Probability and Statistics

A7700: Probability Theory II
Special topics in probability such as stochastic processes, Markov chains. 4 HR./WK.; 4 CR.

A7800: Mathematical Statistics II
The multivariate normal distribution, multiple and partial correlation, regression and least squares, the analysis of variance. 4 HR./WK.; 4 CR.

B6800: 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. 4 HR./WK.; 4 CR.

B7600: 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. 4 HR./WK.; 4 CR.

B7700: Stochastic Processes
Markov chains, limit theorems, renewal equations, random walks, Brownian motion, branching processes, queuing theory. Prereq: Math A7700. 4 HR./WK.; 4 CR.

Group II

Courses in this group will be offered on the basis of student interest. These courses may be substituted for courses in the same subject area listed under Group I.

B1100: Selected Topics in Pure Mathematics
Topics to be chosen from the areas of algebra, analysis, topology, geometry, and logic. 4 HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

B1300: Selected Topics in Probability and Statistics
Topics to be chosen from the areas of probability, statistics, game theory, combinatorial analysis, etc. 4 HR./WK.; 4 CR.

B9800: Independent Study
A program of independent study under the direction of a member of the Department, with approval of the Graduate Advisor. Variable credit.

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., The City College; Ph.D., Princeton Univ.

Joseph Bak, Associate Professor
B.A., Yeshiva Univ., M.A., Ph.D.

Peter Brinkmann, Assistant Professor
M.Sc., Univ. of Tennessee; Ph.D., Univ. of Utah

Mark Brown, Professor
B.S., The City College, M.S.; Ph.D., Stanford Univ.

Isaac Chavel, Professor
B.A., Brooklyn College; M.S., New York Univ.; Ph.D., Yeshiva Univ.

Gautam Chinta, Assistant Professor
B.S., Yale Univ.; Ph.D., Columbia Univ.

Vicki Chuckrow, Associate Professor
B.S., The City College; M.S., New York Univ., Ph.D.

Sean Cleary, Associate Professor
A.B., Cornell Univ.; Ph.D., Univ. of California (Los Angeles)

Jacob Eli Goodman, Professor
A.B., New York Univ.; A.M., Columbia Univ., Ph.D.

Edward Grossman, Professor
A.B., New York Univ., Ph.D.

Raymond Hoobler, Professor
A.B., Oberlin College; M.A., Univ. of California (Berkeley), Ph.D.

Karel M. Hrbacek, Professor
RNDr., Charles Univ. (Prague)

Jay Jorgenson, Professor
B.S., Univ. of Minnesota; M.S., Stanford Univ., Ph.D.

Lee Kaminetzky, Associate Professor
B.S.E., George Washington Univ.; M.S., New York Univ., Ph.D.

Ralph D. Kopperman, Professor
A.B., Columbia Univ.; Ph.D., M.I.T.

Zeph Landau, Assistant Professor
A.B., Harvard Univ., A.M.; Ph.D., Univ. of California at Berkeley

Michael Marcus, Professor
B.S., Princeton Univ.; M.S., M.I.T., Ph.D.

Daniel Mosenkis, Lecturer
B.S., The City College; M.S., Univ. of Wisconsin

Stanley Ocken, Professor
A.B., Columbia Univ.; M.A. Princeton Univ., Ph.D.

Denis V. Osin, Associate Professor
B.S., Moscow State Univ., M.S.. Ph.D.

Thea Pignataro, Associate Professor and Chair
B.S., Polytechnic Inst. of New York; M.A., Princeton Univ., Ph.D.

Rochelle Ring, Associate Professor
B.S., The City College; M.S., New York Univ., Ph.D.

David Schwinger, Lecturer
B.A., Queens College; M.A., Columbia Univ.; M.B.A., New York Inst. of Technology

Niel Shell, Professor
B.S., Polytechnic Inst. of New York, M.S., Ph.D.

Vladimir Shpilrain, Professor
M.A., Moscow State Univ., Ph.D.

PROFESSORS EMERITI

Harry W. Appelgate
Sherburne F. Barber
Jacob Barshay
Harvey Cohn
Morton Davis
Michael Engber
Alberto Guzman
Stanley Kaplan
John Landolfi
Jonah Mann
John Miller
William Sit
Bernard Sohmer
Fred Supnick
Norman Wagner

Department of Media and Communication Arts

(DIVISION OF HUMANITIES AND THE ARTS)

Professor Andrea Weiss, Chair • Department Office: SH 472 • Tel: 212-650-7167

GENERAL INFORMATION

The City College offers the following master's degree in Media and Communication Arts:

M.F.A. in Media Arts Production

ADMISSION REQUIREMENTS

Applicants to the M.F.A. program in Media Arts Production must have a B.A. or B.F.A. degree with a minimum 3.0 (B) grade point average in the major. Undergraduate training in film and video must include courses in the following subjects or the equivalent: film theory and history; screenwriting; two semesters of advanced film and video production (including "hands on" courses in 16mm camera, lighting and sound); one semester each of film editing, video editing, and digital post-production; directing for fiction film video; and documentary production. Training and/or courses in the areas listed above must be completed prior to applying to the MFA program.

ADVISEMENT

Professor David Davidson
M.F.A. Director
SH 286, 212-650-7235

DEGREE REQUIREMENTS

Required Courses

Media and Communications Arts:

B0100: Independent Media Arts – Idea, Structure and Realization 3
B2100: Camera I 3
B2200: Camera II 3
B3000: Digital Production 3
B5000: Editing I 3
B5100: Editing II 3
B5300: Sound Design 3
B6100: Media Arts Management 3
B7100: Seminar in Independent Media Arts 3
B9100: Thesis Project I – Production 9
B9200: Thesis Project II – Post-Production 6

Plus one of the following concentration sequences: *9*

Sequence 1 (Fiction concentration):
B3100: Fiction Screenwriting I (3 CR.)
B3200: Fiction Screenwriting II (3 CR.)
B6200: Directing Fiction (3 CR.)

Sequence 2 (Documentary concentration):
B2900: Research and Writing for Documentary I (3 CR.)
B3300: Research and Writing for Documentary II (3 CR.)
B6300: Producing and Directing the Documentary (3 CR.)

Total Credits: 51

Students may also choose to take additional elective courses B9801, B9802 and B9803: Independent Study, with the permission of the M.F.A. Director.

COURSE DESCRIPTIONS

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. Prereq: MCA/M.F.A. status. Coreq.: B2100, B3100. 3 HR./WK.; 3 CR.

B2100: Camera I
The first of a two-semester sequence of workshops in image gathering for broadcast video and 16mm film. Through a series of production exercises, students master skills in operation of professional film and video cameras, pictorial composition for complex shots, lighting, exposure control, relationship to the director, selection of film stocks, and filtration. Prereq: MCA/M.F.A. status; coreq: B0100, B3000, B2900 or B3100. 3 HR./WK.; 3 CR.

B2200: Camera II
The second course in a two-semester workshop sequence in image gathering for broadcast video and 16mm film. Students build on the foundation of skills mastered in Camera I, executing increasingly more complex production exercises. Topics include moving camera, filtration for special effects, interfacing with the sound department, shooting film for video transfer, shooting video for film transfer, liaison with the laboratory, managing the professional crew, high definition television and digital video. Prereq: B2100 coreq: B3200 or B3300, B6100, B6200 or B6300. 3 HR./WK.; 3 CR.

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. Prereq: MCA/MFA status. Coreq: B0100, B2100, B3000. 3 HR./WK.; 3 CR.

B3100: Fiction Screenwriting I
Focuses on finding meaningful stories on which short fiction screenplays will be based. Through a series of written and oral exercises, students explore the creation of stories from personal experience. Prereq: MCA/M.F.A. Status; coreq: B0100, B2100, B3000. 3 HR./WK.; 3 CR.

B3200: Fiction Screenwriting II
Required of students whose thesis projects will be fiction or cross-genre based. 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 thirty or fewer pages. Prereq: B3100; coreq: B2200, B5000, B6100, B6200. 3 HR./WK.; 3 CR.

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. Prereq: B2900, coreq: B2200, B5000, B6100, B6300. 3 HR./WK.; 3 CR.

B3000: Digital Production
Using new technologies of cinema, digital video cameras and computer editing, this class lays the groundwork for the completion of short works. Prereq: MCA/MFA status. Coreq: B0100, B2100, B2900, or B3100. 3 HR./WK.; 3 CR.

B5000: Editing I
Skill-based course providing a thorough introduction to digital non-linear editing. Students use the techniques learned in the first half of this course to edit and refine their own projects in the second half. Additional non-editorial features of Final Cut Pro are covered to an intermediate level. Lectures, screenings and discussions augment the practical experience with elements of design and theory. Prereq: B3000; coreq: B2200, B5000, B2900 or B3100, B6200 or B6300. 3 HR./WK.; 3 CR.

B5100: Editing II
Students master editing techniques as demonstrated in screening and analysis of creative work in a variety of genres. This project-oriented class allows students to learn and apply advanced picture, graphic and sound capabilities of the AVID Media Composer to editing exercises in fiction, documentary, and cross-genre work. Prereq: B5000; coreq: B5200, B9100. 3 HR./WK.; 3 CR.

B5300: Sound Design
Exploration of the aesthetics and practice of audio as a creative element in film and video 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. Prereq: B3000. Coreq: B9200, B7100. 3 HR./WK.; 3 CR.

B6100: Media Arts Management
Concepts and procedures necessary for organizing and completing thesis productions. This planned management course examines the pre-production, production and post-production processes and assists candidates in preparing deliverables for an organized production. Prereq: B3000.; coreq: B5000, B3300 or B3200, B6200 or B6300. 3 HR./WK.; 3 CR.

B6200: Directing Fiction
Required of candidates whose thesis project will be fiction-based regardless of format. Emphasis is on interpreting the screenplay, use of metaphor, rhythm, development of inner monologues, and shaping performance for camera. Candidates will direct scenes from screenplays developed in Fiction Screenwriting II. Prereq: B3000.; coreq: B2200, B3200, B5000, B6100. 3 HR./WK.; 3 CR.

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. Prereq: B3000; coreq: B2200, B6100, B3300, B5000. 3 HR./WK.; 3 CR.

B7100: Seminar in Independent Media Arts
The capstone course of the program. 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. Prereq: B9100; coreq: B5300, B9200. 3 HR./WK.; 3 CR.

B9100: Thesis Project I – Production
The first part of producing the thesis project. Proposals previously submitted by candidates and approved by the M.F.A. Faculty Committee will begin production. Projects are expected to be original and represent a contribution to the field of media arts. Prereq: B6100; coreq: B5100. 9 HR./WK.;A09 CR.

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. Prereq: B9100; coreq: B7100, 5300. 6 HR./WK.; 6 CR.

B9801, B9802, B9803: Graduate Independent Study
Faculty assigned advanced research projects, which fall outside of the scope of existing MFA courses, but are relevant to a student's specialization in the program. Registration is only permitted by the Department's MFA Program Director, in consultation with a faculty advisor. Written proposal required. Interested students should consult their program advisors on guidelines for creating proposals Prereq: MCA/MFA Status. 1-3 HR./WK.; 1-3 CR.

FACULTY

Jerry Carlson, Associate Professor
B.A., Williams College; M.A., Univ. of Chicago, Ph.D.

Campbell Dalglish, Associate Professor
B.A., Univ. of Colorado; B.F.A., Yale School of Drama

David Davidson, Professor
B.A., Univ. of Illinois; M.F.A., New York Univ.

Andrzej Krakowski, Professor
M.F.A. (Equiv.), Polish State Film School, American Film Institute.

Herman Lew, Associate Professor
B.A., California State Univ. (Los Angeles); M.F.A., New York Univ.

Babak Rassi, Assistant Professor
B.A., George Mason Univ.; M.F.A., Florida State Univ.

Antonio Tibaldi, Assistant Professor
B.A., Univ. of Florence; M.F.A., California Institute of the Arts

Andrea Weiss, Professor and Chair
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 Stephen Jablonsky, Chair • Department Office: SH 72 • Tel: 212-650-7663

GENERAL INFORMATION

The City College offers the following master's degree in Music:

M.A.

The graduate program is designed to award the Master of Arts degree to those interested in acquiring the academic foundation for careers in classical and jazz performance, music history, theory composition and teaching.

DEGREE REQUIREMENTS

Requirements for All Students

V0000: Bibliography and Research Techniques	3
V2100, V2200: Structures of Music I-II	6
V6000-6800: Seminar in Style Criticism	3
Total Credits	**12**

Specialization Requirements

Musicology (History or Theory)

B1900: Thesis Research	3
Courses in Group II (History)	6-9
Courses in Group III (Composition/Theory)	6-9
Total Credits	**30**

Composition

V3100: Composition (4 semesters)	8
V3200: Composition Thesis	1
Courses in Group II (History)	3-6
Courses in Group III (Composition/Theory)	3-6
Total Credits	**30**

Performance

V8100: Private Instruction (4 semesters)	8
V8200: Recital	1
V8300, V8400: Ensemble (4 semesters)	4
One Course in Group II, III or IV	7
Total Credits	**32**

Additional Requirements

The Graduate Committee may waive or modify some of these required courses for students with equivalent training. In addition, up to 6 credits may be taken in related fields with permission of the Department.

Thesis: Students majoring in Music History and in Theory submit a thesis based on original research. Students majoring in Composition submit an original composition of substantial length together with a detailed explanation of its structure and devices. Guidelines for the format of theses are available from the Director of Graduate Studies.

Recital: Students majoring in Performance present a full-length recital, accompanied by an essay concerning an aspect of their recital program.

Comprehensive Examinations: The examinations cover history, theory, source materials, and style analysis.

Foreign Language Requirement: Proficiency requirements may be met in one of the following: French, Italian, German or Spanish.

ADVISEMENT

Graduate students meet with the Director of Graduate Studies, Professor Chadwick Jenkins (SH 80A; 212-650-7666; cjenkins@ccny.cuny.edu) at registration each semester to review their progress and to plan their programs.

COURSE DESCRIPTIONS

Group I. Required Courses

V0000: Bibliography and Research Techniques
The study and evaluation of sources and bibliographical methods. 3 HR./WK.; 3 CR.

V2100: Structures of Music I
Intensive study of common-practice tonal harmony and voice leading, as well as common formal designs, through compositional and analytical exercises. 3 HR./WK.; 3 CR.

V2200: Structures of Music II
An introduction to the theoretical concepts of post-tonal music through compositional, analytical and ear-training exercises. The seminar emphasizes early 20th –century repertoire, as well as secondary literature by contemporary theorists. Prereq.: Mus V2100. 3 HR./WK.; 3 CR.

V2300: Structures of Music III
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. Prereq.: Mus V2200. 3 HR./WK.; 3 CR.

Group II. Courses in History and Critical Research

V6000-6800: Special Topics in the History of Music /Music History Seminars
Seminars in various historical periods of music. Specific topics offered in a given semester will vary according to the needs of students and the availability and interest of faculty. 3 HR./WK.; 3 CR.

V6900: Jazz History Seminar
An in-depth examination of the work of a seminal artist, or time period, critical to the development of jazz. 3 HR./WK.; 3 CR.

V7100: History of Chamber Music
Examination of the evolution of various chamber music combinations from the

Baroque trio sonata to modern times. Emphasis on the stylistic history of the string quartet. 3 HR./WK.; 3 CR.

V7200: The Musical Experience
The essence of music as viewed from the perspective of the science, the social sciences, and the humanities. An examination of the role music plays in the human experience. 3 HR./WK.; 3 CR.

V9100: Tutorial
Independent study under guidance of a faculty member. Hours and credits vary.

Group III. Courses in Composition and Theory

V3100: Composition
Individual projects. May be taken up to 4 times. 2 HR./WK.; 2 CR.

V3200: Composition Thesis
Preparation of the substantial musical composition required for the degree. Work to be done under the guidance of a faculty advisor, whose approval is required prior to registration. Prereq: three semesters of Music V3100. May be taken along with a fourth semester of V3100. 1 HR./WK.; 1 CR.

V5200: Advanced Counterpoint
Composition of tonal and/or modal counterpoint according to style models. Analysis of tonal and/or modal counterpoint. 3 HR./WK.; 3 CR.

V5300: Analytic Techniques of Tonal Music
Concentration on tonal pitch structures in analysis and/or composition. 3 HR./WK.; 3 CR.

B2800: Advanced Orchestration
Modern practices in scoring. Projects in orchestrating original works. Arranging and scoring of piano and vocal materials for special groups. 3 HR./WK.; 3 CR.

B3100: Advanced Score Reading and Conducting
Playing from score using old clefs, transposition. Preparing piano reductions from orchestral scores. Developing baton techniques to deal with the problems of 20th century music. Rehearsal techniques for work with instrumental and vocal groups at various levels of proficiency. 3 HR./WK.; 3 CR.

Group IV. Courses in Performance

V8101: Private Instruction in Piano or Voice, and Performance Seminar
One-hour lesson per week plus participation in two-hour weekly seminar. May be taken only by graduate students with a specialization in performance. May be taken four times. 3 HR./WK.; 2 CR.

V8102: Private Instruction on Instrument
One-hour lesson per week. May be taken only by graduate students with a specialization in performance. May be taken four times. 1 HR./WK.; 2 CR.

V8200: Recital
Recital performed at the College. The program will be chosen in consultation with the faculty advisor, and approved by the graduate advisor during the semester prior to that in which the recital is performed. Historical-analytical background material will be prepared by the student prior to the performance. This course stands in lieu of Music B1900 (Thesis Research) as a requirement for students with a specialization in performance. 1 CR.

V8300: Chamber Music
Rehearsal and performance preparation of works from the 18th century through 20th century repertoire. For instrumental performance majors only. May be taken up to four times. 2 HR./WK.; 1 CR.

V8400: Ensemble
Rehearsal and performance participation in various ensembles, according to major instrument. For performance specializations only. May be taken up to four times. 3 HR./WK.; 1 CR.

Group V. Thesis

See also V3200, V8200

B1900: Thesis Research
Preparation of the thesis or composition required for degree candidates with specializations in Musicology and Theory. Work to be done under the guidance of a faculty advisor, whose approval is required prior to registration. Hrs. to be arranged; 3 CR.

Ph.D. Courses

Courses with V numbers may be credited toward the Ph.D. in Music for students matriculated at The City University Graduate School. For further information on the Ph.D. in Music, refer to the Bulletin of The City University Graduate School.

FACULTY

Daniel Carillo, Assistant Professor
B.A., The City College, M.A.

Alison Deane, Associate Professor
B.M., Manhattan School of Music, M.M.

David Del Tredici, Distinguished Professor
B.A., Univ. of California (Berkeley); M.F.A., Princeton Univ.

Barbara R. Hanning, Professor
B.A., Barnard College; Ph.D., Yale Univ.

Michael Holober, Assistant Professor
B.A., SUNY (Oneonta); M.M., SUNY (Binghamton)

Stephen Jablonsky, Associate Professor and Chair
B.A., The City College; M.A., New York Univ., Ph.D.

Chadwick Jenkins, Assistant Professor
B.A. Towson State Univ., M.A., Univ. of Maryland, College Park; Ph.D., Columbia Univ.

Paul Kozel, Associate Professor
B.Mus., Cleveland State Univ.; M.A., The City College

Shaugn O'Donnell, Associate Professor
B.A., Queens College, M.A.; Ph.D., CUNY

John Patitucci, Associate Professor

Jonathan Perl, Assistant Professor
B.F.A., CUNY; B.A., SUNY Purchase

Jonathan Pieslak, Assistant Professor
B.A., Davidson College; M.A., Univ. of Michigan (Music Theory), M.A. (Music Composition), Ph.D.

Suzanne Pittson, Assistant Professor
B.A., San Francisco State Univ., M.A.

Scott Reeves, Associate Professor
B.M., Indiana Univ., M.M.

PROFESSORS EMERITI

David Bushler
Ronald L. Carter
Constantine Cassolas
Fritz Jahoda
John Graziano
Jack Shapiro
Roger Verdesi

ARTISTS-IN-RESIDENCE

The Vanguard Jazz Orchestra
Musicians' Accord
Neil Clarke
Ray Gallon
Steve Horelick
John Motley
Rich Perry
Ray Santos

Department of Physics
(DIVISION OF SCIENCE)

Professor V. Parameswaran Nair, Chair • Department Office: MR 419 • Tel: 212-650-6832

GENERAL INFORMATION

The City College offers the following master's degree in Physics:

M.A.

DEGREE REQUIREMENTS

Required Courses

Physics:

V0100: Mathematical Methods in Physics	4
V1100: Analytical Dynamics	4
V1500-1600: Electromagnetic Theory	8
V2500-2600: Quantum Mechanics	8
Elective Courses	**6**
Total Credits	**30**

Additional Requirements
No more than nine credits taken in 60000-level courses (see Physics 55100-55500, 58000, 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.

TRANSFER TO PH.D. PROGRAM

Students in the Master's Program at The City College can usually transfer to the Ph.D. program by taking and passing the "First Examination." See the Graduate Advisor.

ADVISEMENT

Graduate Advisor
Prof. Timothy Boyer
MR 331; 212-650-5585

COURSE DESCRIPTIONS

Master's Level Courses

U3500: Quantum Physics I
4 HR./WK.; 4 CR.

U4500: Solid State Physics (same as Physics 55400)
3 HR./WK.; 3 CR.

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 Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR.

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 V1100. Prereq or coreq: Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR.

V1500-1600: Electromagnetic Theory
Electrostatics, magnetostatics, and boundary value problems; Maxwell's equations; multipole radiation from accelerated charges; scattering theory; special theory of relativity. Prereq or coreq: Physics V0100. All master's students will generally be required to take V1500-1600. 3 HR./WK., PLUS CONF.; 4 CR./sem.

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 Physics V2500-2600. Prereq: Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR./sem.

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. 3 HR./WK., PLUS CONF.; 4 CR.

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. Prereq: Physics V2500. 3 HR./WK., PLUS CONF.; 4 CR.

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. Prereq: Physics V2500. 3 HR./WK., PLUS CONF.; 4 CR.

V7100, V7200: Graduate Physics Laboratory I, 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 W5901. 2 LECT., 2 LAB. HR./WK.; 4 CR.

DOCTORAL COURSES OPEN TO MASTER'S STUDENTS

The City College is the major participant in the University Ph.D. program in Physics. A set of graduate courses is offered at City College, as well as 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:

W1200: Continuum Mechanics
4 CR.

W2500-2600: Quantum Field Theory
4 CR./SEM.

W3400: Theory of Relativity
4 CR.

W4500-4600: Quantum Theory of Solids
4 CR./SEM.

W5100-5900: Selected Topics in Advanced Physics
4 CR.

FACULTY

Robert R. Alfano, Distinguished Professor
B.S., Fairleigh Dickinson Univ., M.S.; Ph.D., New York Univ.

Joseph L. Birman, Distinguished Professor
B.S., The City College; M.S., Columbia Univ., Ph.D.; Doc-es-Sciences

Timothy Boyer, Professor
B.A., Yale Univ.; M.A., Harvard Univ., Ph.D.

Ngee-Pong Chang, Professor
B.S., Ohio Wesleyan Univ.; Ph.D., Columbia Univ.

Harold Falk, Professor
B.S., Iowa State Univ.; Ph.D., Univ. of Washington

Swapan K. Gayen, Professor
B.Sc.(Honors), Univ. of Dacca, M.Sc; M.S., Univ. of Connecticut, Ph.D.

Joel Gersten, Professor
B.S., The City College; M.A., Columbia Univ., Ph.D.

Daniel M. Greenberger, Professor
B.S., M.I.T.; M.S., Univ. of Illinois, Ph.D.

Marilyn Gunner, Professor
B.A., SUNY (Binghamton); Ph.D., Univ. of Pennsylvania

Michio Kaku, Professor
B.A., Harvard Univ.; Ph.D., Univ. of California (Berkeley)

Ronald Koder, Assistant Professor
B.S., Univ. of Missouri-Columbia, Ph.D., John Hopkins

Joel Koplik, Professor
B.S., Cooper Union; Ph.D., Univ. of California (Berkeley)

Matthias Lenzner, Associate Professor
M.S., Friedrich-Schiller-Univ.; Ph.D., Jena Germany

Michael S. Lubell, Professor
A.B., Columbia Univ.; M.S., Yale Univ., Ph.D.

Hernan Makse, Associate Professor
Licenciatura (Physics), Univ. of Buenos Aires; Ph.D., Boston Univ.

Carlos Andres Meriles, Assistant Professor
B.Sc., FaMAF, Universidad Nacional de Cordoba, Argentina, Ph.D.

V. Parameswaran Nair, Professor and Chair
B.S., Univ. of Kerala; M.Sc., Syracuse Univ., Ph.D.

Vladimir Petricevic, Professor
Dipl. EE., Univ. of Belgrade; M.S. Miami Univ.; Ph.D., CUNY

Alexios P. Polychronakos, Professor
Dip. E.E., National Technological Univ. of Athens; M.Sc., California Institute of Technology, Ph.D.

Alexander Punnoose, Associate Professor
B.S., Indian Institute of Technology; M.S., Ph.D., Indian Institute of Science

Myriam P. Sarachik, Distinguished Professor
A.B., Barnard College; M.S., Columbia Univ., Ph.D.

David Schmeltzer, Professor
B.Sc., Hebrew Univ.; M.Sc., Technion, D.Sc.

Mark Shattuck, Associate Professor
B.A., Wake Forest Univ., M.S.; Ph.D., Duke Univ.

Frederick W. Smith, Professor
B.A., Lehigh Univ.; Ph.D., Brown Univ.

Jiufeng J. Tu, Associate Professor
A.B., Harvard Univ., A.M.; M.S., Cornell Univ., Ph.D.

Sergey A. Vitkalov, Associate Professor
M.S., Moscow Institute of Physics and Technology; Ph.D., Institute of Solid State Physics, Russian Academy of Sciences

PARTICIPATING FACULTY

Morton M. Denn, Albert Einstein Professor
B.S.E. (Ch.E.), Princeton Univ.; Ph.D., Univ. of Minnesota

Richard N. Steinberg, Professor
B.S., SUNY Binghamton; M.S., Yale Univ., Ph.D.

PROFESSORS EMERITI

Adolf Abrahamson
Michael Arons
Robert Callender
Victor Chung
Herman Z. Cummins
Erich Erlbach
Martin Kramer
Seymour J. Lindenbaum
Marvin Mittleman
Peter Tea
Martin Tiersten

Department of Psychology

(DIVISION OF SOCIAL SCIENCE)

Professor Robert 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

M.A. in Mental Health Counseling

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 Department of Psychology offers a Master of Arts in Mental Health Counseling degree with a focus on prevention and community development. The curriculum provides a thorough foundation in the theory and practice of counseling for the prevention and amelioration of psychological distress. The Master of Mental Health Counseling program provides an opportunity for an education in a high demand, high growth career area. Sixty post-baccalaureate credits are required to complete the degree. The program satisfies the new state requirements for licensure as a mental health counselor.

Applicants are required to have a minimum grade point average of 3.2. Other requirements include an individual and/or group interview and three letters of recommendation. The deadline for submitting an application for fall admission is April 15th. 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 Cynthia Grace, Program Director
NA 7/230; Tel: 212-650-5713

M.A. IN GENERAL PSYCHOLOGY DEGREE REQUIREMENTS

Students may complete the degree in one of two ways: with a thesis (B9900) and 31 additional credits or without a thesis with 40 credits.

Required Courses

V0100: Advanced Experimental Psychology I 4
V0500: Statistical Methods in Psychology I 3

A student also must take one (3 credit) 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.

A student must maintain a minimum grade point average of 3.0

Thesis Option: Students choosing the thesis option are required to enroll in B9900 for which they receive 3 credits with no grade until they complete their thesis. Most students enroll in B9900 for two semesters 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 V0500, V0100 and 3 credits from among one of the biological foundations, cognitive or testing areas (or the GRE substitution). The other degree requirements are identical as for the thesis students. Up to 15 graduate credits are eligible for transfer from other approved institutions.

Total Credits **31-40**

M.A. IN MENTAL HEALTH COUNSELING

The Two-Year Sequence

Semester 1	**Credits**
Developmental Psychology	3
Theories and Techniques of Counseling	3
Group Dynamics and Group Counseling	3
Professional Orientation and Ethics	2
Recognition and Reporting of Child Abuse	1
Elective	3

Semester II

Psychopathology	3
Clinical Instruction	3
Family and Couples Counseling	3
Drug and Alcohol Abuse: Diagnosis and Treatment	3
Elective	3

Semester III

Multicultural Issues in Counseling	3
Assessment and Appraisal of Individuals, Couples, Families and Groups	3
Lifestyle and Career Development	3
Practicum in Counseling I	3
Elective	3

Semester IV

Counseling Adolescents	3
Research and Program Evaluation	3
Foundations of Mental Health Counseling and Consultation	3
Practicum in Counseling II	3
Psychoeducational and Community Interventions	3

Total: 60

Twenty-four (40 percent) of the 60 credits may be transfer credits at the discretion of the program.

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 Graduate Director. Courses with grades less than B are not eligible for transfer credit.

COURSE DESCRIPTIONS

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. 3 HR./WK.; 3 CR.

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 M.A. students. 2 LECT., 4 LAB. HR./WK.; 4 CR.

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 M.A. and Ph.D. students. 2 rec., 2 LAB. HR./WK.; 3 CR.

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. 2 rec., 2 LAB. HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

V1200: An Introduction to Neuropsychology
This course will provide 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. 3 HR./WK.; 3 CR.

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. *(Rationale: Neuropsychology is a fast growing area of Psychology. This course will provide students in a general M.A. program with some exposure to the field)*. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

V2500: Developmental Psychology-The Later Years
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. 3 HR./WK.; 3 CR.

V3000: Psychology of Learning
Analysis of contemporary research and theory in the area of behavior modification. 3 HR./WK.; 3 CR.

V3300: Psychological Aspects of Learning Disabilities
This course will provide 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 3) right hemisphere learning disorders. Diagnosis and evaluation will be a central component of the course, and a case presentation format will be used to flesh out our understanding of each disorder. Prereq.: Doctoral Students must have completed at least one semester of Diagnostic Testing. 3 HR./WK.; 3 CR.

V3900: Introduction to Neuropsychology
This course will provide an overview of the field of neuropsychology, focusing on what is known about the functional organization of brain systems. Prereq.: Admission to the MA program or the instructor's permission. 3 HR./WK.; 3 CR.

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. Prereq.: Psy. 70500. 3 HR./WK.; 3 CR.

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. Prereq.: Master's level Statistics or Experimental Psychology or permission from the instructor. 3 HR./WK.; 3 CR.

V4600: Advanced Social Psychology
Among the topics to be covered are: methodology; social motivation; social or person perception; group processes; and attitude change. 3 HR./WK.; 3 CR.

V5301: Family Psychology
The course explores family structure and process. An effort is made to study historical and cultural factors and contemporary changes in the family. Theoretical models will be examined in some detail as a basis for clinical and research evaluation. 3 HR./WK.; 3 CR.

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 will be substantially supported by demonstrations of patients at a psychiatric hospital and clinic. The first semester will stress the functional psychoses. 3 HR./WK.; 3 CR.

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. 2 LECT., 2 LAB. HR./WK.; 3 CR.

V6500: Group Therapy and Counseling
Reviews concepts and theoretical perspectives related to the dynamics, processes, and functioning of small groups and therapy groups in particular, with majors focus on the developmental dimensions, characteristics of behavior of all small groups that meet face to face with the same members on a regular basis over a period of time. Contrast between individual and group therapy are examined, key healing elements of therapy groups are studied, and critical analytic-behavioral skills of therapists are also examined for their ability to enhance the key healing elements of group therapy. Differences between Alcoholics Anonymous and group therapy are also examined with special attention to procedures and goals of cognitive-behavioral, Gestalt, and interpersonal-psychodynamic group therapies. Class members will participate in, and be members of, an ongoing classroom self-study group – a Training Group – comprised of all members of the class. 3 HR./WK.; 3 CR.

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. 3 HRS./WK; 3 CR.

V7000: Substance Abuse Assessment and Treatment Planning
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 on theories and techniques of substance abuse treatment, including in-class role-play practice in principles of assessment, diagnosis, case conceptualization, stages of readiness for treatment, and treatment planning. 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 emotion, cognition-perception, physiology, values, and behavior, as well as the biological, psychological, social, family, and community risk, resiliency, and epidemiological factors related to the onset, continuation, and treatment-outcome prognosis of drug abuse. 3 HR./WK.; 3 CR.

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 will be examined. Prereq.: Undergraduate courses in substance abuse and/or abnormal psychology. 3 HR./WK.; 3 CR.

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 will also be reviewed. Discussion of major diagnostic classifications systems, including DSM-III and the GAP manual. Prereq: permission of the instructor. 3 HR./WK.; 3 CR.

V7600: Fundamentals of Program Evaluation and Consultation: A Practical Approach
This course integrates several aspects of program evaluation into a practicum-based experience. The course will review basic evaluation theory and methods used in evaluation research. An introduction to the variety of purposes for evaluation is provided with an emphasis on the range of current methods used in evaluation. The course will also focus on the evaluator's role and on the principles of successful evaluation consultation. Students will review the basic steps involved in designing and implementing an evaluation and in reporting its results. The course will help students to develop the skills they need to identify or develop program objectives, document program implementation, assess program impact and report on a program evaluation. Prereq.: A "B" or better average in psychology undergraduate methods and statistics courses or "B" or better in V0100 and V0105; and a "B" or better in a "content-area" graduate course. 3 HR./WK.; 3 CR.

B9700: Special Topics in Psychology
Prereq: approval of the appropriate faculty sponsor. Hrs. to be arranged; 3 CR.

B9800: Tutorial
Prereq: approval of the appropriate faculty sponsor. May be taken twice for credit. Hrs. to be arranged; 3 CR.

B9900: Psychological Research and Seminar
Psychological research and seminar for candidates for the M.A. degree who are engaged in thesis research. Offered each semester. Required for M.A. students. Hrs. to be arranged; 3 CR.

COLLOQUIA

All master's students are expected to attend colloquia regularly and to participate in reports of research.

PH.D. ELECTIVES

In addition to the M.A. Program, City College houses two Ph.D. programs: the Clinical Psychology Program and the Cognition Neuroscience Program. Several Ph.D. courses are open to M.A. students. Students interested in taking courses at the Ph.D. level should contact the program director in clinical psychology (Elliot Jurist) or cognitive neuroscience (John Foxe).

FACULTY

Adeyinka Akinsulure-Smith, Assistant Professor
B.A., Univ. of Western Ontario; M.A., Columbia Univ., Ed.M., M.Phil., Ph.D.

William Crain, Professor
A.B., Harvard Univ.; Ph.D., Univ. of Chicago

Diana Diamond, Associate Professor
B.A., Wesleyan Univ.; M.A., Univ. of Massachusetts, M.S., Ph.D.

William Fishbein, Professor
B.S., New York Univ., M.A.; Ph.D., Univ. of Colorado

Tiffany Floyd, Assistant Professor
B.A. SUNY (Binghamton); M.A.,Temple University, Ph.D.

John J. Foxe, Professor
B.A., Univ. College Dublin; B.Sc., Iona College; M.S., Albert Einstein College of Medicine, Ph.D.

Peter Fraenkel, Associate Professor
B.A., Boston Univ.; Ph.D., Duke Univ.

Hilary Gomes, Associate Professor
B.S., Georgetown Univ.; M.A., City College; Ph.D., CUNY

Cynthia A. Grace, Associate Professor
B.A., New Paltz; M.A., Columbia Univ., M.Ed., Ed.D.; 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 King, Professor
B.A., Rutgers Univ.; M.A., Univ. of Colorado, Ph.D.

Arthur D. Lynch, Associate Professor
B.A., Univ. of Texas, Ph.D.

Robert Melara, Professor and Chair
B.A., Stony Brook Univ.; M.A., New School, Ph.D.

Glen Milstein, Assistant Professor
B.A., Brandeis Univ.; Ph.D., Teachers College (Columbia Univ.)

Cynthia A. Grace, Associate Professor
B.A., SUNY (New Paltz); M.A., Teachers College, Columbia Univ., Ed.D.; Ph.D., CUNY

Ruth Ellen Proudfoot, Associate Professor
A.B., Radcliffe College; Ph.D., New York Univ.

Tony Ro, Professor
B.A., Univ. of California (Berkeley); Ph.D., Univ. of California (Davis)

Margaret Rosario, Associate 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.

Irvin S. Schonfeld, Professor
B.S. Brooklyn College; M.A., New School; Ph.D., CUNY

Brett Silverstein, Professor and Dean, Division of Social Science
B.A., State Univ. of New York (Stony Brook); Ph.D., Columbia Univ.

Arietta Slade, Professor
B.A., Sarah Lawrence College.; Ph.D., New York Univ.

Ellen E. Smiley, Associate Professor
B.S., Denison Univ.; A.M., Univ. of Illinois, Ph.D.

Arthur J. Spielman, Professor
B.A., The City College; Ph.D., CUNY

Vivien C. Tartter, Professor
B.A., Brown Univ., M.A., Ph.D.

Stephen Thayer, Professor
B.A., New York Univ.; M.A., Columbia Univ., Ph.D.

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

Anderson J. Franklin
Eugene L. Hartley
Douglas C. Kimmel
Donald E. Mintz
Herbert Nechin
Lawrence Nyman
Vera Paster
Irving H. Paul
John J. Peatman
Lawrence Plotkin
Getrude R. Schmeidler
Jerry Siegel
Ann Rees
Harold Wilensky

Public Service Management Program

(DIVISION OF SOCIAL SCIENCES)

Dean Brett Silverstein, Director • Program Office: NAC 6/141 * Tel: 212-650-5826

GENERAL INFORMATION

The City College offers the following master's degree in public service management:

M.P.A.

PROGRAM AND OBJECTIVES

This interdisciplinary program is designed to prepare students for management-level positions in government agencies and non-profit organizations. The program combines course work in management. economics, policy, and social problems with the opportunity to specialize in one of five areas of public service: urban affairs; public-private partnerships in management of infrastructure; environmental concerns; social issues; and international relations.

DEGREE REQUIREMENTS

Required Courses:

B1600: Management of Public Organizations 3
B1610: Public Budgeting and Finance 3
B1620: Introduction to Statistics: Accessing, Analyzing, and Interpreting Data 3
B1700: Introduction to Public Policy 3
B1710: Policy Frameworks and Target Populations: Race, Ethnicity, Gender, and Class 3
B1720: Economics for Public Policy: Markets, Market Interventions, and Market Failures 3
B1730: Policy Analysis and Policy Writing 3
B1460: Public Policy Internship in Area of Specialization 3
B9900: Capstone/Thesis in Area of Specialization 3

Total credits 27

Specialization Requirments:
Students are required to select and complete 12 credits in one of the specializations listed below. Of those 12 specialization credits, six are required and six are elective. Elective courses are selected in consultation with an advisor.

Urban Policy

ECO B9502:Urban Economics 3
PSM B1740: Urban Politics 3

Public-Private Partnerships in the Management of Infrastructure

ECO B9523: Transportation Economics 3
ECO B9524: Public-Private Partnerships 3

Environmental Policy

ECO B9526: Economics of the Environment and Natural Resources 3
ECO B5927: Environmental Management 3

Social Policy

PSM B1750: Power, Inequality, and Social Welfare Policy 3
ECO B9520: Urban Economics 3

Foreign Policy

IR B6927: International Political Economy 3
IR B6940: Foreign Policy Analysis 3
Total Elective Credits 6

Total Credits 45

ADVISEMENT

Dean Brett Silverstein, Director: NAC 6/141, 650-5861.

Ms. Wendi Joy Franklin (general program information, admissions): NAC 6/293, 650-5844.

Professor Kevin Foster: NAC 5/103A, 650-6201.

Professor John Krinsky: NAC 4/138B, 650-5236.

Mr. Mark Musell (capstones, internships, community service scholarships): NAC 6/140, 650-6809.

Professor Leslie Paik: NAC 6/127, 650-5854.

COURSE DESCRIPTIONS

All courses carry the course designation PSM unless otherwise noted

B1600: 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

B1620: Introduction to Statistics: Accessing, Analyzing, and Interpreting Data
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, SPSS and STATA. By the end of the course, students will be able to create a simple database, run basic statistical analyses, and prepare and analyze univariate and multivariate regressions. 3 HR. /WK.; 3 CR.

B1630: Communication and Political Action
Examines the role of mass media in American politics, focusing on the news media. Covers evolving theories about the function of the press in a democratic society, the nature of news, the effects of mass communication, the impact of the news media on public opinion, and the declining public support for the media. 3 HR./WK.; 3 CR.

B1640: MPA Internship
Students complete 400 hours of professional-level work in a government agency or non-profit organization. 3 CR.

B1700: Introduction to 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. 3 HR./WK.; 3 CR.

B1710: Policy Frameworks and Target Populations: Race, Ethnicity, Gender, Immigration, 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. 3 HR /WK.; 3 CR.

B1720: The Economics of Public Policy: Markets, Market Interventions, and Market Failures
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. 3 HR./WK.; 3 CR.

B1730: Policy Analysis and Policy Writing
Covers the basic techniques of policy analysis and the art, craft, and science of providing problem-solving advice to managers, policy-makers, or citizens. Explores the importance of understanding the policy context within and outside of an organization. Provides tools and practical advice on communicating clearly, concisely and persuasively. 3 HR./WK.; 3 CR.

B1740: Urban Politics
Examines different approaches to the study of urban politics, each of which has political implications. Course investigates pluralist, elite, and regime theories. Also covers the intuitional aspect of city politics. Focuses on New York and its relation to state and federal governments. 3 HR./WK.; 3 CR.

B1750: Power, Inequality, and Social Welfare Policy
Examines the development of the American welfare state and current conflicts and debates about its performance and future. Covers the history of social welfare policies in the United States and the challenges associated with changing those policies. Course requires a research project with direct relevance to a social welfare agency in New York City. 3 HR./WK.; 3 CR.

B1760: Introduction to the Geographic Information Systems (GPS) and Remote Sensing
Covers the basic concepts of geography necessary to efficiently use GPS. Also covers basic GPS concepts, techniques, and applications. Examines remote sensing of the environment. Course reviews the historical creation of satellite platforms, current usages of satellite data in earth sciences, and techniques used to highlight important data sets. 3 HR./WK.; 3 CR.

B1770: Housing Policy
Covers the basics of urban housing policy in the U. S., with a focus on New York City. Highlights the important issues that define urban housing policy as it developed over the past sixty years. Considers role of markets and subsidies in providing housing for the poor. Considers questions of homelessness, gentrification, and affordability. 3 HR./WK.; 3 CR.

B1780: Environmental Politics and Policy: Comparative and Global Perspectives
Provides an historical overview of environmental policy and politics. Covers the role of major participants in the political process; land stewardship and public/private lands; waste and energy policy; water and air policy; the emergence of global political players; environmental regimes; and future issues. 3 HR./WK.; 3 CR.

B1790: Environmental Law
Examines the fundamental types of government regulation and laws. Analyzes the outcomes desired and achieved by those. Reviews environmental laws promulgated by federal, state, and city governments and by regional authorities (water and land). 3 HR./WK.; 3 CR.

B1800: Women and Politics
Covers the theories and history of women's political participation; women and political attitudes; women and political participation; women in public office; women and policy; and women leaders. Students prepare and deliver presentations. 3 HR./WK.; 3 CR.

B1810: Law and Public Policy
Covers how courts contribute to the making of public policy. Examines how law shapes and constrains public policy by setting rules and limits, and by establishing the terms of discourse. Topics include judges as policy makers; interactions between the judiciary and the executive and legislative branches, as well as interest groups, social movements, the media, and the general public. Special emphasis on whether courts are effective agents of social change. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 LECT., 2 LAB HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ECO B 9502: 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. 3 HR./WK.; 3 CR.

ECO B9523: Transportation Economics
Introduces students to the major theories, methods, and policy issues in the field of urban transportation economics. Topics include demand analysis and forecasting; cost structure of transportation firms; pricing and regulation; competition and market structure; public transit analysis; network economics; externalities and congestion pricing; transportation investment analysis; and joint transportation and land-use modeling. Emphasis is on real-world transportation problems. 3 HR./WK.; 3 CR.

ECO B9524: Public-Private Partnerships and Infrastructure Financing and Management
Examines the role of public-private partnerships in creating and maintaining transportation, housing, and other infrastructure projects. Considers project management and compares innovative solutions from across the U. S. and other countries. 3 HR./WK.; 3 CR.

ECO B9525: Government Regulation and Executive Decision Making
Surveys the social, legal, political, and ethical responsibilities of businesses to both external and internal stakeholders. Examines the different positions regarding the notion of corporate responsibility toward society, as well as the nature of such responsibility. Covers the impact of ethical orientation on economic and financial performance. Application of stakeholder and ethical systems to specific problems and case studies. 3 HR./WK.; 3 CR.

ECO B9526: Economics of the Environment and Natural Resources
Examines how people make choices when unlimited wants meet scarce resources. Covers economic approaches to environment and natural resource problems; market failures; regulation and trading mechanisms; classical models of natural resources; discounting and accounting for risk and uncertainty; welfare economics; cost-benefits analysis; development and the environment; renewable and nonrenewable resource allocation; and the economics of climate change. 3 HR./WK.; 3 CR.

ECO B9527: Environmental Management
Examines the theory and practice of social entrepreneurship in the private, public, and non-profit sectors. Areas of social innovation as diverse as business, environment, education, human services, and government will be explored. Topics covered include social enterprise, venture philanthropy, and social return on investment. Students gain practical knowledge of how to identify potential social venture opportunities; develop skills and competencies related to social entrepreneurships; and examine ways of measuring success. 3 HR./WK.; 3 CR.

ENGIN I2600: Urban Transportation Planning
Transportation planning in context of U. S. policy, TEA21 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. 2 HR./WK. PLUS CONF.; 3 CR.

IR B6200: International Organizations
Analyzes 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 deal with the problems of peace and security, economic and social development, human rights, and humanitarian assistance. 2 HR./WK. PLUS CONF.; 3 CR.

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, the laws of warfare, the use of force, refugees, and international criminal tribunals. 2 HR./WK. PLUS CONF.; 3 CR.

IR B6927: International Political Economy
Explores theories that attempt to explain the dynamics of the international economy, and examines the institutions that provide for cooperation in facilitating international trade, monetary exchange, and investment. It pays particular attention to the role of the World Trade Organization, the World Bank, the International Monetary fund, and the U. N. development agencies. Examines the debates around globalization. 2 HR./WK. PLUS CONF.; 3 CR.

IR B6928: Human Rights in World Politics
Explores the development and implementation of human rights norms within the international system. It also discusses the debates surrounding the concept of 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 international levels. 2 HR./WK. PLUS CONF.; 3 CR.

IR B6940: Foreign Policy Analysis
Covers the basic approaches and theories that help explain foreign policy decisions and actions. Students engage in empirical work on specific countries. 2 HR./WK. PLUS CONF.; 3 CR.

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. 3 HR. /WK.; 3 CR.

SOC B5300: Comparative Urban Development
Examines the links between cities and social theory through a series of comparisons that includes Engel's Manchester and the new Manchester; turn of the century Chicago and the new Chicago; post-socialist Prague; and New York. Considers questions of continuity and differences across cities and over time in the context of current analytical debates. 3 HR./WK.; 3 CR.

SOC B5400: The Urban Child
Examines the historical roots and life experiences of U.S. Latinos, with a focus on children and young people who live in urban contexts. Topics covered include: the colonial experience, annexation, migration, and the development of Latino communities within U.S. borders; growing up Latino, family life, sexuality, and gender relations; religion and spirituality; the challenges of maintaining cultural values and traditions while confronting prejudice and discrimination; and the emergence of a Latino identity. Course will also consider the impact of new trends among the now-largest minority group in this country. 3 HR./WK.; 3 CR.

SOC B5500: Latinos in the United States
Covers the socio-economic and political origins of migration from Latin American and the Spanish-speaking Caribbean to the

Unites States, with an emphasis on New York City. Examines the impact that U. S. society has had on Latinos in New York and other parts of the country in areas of employment, education, politics, social mobility, and ethnic relations. 3 HR./WK.; 3 CR.

SOC B5600: Comparative Immigration Policy
Examines the new immigration to the U. S. in light of the old, searching for similarities that link this latest wave to the earlier experience, and for differences that make recent immigration distinctive. New York's experience will be placed in the context of other immigrant cities, such as Los Angeles. Covers concepts and theories in the field of immigration. 3 HR./WK.; 3 CR.

SOC B6100: Seminar: Problems in Criminology
Criminology and criminal law. Problems in the measurement and statistical analysis of crime; typologies of offenders; eighteenth and nineteenth century backgrounds of criminological thought; and contemporary theories of criminality. Analysis of selected behavior systems in crime recidivism, and problems of prediction. Offered in cooperation with the School of Education. 3 HR./WK.; 3 CR.

FACULTY

Maria Binz-Scharf (Economics)
Adib Birkland (Economics)
Ken Craddock (Rangel Center)
David Diaz (Political Science)
Damiel DiSalvo (Political Science)
Kevin Foster (Economics)
Lily Hoffman (Sociology)
John Krinsky (Political Science)
R. L'Heureux Lewis (Sociology)
Mark Musell (Rangel Center)
Leslie Paik (Sociology)
Jenny Schuetz (Economics)
Ramya Shankar (Economics)
Arthur Spears (Anthropology)

Charles B. Rangel Center for Public Service

Dean Brett Silverstein, Director • Office: NAC 6/141 • Tel. 212 650-5861

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 under construction.

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 serves as a source of information, research, and analysis on the topic of promoting the involvement of under-served individuals in the leadership of the public service. Current research focuses on collecting data that will serve as the foundation for the Center's planned database on the promotion of leadership among under-served populations. The research, partially funded by a Ford Foundation grant, will examine graduate programs in public service to determine the level of participation by students from under-served groups and the degree to which those programs address the skills and knowledge required to advance minority participation in public service. The research will also review "best practices" regarding the promotion of representation of the underserved in the public service, information that can serve among other things, as the basis for public-service skills enhancement through training and instruction.

NEW FACILITIES

The Charles B. Rangel Center will be located adjacent to campus in a town house currently under renovation. The facility will feature offices, classrooms, meeting rooms, and a state-of-the-art conference center, all designed to support the various programs of the Rangel Center. The facility will also be the home of the new C.V. Starr Library, which will hold, among other things, documents and memorabilia from the long and distinguished career of Charles B. Rangel. The Rangel Center also plans a cutting-edge computer center designed for student training and research.

Department of Sociology

(DIVISION OF SOCIAL SCIENCE)

Professor Gabriel Haslip-Viera, Chair • Department Office: NA 6/125 • Tel: 212-650-5485

GENERAL INFORMATION

The City College offers the following master's degree in Sociology:

M.A.

DEGREE REQUIREMENTS

Required Courses

V0100: Development of Sociological Theory	3
B1001: Quantitative Methods	3
B1002: Qualitative Methods	3

Elective Courses

Graduate courses in both theoretical and applied Sociology	21
Total Credits	**30**

ADDITIONAL REQUIREMENTS

The student may take six credits of relevant graduate work at other schools, subject to the approval of the Chair of the Graduate Committee.

Thesis: Required.

Comprehensive Examination: The candidate must pass a written comprehensive examination.

Statistics: Demonstration of proficiency in statistics.

Language Requirement: Proficiency in the use of one relevant language may be substituted for the statistics requirement.

ADVISEMENT

Graduate students must see the graduate advisor each semester to review their progress and plan their programs.

COURSE DESCRIPTIONS

V0100: Development of Sociological Theory
Critical examination of the major treatises and schools in the development of sociological theory from Comte to the 20th century theorists. 3 HRS./WK; 3 CR.

B1001: Quantitative Methods
Appraisal of the concepts and methods used in quantitative research. Discussion of the applications of quantitative techniques, including computer analysis for large-scale survey data. Examples from published research will be used to examine the adequacy of research design as well as the relevance of particular techniques. Prereq: an introductory course in statistics, or research. 3 HRS./WK; 3 CR.

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. Prereq: an introductory course in statistics, or research. 3 HRS./WK; 3 CR.

B1100: Seminar in General Sociological Analysis
A comparative overview of various current models of sociological analysis, including functionalism, enthnomethodology, and evolutionary schools. 3 HRS./WK; 3 CR.

B1200: Seminar in Social and Cultural Anthropology
Principles and problems of anthropology in interdisciplinary focus. Development of anthropological concepts and propositions and their use in the several social sciences. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

B6100: Seminar: Problems in Criminology
Criminology and criminal law. Problems in the measurement and statistical analysis of crime; typologies of offenders. Eighteenth and nineteenth century backgrounds of criminological thought; contemporary theories of criminality. Analysis of selected behavior systems in crime recidivism and problems of prediction. Offered in cooperation with the School of Education. 3 HRS./WK; 3 CR.

B8000: Deviant Behavior
Societal, legal, moral, religious and sociological definitions of deviant behavior. Current approaches to dealing with the deviant. Deviance as role behavior. 3 HRS./WK; 3 CR.

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. 3 HRS./WK; 3 CR.

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 char-

acteristics 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. 3 HRS./WK; 3 CR.

B3200: Research
Individualized research on specific projects, under the direction of a graduate professor. Conferences to be arranged. Approval of a faculty member and Chair of Graduate Committee required. (Maximum of 6 credits.) 3 CR./SEM.

B5100: The Metropolitan Community
An examination of the varied communities that make up the city and their impact upon society based on theories of urbanization and urban life. Included are different religious groups, gays, racial minorities and a variety of social classes. There is special focus on how the groups interact with each other. 3 HRS./WK; 3 CR.

B5200: The 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, expansion, political, social and economic life. 3 HRS./WK; 3 CR.

C0000: Series
Courses given on special issues in sociology, on a rotating schedule, such as public policy, ethnic issues, drug and alcohol problems, etc. 3 HRS./WK; 3 CR.

Courses offered in other graduate programs are available to graduate students in Sociology with permission of the Graduate Sociology Committee.

FACULTY

Ibtihaj Arafat, Professor
B.S., Oklahoma State Univ., M.S., Ph.D.

Mehdi Bozorgmehr, Associate Professor
B.S., California State Univ.; M.A., San Diego State Univ.; M.A., Univ. of California (Los Angeles) Ph.D.

Katherine K. Chen, Assistant 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.

Marina Wikramanayake Fernando, Associate Professor
B.A., Univ. of Ceylon, Sri Lanka; M.A., Univ. of Wisconsin, Ph.D.

Gabriel Haslip-Viera, Professor and Chair
A.A.S., SUNY(Farmingdale); B.A., The City College M.A., Columbia Univ., Ph.D.

William Helmreich, Professor
B.A., Yeshiva Univ., M.A.; Ph.D., Washington Univ. (St. Louis)

Ramona Hernandez, Professor
B.A., Lehman; M.A., New York Univ.; Ph.D., CUNY

Lily M. Hoffman, Associate Professor
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Milton L. Barron
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Baidya Nath Varma
Charles Winick
Betty Yorburg

School of Architecture, Urban Design and Landscape Architecture

School of Architecture, Urban Design and Landscape Architecture

Professor George Ranalli, Dean • Professor Peter Gisolfi, Chair • Department Office: Shepard 103 • Tel: 212-650-7118

GENERAL INFORMATION

The School of Architecture, Urban Design and Landscape Architecture offers the following graduate degrees:

M. Arch.

M.L.A.

M.U.P. (Urban Design)

PROGRAMS AND OBJECTIVES

The School offers programs leading to professional degrees in the following areas:

Architecture (Program Director – Professor Bradley Horn)

Landscape Architecture (Program Director – Professor Achva Benzinberg Stein)

Urban Design (Program Director – Professor Michael Sorkin)

Additional information about programs in Architecture may be found in the Bulletin of Undergraduate Programs.

Master of Architecture I
Students are admitted to the Master of Architecture I program after completing a liberal arts education. The curriculum is dedicated to investigating the union of architectural form and thought. It understands architecture as the meeting ground between public and private expression and sees the city as its preeminent site. The program seeks to import mastery of the fundamental skills and ideas necessary for the practice of architecture in the 21st Century. The principal medium for this is the design studio. Nourished by courses in technology, environment, history, and theory, students will undertake problems of growing complexity over the three years of the program.

The required Master's curriculum covers the full range of topics—from basic design to structures and environmental systems, to history, philosophy, and the ethics of profession—necessary for students starting their architectural studies "from scratch." Beginning with the investigation of form-making in the abstract, with the nature of the architectural program, and with the media of architectural representation, projects progressively integrate questions of landscape, the social organization of space, the characteristics of institutional form, the morphology and typology of city space, construction, and environmental technology.

The program includes both required courses and a substantial number of electives. These latter may be taken both from within the School and from any of the institutions in the CUNY system, including the Graduate Center. Students can use these options both to reinforce work in the studio and to pursue their own special interests within the field. Widespread inquiry is encouraged: the program is firm in its belief that excellence of form is built on a foundation of excellence in ideas.

Master of Architecture II
The Master of Architecture II program is directed at students who already hold a first professional degree in architecture who wish to deepen their design abilities and expand their knowledge of contemporary theory, technology, and environmental systems. The three studios in the sequence provide in-depth studies of architectural problems that seek to integrate the forms, ideas, and technologies that anticipate construction. Projects may also explore the far boundaries of the discipline of architecture, participating in the research behind its continuing reinvention.

Students will have the opportunity to take a number of elective courses in areas of their own special interest. These may be selected from among those offered in the three programs of the School as well as from other institutions in the CUNY system, including the Graduate Center. Students are strongly encouraged to seek these points of conjuncture between architecture and related disciplines that are most meaningful to their individual development as practitioners.

Masters of Landscape Architecture I
The Master's of Landscape Architecture first professional degree option is intended for students who hold degrees in disciplines other than landscape architecture. This six semester program leads to a first professional degree (M.L.A.). The program objective is to prepare students to practice the profession of Landscape Architecture with the knowledge and skill required to manage and design the process of changes associated with the creation of places in urban, suburban and natural landscapes.
The program also provides an opportunity for students to productively link their background with the discipline of landscape architecture toward development of an individual definition of how the profession can contribute to creating successful and sustainable communities. The program ensures that students develop a full range of

design and professional skills, integrating the concept and execution of long-term sustainable practices into educational processes. Offered is a flexible program that allows students to expand the definition of landscape architecture relative to flexible program that allows students to expand the definition of landscape architecture relative to their own skills, interests and goals.

The principal medium of instruction is the design studio. Students undertake design and planning problems of growing complexity over the three years of the program. The studio courses are supported by seminars in natural science, technology, history, and theory,

Masters of Landscape Architecture II
A two-semester sequence leading to a graduate or second degree (M.L.A.) for students with a first professional undergraduate degree in Landscape Architecture (B.A. or B.S. in Landscape Architecture). 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 are extensive opportunities for students to pursue independent research and enroll in the full range of courses in the college and university.

Urban Design
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.

This program is focused on the design of new forms for the city and urban life. Committed to experiment, it seeks to investigate the effects on and prospects for the city arising from contemporary transformations in technology, culture, lifestyles, environment, economic organization, governance, and architecture. Drawing on the unparalleled resources of City University and the City of New York, the program aims to stimulate analytical rigor formal creativity in a variety of media. The program seeks to play an active and ameliorative role in shaping futures for New York and cities around the world through both formal research and direct engagement with communities.

The program is designed to be completed in two full-time, sequential semesters. At its core is the design studio, taught by the Director, which moves, in a two semester sequence, from an abstract consideration of urban morphologies and systems to a realistic, large-scale, project sited in New York City. The studio also travels annually to observe a city under unusual stress. To date these have included Nicosia, Havana, and Johannesburg. The curriculum also includes varying courses taught by distinguished CUNY and visiting faculty devoted to urban history, theory, analysis, and to natural and social urban ecologies.

ADMISSIONS

Applications for admission to all graduate programs may be obtained from the School of Architecture, Landscape Architecture, and Urban Design. All applications must include a curriculum vitae, three letters of recommendation from persons familiar with the applicant's intellectual and design abilities, an academic transcript, a 500 word essay describing the applicant's interest in architecture, landscape architecture or urban design (as appropriate), an appropriate portfolio of creative work, and a non-refundable application fee.

Although not required, applicants who are able to do so should schedule an interview with the Director of the program. Applicants are strongly advised that the program curriculum includes rigorous reading and writing requirements. Students whose first language is not English must submit current TOEFL scores.

The deadline for the receipt of applications is January 1 (M.U.P.), January 15 (M.Arch. I and II), and January 30 (M.L.A. I and II) and applicants will be notified of admissions decisions by April 30.

In the United States, most state 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 U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. 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.

Master's degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The NAAB grants candidacy status to new programs that have developed viable plans for achieving initial accreditation. Candidacy status indicates that a program should be accredited within 6 years of achieving candidacy, if its plan is properly implemented.

ACCREDITATION

The M. Arch., M.L.A. and the 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.

The Master of Architecture is a NAAB fully accredited program.

The Master of Landscape Architecture programs was granted candidacy and initial accreditation respectively as required by the ASLA accreditation board.

REQUIREMENTS FOR THE M.ARCH. DEGREE

Master of Architecture I

First Professional Degree

Semester 1

61000: Visual Studies 1	3
61100: Architecture Studio 1.1	6
61200: Western Architecture 1	3
61300: Materials/Construction 1	3
61500: Environmental Systems I	3

Semester 2

62000: Visual Studies 2	3
62100: Architectural Studio 1.2	6
62200: Western Architecture 2	3
62300: Materials/Construction 2	3
62400: Structures 1	3

Semester 3

73100: Architecture Studio 1.3	9
73200: Modern Architecture and Urbanism	3
73400: Structures 2	3
73500: Site Design	3

Semester 4

74100: Architecture Studio 1.4	9
74400: Structures 3	3
74500: Environmental Systems 2	3
General or Professional Elective	3

Semester 5

85100: Architecture Studio 1.5	9
85200: World Architecture	3
85600: Professional Practice 1	3
Professional Elective	3

Semester 6

One of the following two:	9
86100: Architecture Studio 1.6	
86101: Architecture Thesis	
Professional Electives	9

Total credits **108**

Master of Architecture II

Second Professional Degree

Semester 1

91101: Architecture Studio 2.1	9
91201: Studio Seminar 1	3
Professional Electives	6

Semester 2

91201: Studio Seminar 2	3
92101: Architecture Studio 2.2	9
Elective	6

Semester 3

One of the following two:	9
91201: Studio Seminar 2.3	
93101: Architecture Thesis	
Elective	3

Total credits **48**

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: Site Planning Landscape Technology I	3
LAAR 61400: Drawing/Visual Media Studies	3
LAAR 61500: Geomorphology for Landscape Architects	3

Semester 2

LAAR 62100: Landscape Architecture Studio II	6
LAAR 62200: History/Theory of Landscape Architecture I	3
LAAR 62300: Landscape Technology II	3
LAAR 62700: Landscape Ecology	3
LAAR 62300: Landscape Technology II	3

Semester 3

LAAR 63100: Landscape Architecture Studio III	6
LAAR 63200: History/Theory Landscape Architecture II	3
LAAR 63300: Environmental Planning	3
BIO B4700: Botany for Landscape Architects	3

Semester 4

LAAR 64100: Landscape Architecture Studio IV	6
LAAR 64400: Planting Design	3
ARCH 71200: Architectural Management	3
Elective (History)	3

Semester 5

LAAR 64700: Landscape Restoration	3
LAAR 65100: Landscape Architecture Studio V	6
LAAR 65150: Thesis Preparation	3
LAAR 65200: Urbanism	3

Semester 6

LAAR 66100: Thesis Studio	9
Professional Electives	3
Electives	3

Total credits **90**

Master of Landscape Architecture II

Second Professional Degree

Semester 1

LAAR 65150: Thesis Research	3
Electives in History/Theory of Landscape Architecture and/or Natural Systems	9
Electives in Planning	6

Semester 2

LAAR 65200: Urbanism	3
LAAR 72100: Landscape Architecture Thesis	9
Professional Electives	6

Total credits **36**

Additional Requirements
Students must complete the prescribed 36 credits with a cumulative academic average of 3.0 or better.

REQUIREMENTS FOR THE M.U.P. DEGREE

Semester 1 (Fall)

61001: Urban Design Studio I	7
61002: History of Urban Space I	3
61003: Reading the City I	3
61004: Urban Ecologies I	3

Semester 2 (Spring)

62001: Urban Design Studio II	7
62002: History of Urban Space II	3
62003: Reading the City II	3
62004: Urban Ecologies II	3

Total Credits **32**

Additional Requirements
Students must complete the prescribed 32 credits with a cumulative academic average of 3.0 or better.

COURSE DESCRIPTIONS

Architecture

Architecture courses carry a designation of ARCH

61000: Visual Studies 1
Students are led to see architectural space and to understand and draw the elements that define it. 4 HR./WK.; 3 CR.

61100: Architectural Studio 1.1
The objective of this studio is to introduce student with an undergraduate degree in another discipline to basic architectural design principals, drawing conventions and model making techniques. Through a series of short interrelated exercises students will be initiated into the language of architecture. Two and three-dimensional exercises will focus on the principles of fundamental space making elements (line, plane, and volume), hierarchical spatial sequence, scale, proportion, morphology and spatial perception. All exercises are designed to develop the student's abilities to translate an idea into a physical design concept. Students are required to keep a sketchbook and are required to submit a portfolio of work done during the term. 8 HR./WK.; 6 CR.

61200: Western Architecture 1
A seminar in the theoretical readings that have shaped architecture and its study from the classical period to the present. The emphasis will lie in the application of theory and the relationship between philosophies and theories of architecture and their historical, political and cultural contexts. Readings will include a review of post-Colonial discourse and problems surrounding world architecture today. 3 HR./WK.; 3 CR.

61300: Materials/Construction 1
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. 3 HR./WK.; 3 CR.

61500: Environmental Systems 1
Heating, ventilating, air-conditioning, plumbing, and electrical systems in buildings will be studied from a rudimentary design view to a level from which students will understand criteria involved in making choices between construction systems. Such things as space requirements and coordination with other building systems will be studied. 3 HR./WK.; 3 CR.

62000: Visual Studies 2
Further development of Visual Studies I that will incorporate the effect of light on space and form through the understanding and development of shades and shadows and the integration of color. 4 HR./WK; 3 CR.

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. Emphasis will be placed on developing a further understanding and expansion of architectural principles including spatial definition, formal composition, program analysis and organization and basic building structures and detailing as they relate to specific site contexts and activities. Projects will encompass small-scale public buildings on both urban and open sites. The general objective of this studio is to develop a student's abilities to interrelate multiple considerations and to expand their conceptual capabilities. Further consideration of skills and techniques in drawing and building craft will be addressed. 8 HR./WK.; 6 CR.

62200: Western Architecture 2
The second of a two-semester survey that reviews the physical forms of architecture and related arts in a chronological format through an examination of case studies. The second semester will explore Mannerist, Baroque, Ottoman, Rococo, Romantic, Neo-Classical and Colonial Architecture, as well as twentieth century movements. The interaction of architecture with its social, cultural and political context will be stressed. Pre-req.: Arch 61200. 3 HR./WK.; 3 CR.

62300: Materials/Construction 2
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. 3 HR./WK.; 3 CR.

62400: Structures 1
This is a required course for students in the master's program of architecture as introduction to the design and engineering of building structures. It gives an overview of structural forms and their history. Analyzing simple examples of built structures it makes students familiar with the basic principles of statics and strength of materials. 3 HR./WK. 3 CR.

73100: Architecture Studio 1.3
The third studio will focus on the ideas of habitation and community. Through a series of discrete phases students will develop an analytic methods as related to site, context and human activity patterns along with notions of how precedent and typology, through transformation, inform the design concept. The term's work will be organized around a defined process of design leading from analysis, and conceptualization, through to design development. The student will be made aware of how social and cultural values relate to the development of a formal construct at the hierarchy of scales from community to private living spaces. 12 HR./WK.; 9 CR.

73200: Modern Architecture and Urbanism
This course addresses the architectural and philosophical currents that inform contemporary world architecture today. Topics discussed include New Materiality, The Industrial City, Technology and Meaning, Origins of Revivalism, Colonialism, critiques and revivals of Modernism, Post-Modernism, Deconstructivism, Critical Regionalism, Architecture in Developing Countries, and regional developments in the United States. 4 HR./WK.; 3 CR.

73400: Structures 2
This is a required course introducing students of architecture to the design of wood and steel structures. It covers the properties of these materials and their respective structural forms and introduces students to the structural analysis of simple building components made from them. Students will develop an understanding of the behavior of structural systems made from wood or steel which will help them design building structures as part of a safe, functional, economical, and aesthetically sound building design. Prereq: Arch 61400. 3 HR./WK. 3 CR.

73500: Site Design
This is a required course to develop the basic principles of site planning, environmental and ecological factors of siting, building, grading, drainage, and materials in the development of physical form to land forms. 3 HR./WK.; 3 CR.

74100: Advanced Studio 1.4
Students may select from a series of studio electives which will focus on particular buildings, typologies, site contexts and thematic concerns. These studios will be taught by noted architectural faculty, giving the students the opportunity to work with them in exploring alternative design solutions to the designated concern. Among those topics for possible studio focuses are place of work, cultural, educational and recreational facilities. Design problems will be of moderate to large scale (50-100,000 square feet) with complex programs incorporating a broad range of activates and scales of spaces. Students are recommended to elect one studio, which focus on urban sites and has an urban design component. Prereq: 73100. 12 HR./WK.; 9 CR.

74400: Structures 3
This is a required course introducing students of architecture to the design and engineering of reinforced concrete structures. It covers material properties, mechanics of reinforced and prestressed concrete systems, numerical methods of

sizing structural members and their reinforcement, and criteria for proportioning concrete building frames and their components as part of a safe, functional, economical, and aesthetical building design. Prereq: Arch 62400. 3 HR./WK. 3 CR.

74500: Environmental Systems 2
The artificial and natural lighting of buildings will be studied along with the analysis and treatment of the built sonic environment. Spaces for performance and public assembly will be addressed along with housing, education and others. 3 HR./WK.; 3 CR.

85100: Architecture Studio 1.5
Students may select from a series of studio electives which will focus on particular buildings, typologies, site contexts and thematic concerns. These studios will be taught by noted architectural faculty, giving the students the opportunity to work with them in exploring alternative design solutions to the designated concern. Among those topics for possible studio focuses are place of work, cultural, educational and recreational facilities. Design problems will be of moderate to large scale (50-100,000 square feet) with complex programs incorporating a broad range of activates and scales of spaces. Students are recommended to elect one studio, which focus on urban sites and has an urban design component. 12 HR./WK.; 9 CR.

85200: World Architecture
This course includes case studies of traditional architecture, landscape and urban design of India, China, Korea, Japan, Southeast Asia, Islam and Medieval Europe, with a view towards understanding how architecture forms develop, and interact with the cultures that produce them. 3 HR./WK.; 3 CR.

85600: Professional Practice 1
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. 3 HR./WK.; 3 CR.

86100: Architecture Studio 1.6
The final two Architecture Studios allow students to directly engage advanced topics and critical issues in contemporary architecture. The studios will be taught by noted architects, bringing questions and insights gleaned from their own practice to the studio. Studio topics can range from advanced architectural design, to research to architecture as a component of urbanism and the landscape. 9 HR./WK.; 9 CR.

86101: Architecture Thesis
The last semester design studio offers the students the opportunity to investigate a topic of their own choosing which addresses a significant area of cultural concern. The objective of this studio is to enable the student to develop an original and significant body of work which expands upon the present state of understanding of a particular architectural or urban issue. Preparation for the thesis term will occur in an elective course during the previous term in which the students will define their theses and prepare research on their thesis topic. 12 HR./WK.; 9 CR.

91101: Architecture Studio 2.1
The third studio will focus on the ideas of habitation and community. Through a series of discrete phases students will develop an analytic methods as related to site, context and human activity patterns along with notions of how precedent and typology, through transformation, inform the design concept. The term's work will be organized around a defined process of design leading from analysis, and conceptualization, through to design development. The student will be made aware of how social and cultural values relate to the development of a formal construct at the hierarchy of scales from community to private living spaces. 12 HR./WK.; 9 CR.

91201: Studio Seminar 1
This seminar course is taught in parallel to Architecture Studio 2.1. It provides special topics of study or background research and readings that support and broaden the work of the studio. Pre-req: ARCH 91101. 3 HR./WK.; 3 CR.

92101: Architecture Studio 2.2
Students may select from a series of studio electives which will focus on particular building, typologies, site contexts and thematic concerns. These studios will be taught by noted architectural faculty, giving the students the opportunity to work with them in exploring alternative design solutions to the designated concern. Among those topics for possible studio focuses are place of work, cultural, educational and recreational facilities. Design problems will be of moderate to large scale (50-100,000 square feet) with complex programs incorporating a broad range of activates and scales of spaces. Students are recommended to elect one studio, which focus on urban sites and has an urban design component. Prereq: 73100. 12 HR./WK.; 9 CR.

92201: Studio Seminar 2
This seminar course is taught in parallel to Architecture Studio 2.2. It provides special topics of study or background research and readings that support and broaden the work of the studio. 3 HR./WK.; 3 CR.

93101: Studio Seminar 2.3
For students that have already completed a professional degree in architecture, the sequence of three Architecture Studios allows direct engagement with advanced topics and critical issues in contemporary architecture. The studios will be taught by noted architects, bringing questions and insights gleaned from their own practice to the studio. Studio topics can range from advanced architectural design, to research, to architecture as a component of urbanism and the landscape. 9 HR./WK.; 9 CR.

93102: Architecture Thesis
The last semester design studio offers students prepared to formulate and undertake a thesis in architecture the opportunity to investigate a topic of their own choosing which addresses a significant area of cultural concern. The objective of this studio is to enable the student to develop an original and significant body of work which expands upon the present state of understanding of a particular architectural or urban issue. Preparation for the thesis term will occur in an elective course during the previous term in which the students will define their theses and prepare research on their thesis topic. The Architecture Thesis studio is offered as an alternative to Architecture Studio 2.3 for a limited number of students with permission of the faculty. 9 HR./WK.; 9 CR.

Landscape Architecture

Landscape Architecture courses carry a designation of LAAR

61100: Landscape Architecture Studio I
Studio I is the first of a six-course studio design sequence. The course is an introduction to the range of spatial and cognitive skills involved in shaping urban open space. Students are expected to bring both critical and creative dimensions to the analytical and inventive phases of their work. This studio addresses the culture and characteristics of urban recreation. In the first studio design problem, a single-purpose facility is spatially expanded and transformed from the mundane to the sacred. Students identify aesthetic and cultural issues, research recreational case studies and conduct photographic essays. Using art as a precedent for design exploration, they synthesize their analysis into a design expression that accommodates the requirements of the facility. The design problems increase in scale and complexity when the recreation environment or its environs are shared by other interest or

age groups, adding the issue of conflict and conflict resolution to the problem. 10 HR./WK.; 6 CR.

61300: Site Planning - Technology I
This course involves an understanding of the relationship of physical development to land forms. The course deals with small area and sites. It deals with the basic principles of site planning, environmental and ecological factors of siting, building, grading, drainage, site structures and material. Underlying issues of environmentally responsible design, zoning requirements and affordability are addressed. It reviews methods for site inventory, site analysis and site selection, and investigates their application through class exercises in the development of conceptual site designs for small sites. Grading, an environmental necessity, functional requisite and aesthetic expression is an important aspect of the course and is used as a focus to integrate other aspects, e.g., drainage and road alignment. 3 HR./WK.; 3 CR.

61400: Drawing and Visual Media Studies
The first year class in drawing and digital graphics will explore methods of representation of environmental, social and cultural phenomena within the landscape. 3 HR./WK.; 3 CR.

61450: Fundamentals of CAAD
Students will acquire the basic skills of digital drawing and plotting with a Computer Aided Drafting program. The goal is to have each person develop drafting proficiency as well as a working knowledge of the program's use in the development of designs and construction documents. 3 HR./WK.; 3 CR.

61500: Geomorphology for Landscape Architects
Students will be introduced to the study of landforms and their evolution. Emphasis is placed on topographic expression of geologic structures and features, as well as on the relationships between properties of earth materials and the forces applied to them by all agents of erosion, including humans. 3 HR./WK.; 3 CR.

62100: Landscape Architecture Studio II
The second design studio focuses primarily on community and the residential environment. Using much of the knowledge and skill acquired in the previous studio, the student is confronted with more complex design problems. The student deals with the siting of residential buildings, the creation of domestic space, the design of a variety of open space facilities (e.g., walks, sitting areas, recreational areas, service areas, parking, circulation, etc.). Along with a critical understanding of the domestic landscape – involving issues of territoriality, the social contract, and other behavioral characteristics related to design – and the acquisition of skills for shaping that landscape, a major objective of this design studio is to provide an understanding of the complexity of a multi-component facility that is connected and integrated into a larger set of related components. In addition, students are expected to integrate into studio activity, advanced graphic skills involving drawing, model making and digital imaging, acquired in the first year graphic sequence. 10 HR./WK.; 6 CR.

62200: History and Theory of Landscape Architecture I
This course investigates the theoretical and historical foundations of Landscape Architecture and reviews influences on the form of gardens, urban open space and city planning from prehistory to the beginnings of contemporary precedents. Coverage includes a detailed review of early garden styles and public open space expressions in ancient Mesopotamia, Egypt, Greece and Rome, followed by examples of Medieval and Moorish gardens and their influences on later Italian and French Renaissance garden styles, and still later, the reactionary English Landscape garden style. Paralleling garden design, the course will also exam how social and environmental forces affected the planning and design of towns and cities during these same periods. The course ends with an examination of the theories and meaning informing 19th and 20th Century precedents of contemporary garden and open space expression, as well as describing the roots of urban planning during that period. 3 HR./WK.; 3 CR.

62300: Landscape Technology II
This course is a continuation of LAAR 62300 with problems increasing in scale, complexity and application. The course also involves an understanding of the relationship of physical development to land forms. Emphasis in the course is with large areas and sites. It continues to deal with the basic principles of site planning, environmental and ecological factors of siting, building, grading, drainage, site structures and material. Underlying issues of environmentally responsible design, zoning requirements and affordability for larger sites are addressed. It reviews methods for site inventory, site analysis and site selection, and investigates their application through class exercises in the development of conceptual site designs for large sites. Grading, continues to be used as a focus to integrate other aspects, e.g., drainage and road alignment. 3 HR./WK.; 3 CR.

62700: Landscape Ecology
This course in applied landscape ecology will explore the structure, function and dynamic processes of landscapes, at multiple scales, and in diverse contexts. This exploration will be aimed at the theoretical, technical and strategic knowledge that influences landscape planning, design, and management decisions. 3 HR./WK.; 3 CR.

63100: Landscape Architecture Studio III
The third design studio focuses on complex and dynamic public landscapes ranging from streets to waterfronts, plazas and neighborhoods. The physical structure of the landscape (its drainage, climate, morphology and archeology) is considered in relationship to the cultural structure of the site (its history and the ongoing experiences and memories of the people who live, work and play in the landscape). Students investigate the uniqueness and complexity of each urban site in terms of dynamic environmental processes, competing interests and uses, cultural diversity and communal memories. Site analysis and understanding involves active observation - hunting for clues, listening to stories, engaging in activities - as well as more traditional methods utilizing drawing and photography. For each of the study projects, the student must articulate the design concepts and find ways to physically communicate and create meaning in place. In conjunction with each design project, the work of accomplished landscape architects is presented to expand the student's approach to conceptual development, design and presentation. 10 HR./WK.; 6 CR.

63200: History and Theory of Landscape Architecture II
The course starts with a review of 20th Century garden precedents; establishing the aesthetic and cultural motivations that informed early expressions of the modern landscape garden, open space and urban development. The coverage then turns to a survey of the various styles and theoretical underpinnings that have influenced a wide spectrum of contemporary landscapes and their designers, including the design of specialized urban and suburban open spaces, ecologically determined plant community restorations, corporate headquarter campuses, vest pocket parks, theme gardens and new city forms. The course ends with a discussion on possible future directions for landscape design and the current forces influencing them. 3 HR./WK.; 3 CR.

63300: 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 commu-

nities, wildlife habitat and regional design style trends. The students collectively undertake a layered site analysis applying all the topics to a real site. A transparent overlay technique is used to identify areas of the site with special concerns. Each student also prepares a colloquium presentation (short paper and slides) on a particular aspect of Hudson River Valley ecology, design, local materials or an historical feature, which are compiled into a notebook kept at the Architecture Library reserve desk as a reference document. The accompanying slides become part of the Program's permanent slide library collection. 3 HR./WK.; 3 CR.

64100: Landscape Architecture Studio IV
The fourth design studio provides a semester-long problem in which the student is assigned, or chooses a large area within an existing urban complex that is in need of examination due to deterioration, change of use, or the need for a comprehensive approach to urban landscape intervention. Within a larger urban context, each student selects her/his own study area, with the instructor reviewing the proposed project for appropriateness in complexity and scope. In addition to physical and aesthetic spatial recommendations, designs must respond to significant systemic influences, including economic and demographic conditions, pedestrian and vehicular circulation, service infrastructure, as well as cultural, educational and recreational needs. The end product of this studio is a publication in which, in both narrative and graphic form, the student explains the problem, the method of solution, the objectives, and the plan. This format offers an effective method for teaching students how to organize themselves graphically and verbally in the identification of a design problem and the presentation of its solution. It is also an effective job interview tool for demonstrating the range of a student's organizational and graphic skills. 10 HR./WK.; 6 CR.

64400: Planting Design
Study of plants as elements of design on and with the land. Natural distribution and ecological considerations in planting design will be the underlying principles. However, issues of aesthetic and functional uses will also be explored Various scales of planting design and the relationship to large scale landscape planning will be examined. 3 HR./WK.; 3 CR.

64700: Landscape Architecture I
Students will develop competence in the process of landscape restoration. This will include an understanding of planting design, soil remediation, bioengineering, and habitat restoration of several types of ecosystems. Topics will include: analyzing situations suitable for ecosystem restoration, developing and "selling" form-generating solutions to ecological problems, choosing compatible plants, design principles in planting, research methods for design solutions, and awareness of ecological implications of plantings. 3 HR./WK.; 3 CR.

65100: Landscape Architecture Studio V
The fifth design studio provides a semester-long problem in which students are assigned a large existing urbanized area located within an ecologically sensitive context that is in need of examination due to deterioration, change of use, or the need for a comprehensive approach to urban landscape intervention. While the introduction of ecologically sensitive issues is a significantly new area of knowledge to integrate into the design process, issues involving the economic and demographic conditions, pedestrian and vehicular circulation, service infrastructure, as well as cultural, educational and recreational needs are similar to those identified in LAAR 64100-Landscape Architecture Studio IV. In addition, this studio will introduce the use of Geographic Information Systems (GIS) technology with special emphasis on a city's constantly evolving data base for accessing quantitative cultural and environmental data via internet conductivity. Within the larger urban context, each student selects her/his own study area, with the instructor reviewing the proposed project for appropriateness in complexity and scope. Each student conducts a thorough analysis of the individual study area, defines a set of social/environmental/ecological issues, and explores the resolution of these issues as a set of alternative open space design solutions. 10 HR./WK.; 6 CR.

65150: Landscape Architecture Research
The activities of this course are focused on the development of a thoughtful and defensible proposal including the identification of a significant problem, a comprehensive analysis and preliminary solutions resolving identified cultural/ecological issues and needs. The proposal will be presented in a bound publication format and reviewed by a group of critics, who will evaluate the soundness of the proposal and make suggestions for its improvement. 4 HR./WK.; 3 CR.

65200: Urbanism
(Also, UD 61004: Urban Ecologies I) The course involves the investigation of the place of the city in a variety of planetary and natural systems that seek to define the limits of urban sustainability. Using the concept of the urban "ecological footprint", the course will examine the practical boundaries of urban growth, the interaction of cities and the environment, the cycles of urban respiration and development, and the fundamentals of a sustainable urban economy. 3 HR./WK.; 3 CR.

61100: Thesis Studio
Studio I is the first of a six-course studio design sequence. The course is an introduction to the range of spatial and cognitive skills involved in shaping urban open space. Students are expected to bring both critical and creative dimensions to the analytical and inventive phases of their work. This studio addresses the culture and characteristics of urban recreation. In the first studio design problem, a single-purpose facility is spatially expanded and transformed from the mundane to the sacred. Students identify aesthetic and cultural issues, research recreational case studies and conduct photographic essays. Using art as a precedent for design exploration, they synthesize their analysis into a design expression that accommodates the requirements of the facility. The design problems increase in scale and complexity when the recreation environment or its environs are shared by other interest or age groups, adding the issue of conflict and conflict resolution to the problem. 10 HR./WK.; 6 CR.

66100/72100: Landscape Architecture Thesis
The final design studio includes the identification of a significant urban problem, a comprehensive analysis and design solutions resolving the identified cultural/ecological issues and needs developed in LAAR 65150 and a design/planning solution to the problem chosen. The final product will include a defensible rationale for the design approach, a series of diagrams, drawings and spatial models informed by the knowledge and skill gained through previous coursework in the program and will be reviewed by group of critics intervening at the end of the thesis preparation course. In addition, a publication is required, using both a narrative and graphic format, and presenting a defensible proposal 12 HR./WK.; 9 CR.

Urban Design

Urban Design courses carry a designation of 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. 10 HR./WK.; 7 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK. 3 CR.

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. 3 HR./WK.; 3 CR.

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. 10 HR./WK.; 7 CR.

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, phenomonological, etc.—and their impact on attempts to understand the contemporary city of fragments and layers. 3 HR./WK.; 3 CR.

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. 3 HR./WK.;
3 CR.

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. 3 HR./WK.; 3 CR.

64301-64305: 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. Variable credit.

FACULTY

Jacob Alspector, Associate Professor
B.Arch., The Cooper Union

Lance Jay Brown, Professor
B.Arch., Harvard Univ., M.Arch, (Urban Design); R.A., A.I.A, A.C.S.A., D.P.

Mi-Tsung Chang, Assistant Professor
B.Arch., Pratt Institute, M.Arch.; Ph.D., Union Institute

Jerrilyn Dodds, Distinguished Professor
B.A., Columbia Univ., M.A.; Ph.D., Harvard Univ.

Jeremy Edmiston, Associate Professor
B. Arch., Univ. of Technology (Australia); M.S., Columbia Univ.

Alan Feigenberg, Professor
B.A., Univ. of Pennsylvania; M.Arch., Columbia Univ.; R.A.

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Hanque Macari, Professor
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George Ranalli, Professor and Dean of Architecture
B.Arch., Pratt Institute; M.Arch., Harvard Univ., R.A.

Julio Salcedo, Associate Professor
B. A., Rice Univ.; M. Arch., Harvard Univ.

Michael Sorkin, Distinguished Professor
B.A., Univ. of Chicago; M.A., Columbia Univ.; M.Arch., M.I.T.

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B.L.A., Univ. of Calif. (Berkeley); M.L.A., Harvard Univ., F.A.I.A.

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M. Arch., Facolta di Architettura, Politecnico di Milano

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Norval White

The School of Education

The School of Education

Professor Alfred Posamentier, 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 settings, 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. 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

The City College School of Education provides access to the field of education for all who show promise of contributing to New York City schools and the education of the City's children. In keeping with the historical mission of the College, the School opens its doors to those who, because of national origin, native language, or economic condition, might otherwise find a career in education out of reach.

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.

A. 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 stan-

dards 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.

B. 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.

C. Educating For and About Diversity

The great strength of City College is the diversity of its students 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.

D. 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.

   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.

2) 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.

   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.

E. 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 connec-

tion 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.

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.

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 elementary teachers, 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. Students 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, students interested in State certification should inform themselves of current requirements. Students having questions regarding State requirements should consult the Certification Officer (NA 3/213) or visit the CCNY certification website at www.ccny.cuny.edu/education/certification or visit the NYS certification website at www.highered.nysed.gov/tcert.

All School of Education students 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.

Students 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 elementary and secondary schools of New York City are advised to obtain a copy of the certification requirements from the Office of Teacher Education and Certification, 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 students complete a certification program, they may request the College, through the Certification Officer (NA 3/213), to recommend their certification to the New York State Education Department. The Dean's Office, in conjunction with the program head, 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 NYSTCE to be passed are the Liberal Arts and Sciences Test (LAST), the Assessment of Teaching Skills-Written (ATS-W), and the Content Specialty Test(s)(CST). In addition, Bilingual Childhood Education students must also take the Bilingual Education Assessment (BEA).

For professional certification, candidates must also have a master's degree in an area that is functionally related to the area of certification and three years of satisfactory teaching experience in the certification area.

GRADUATE PROGRAMS

Master of Science in Education
Bilingual Childhood Education
Early Childhood Education
Educational Leadership
Educational Theatre
Childhood Education
Literacy, (Birth-Grade 6) or (Grades 5-12)
Mathematics Education (Grades 5-9)
Science Education (Grades 5-9): Biology, Chemistry, Earth Science, Physics
Teaching Students with Disabilities in Childhood Education
Teaching Students with Disabilities in Middle Childhood Education
Bilingual Special Education

Master of Science
Teaching English to Speakers of Other Languages

Master of Arts
Art Education (Grades K-12)
English Education (Grades 7-12)
Mathematics Education (Grades 7-12)
Secondary 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
Childhood Education
Early Childhood Education
English Education
Mathematics Education
Science Education: Biology, Chemistry, Earth and Atmospheric Science, Physics
Social Studies Education

Post Master's Advanced Certificate Program
Educational Leadership

OFFICERS OF THE ADMINISTRATION

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NA 3/203, 212-650-5471

Associate Dean
Professor Doris Cintrón
NA 3/213, 212-650-5302

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Professor Gretchen Johnson
NA 6/207B; 212-650-7262

Department of Leadership and Special Education Chair
Professor Sylvia Roberts
NA 6/207B; 212-650-7262

Department of Secondary Education Chair
Professor Susan Semel
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SCHOOL OF EDUCATION OFFICES

Department of Education
NA 6/207B; 212-650-7262

Office of Student Services
NA 3/223A; 212-650-5316

Field Experiences and Student Teaching
NA 6/207A; 212-650-6915

Graduate Admissions
NA 3/223A; 212-650-6296

Certification Office
NA 3/213; 212-650-5590

The Office of Graduate Admissions provides general information about the programs of study. All courses must be approved by the student's 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.

ADVISORS FOR ADMISSIONS, COURSES, PROGRAMS, AND REGISTRATION

Leadership
Dr. Joyce Coppin, 212-650-6276

Art Education
Professor Catti James, 212-650-7433

Bilingual Education
Professor Joseph Davis, 212-650-6240

Childhood Education
Professor Jan Valle, 212-650-5186

Early Childhood Education
Professor Beverly Falk, 212-650-5182

English Education
Professor Elizabeth Rorschach, 212-650-6291

Literacy Acquisition and Development
Professor Adele Gilhooly, 212-650-6289

Mathematics Education
Professor Beverly Smith, 212-650-5975

Science Education
Professor Richard Steinberg, 212-650-5698

Social Studies Education
Professor Susan Semel, 212-650-5038

Special Education
Professor Laura Rader, 212-650-7206

Bilingual Special Education
Professor Nancy Stern/ 212-650-5328
Professor Laura Rader, 212-650-7206

TESOL
Professor Joseph Davis, 212-650-6240

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.

Students who have not completed all liberal arts requirements for initial certification will be admitted conditionally, pending completion of those courses they lack. Conditioned courses must be completed, in addition to the core education curriculum, in order for a student 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. Students 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. 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 student 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. Students 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
Students 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 may be obtained from the Office of Graduate Admissions, NA 3/223A.
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. Provide evidence of having taken the LAST (and CST for secondary education programs) if applying to a program that leads to initial certification.

Decisions on admissions will be made by each graduate program after consideration of all admissions materials. Decisions will be announced in January for spring admissions and June for fall admissions.

The Advanced Certificate programs are designed to accommodate students who already have a baccalaureate degree with a major in English, history, mathematics, or one of the sciences, but no teacher preparation courses. The programs in the four major discipline areas of study consist of fifteen credits of study in education which, together with any liberal arts prerequisites, will lead to New York State initial certification as a secondary school teacher of English, mathematics, science, or social science.

Meeting Professional Standards
As a professional school with the responsibility of recommending students for New York State certification, the School of Education must conduct ongoing professional evaluation of students. 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 head deems the work appropriate to the student's 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.

Conditional matriculation can be achieved with copy and notarized translation of academic records and certifications from all foreign institutions attended until the originals are received.

Credentials filed in support of an application become part of the permanent file and the property of the college. When a student has presented both the original and a copy of a document, the registrar will return the original to the student after verification.

Non–Matriculant Admissions

The School of Education will allow degree and/or certification seeking students to take up to nine credits as non–matriculated students. If such students are accepted as matriculated students, the program head will decide whether any of the credits taken as a non–matriculated student may be applied toward the program requirements.

Those who wish to attend as non–matriculated students may be admitted to courses for which they are qualified. Such students must file for admission as a non–matriculated student at the Office of Graduate Admissions in NA 3/223A and present student copies of transcripts or other credentials proving graduation from an accredited institution at that time.

Non–matriculated students who hope to pursue a graduate program in education are strongly advised to take the LAST during the first semester, if they have not already passed these examinations or otherwise hold New York State certification.

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 student's area of teaching is encouraged by the College.

Advisors in each of the several teaching and service fields are available for consultation at registration and during the regular semesters. Courses taken as a non–degree student are applicable neither to a certificate program nor to a master's degree program.

Those who wish to attend as non-degree students may be admitted to courses for which they are qualified. Such students may file for admission at non-degree registration, which is described in the schedule of classes. Before registration, these applicants must present student copies of transcripts or other credentials proving graduation from accredited institutions. A student may file for admission as a non-degree student in the Office of Graduate Admissions, NA 3/223A.

Non-degree students must follow the regular rules for registration and course requirements, including prerequisites. Schedules of classes are available at the School of Education, the Office of the Registrar, Administration Building-102, and online.

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 + and – grades) (lowest passing grade for graduate credit)
- F No credit granted. If this grade is received in a required course, the course must be repeated.
- W Withdrew without penalty
- INC Incomplete. This is a temporary grade, authorized only where unavoidable circumstances have prevented the completion of course assignments. Instructors may give this grade at their discretion, but it is expected that students will complete the requirements by 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 students 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. Students whose academic status falls below this standard will be placed on probation.

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 students. These restrictions are noted in the course descriptions. Students 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 student's 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 students (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. Students 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. Students 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
Students can include independent study courses in their programs, as appropriate with a maximum of six credits. Such work may only be embarked upon under the advisement of a program advisor. Students 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 students who are matriculated in graduate programs in the School of Education will be admitted to student teaching/practicum courses. Those matriculated students who wish to take student teaching courses must apply during the first ten weeks of the preceding semester to the Office of Field Experiences and Student Teaching, NA 6/207A, 650-6915, www.ccny.cuny.edu/education/fieldexperiences/ for further information.

Admission Requirements for Student Teaching
To be admitted to student teaching, students must have:

1. A completed application with essay submitted to the Office of Field Experiences
2. A recommendation from their program advisor,
3. Completed a successful interview with the Director of Field Experiences,
4. Completed all prerequisite courses and have no INC grades,
5. Maintained a GPA of 3.0 or higher,
6. Shown satisfactory results from the tuberculin (TB) test (if not employed with the New York City Department of Education,
7. Completed 100 hours of field experiences,
8. Submitted LAST scores of 220 or above in written portion and overall,
9. Submitted ATS-W and CST scores.

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 permits to non-degree students to take courses in other divisions of the College. Such students must arrange their own registration in other divisions of the College and fulfill requirements of these divisions.

Matriculants. Matriculated graduate students 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 Approval. A matriculated student 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 student must present such approval to the Registrar and obtain the necessary permission prior to the registration period. No more than 6 credits of transfer courses may be applied to degree requirements.

Proof of Outside Work. The student is responsible for having an official transcript sent from the other institutions as soon as final grades are available. A student who expects to be graduated at the end of the current term should not register in courses at another institution.

Human Relations Courses Likely to be Accepted by the New York City Department of Education
It is expected that the following courses will be offered in such a manner as to comply with the regulations of the New York City Department of Education for teacher credit in meeting the "Human Relations" requirements.

EDUC 0200A: Psychology of Teaching and Learning
EDUC 2200A: Human Relations in a Pluralistic Society
EDUC 3600A: Anthropology and Urban Education
EDCE 1800K: Parent, Child, and the School
EDCE 5700C: Education That is Multicultural

ATTENDANCE

Attendance is credited from the first session of the course. Students who register late incur absences for all sessions held prior to their registration.

Students 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 student 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 student must appeal to the School of Education Committee on Course and Standing in order to avoid the "F" grade.

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 0000I) and Individual Study in Educational Research (EDUC 0100I) 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 students register for courses.

Enrollment Residence and Time Limitations. To be continued as a matriculant in a master's degree program, a student 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 Committee on Course and Standing, School of Education. 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 students 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 Director of the Office of Student Services.

Withdrawal from Courses. Students wishing to withdraw from courses must report to the Office of the Registrar, to make formal application.

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 head. Full time student 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 student who fails to maintain a satisfactory record in graduate courses.

Professional Requirements. The right is reserved to ask the withdrawal of any student who fails to display satisfactory professional attitudes and behavior in class or in a professional position.

Applying for Graduation. Candidates for degrees and advanced certificates must apply before November 1st or March 1st of their expected final semester (July 1st, if final semester is to be the summer session). Applications may be obtained at the Registrar's Office or online at www1.ccny.cuny.edu.

Maintenance of Matriculation See Academic Requirements and Regulations section of this bulletin.

Graduation Honors. Students 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 students. 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 student 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 student 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 student must first arrange an appeal conference with the instructor who shall arrange a conference with the student 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 director of 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. Students 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 student wishes to pursue an appeal, he or she must discuss it with the program head. The program head will make an independent recommendation and then forward it to the department Chair and to the Committee on Course and Standing.

The student 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 director of the Office of Student Services (OSS) and, in general, students should discuss the appeal with the Director before submitting a formal appeal.

The Committee on Course and Standing considers appeals in writing and neither the student nor the instructor appears in person. The student's appeal should be in the form of a detailed letter accompanied by any supporting evidence the student wishes to submit, including copies of papers or letters from other students or instructors.

The Committee normally asks the instructor and the department chair to comment, in writing, on the student's appeal. On request, the OSS director will discuss these responses with the student before the Committee meets.

The Committee's decision is sent to the student, in writing, by the OSS director. 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. The Committee has delegated its authority to the OSS director for requests for extensions for incompletes, limitations on registration, and similar matters, but reserves appellate authority to itself.

STUDENT LIFE AND SERVICES

Educational Placement
Educational Placement services are available to assist graduate students and alumni in locating and securing positions in local and out of town school systems. Further information may be obtained from the Office of Student Services, NA 3/223A, or the Career Services Office, NA 1/116.

Student Organizations

Education Club
Offers students 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.

Honor Society
Kappa Delta Pi, is an honor society in Education. City College constitutes the Gamma Iota Chapter. Graduate students and undergraduates in the junior or senior year who are preparing for the teaching profession, and who exhibit commendable personal qualities, sound educational ideals, and superior scholarship may be elected to membership if recommended by faculty.

Department of Childhood Education

Professor Gretchen L. Johnson, Chair • Department Office: NA 6/207B • Tel: 212-650-7262

GENERAL INFORMATION

The Department of Childhood Education is located within the School of Education. The School of Education maintains policies and regulations that apply to all students in education programs.

The City College Department of Childhood Education offers the following master's degrees and advanced certificates in education:

Master of Science in Education (M.S.Ed)
Bilingual Childhood Education (Grades 1-6)
Bilingual Childhood Special Education (Grades 1-6)
Childhood Education (Grades 1-6)
Early Childhood Education (Birth-Grade 2)
Educational Theatre (K-Grade 12)
Literacy: (Birth-Grade 6; Grades 5-12)

Master of Science (M.S.)
Teaching English to Speakers of Other Languages (K-Grade 12)

Extension Program
Bilingual Extension

Non-degree Certificate Programs
Childhood Education (Grades 1-6)
Early Childhood Education (Birth-Grade 2)

ADVISEMENT

The Office of Student Services (212-650-5316) or the Office of the Chair (212-650-7262) will be pleased to assist you in contacting the faculty member in charge of any of the programs above.

PROGRAMS AND OBJECTIVES

All courses are EDCE unless otherwise noted.

BILINGUAL CHILDHOOD EDUCATION

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.

Stream A – For students holding initial New York State certification and a Bilingual Extension. This stream will lead to professional New York State certification and a master's degree in Bilingual Education.

Required Courses:
2300C: Social Studies Inquiry for Pre-K to 6 Teachers 3
2400C: Development and Evaluation of Materials in Bilingual Education 3
3200C: Science Inquiry for Pre-K to 6 Teachers 3
5201C: Teaching English Language to Bilingual English Language Learners (Pre K-6) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
5700C: Education That is Multicultural 3
6200C: Mathematics Inquiry for Pre K-6 Teachers 3
2203I: Content Research Seminar in Bilingual Education 2
2900I: Seminar in Educational Research 2

Electives (with permission of advisor): 6
0100E: Cultural Pluralism in Curriculum Development 3
0200F: Contemporary Problems in Bilingual Education 3
5100C: Teaching Foreign Languages in Elementary Education 3
5202C: Teaching Language Arts and Reading to Bilingual-Bicultural Students (Spanish) 3
5203C: Teaching Language Arts & Reading to Bilingual-Bicultural Children (Haitian) 3
5204C: Teaching Language Arts and Reading to Bilingual-Bicultural Children (Chinese) 3
5500C: Children of the Caribbean Cultures and Curriculum 3
6700C: Phonology of English for Teachers 3
6800C: Grammar and its Pedagogy: English and Other Languages 3

Total credits 31

Stream B – For students who hold initial New York State certification seeking a professional certificate and a Bilingual Extension. This stream will provide the requirements for a master's degree in bilingual education, a bilingual extension and a professional certificate.

Required Courses:
2400C: Development and Evaluation of Materials in Bilingual Education 3
2600C: Linguistics in a Multicultural Society 3

5201C: Teaching English Language Arts to Bilingual English Language Learners (Pre K-6) 3
One of the following three: *3*
5202C: Teaching Language Arts & Reading to Bilingual-Bi-Cultural Students (Spanish) 3
or
5203C: Teaching Language Arts & Reading to Bilingual-Bi-Cultural Children (Haitian) 3
or
5204C: Teaching Language Arts & Reading to Bilingual-Bi-Cultural Children (Chinese) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-6) 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5700C: Education That is Multicultural 3
6400C: Teaching Content (Math, Science, and Social Studies) using both English and a Native Language 3
2203I: Content Research Seminar in Bilingual Education 2
2900I: Seminar in Educational Research 2

Total credits 31

Stream C – For Students who hold a bachelor's degree outside of education while seeking an initial New York State Certificate (Childhood) and a Bilingual Extension.

Prerequisite/Corequisite:
EDUC 0200A: Psychology of Teaching and Learning 3
EDUC 0300A: Child Development 3

Required Courses:
2100C: Social Studies in Childhood Education 3
3100C: Science in a Program of Childhood Education 3
5201C: Teaching English Language Arts to Bilingual English Language Learners (Pre K-6) 3
5202C: Teaching Language Arts and Reading to Bilingual-Bicultural Students (Spanish) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-6) 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5700C: Education That is Multicultural3
6000C: How Children Learn Mathematics: Implications for Teaching I 3
6100C: How Children Learn Mathematics: Implications for Teaching II 3
6400C: Teaching Content (Math, Science, and Social Studies) Using both English and a Native Language 3
One of the following two: *3*
4100C: Teaching Elementary Arts and Crafts in Childhood Education 3
7100C: Creative Movement and Music in Childhood Education 3
2203I: Content Research Seminar in Bilingual Education 2
2900I: Seminar in Educational Research 2
0502G: Student Teaching in Bilingual Education 6
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0

Total credits 52

BILINGUAL CHILDHOOD SPECIAL EDUCATION

This program prepares bilingual special education teachers to address the educational, emotional and behavioral needs of linguistically diverse minority students with a wide range of disabilities. Students completing the program become certified in Special Education 1-6 with Bilingual Extension.

Stream I – For students with initial certification

Required Courses:
EDLS 3300K: Building Community in Inclusive Contexts 3
EDLS 3800K: Differentiated Instruction and Assessment in Collaborative Contexts in Childhood Education 3
5202C: Teaching Language Arts & Reading to Bilingual Students (Spanish) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
EDLS 5300K: Positive Approaches to Challenging Behaviors 3
5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-6) 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5700C: Education That is Multicultural 3
5901G: Curriculum and Instructional Approaches in Bilingual Special Education 3
6000K: Introduction to the Education of Language Minority Students with Disabilities 3
6100K: Assessing the Educational Needs of Language Minority Students with Disabilities 3
6200K: Language Minority Families and the Special Education System 3
5701G: Practicum Teaching Bilingual Special Education 3
2600I: Content Research Seminar in Special Education 2
2900I: Seminar in Educational Research 2

Total credits 43

Stream II – For students without initial certification

Required Courses:
EDUC 0200A: Psychology of Learning and Teaching 3
EDUC 0300A: Child and Adolescent Development 3
EDUC 0400A: The School in American Society: Bilingual Education in the Urban School 3
EDLS 3300K: Building Community in Inclusive Contexts 3
EDLS 3600K: Approaches to Literacy I Childhood Education 3
EDLS 3800K: Differentiated Instruction and Assessment in Collaborative Contexts in Childhood Education 3

5202C: Teaching Language Arts & Reading to Bilingual Students: Spanish 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
EDLS 5300K: Positive Approaches to Challenging Behaviors 3
5401C: Methods of Teaching English to Speakers of Other Languages 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5700C: Education That is Multicultural 3
5901G: Curriculum and Instructional Approaches in Bilingual Special Education 3
6000K: Introduction to the Education of Language Minority Students with Disabilities 3
6100K: Assessing the Educational Needs of Language Minority Students with Disabilities 3
6200K: Language Minority Families and the Special Education System 3
0703G: Internship in Bilingual Special Education 4
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
2600I: Content Research Seminar in Special Education 2
2900I: Seminar in Educational Research 2

Total credits 56

BILINGUAL EXTENSION CERTIFICATE

Extension in Bilingual Education only—for students who hold initial or professional certification in early childhood/middle or adolescent education while seeking a Bilingual Extension.

Required Courses:

Select one of the following two: 3
5201C: Teaching English Language Arts to Bilingual English Language Learners (Pre K-6) 3
6500C: Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult) 3
5202C: Teaching Language Arts & Reading to Bilingual-Bicultural Students (Spanish) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5700C: Education That is Multicultural 3
6400C: Teaching Content (Math, Science, and Social Studies) using both English and a Native Language 3

Total credits 18

CHILDHOOD EDUCATION

The master's degree program in childhood education (grades 1-6) is designed to meet the needs of two distinct groups of students: (1) practicing teachers who have achieved provisional or initial teacher certification in grades 1-6 and who wish to pursue professional certification as a teacher, and (2) 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).

Students without provisional or initial certification at the time of application to the graduate program will be accepted into, and must complete, the initial certification program, including student teaching or supervised teaching at both the 1-3 and 4-6 grade levels. Initial certification students must have an academic major or concentration in the liberal arts or sciences and also be prepared broadly across the liberal arts. Upon admission to the program, candidates' academic preparation will be assessed and they will be informed of any additional undergraduate preparation needed to complete the program.

Students accepted into the professional-certification program, who achieved their provisional or initial certification through an independent route rather than through a registered teacher education program, may be required to take prerequisite education methods courses as part of the elective portion of their program. The candidates' pedagogical preparation will be assessed at the time of admission to the program and they will be informed of any prerequisite methods courses that are needed to complete the program.

Both the initial and professional programs are designed to meet the New York State Education Department requirements for certification in Childhood Education that went into effect in January 2004.

Stream A – Initial Certificate Program

Up to nine credits can be waived due to equivalent coursework on the graduate or undergraduate level.

Required Courses:

EDUC 0100A: Urban Schools in a Diverse Society 3
EDUC 0200A: Psychology of Teaching and Learning 3
EDUC 0300A: Child Development 3
0500C: Emergent to Fluent Literacy 3
0510C: Literacy Strategies Birth-Grade 6 3
One of the following two: *3*
1800K: Family, Child & School 3
5700C: Education That is Multicultural 3
2900F: Curriculum Development in Childhood Education I 3
3000F Curriculum Development in Childhood Education II 3
2100C: Teaching Social Studies in Childhood Education 3
3100C: Science in a Program of Childhood Education 3
6000C: How Children Learn Math: Implications for Teaching I 3
6100C: How Children Learn Math: Implications for Teaching II 3
One of the following two: *3*
4100C: Teaching Arts and Crafts in Childhood Education
4400C: Integrating Theatre and Related Arts into the Classroom
One of the following options: *6*
0401G: Teaching Practice in Childhood Education I and Seminar (grades 1-3) 7 weeks 3
0402G: Teaching Practice in Childhood Education II and Seminar (grades 4-6) 7 weeks 3

or

0403G: Supervised Teaching in Childhood Education I and Seminar (grades 1-3) 7 weeks 3

0404G: Supervised Teaching in Childhood Education II and Seminar (grades 4-6) 7 weeks 3

EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0

2204I: Content Research Seminar in Childhood Education 2

2900I: Seminar in Educational Research 2

Total credits 40-49

Stream B – Professional Certificate Program

Required Courses:

One of the following: *3*

0800C: Critical Examination of Current Original Research in Literacy

or

2000C: First and Second Language and Literacy Acquisition

or

2700C: Literacy for Struggling Readers and Writers

and

2300C: Social Studies Inquiry for Pre-K-6 Teachers 3

3200C: Science Inquiry for Pre-K-6 Teachers 3

6200C: Mathematics Inquiry for Pre-K-6 Teachers 3

0400F: Contemporary Problems and Issues in Childhood Education 3

3000F: Curriculum Development in Childhood Education II 3

One of the following options: *4*

2204I: Content Research-Childhood Education 2

2900I: Seminar in Educational Research 2

or

EDUC 0000I: Introduction to Educational Research 2

EDUC 0100I: Individualized Study in Education 2

Electives: (to be approved by advisor) 9

Total credits 31

NON-DEGREE CERTIFICATION OPTIONS

ADVANCED CERTIFICATE PROGRAM IN CHILDHOOD EDUCATION

The advanced certification program is designed for candidates who are interested in a "fast track" to initial certification and able to commit to a full-time (or nearly full-time) graduate program. Candidates complete coursework and all other requirements for initial certification with the goal of seeking and securing employment as a teacher *before* completion of the master's degree.

Required Courses:

Foundations 6

EDUC 0100A: Urban Schools in a Diverse Society* 3

Choose one of the following three:

EDUC 0200A: Psychology of Teaching and Learning* 3

EDUC 0300A: Child Development* 3

2100K: Developmental Issues in Early Childhood and Childhood Education* 3

Literacy Courses 6

0500C: Literacy: Emergent to Fluent* 3

0510C: Literacy Strategies and Resources, Birth-Grade 6* 3

Curriculum and Methods Courses 9

2100C: Teaching Social Studies in Childhood Education* 3

6000C: How Children Learn Mathematics: Implications for Teaching I* 3

2900F: Curriculum Development in Childhood Education I* 3

Student Teaching 6

EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues (0 CR.)

0401G: Student Teaching I in Childhood Education and Seminar 3

and

0402G: Student Teaching II in Childhood Education and Seminar 3

or

Supervised Teaching I and Seminar 3

and

Supervised Teaching II and Seminar 3

** Denotes 10-15 hours of fieldwork required*

Total credits 27

Non-degree Certificate Program in Early Childhood Education for Holders of Certification in Childhood Education

This program is for individuals who hold initial certification in Childhood Education (grades 1-6) who want to extend their certification to include early childhood education (birth through grade 2).

Required Courses:

0200C: Curriculum Development in Early Childhood Education 3

1900C: Language and Literacy Development in Young Children 3

3500C: Education in the Early Years: Infants, Toddlers & Preschoolers 3

4200C: Including Young Children with Special Needs in the General Education Classroom 3

One of the following two: *3*

0301G: Teaching Practice in Early Childhood Education I and Seminar (7 weeks)

0303G: Supervised Teaching in Early Childhood Education and Seminar (7 weeks)

Total credits 15

Non-degree Certificate Program in Childhood Education for Holders of Certification in Early Childhood Education

This program is for individuals who hold initial certification in early childhood education (birth through grade 2) who want to extend their certification to include childhood education (grades 1-6).

Required Courses:

0510C: Literacy Strategies Birth-Grade 6 3

2100C: Teaching Social Studies in Childhood Education 3

3000F Curriculum Development in Childhood Education II 3

6100C: How Children Learn Math: Implications for Teaching II 3

One of the following two: *3*
0401G: Teaching Practice in Childhood Education l and Seminar (grades 1-3) (7 weeks) 3
0403G: Supervised Teaching in Childhood Education I and Seminar (grades 1-3) (7 weeks) 3

Total credits **15**

EARLY CHILDHOOD EDUCATION

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. The program leads to New York State certification as a teacher of 0–8 year olds.

Stream A – Initial Certificate Program

Up to six credits can be waived at discretion of the advisor.

The initial certification program is for individuals who hold a bachelor's degree outside of education and want to enter the profession. Rich fieldwork and student teaching experiences with educators in the public schools of New York City combine educational theory with practice.

Required Courses:

EDUC 0100A: Urban Schools in a Diverse Society 3
0100C: Observing and Recording Young Children's Development in Classroom Contexts3
0200C: Curriculum Development in Early Childhood Education 3
3500C: Education in the Early Years: Infants, Toddlers & Preschoolers 3
2100K: Developmental Issues in Early Childhood/Childhood Education 3
One of the following two: *3*
1800K: Family/Child/School 3
5700C: Education That is Multicultural 3
and
0500C: Emergent to Fluent Literacy 3
1900C: Language and Literacy Development in Young Children 3
2101C: Social Studies in the EC Curriculum 3
3300C: How Young Children Learn Science 3
6000C: How Young Children Learn Mathematics: Implications for Teaching I 3
One of the following two: *3*
4300C: Art and Expressive Activities in ECE 3
7300C: Music and Movement for Young Children 3
One of the following options: *6*
0301G: Teaching Practice in Early Childhood Education I and Seminar 3
0302G: Teaching Practice in Early Childhood Education II and Seminar 3
or
0301G: Teaching Practice in Early Childhood Education 1 and Seminar 3
0303G: Supervised Teaching in Early Childhood Education Seminar 3
and
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
2202I: Content Research Seminar in Early Childhood Education 2
2900I Seminar in Educational Research 2
Suggested Electives: *
0300F: Contemporary Problems and Issues in ECE 3
4200C: Including Young Children with Special Needs in the General Education Classroom 3

Total credits **46**
** This is not an inclusive list. Please review the College's Schedule of Classes for each semester's list of offerings.*

Stream B – Professional Certificate Program

The professional certification program is for teachers who already possess initial certification in some area of education. It emphasizes ongoing inquiry and learning and the evolving nature of the professional teacher.

Required Courses:

0100C: Observing and Recording Young Children's Development in Classroom Contexts3
0200C: Curriculum Development in Early Childhood Education 3
0300F: Contemporary Problems and Issues in ECE 3
2100K: Developmental Issues in Early Childhood/Childhood Education 3
3500C: Education in the Early Years: Infants, Toddlers & Preschoolers 3
One of the following: *3*
0800C: Critical Examination of Current Original Research in Literacy 3
or
2000C: First and Second Language and Literacy Acquisition (3cr.)
or
2700C: Literacy for Struggling Readers and Writers (3cr.)
and
2300C: Social Studies Inquiry for Pre-K-6 Teachers 3
3200C: Science Inquiry for Pre-K-6 Teachers 3
6200C: Mathematics Inquiry for Pre-K-6 Teachers 3
2202I: Content Research Seminar in Early Childhood Education 2
2900I: Seminar in Educational Research 2

Suggested Electives:*

1900C: Literature and Storytelling 3
2100C: Teaching Social Studies in Childhood Education 3
2101C: Social Studies in the Early Childhood Curriculum 3
3300C: How Young Children Learn Science 3
EDLS 5000K: Introduction to the Psychology of the Exceptional Child 3
EDLS 5300K: Positive Approaches to Challenging Behaviors 3
5700C: Education That is Multicultural 3
6000C: How Young Children Learn Mathematics: Implications for Teaching I 3

9602G: Administration and Supervision of Early Childhood Education 3
7300C: Music and Movement for Young Children 2
4300C: Art and Expressive Activities in Early Childhood Education 2

Total credits 31

** This is not an inclusive list. Please review the College's Schedule of Classes for each semester's list of offerings. Also note that students pursuing a New York State certificate must obtain six (6) credits of special education courses, although these are not required for the Master's degree.*

Stream C

This program stream is for individuals who hold initial certification in some area of education and who are seeking a master's degree leading to initial certification in early childhood education.

Required Courses:

Core Courses: 15
0100C: Observing and Recording Young Children's Development in Classroom Contexts 3
0200C: Curriculum Development in Early Childhood Education 3
0300F: Contemporary Problems and Issues in ECE 3
2100K: Developmental Issues in Early Childhood/Childhood Education 3
3500C: Education in the Early Years: Infants, Toddlers & Preschoolers 3

Literacy
One of the following three: 3
0500C: Emergent to Fluent Literacy 3
0800C: Critical Examination of Current Literacy Research 3
1900C: Language and Literacy Development in Young Children 3

Methods/Advanced Methods/ or Electives (on advisement):

One of the following two: 3
2101C: Social Studies in the Early Childhood Curriculum 3
2300C: Social Studies Inquiry for Pre-K-6 Teachers 3
One of the following two: 3
3300C: How Young Children Learn Science 3
3200C: Science Inquiry for Pre K-6 Teachers (content/pedagogy course) 3
One of the following two: 3
4300C: Art and Expressive Activities in ECE 3
7300C: Music and Movement for Young Children 3
One of the following three: 3
6000C: How Young Children Learn Mathematics: Implications for Teaching I 3
6200C: Mathematics Inquiry for Pre-K-6 Teachers 3
Approved course in Special Education, Bilingual Education or other area.

Student Teaching/ Supervised Teaching (in the range of grades for which the candidate has no prior experience):

One of the following two: 3
0301G: Teaching Practice in Early Childhood Education I and Seminar (7 weeks) 3
0303G: Supervised Teaching in Early Childhood Education and Seminar (7 weeks) 3

Research:

2202I: Content Research Seminar in Early Childhood Education 2
2900I: Seminar in Educational Research 2

Total credits 37

NON-DEGREE CERTIFICATION OPTIONS

ADVANCED CERTIFICATE PROGRAM IN EARLY CHILDHOOD EDUCATION

The advanced certification program is designed for candidates who are interested in a "fast track" to initial certification and able to commit to a full-time (or nearly full-time) graduate program. Candidates complete coursework and all other requirements for initial certification with the goal of seeking and securing employment as a teacher *before* completion of the master's degree.

Required Courses:

Foundations 6
EDUC 0100A or 22100: Urban Schools in a Diverse Society* 3
2100K: Developmental Issues in Early Childhood/Childhood Education* 3

Literacy 6
0500C: Literacy: Emergent to Fluent* 3
1900C: Language and Literacy Development in Young Children* 3

Curriculum and Methods 9
0100C: Observing and Recording Young Children in Classroom Contexts* 3
3500C: Education in the Early Years: Infants, Toddlers, & Preschoolers* 3
6000C: How Young Children Learn Math I* 3

Student Teaching 6
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
0301G: Teaching Practice in Early Childhood Education I and Seminar 3
and
0302G: Teaching Practice in Early Childhood Education II and Seminar 3
or
0303G: Supervised Teaching in Early Childhood Education and Seminar 3
** Denotes 10 – 15 hours of fieldwork required*

Total credits 27

Non-degree Certificate Program in Early Childhood Education for Holders of Certification in Childhood Education

This program is for individuals who hold initial certification in childhood education (grades 1-6) who want to extend their certification to include early childhood education (birth through grade 2).

Required Courses:

0200C: Curriculum Development in Early Childhood Education 3
1900C: Language and Literacy Development in Young Children 3
3500C: Education in the Early Years: Infants, Toddlers & Preschoolers 3
4200C: Including Young Children with Special Needs in the General Education Classroom 3
One of the following two: 3
0301G: Teaching Practice in Early Childhood Education I and Seminar (7 weeks) 3

0303G: Supervised Teaching in Early Childhood Education and Seminar (7 weeks) 3

Total credits 15

Non-degree Certificate Program in Childhood Education for Holders of Certification in Early Childhood Education

This program is for individuals who hold initial certification in early childhood education (birth through grade 2) who want to extend their certification to include childhood education (grades 1-6).

Required Courses:

0510C: Literacy Strategies Birth-Grade 6 3
2100C: Teaching Social Studies in Childhood Education 3
3000F Curriculum Development in Childhood Education II 3
6100C: How Children Learn Math: Implications for Teaching II 3
One of the following two: 3
0401G: Teaching Practice in Childhood Education l and Seminar (grades 1-3) (7 weeks) 3
0403G: Supervised Teaching in Childhood Education I and Seminar (grades 1-3) (7 weeks) 3

Total credits 15

EDUCATIONAL THEATRE

This program seeks to educate candidates to be exemplary theatre educators who can lead theatre classes at all levels (K-12), integrate theatre studies into the classroom and general school curriculum, and work with a diverse population of students in a variety of educational settings, including schools and community agencies. The program endeavors to prepare candidates 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 K-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 arts institute.

The Program provides opportunities for students to work with the Creative Arts Team (CAT), Lincoln Center Institute (LCI) and Manhattan Theatre Club (MTC). These unique partnerships will allow students to take elective courses with the CAT program, work with LCI teaching artists within their CCNY courses and work in a mentorship capacity with the Education Program at Manhattan Theatre Club

Stream A

Candidates who have graduated with an undergraduate degree (B.A.) in theatre comprised of 30-42 credits in: Acting Styles; Directing; Dramatic Literature/Theatre History; Design/Technical Theatre (or the equivalent) would be admitted to Stream A. This stream will provide them with more specific courses in educational theatre as well as education foundations and methods courses (both Generalized and Specialized Pedagogical Cores) required for initial teacher certification in Educational Theatre. Liberal arts distribution requirements, including a year of language other than English, will be evaluated upon admission to the program. Up to nine credits of coursework may be waived due to equivalent coursework on the undergraduate level. Up to six credits of equivalent graduate work may be transferred in to meet program requirements.

Prerequisites: BA in Theatre or equivalent, LAST examination.

Required Courses:

Core

0700A: Drama in Education. (must be taken during the first semester of enrollment in program coursework) 3
Choose one of the following three: 3
0800A: Dramatic Literature for High School Students 3
0900A: Devising Theatre 3
0400C: Teaching Literacy Through Drama 3
3600C: Theatre/Performance for Young Audiences 3

Electives

Choose one of the following four: 2-4
4400C: Integrating Arts into the Classroom 3
4600C: Applied Theatre 3
0500F: Special Topics in Educational Theatre 3
Independent Study (2-4cr.)

Generalized Pedagogical Core

EDUC 0100A: Urban Schools in a Diverse Society* 3
EDUC 0200A: Psychology of Teaching and Learning* 3
EDUC 0300A: Child or Adolescent Development* 3
4500K: Disability Studies and the Arts 3
Choose one of the following four: 3
0500C: Emergent to Fluent Literacy (Pre K-Grade 6)* 3
0600C: Fluent to Experienced Literacy (7-12)* 3
5201C: Teaching English Language Arts to Bilingual English Language Learners (Pre K-6)* 3
6500C: Teaching English Language Arts to Bilingual English Language Learners (7-12)* 3

Specialized Pedagogical Core

Choose one of the following two: 3
3700C: Fundamentals of Teaching Theatre* 3
4000F: Drama as a Learning Medium Across the Curriculum* 3
0201G: Student Teaching in Educational Theatre (K-6) 3
0202G: Student Teaching in Educational Theatre (7-12) 3
1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
2206I: Content Research Seminar I 2
2900I: Seminar in Educational Research 2

** Denotes 10-15 hours of fieldwork required*

Total credits 31-40

Stream B

This program leads to the M.S.Ed degree in Educational Theatre and Initial Certification in Theatre K-12

Candidates who may not hold a B.A. in theatre but already hold initial teacher certification (in areas such as early childhood, childhood, or any secondary school content area) would be admitted into Stream B. This stream will lead to professional certification in the area of their initial certification and initial certification in educational theatre. These students are exempt from the Generalized Pedagogical Core. The state requires 120 hours (20 full days) of student teaching in educational theatre. Students lacking an undergraduate degree in theatre will be required to complete 12 credits of pre /co-requisites of basic theatre courses (Acting Styles; Directing; Dramatic Literature/Theatre History; Design/Technical Theatre) offered in the undergraduate level through City College.

Required Courses

Core: 15

0700A: Drama in Education 3
Required to take First Semester of Coursework
0800A: Dramatic Literature for High School Students 3
0900A: Devising Theatre 3
0400C: Teaching Literacy Through Drama 3
3600C: Theatre/Performance for Young Audiences 3

Electives 3

One of the following four:
4400C: Integrating Arts into the Classroom 3
4600C: Applied Theatre 3
0500F: Special Topics in Educational Theatre 3
Independent Study (2-4 CR.)

Specialized Pedagogical Core 13

3700C: Fundamentals of Teaching Theatre* 3
4000F: Drama as a Learning Medium Across the Curriculum* 3
One of the following three:
0201G: Student Teaching in Educational Theatre (K-6) 3
0202G: Student Teaching in Educational Theatre (7-12) 3
0203G: Supervised Teaching in Educational Theatre 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues (0 CR.)
2206I: Content Research Seminar I 2
2900I: Seminar in Educational Research 2
** Denotes 10-15 hours of fieldwork required*

Total credits 31

LITERACY ACQUISITION AND DEVELOPMENT

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.

Stream A–Birth–6th Grade

Required Courses:

Prerequisites: 6
0500C: Emergent to Fluent Literacy or equivalent 3
0510C: Literacy Strategies Birth to Grade 6 or equivalent 3
Initial State Certification
1500C: Linking Literacy, Assessment, Instruction and Learning * 3
1600C: Literacy Inquiry Practicum * 3
1600E: Small Group Literacy Inquiry Practicum* 3
1300E: Negotiating Curriculum Standards, Children's Inquiries and appropriate Multicultural Materials*3
1400E: Writing for Teachers 2
1700E: Critical Use of Technology for Literacy Instructors* 2
0801C: Beginning Literacy Research Seminar 2
0802C: Literacy Research Seminar II 2
0803C: Literacy Research Seminar III 2
0804C: Literacy Research Seminar IV 1
1700G: Home-School Partnerships for Literacy Development 3
2000C: First and Second Language and Literacy Acquisition 3
2700C: Literacy for Struggling Readers and Writers 3
** Particular to the Birth-6th Grade literacy certificate*

Total credits 38

Stream B–5th–12th Grade

Required Courses:

Prerequisites: 6
0600C: From Fluent to Experience Literacy or equivalent 3
0610C: Literacy Strategies and Resources in the Content Areas or equivalent 3
Initial State Certification
1501C: Linking Literacy, Assessment, Instruction and Learning * 3
1601C: Literacy Inquiry Practicum * 3
1601E: Small Group Literacy Inquiry Practicum* 3
1301E: Negotiating Curriculum Standards, Children's Inquiries and appropriate Multicultural Materials* 3
1400E: Writing for Teachers 2
1701E: Critical Use of Technology for Literacy Instructors* 2
0801C: Beginning Literacy Research Seminar 2
0802C: Literacy Research Seminar II 2
0803C: Literacy Research Seminar III 2
0804C: Literacy Research Seminar IV 1
1700G: Home-School Partnerships for Literacy Development 3
2000C: First and Second Language and Literacy Acquisition 3
2700C: Literacy for Struggling Readers and Writers 3
** Particular to the 5th to 12th Grade literacy certificate*

Total credits 38

TESOL

The School of Education offers a master of science in the Teaching of English to Speakers of Other Languages (TESOL). 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 TESOL teaching and learning environment. The program aims to develop teachers who are committed to promoting equity and excellence in urban public education, particularly for English language learners. Students may enroll in one of three Streams.

Stream A – For students who hold initial or provisional teaching certification in TESOL

Required Courses:

2600C: Linguistics in a Multicultural Society 3
5201C: Methods of Teaching English Language Arts to Bilingual English Language Learners (Pre K-6) 3
Choose one of the following two: 3
5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-6) 3
6900C: Methods of Teaching English to Speakers of other Languages II (7-Adult) 3
5700C: Education That is Multicultural 3
5800C: Theories of Second Language Acquisition 3
6500C: Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult) 3
6800C: Grammar and its Pedagogy: English and Other Languages 3
One of the following three: 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
6700C: Phonology of English and Other Languages For Teachers 3
6900C: Methods of Teaching English to Speakers of other Languages II (7-Adult)* 3
**if not previously chosen*

Field Experiences and Student Teaching – 30 hours of field experiences to be apportioned within the pedagogical core curriculum, and 20 hours in the research seminars. Each 3-credit practicum will require 10 days of work with students learning English as a second language.

6601C: Practicum (A) in Teaching a Second Language: Elementary 2
6602C: Practicum (B) in Teaching a Second Language: Secondary 2
Research Seminars:
2205I: Content Research Seminar in TESOL Education 2
2900I: Seminar in Educational Research 2

Total credits 32

Stream B – For students who do not seek New York State Certification in TESOL (those seeking employment outside the United States, in adult education or in English language institutes)

Required Courses:

4500A: Teaching English to Adult Speakers of other Languages 3
2600C: Linguistics in a Multicultural Society 3
Choose one of the following two: 3
5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-6) 3
6900C: Methods of Teaching English to Speakers of Other Languages II (7-Adult) 3
5800C: Theories of Second Language Acquisition 3
6500C: Methods of Teaching English Language Arts to Bilingual English Language Learners (7-Adult) 3
6800C: Grammar and its Pedagogy: English and Other Languages 3
One of the following three: 3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education 3
5900C: Development and Evaluation of Materials for teaching Second Languages (English) 3
6900C: Methods of Teaching English to Speakers of Other Languages II (7-Adult)* 3
** if not previously chosen*

In addition to field experiences that are apportioned within the pedagogical core curriculum, students complete one of the following practicum courses, which will require 10 days of work with students learning English as a second language.

One of the following four practica: 2
6601C: Practicum (A) in Teaching a Second Language: Elementary 2
6602C: Practicum (B) in Teaching a Second Language: Secondary 2
6603C: Practicum (C) in Teaching a Second Language: Mixed Levels 2
6604C: Practicum (D) in Teaching a Second Language: Adults 2
Research Seminars:
2205I: Content Research Seminar in TESOL Education 2
2900I: Seminar in Educational Research 2

Total credits 30

Stream C- For students holding a bachelor's degree outside Education who seek initial New York State certification in TESOL

Prerequisite/Corequisites: 6
EDUC 0200A: Psychology of Learning and Teaching 3
One of the following two:
EDUC 0300A: Child Development 3
EDUC 0500A: Adolescent Learning and Development 3

Required Courses:

2600C: Linguistics in a Multicultural Society 3
5201C: Methods of Teaching English Language Arts to Bilingual English Language Learners (pre K-6) 3
5300C: Language Minority Students and Urban Schooling in the U.S. 3
5400C: Methods of Teaching English to Speakers of Other Languages I (pre K-6) 3
5700C: Education That is Multicultural 3
5800C: Theories of Second Language Acquisition 3
6000K: Introduction to the Education of Language Minority Students with Disabilities 3

6500C: Methods of Teaching English Language Arts to English Language Learners (7-Adult) 3
6800C: Grammar and its Pedagogy: English and Other Languages 3
6900C: Methods of Teaching English to Speakers of other Languages II (7-Adult) 3
7200C: Field-based Inquiry: TESOL 3
2205I: Content Research Seminar in TESOL 2
2900I: Seminar in Educational Research 2
0503G: Student Teaching in TESOL (Pre-K-6) 3
0504G: Student Teaching in TESOL (7-12) 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0

Field experiences are apportioned within the pedagogical core curriculum, and in an additional course, Field-based Inquiry: TESOL (3 CR.), which requires 45 hours of fieldwork prior to student teaching. Candidates also complete 6 credits of supervised teaching, including one experience at the elementary level and one at the secondary level, each of at least 20 school days (6 CR.).

Total credits 43-49

COURSE DESCRIPTIONS

Each of the following courses carries a designation of EDCE unless otherwise noted. The courses are arranged according to the last-place letter.

EDUC 0100A: 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. Includes 10 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0200A: Psychology of Learning and Teaching
The course includes 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. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0300A: Child Development
Theories and principles of development pertinent to culturally and ethnically-diverse and inclusive classrooms with an emphasis on classroom applications and fieldwork. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0400A: 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, 22200, or equivalent. 3 HR./WK.; 3 CR

0401A: 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. 3 HR./WK.; 3 CR

0402A: 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. Pre-req.: EDCE 0401A. Co-req: Instructional assignment in ESL summer school program. 3 HR./WK.; 3 CR

0700A: 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. 3 HR./WK.; 3 CR

0800A: Dramatic Literature for High School Students
This course explores dramatic literature in the high school classroom 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 dramatic literature in educational theatre. This course offers students the tools to begin their own research into specific theatrical periods, and geographic and cultural areas. Contemporary plays which have been produced for theatre for young audiences will also be studied. While it is impossible to be all inclusive, this course offers students the tools to begin their own research into specific theatrical periods, and geographic and cultural areas. Dramaturgical studies will be investigated, as well as practical implementation and evaluation of dramatic experiences for the middle and high school students. 3 HR./WK.; 3 CR

0900A: 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. 3 HR./WK.; 3 CR

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. 3 HR./WK.; 3 CR

0100C: Observing and Recording Children in Classroom Contexts
How to examine children's behaviors, work, and approaches to learning to inform the development of environments responsive to students' diverse needs. Major developmental and learning theories are referenced. Case study of an individual child

will be completed. Required for initial certification. Ancillary requirement for professional certificate (on advisement). Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

0200C: 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). Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

0400C: 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. 3 HR./WK.; 3 CR

0500C: 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. Includes 15 hours of fieldwork in exemplary setting. 3 HR./WK.; 3 CR.

0510C: 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. 3 HR./WK.; 3 CR.

0600C: 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. Includes 15 hours of fieldwork in exemplary setting. 3 HR./WK.; 3 CR.

0610C: Literacy Strategies and Resources in the Content Areas (5th-12th)
This course will explore literacy practices in the different **c**ontent 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. 3 HR./WK.; 3 CR.

0800C: 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. Includes 8 hours of fieldwork in certificate area. 3 HR./WK.; 3 CR.

0801C: 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. Includes 8 hours of fieldwork. 2 HR./WK.; 2 CR.

0802C: 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. Prerequisite: 0801C. Includes 8 hours of fieldwork.2 HR./WK.; 2 CR.

0803C: 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. Prerequisite: 0801C and 0802C. Includes 8 hours of fieldwork. 2 HR./WK.; 2 CR.

0804C: 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. Prereq.: Literacy Research Seminar I, II, and III.
1 HR./WK.; 1 CR.

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. Co requisites: 1600C or 1600E. 3 HR./WK.; 3 CR.

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 5^{th}- 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. Co-requisites: 1601C or 1601E. 3 HR./WK.; 3 CR.

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-6^{th} 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. Co-requisites and Prerequisites: 1500C and/or 1600E. Includes 18 hours practicum. 3 HR./WK. 3 CR.

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 5^{th} to 12^{th} 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. Co-requisites and Prerequisites: 1501C and/or 1601E. Includes 18 hours practicum. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Includes 8 hours of fieldwork.3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

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 U.S. 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 technol-

ogy component. Required for professional certification. Prereq. EDUC 2100C or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: 5300C. 3 HR./WK.; 3 CR.

2600C: Linguistics in a Multicultural Society
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. 3 HR./WK.; 3 CR.

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. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Pre- or coreq.: EDUC 3100C. 3 HR./WK.; 3 CR.

3100C: Science in a Program of Childhood Education
Development of first-hand knowledge of standards-based science content, materials and methods appropriate to the several growth levels of children in the primary and intermediate programs of the elementary school. Written reviews of scholarly literature, maintenance of written journals, and fieldwork on the study of teaching in a childhood education classroom. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

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. Prereq.: EDUC 3100C or equivalent. 3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

3400C: Focus on Inquiry in Education
Study of background literature and developmental theory; observing and recording children's growth; teacher's role. Special permission required. 3 HR./WK.; 3 CR.

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). Prereq.: Child Development. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR

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. 3 HR./WK.; 3 CR

3800C: Materials for a Flexible and Individualized Curriculum
The development, use and evaluation of materials for individuals and small group instruction. 3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

4200C: Including Young Children with Special Needs in the General Education Classroom
This course will provide early childhood educators with a theoretical framework and practical applications for successfully including students with special needs within the general education setting. Information, guidance and resources will be presented to assist teachers in differentiating curriculum, using adaptive technology, assessing students holistically, working with their classroom/administrative school 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 diversity issues, helping teachers to frame differences in a respectful, non-biased way. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

4400C: Integrating Theatre and Related Arts into the Curriculum
This course explores how teachers can use dramatic activities and dramatic play to help students engage in the learning process and develop their cognitive and social skills. 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 main concepts, structures and conventions of the field of dramatic activities and related arts will also be investigated. 3 HR./WK.; 3 CR

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. 3 HR./WK.; 3 CR

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. 3 HR./WK.; 3 CR.

5201C: Methods of Teaching English Language Arts to Bilingual English Language Learners (Pre-K – 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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

5202C: Teaching Language Arts & Reading to Bilingual-Bicultural Students (Spanish)
Methods and materials for the teaching of reading and language in Spanish to Spanish-dominant and English-dominant children. Prereq: 5300C. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Prereq: 5300C. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

5204C: Teaching Language Arts & Reading to Bilingual-Bicultural Students (Chinese)
Methods and materials for the teaching of reading and language in Chinese to Chinese-dominant and English-dominant children. Prereq: 5300C. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

5300C: Language Minority Students and Urban Schooling in the U.S.
This course explores the historical background policies, approaches, and theoretical foundations of bilingual education and other educational programs for immigrant, bilingual, and language minority students. It also considers the social, political, and economic context that surrounds the education of immigrant students in urban schools. 3 HR./WK.; 3 CR.

5400C: Methods of Teaching English to Speakers of Other Languages I (Pre K-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. Includes 10 hours of fieldwork. 3 HR./WK., 3 CR.

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. 3 HR./WK., 3 CR.

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. 3 HR./WK.; 3 CR.

5600C: Psycholinguistic and Sociolinguistic Aspects of Bilingual Education
Relevant findings in psycholinguistics and socio-linguistics. Acquisition and social settings of first and second languages by children. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

6000C: How Children Learn Mathematics: Implications for Teaching I
Emphasis on growth and development of the mathematical thinking of children in grades Pre K – 3 through their action and exploration in a supportive classroom environment. Includes discussion of teaching strategies, planning learning experiences, and a strong component on the use of technology for modeling effective instruction and studying children's learning. Prerequisites: Math 18000 and 18500 or equivalent. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

6100C: How Children Learn Mathematics: Implications for Teaching II
Emphasis on growth and development of the mathematical thinking of children in grades 3-6 through their action and exploration in a supportive classroom environment. Includes discussion of teaching strategies, planning learning experiences, and a strong component on the use of technology for modeling effective instruction and studying children's learning. Prereq.: EDUC 6000C. Includes 10-15 hours of fieldwork. 3 HR./WK; 3 CR.

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. Prereq.: EDCE 6000C or the equivalent, 3 HR./WK.; 3 CR.

6400C: Teaching Content (Math, Science, Social Studies) using both English and a Native Language.
Designed to develop an interdisciplinary approach to teaching Math, Science, and Social Studies using both English and a native language (e.g., Chinese, Haitian, and Spanish). Prospective bilingual teachers will be provided with knowledge, interdisciplinary content skills, and specific language-related skills on how to use available materials and resources (i.e., standard glossaries and curriculum guides) when planning and integrating content-area learning experiences and/or interdisciplinary thematic units, using both English and one native language (Chinese, Haitian, or Spanish). Prereq: 5300C. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

6601C: Practicum (A) in Teaching a Second Language (Elementary)
Designed to provide students with supervised field experiences teaching the language of their specialized study to students for whom it is not their primary language. 2 HR./WK.; 2 CR.

6602C: Practicum (B) in Teaching a Second Language (Secondary)
Designed to provide students with supervised field experiences teaching the language of their specialized study to students for whom it is not their primary language. 2 HR./WK.; 2 CR.

6603C: Practicum (C) in Teaching a Second Language (Mixed Levels)
Designed to provide students with supervised field experiences teaching the language of their specialized study to students for whom it is not their primary language. 2 HR./WK.; 2 CR.

6604C: Practicum (D) in Teaching a Second Language (Adults)
Designed to provide students with supervised field experiences teaching the language of heir specialized study to students for whom it is not their primary language. 2 HR./WK.; 2 CR.

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. Prereq: 2600C. 3 HR./WK.; 3 CR.

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. Prereq: 2600C. 3 HR./WK.; 3 CR.

6900C: Methods of Teaching English to Speakers of Other Languages II (Grade 7 – Adult)
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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. Includes 10 hours of fieldwork at the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

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. Prerequisites: EDUC 0200A, either 0300A or 0500A and EDCE 5400C and either 5201C or 6500C. Includes 45 HRS in-school experience and bi-weekly seminar; 3 CR.

7300C: Music and Movement for Young Children
Participants in this course learn how to create a program of activities that guide and incorporate the diverse needs and interests of young children through their responses to music, rhythms, dramatic play, and spontaneous imaginative experiences. Required for initial certification. Includes 10-15 hours of fieldwork. 3 HR./WK.; 3 CR.

0100E: Cultural Pluralism in Curriculum Development
Basic concepts of cultural pluralism in the development of curriculum. Analysis of recent research derived from studies of major minority groups. 3 HR./WK., PLUS FIELD TRIPS; 3 CR.

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. Includes 20 hours of fieldwork. 3 HR/WK.; 3 CR.

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 5^{th} to 12^{th} 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. Includes 20 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 2 HR./WK.; 2 CR.

1600E: Small Group Literacy Inquiry Practicum Birth-6^{th} Grade
This course supports candidates in learning the premises of inquiry-based learning and transformative practices within the field of literacy for Birth to 6^{th} 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. Co-requisites and Prerequisites: 1500C and/or 1600C. Includes 18 hours practicum. 3 HR./WK.; 3 CR.

1601E: Small Group Literacy Inquiry Practicum- 5^{th}-12^{th} 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 5^{th}-12^{th} 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. Co-requisites and Prerequisites: 1501C and/or 1601C. Includes 18 hours practicum. 3 HR./WK.; 3 CR.

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 6^{th} 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. Includes 8 hours of fieldwork. 2 HR./WK.; 2 CR.

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 5^{th} to 12^{th} 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. Includes 8 hours of fieldwork. 2 HR./WK.; 2 CR.

0200F: 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. Prereq.: EDUC 0500G or present full-time service as a teacher. This course must be taken before EDUC 2200I. 3 HR./WK.; 3 CR.

0300F: 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. Pre-requisite: a minimum of 18 credits or special permission of advisor. 3 HR./WK.; 3 CR.

0400F: 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. Pre-requisite: a minimum of 18 credits or special permission of advisor. 3 HR./WK.; 3 CR.

0500F: Special Topics in Educational Theatre
Course description: This course investigates how students can negotiate the complex role of being both a teacher and an artist in and out of the classroom setting. Methods and materials for exploring the process of being a teaching artist include discussions on the role of the teaching artist in different classroom settings (e.g. a one-shot, residency, afterschool programs, other settings) 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. 3 HR./WK.; 3 CR

2900F: Curriculum Development in Childhood Education I
Students develop a framework for analyzing learners, curriculum design, and teaching strategies based on readings by outstanding contributors to educational thought and practice, and observation of children in a classroom setting. Includes case study of a child in the classroom context. Open only to matriculants. Includes 10-15 hours of fieldwork at the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

3000F: Curriculum Development in Childhood Education II
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. Prereq.: EDUC 2900F. Includes 10-15 hours of fieldwork at the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

4000F: Drama as a Learning Medium Across the Curriculum
This course explores theories and practices of educational drama and theatre as they can be applied to grades K-12. Participants 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 relationship of classroom drama to curricular subject matter (including but not limited to Social Studies; Literacy, English Language Learners, Math/Science) will be examined. Practical work in design, implementation, and evaluation of dramatic experiences for students of different age ranges will be investigated. 3 HR./WK.; 3 CR

0201G: Student Teaching in Educational Theatre 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Advanced Certificate students: See advisor or program head for necessary prerequisites. Coreq.: 1900G. 3 CR.

0202G: Student Teaching in Educational Theatre 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Advanced Certificate students: See advisor or program head for necessary prerequisites. 3 CR.

0203G: Supervised Teaching in Educational Theatre 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Coreq.: 1900G. 3 CR.

0301G: 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. Advance approval necessary. To be completed at the end of the program sequence. Coreq.: EDUC 1900G. 3 HR./WK.; 3 CR.

0302G: 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. Advance approval necessary. To be completed at the end of the program sequence. Co-req.: EDUC 1900G. 3 HR./WK.; 3 CR.

0303G: 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. Advance approval necessary. To be completed at the end of the program sequence. 3 HR./WK.; 3 CR.

0304G: 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. Advance approval required. 0 CR.

0305G: 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. Advance approval required. 0 CR.

0401G: 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Advanced Certificate students: See advisor or program head for necessary prerequisites. Coreq.: 1900G. 3 CR.

0402G: 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Advanced Certificate students: See advisor or program head for necessary prerequisites. 3 CR.

0403G: 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. Coreq.: 1900G. 3 CR.

0404G: Supervised Teaching in Childhood Education II and Seminar
Supervised 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. Advance approval required. Prerequisites: 21 CR. of initial certification courses and CST examination. 3 CR.

0405G: Student Teaching in Childhood Education and Seminar
Supervised student teaching for 100 hours in grades 1 to 3 or 4 to 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. Advance approval required. 0 CR.

0406G: 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. Advance approval required. 0 CR.

0502G: Student Teaching in Bilingual Education
A continuation of EDUC 0501G. Five mornings and one afternoon per week. Open only to matriculants. Advance approval required. Prereq.: EDUC 0501G. For certification purposes, this is equivalent to six semester hours of undergraduate student teaching for 300 clock hours of supervised observation and teaching. 6 CR.

0503G: Student Teaching in TESOL (Grades Pre-K-6)
Students will spend 7 weeks of supervised student teaching in grades Pre-K through 6, and meet in a weekly seminar. 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. Students 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. Includes special seminars on preventing child abduction and on preventing alcohol, tobacco and other drug abuse. Required of all students in the graduate initial certification program in TESOL. Prerequisites: EDCE 2600C, 5201C, 6500C, 5400C, 5700C, 5800C, 6000K, 6800C, 6900C, and 7200C. 150 Hours of in-school experience and weekly seminar. 3 CR.

0504G: Student Teaching in TESOL (Grades 7-12)
Students will spend 7 weeks of supervised student teaching in grades 7-12, and meet in a weekly seminar. 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. Students 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. Includes special seminars on preventing child abduction and on preventing alcohol, tobacco and other drug abuse. Required of all students in the graduate initial certification program in TESOL. Prerequisites: EDCE 2600C, 5201C, 6500C, 5400C, 5700C, 5800C, 6000K, 6800C, 6900C, and 7200C. 150 Hours of in-school experience and weekly seminar. 3 CR.

0703G: 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.
4 HR./WK.; 4 CR.

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. Includes 8 hours of fieldwork. 3 HR./WK.; 3 CR.

EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues
Definitions, indicators, and the impact of abuse and neglect on the child; reporting abuse. Violence prevention. Additional workshops include topics such as certification, resume building and professional resources. Coreq.: Student Teaching. 2 HR./WK.; 0 CR.

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. Prereq.: completion of 15 credits. 3 HR./WK.; 3 CR.

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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

9602G: Guidance Services

9604G: Literacy Programs

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. 3 HR./WK.; 3 CR.

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. Prereq.: 2100K or equivalent. 2 HR./WK.; 2 CR.

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. Prereq.: see individual programs. 2 HR./WK.; 2 CR.

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. Prereq.: Matriculation, 15 CR. and EDUC 2900F. 2 HR./WK.; 2 CR.

2205I: Content Research Seminar in TESOL
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. Prereq.: see individual programs. Includes 10 hours of fieldwork. 2 HR./WK.; 2 CR.

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. Prereq.: Matriculation, 15 CR. and EDUC 2900F. 2 HR./WK.; 2 CR.

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. 2 HR./WK.; 2 CR.

6100I: Working with Parents of Students with Disabilities
Problems, principles, and procedures in working with parents of students with disabilities. Impact of disabling factors on parents, and study of different problem solutions including study of school and community resources. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Includes 10-15 hours of fieldwork.
3 HR./WK.; 3 CR.

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.
3 HR./WK.; 3 CR.

4500K: Exploring Disability through Theatre and the Arts
This course focuses upon the emerging discipline of Disability Studies in which disability is understood as "natural human variation" and an essential feature of diversity in a multicultural society. Drawing upon the narrative work of disabled artists (e.g., theater, painting, memoir, poetry, dance, comedy), disability is re-conceptualized as an issue of identity and representation. Candidates will be asked to identify and critique disability representation or omission in cultural media (e.g., film, newspapers, television

news and entertainment, animated films, magazines, advertisements). The potential of theatre arts as a powerful vehicle for positive disability representation will be explored in depth. Ongoing work of disabled theater artists and companies in New York City (e.g., Theater By the Blind, Our Time Theater Company, Sprout Film Festival, Nicu's Spoon, Inc.) will be highlighted, as well as national and international companies. Within an educational theatre curriculum, candidates will be asked to design and implement "cutting-edge" instructional strategies and practices for addressing the needs of diverse learners in inclusive settings. 3 HR./WK.; 3 CR.

6000K: Language Minority Students with Disabilities
An overview of the needs of children with disabilities who are in the process of acquiring skills in English. Special Education and Bilingual Education principles will be emphasized and a rationale for the integration of theories and practices from these two fields will be established. 3 HR./WK.; 3 CR.

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. Prereq.: Includes 20 hours practicum. EDUC 6000K. 3 HR./WK.; 3 CR.

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. Prereq.: EDUC 6000K. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. 3 HR./WK.; 3 CR.

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. Prereq.: fluency in conversational Spanish. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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Department of Leadership and Special Education

Professor Sylvia Roberts, Chair • Department Office: NA 6/207B • Tel: 212-650-7262

GENERAL INFORMATION

The City College offers the following master's degrees and advanced certificates in Education:

Master of Science in Education (M.S.Ed.)
Bilingual Childhood Special Education
Teaching Students with Disabilities in Childhood Education
Teaching Students with Disabilities in Middle Childhood Education
Administration and Supervision

Post Master's Advanced Certificate Program
Administration and Supervision

ADVISEMENT

The Office of Student Services (212-650-5316) of the Office of the Chair (212-650-7262) will be pleased to assist you in contacting the faculty member in charge of any of the programs above.

PROGRAMS AND OBJECTIVES

All courses are EDLS unless otherwise noted.

BILINGUAL CHILDHOOD SPECIAL EDUCATION

This program prepares bilingual special education teachers to address the educational, emotional, and behavioral needs of linguistically diverse minority students with a wide range of disabilities. Students completing the program become certified in Special Education 1-6 with Bilingual Extension.

Stream A – For students with initial certification

Required Courses:

3300K: Building Community in Inclusive Contexts	3
3800K: Differentiated Instruction and Assessment in Collaborative Contexts I in Childhood Education	3
5202C: Teaching Language Arts & Reading to Bilingual Students (Spanish)	3
5300C: Theories and Practices of Bilingual Education	3
5300K: Positive Approaches to Challenging Behaviors	3
5400C: Methods of Teaching English to Speakers of Other Languages	3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education	3
5700C: Education That is Multicultural	3
5901G: Curriculum and Instructional Approaches in Bilingual Special Education	3
6000K: Introduction to the Education of Language Minority Students with Disabilities	3
6100K: Assessing the Educational Needs of Language Minority Students with Disabilities	3
6200K: Language Minority Families and the Special Education System	3
5701G: Practicum Teaching Bilingual Special Education	3
2600I: Content Research Special Education	2
2900I: Seminar in Educational Research	2
Total credits	**43**

Stream B – For students without initial certification

Required Courses:

0200A: Psychology of Learning and Teaching	3
0300A: Child and Adolescent Development	3
0400A: The School in American Society: Bilingual Education in the Urban School	3
3300K: Building Community in Inclusive Contexts	3
3600K: Approaches to Literacy I in Childhood Education	3
3800K: Differentiated Instruction and Assessment in Collaborative Contexts I in Childhood Education	3
5202C: Teaching Language Arts & Reading to Bilingual Students: Spanish	3
5300C: Theories & Practices of Bilingual Education	3
5300K: Positive Approaches to Challenging Behaviors	3
5400C: Methods of Teaching English to Speakers of Other Languages	3
5600C: Psycho-Sociolinguistic Aspects of Bilingual Education	3
5700C: Education That is Multicultural	3
5901G: Curriculum and Instructional Approaches in Bilingual Special Education	3
6000K: Introduction to the Education of Language Minority Students with Disabilities	3
6100K: Assessing the Educational Needs of Language Minority Students with Disabilities	3
6200K: Language Minority Families and the Special Education System	3
0703G: Internship in Bilingual Special Education	4

2600I: Content Research Special Education 2
2900I: Seminar in Educational Research 2

Total credits 56

SPECIAL EDUCATION

The School of Education offers two graduate programs in special education: Teachers of Students with Disabilities in Childhood Education (Grades 1-6) and Teachers of Students with Disabilities in Middle Childhood Education (Grades 5-9). The programs require 31-43 credit hours (depending on previous coursework) and lead to a master of science (education). Completion of either of the programs satisfies the educational requirements for provisional (initial) certification in New York State and students may apply for such through the School. In addition, the master's degree fulfills the education requirements for the State Professional (permanent) Certificate in either special education or childhood education if the candidate already holds provisional certification. 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.

Stream A – Teaching Students with Disabilities in Childhood Education (Grades 1-6)

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 that can be made up within two semesters 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 is not counted toward the master's degree):

EDUC 0100A: Urban Schools in a Diverse Society (includes 10 hours of field work) 3
EDUC 0200A: Psychology of Learning and Teaching 3
EDUC 0300A: Child Development 3
5000K: Introduction to Inclusive Education 3

The 31-credit program listed below fulfills the education requirements for initial or professional New York State certification in special education (for those who hold initial). It will also fulfill the education requirements for professional certification in childhood education (for those who hold provisional 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.

Required Courses:

5300K: Positive Approaches to Challenging Behaviors 3
One of the following two: 3
3300K: Building Community in Inclusive Contexts 3
3500K: Identity and Disability 3
3600K: Approaches to Literacy I in Childhood Education 3
3700K: Approaches to Literacy II in Childhood Education 3
3800K: Differentiated Instruction and Assessment in Collaborative Contexts I in Childhood Education 3
One of the following two: 3
3900K: Differentiated Instruction and Assessment in Collaborative Contexts II in Childhood Education 3
4000K: Disability Studies in Childhood Education 3
5400C: Methods of Teaching English to Speakers of Other Languages 3
6100I: Parents, Families and Disabilities 3
One of the following two: 3
5700G: Practicum in Teaching Special Education (for those who hold teaching positions) 3
0701G: Internship in Special Education I: Childhood Education (for those not teaching) 3
One of the following options: 4
2600I: Content Research Seminar in Special Education 2
2900I: Seminar in Educational Research 2
or 0000I: Introduction to Educational Research 2
EDUC 0100I: Seminar in Educational Research 2

Total credits 31

Stream B - Teaching Students with Disabilities in Middle Childhood Education (Grades 5-9)

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 that can be made up within two semesters 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 is not counted toward the master's degree):

EDUC 0100A: The School in American Society 3
EDUC 0200A: Psychology of Learning and Teaching 3
EDUC 0300A: Child and Adolescent Development 3
5000K: Introduction to Inclusive Education 3

The 31-credit program listed below fulfills the education requirements for initial or professional New York State certification in Special Education (for those who hold initial). Note: those taking courses requiring fieldwork or practica may do it in their own work-

places 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:

5300K: Positive Approaches to Challenging Behaviors 3
One of the following two: *3*
3300K: Building Community in Inclusive Contexts (for candidates who are interested in teaching in inclusion classrooms and others) 3
3500K: Identity and Disability 3
3601K: Approaches to Literacy I in Middle Childhood Education 3
3701K: Approaches to Literacy II in Middle Childhood Education 3
3801K: Differentiated Instruction and Assessment in Collaborative Contexts I in Middle Childhood Education 3
One of the following two: *3*
3901K: Differentiated Instruction and Assessment in Collaborative Contexts II in Middle Childhood Education 3
4001K: Disability Studies in Middle Childhood Education 3
5400C: Methods of Teaching English to Speakers of Other Languages 3
6100I: Parents, Families, and Disability 3
One of the following two: *3*
5700G: Practicum in Teaching Special Education 3
0701G: Internship in Special Education I: Middle Childhood Education 3
One of the following options: 4
2600I: Content Research Seminar in Special Education 2
2900I: Seminar in Educational Research 2
or
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Seminar in Educational Research 2

Total credits 31

EDUCATIONAL LEADERSHIP

School District Leader

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). 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
- Coordinator of Educational Planning
- Director of Finance and Business Management
- Director of Special Programs and Projects

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.

School Building Leader

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).

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.

DEGREE REQUIREMENTS

School District Leader

Core A: Human, Foundational, & Structural Elements of Education

7101G: Dynamics of Educational Organizations 3
7201G: Moral Dimensions of Leadership 3
7401G: Instructional Leadership 3
6701G: School Management 3
8801G: School Community Building 3
8601G: Education Law 3

Core C: District Level Application

8103G: Management Operations at the District Level 3
8604I: Social Responsibility, Politics, and Education 3
5607G: Leadership at the District Level 3
7904G: Internship and Seminar 3

Total credits 30

School Building Leader Degree Requirements

Core A: Human, Foundational, & Structural Elements of Education

7101G: Dynamics of Educational Organizations 3

7201G: Moral Dimensions of Leadership 3
7401G: Instructional Leadership 3
6701G: School Management 3
8801G: School Community-Building 3
8601G: Education Law 3

Core B: Building Level Application

7001G: Foundations of Educational Policy-Making 3
2501I: Research and Assessment Seminar in Educational Leadership 2
8501I: Field Problem Seminar in Educational Leadership 2
7301G: Curriculum Development 3
7904G: Internship and Seminar: Building Level 3

Total credits 31

Entry Level Leader Certification Program (ELLC)

The Entry Level Leadership Certification Program (ELLC) is a fast-track twenty-one (21) credit hour initial School-Building Leadership certification program targeted for entry-level leader positions in education. 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, and people, the ELLC Program concentrates on preparing a cohort of candidates to assume the moral stewardship of equity and excellence in diverse, high-need urban schools. The ELLC Program is a certification-only program that involves Core A courses plus three semester internship. 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, 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 have a bachelor's degree from an accredited institution, a master's degree with a minimum 3.0 G.P.A., state certification as a teacher, guidance counselor, school psychologist, school social worker, or other appropriate certification, three years teaching or relevant educational work experience, including demonstrated success in fulfilling leadership roles in school or district, three letters of recommendation, satisfactory completion of an interview and on-site essay and submit official transcripts. In addition, candidates will be judged on the basis of references, interviews, and potential for professional work in administration.

Entry Level Leader Certification (ELLC) Requirements

Core A: Human, Foundational, & Structural Elements of Education

7101G: Dynamics of Educational Organizations 3
7201G: Moral Dimensions of Leadership 3
7401G: Instructional Leadership 3
6701G: School Management 3
8801G: School Community Building 3
8601G: Education Law 3
7904G: Internship and Seminar 3

Total credits 21

COURSE DESCRIPTIONS

Each of the following courses carries a designation of EDLS unless otherwise noted. The courses are arranged according to the last-place letter.

EDUC 0100A: 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. Includes 10 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0200A: 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. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0300A: Child Development

Theories and principles of development pertinent to culturally and ethnically diverse and inclusive classrooms with an emphasis on classroom applications and fieldwork. Includes 10-15 hours of fieldwork at either the 1-3 or 4-6 grade levels. 3 HR./WK.; 3 CR.

EDUC 0400A: 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, 22200, or equivalent. 3 HR./WK.; 3 CR.

EDUC 0500A: 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 communication, and classroom management strategies. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy

The nature of students with disabilities and health-care needs. Effects of disabilities on learning and behavior. Identifying strengths, individualizing instruction, and collaborating to prepare special-needs students to their highest levels of achievement, literacy, and independence. Language acquisition and literacy development by native English speakers and English language learners. Developing lis-

tening, speaking, reading and writing. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

0701G: Internship in Special Education I: Childhood Education
Students will be assigned to a school and spend half a semester in a special education or inclusion classroom, grades 1-3, and half a semester in a special education or inclusion classroom, grades 4-6. Minimum of 15 hours per week, 3 credits equivalent to 12 semester hours for 240 hour (40 day) minimum. There is a scheduled weekly seminar. 3 CR.

EDCE 0703G: 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. 4 HR./WK.; 4 CR.

EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues
Definitions, indicators, and the impact of abuse and neglect on the child; reporting abuse. Violence prevention. Additional workshops include topics such as certification, resume building and professional resources. Coreq.: Student Teaching. 2 HR./WK.; 0 CR.

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 statues are to be studied and analyzed. 3 HR./WK.; 3 CR.

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 and in an integrative seminar. Individual conferences to review teaching strategies, materials, and techniques. Department permission required. 3 HR./WK.; 3 CR.

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. Prereq.: completion of 15 credits. 3 HR./WK.; 3 CR.

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. Includes 10 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq.: 7100G. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq.: 7300G. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereqs.: 7100G, 7200G. 3 HR./WK.; 3 CR.

7903G: Internship in School Administration and Supervision
Carefully planned and supervised on-the-job training under general control of the faculty in Administration. Where possible, the work will be in a school system, but, as appropriate, may be carried on in another community agency. Regular reports and conferences required. 3 HR./WK.; 3 CR.

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. 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 school-site administrator. Problem-solving seminars that focus on internship activities are conducted on a regular basis. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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 Washing-ton, D.C. are also utilized. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

8601G: Education 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Special permission of particular program advisor required. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

EDUC 0000I: 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. 2 HR./WK.; 2 CR.

EDUC 0100I: 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. Prereq.: EDUC 0000I. 2 HR./WK.; 2 CR.

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. Prereq.: see individual programs. 2 HR./WK.; 2 CR.

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. 2 HR./WK.; 2 CR.

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. 2 HR./WK.; 2 CR.

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. 2 HR./WK.; 2 CR.

EDCE 6100I: Parents, Families, and Disability
Understanding and valuing the perspective and knowledge of parents and families who raise children with disabilities forms the focus of this class. We will reflect upon our own assumptions and misconceptions about parents and families and consider positive reconceptualizations of family/school relationships. We explore how "the medical model of disability"—inherent within the institution of special education—disrupts effective communication between families and professionals. We will also explore the relational aspects of disability on extended family members. Attention will be paid to culturally responsive factors that promote effective communication and authentic collaboration with families as well as effective parent/family advocacy strategies. 3 HR./WK.; 3 CR.

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. Special permission required. 2 HR./WK.; 2 CR.

8100I: Individual Research in Educational Administration and Supervision
Advanced study of special problems in education sponsorship by staff member. Special permission required. Hours to be arranged. 2 HR./WK.; 2 CR.

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. 3 HR./WK.; 3 CR.

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.) HR. TO BE ARRANGED/WK.; 1-6 CR.

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. 2 HR./WK.; 2 CR.

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. Open to nonmatriculants; permission required. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

3500K: Identity and Disability
What does it mean to be "disabled" in contemporary society? Is disability best viewed as a marker of identity such as race, ethnicity, class, gender, and sexual orientation? How does a person experience disability as it intersects *with* these other markers of identity? Is there a disability culture? What is the history of people with disabilities? How are people with disabilities represented: in literature, science, the law, religion, the media, film and television? How is disability understood in other countries and cultures? Bearing these questions in mind, we must ask: How do school structures incorporate disabled students and teachers? What is learned about disability both formally and informally throughout general education? How is disability taught within the curriculum? Given that all teachers work with a significant number of students labeled disabled, these are all important questions to explore. In this course, participants will engage with issues raised by Disability Studies in conceptualization(s) of disability and the social impact of our individual values, beliefs, and actions. 3 HR./WK.; 3 CR.

3600K: Approaches to Literacy I in Childhood Education
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). Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3601K: Approaches to Literacy I in Middle Childhood Education
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). Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3700K: Approaches to Literacy II in Childhood Education
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. Prereq. EDUC 3600K. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3701K: Approaches to Literacy II in Middle Childhood Education
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. Prereq. EDUC 3601K. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3800K: Differentiated Instruction and Assessment in Collaborative Contexts I in Childhood Education
This course is the first in a two-part sequence designed to foster creative approaches to planning, implementation of instruction, ongoing curriculum-based/authentic instruction for *all* children in a variety of educational settings. Participants will focus on understanding differences as a basis for planning; use diagnostic assessment in an ongoing manner to make instruction more responsive to learner need; utilize multiple forms of intelligence; assist students by frequently guiding them in making interest-based choices; use varied instructional arrangements; employ student readiness, interest, and learning profile in planning; develop multi-option assignments; develop flexible use of timing; facilitate students becoming more self reliant learners; and implement multiple forms of assessment. 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, differentiated instructional design and planning 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. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3801K: Differentiated Instruction and Assessment in Collaborative Contexts I in Middle Childhood Education
This course is the first in a two-part sequence designed to foster creative approaches to planning, implementation of instruction, ongoing curriculum-based/authentic instruction for *all* children in a variety of educational settings. Participants will focus on understanding differences as a basis for planning; use diagnostic assessment in an ongoing manner to make instruction more responsive to learner need; utilize multiple forms of intelligence; assist students by frequently guiding them in making interest-based choices; use varied instructional arrangements; employ student readiness, interest, and learning profile in planning; develop multi-option assignments; develop flexible use of timing; facilitate students becoming more self reliant learners; and implement multiple forms of assessment. 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, differentiated instructional design and planning 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. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3900K: Differentiated Instruction and Assessment in Collaborative Contexts II in Childhood Education
This course is the second part of a two-part sequence that extends the content addressed in Part I. Participants will 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 ways in which students demonstrate their knowledge as a result of interacting with information (product). 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 acquired knowledge of assessment, differentiated instructional design and planning 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. EDUC 3800K. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

3901K: Differentiated Instruction and Assessment in Collaborative Contexts II in Middle Childhood Education
This course is the second part of a two-part sequence that extends the content addressed in Part I. Participants will 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 ways in which students demonstrate their knowledge as a result of interacting with information (product). 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 acquired knowledge of assessment, differentiated instructional design and planning 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. EDUC 3801K. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

4000K: Disability Studies in Childhood Education
This course has the dual focus of promoting understanding disability and creating instruction informed by the experience of disability. Various contemporary literary and historical accounts of living with disability will be explored with attention to their use in a variety of educational contexts. Traditional as well as alternative interpretations of living with disability will be explored for consideration of their impact on learning. Moving away from the hegemony of strictly biological and/or pathological interpretations of disability, participants will design curriculum materials for classroom use that integrate disability positive portrayals. The participants will identify print materials (i.e., picture books, chapter books, young adult fiction, memoirs, biography, newspaper and magazine articles), and other visual media (film, television programs, advertisements, web-based materials) suitable for inclusion in the general curriculum (i.e., language arts, social studies, science, mathematics). From this selection the participants will develop lessons that focus on understanding disability in the everyday context (i.e., how many people live with disability). Attention will be given to issues of transition and access. This curriculum experience seeks to promote the view of disability as an essential feature of diversity in a multicultural society. Includes 15-20 hours of fieldwork. 3 HR./WK.; 3 CR..

4001K: Disability Studies in Middle Childhood Education
This course has the dual focus of promoting understanding disability and creating instruction informed by the experience of disability. Various contemporary literary and historical accounts of living with disability will be explored with attention to their use in a variety of educational contexts. Traditional as well as alternative interpretations of living with disability will be explored for consideration of their impact on learning. Moving away from the hegemony of strictly biological and/or pathological interpretations of disability, participants will design curriculum materials for classroom use that integrate disability positive portrayals. The participants will identify print materials (i.e., picture books, chapter books, young adult fiction, memoirs, biography, newspaper and magazine articles), and other visual media (film, television programs, advertisements, web-based materials) suitable for inclusion in the general curriculum (i.e., language arts, social studies, science, mathematics). From this selection the participants will develop lessons that focus on understanding disability in the everyday context (i.e., how many people live with disability). Attention will be given to issues of transition and access. This curriculum experience seeks to promote the view of disability as an essential feature of diversity in a multicultural society. Includes 15-20 hours of fieldwork. 3 HR./WK.; 3 CR..

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Includes 15-20 hours of fieldwork. 3 HR./WK.; 3 CR..

EDCE 6000K: Introduction to the Education of Language Minority Students with Disabilities
An overview of the needs of children with disabilities who are in the process of acquiring skills in English. Special Education and Bilingual Education principles will be emphasized and a rationale for the integration of theories and practices from these two fields will be established. Prereq.: EDUC 5000K. 3 HR./WK.; 3 CR.

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. Prereq.: EDUC 6000K or permission of instructor. Includes 20 hours practicum. 3 HR./WK.; 3 CR.

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. Prereq.: 5000K. 3 HR./WK.; 3 CR.

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. Hours to be arranged.

Requires sponsorship by an appropriate faculty member. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

FACULTY

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Department of Secondary Education

Professor Susan Semel, Chair • Department Office: NA 6/207B • Tel: 212-650-7262

GENERAL INFORMATION

The Department of Secondary Education offers graduate programs leading to New York State initial and professional certification in adolescent education (7-12) in the following areas: English, mathematics, science, and social studies; and K-12 in art and music. There are middle school programs (5-9) in mathematics and science.

Initial-certification programs are available at the graduate level for students with a baccalaureate in their teaching subject area. At the graduate level, students ordinarily enroll in an initial-certification master's program; students already holding a master's degree in their subject area or with previous graduate work may enroll in the advanced-certification program (initial).

Professional-certification programs leading to a master's degree are available to students who possess initial certification at the undergraduate level.

The City College offers the following master's degrees and advanced certificates in secondary education:

Master of Arts (M.A.)
Art Education (K-Grade 12)
English Education (Grades 7-12)
Mathematics Education (Grades 7-12)
Music Education (Grades 7-12)
Science Education (Grades 7-12)
Biology, Chemistry, Earth and Atmospheric Science, Physics
Social Studies Education (Grades 7-12)

Master of Science in Education (M.S.Ed.)
Mathematics Education(Grades 5-9)
Science Education (Grades 5-9)
Biology, Chemistry, Earth and Atmospheric Science, Physics

Advanced Certificate Programs for Masters Degree Holders
English Education (Grades 7-12)
Mathematics Education (Grades 7-12)
Science Education (Grades 7-12)
Biology, Chemistry, Earth and Atmospheric Science and Physics
Social Studies Education (Grades 7-12)

ADVISEMENT

The Office of Student Services (212-650-5316) or the Office of the Chair (212-650-7262) will be pleased to assist you in contacting the faculty member in charge of any of the programs above.

All of the following courses carry a designation of EDSE unless otherwise noted.

ART EDUCATION (K-12)

Required Courses:
Secondary Education

EDUC 0500A: Adolescent Learning and Development	3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy	3
1200E: Reading and Writing Across the Curriculum	3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues	0
4100E: Teaching Art in Secondary Schools	4
4200E: Problems of Teaching Art	3
0800G: Teaching Practicum in the Arts	3
4300F: Workshop in Art Education	3
Art	
5300E: Special Projects I	3
6300E: Special Projects II	3
One course in art history selected under advisement	3
One studio course selected under advisement	3
Research Course:	*3-4*
0200I: Master's Project	3
Total credits	**38**

ENGLISH EDUCATION

The English education program serves both students who want to become high school English teachers and those students who are currently practicing educators interested in meaningful professional development. This graduate program encourages students to develop a breadth of knowledge and a specialization within the field.

Graduate students in English education, English, or a related field have the three different teacher certification programs to choose from: Initial, Professional, and Advanced.

Undergraduate English majors in good standing can begin coursework toward a teaching credential during the senior year.

Stream A – Initial Certification
Graduate students with an undergraduate major in English, or a related field, complete 38-39 credits resulting in both New York State initial teacher certification in secondary English and

a Master of Arts in secondary English education.

Required Courses:
Education
EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1100E: Methods of Teaching English in Secondary Schools 4
0300E: Curriculum Development in Secondary School English 4
0600G: Teaching Practicum in Secondary Education 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
Research Courses: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Education 2
or
0200I: Master's Project 3
English Education
1202E: Teaching Reading in Secondary Schools 3
1500E: Teaching Writing in Secondary Schools 3
Linguistics elective 3
English or English Education
Content pedagogy electives with advisor's approval 9

Total credits 38 - 39

Stream B – Professional Certification
The professional certification program is for graduate students with initial certification in secondary English. The students in this program enhance their prior study of English by taking courses in areas not previously studied. In addition, they will complete courses that link the English content and pedagogy of the secondary school. The program culminates with a master's degree thesis. Students must complete 31-32 credits resulting in New York State professional teacher certification and a Master of Arts in secondary English education.

Required Courses:
Education
1100E: Methods of Teaching English in Secondary Schools 4
Research Courses: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Education 2
or
0200I: Master's Project 3
English Education
1202E: Teaching Reading in Secondary Schools 3
1500E: Teaching Writing in Secondary Schools 3
Linguistics elective 3
Content pedagogy electives with advisor's approval 9
English electives 6

Total credits 31-32

Stream C–Advanced Certificate
Students with a Master of Arts degree in English, who want to prepare to teach secondary school English take 23 credits resulting in New York State advanced teacher certification.

Required Courses:
EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
0300E: Curriculum Development in Secondary School English 4
1100E: Methods of Teaching English in Secondary Schools 4
1202E: Teaching Reading in Secondary Schools 3
1500E: Teaching Writing in Secondary Schools 3
0600G: Teaching Practicum in Secondary Education 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0

Total credits 23

Stream D – Transitional B – New York City Teaching Fellows Program
Graduate students accepted into the Secondary English Teaching Fellows program must complete 31 credits resulting in New York State initial teacher certification and a Master of Arts in secondary English education.

Required Courses:
Education
0502A: Adolescent Learning in the Urban Context 3
0503A: Introduction to Teaching Humanities in the Urban Context 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1101E: Methods of Teaching English in Secondary Schools 3
0301E: Curriculum Development in Secondary School English 3
0602G: Supervised Teaching in Middle/Secondary Schools 0
Research Courses
0001I: Introduction to Educational Research 2
0101I: Independent Study in Educational Research 2
English Education
1202E: Teaching Reading in Secondary Schools 3
1300E: Testing and Assessment in the English Language Arts 3
1500E: Teaching Writing in Secondary Schools 3
English or English Education
Content pedagogy elective with advisor's approval 3

Total credits 31

MIDDLE SCHOOL MATHEMATICS EDUCATION

Stream A – Initial Certification Program
The initial certification program in middle school mathematics is for graduate students who have completed 12 credit hours of mathematics including a course in calculus and are interested in teaching mathematics in grades 5-9. This program provides a background in the study of education psychology, literacy, special education, teaching

methodology, and curricular issues related to mathematics. It links mathematics content and pedagogy and provides the additional coursework in mathematics needed to meet New York State certification requirements. The program culminates with a master's degree thesis or an equivalent project.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1201E: Middle School Literacy 4
6100E: Teaching Mathematics in Middle and Secondary Schools 4
6400E: Curriculum, Instruction and Assessment in Middle and Secondary School Mathematics 4
0600G: Teaching Practicum in Middle Level Education 3
MATHE 4600C: Introduction to Mathematical Thinking 3
MATHE 4700C: Mathematics Foundations of Arithmetic 3
MATHE 4800C: Mathematics Foundations in Algebra and Arithmetic 3
Choose three courses from the following in consultation with the advisor *9*
Mathematics Education Courses
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 Mathematics 3
EDSE 6600E: Strategies for Using Computers in the Mathematics Class 3
EDSE 6800E: Teaching Mathematics Using Graphing Utilities 3
Algebra Courses
MATHE 2600E: Linear Algebra 3
Geometry Courses
MATHE 0400E: Foundations of Geometry 3
Discrete Mathematics Courses
MATHE 0700E: Introduction to Discrete Mathematics 3
MATHE 2100E: Probability 3
MATHE 2200E: Mathematical Statistics 3
Analysis Courses
MATHE 0500E: Classic Applications of Calculus I 3
MATHE 2800E: Numerical Analysis 3
Topics
MATHE 1000E: The History of Mathematics 3
MATHE 2700E: The Theory of Numbers 3
MATHE 6500C: Mathematical Applications in Science and Industry 3
MATHE 3200F: Independent Study and Research in Mathematics (1-3 CR.)
Research: *3-4*
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Student and Research in Mathematics 2
or
0200I: Master's Project 3

Total credits 42-43

Stream B – Professional Certification Program

The professional certification program is for graduate students who have fulfilled the requirements for initial certification and who have completed 12 credit hours of mathematics, including Calculus I. The students in this program enhance their prior study of mathematics by taking courses in areas not previously studied. In addition, they will complete courses that link the mathematical content and pedagogy of the middle school. The program culminates with a master's degree thesis or an equivalent project. Candidates who do not have middle school teaching experience will be required to complete 50 hours of fieldwork in a middle school.

Required Courses:

6100E: Teaching Mathematics in Middle and Secondary Schools 4
6400E: Curriculum, Instruction and Assessment in Middle and Secondary School Mathematics 4
2700E: Middle and Secondary School Mathematics: Teaching Developmentally 3
6200E: Teaching Problem-Solving Strategies in Mathematics 3
6800E: Teaching Mathematics Using Graphic Utilities 3
MATHE 4600C: Introduction to Mathematical Thinking 3
MATHE 4700C: Mathematics Foundations of Arithmetic 3
MATHE 4800C: Mathematics Foundations in Algebra and Arithmetic 3
Three courses from the following in consultation with the advisor *9*
Algebra Courses
MATHE 2600E: Linear Algebra 3
Geometry
MATHE 0400E: Foundations of Geometry 3
MATHE 1100E: Advanced Euclidean Geometry 3
Discrete Mathematics
MATHE 0700E: Introduction to Discrete Mathematics 3
MATHE 2100E: Probability 3
MATHE 2200E: Mathematical Statistics 3
Analysis
MATHE 0500E: Classic Applications of Calculus I 3
MATHE 2800E: Numerical Analysis 3
Topics
MATHE 1000E: The History of Mathematics 3
MATHE 2700E: The Theory of Numbers 3
MATHE 6500C: Mathematical Applications in Science and Industry 3
MATHE 3200F: Independent Study and Research in Mathematics (1-3 CR.)
Research *3-4*
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Student and Research in Mathematics 2
or
0200I: Master's Project 3

Total credits 38-39

Stream C – Transitional B – New York City Teaching Fellows Program
This program is intended for students in the New York City Teaching Fellows Program who hold have completed a minimum of 15 semester hours of mathematics (including Calculus I) and 9 credits of cognates. (It is expected that the mathematics coursework was completed with a GPA of 3.0 or bet-

ter.) Candidates who have not completed the required credits in mathematics will need to take mathematics courses in addition to the program. The program leads to initial NYS certification to teach as a mathematics specialist in New York State middle schools (grades 5-9).

Required Courses:

0502A: Adolescent Learning in the Urban Context 3
0504A: First Year Teaching Mathematics in an Urban Context 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
0602G: Supervised Teaching at the Middle/Adolescent Level 0
1203E: Middle School Literacy for Teachers 3
6101E: Teaching Mathematics in New York City 3
6103E: Teaching and Learning Middle School Mathematics 3
6401E: Curriculum, Instruction, and Assessment in Mathematics Education 3
MATHE 4600C: Introduction to Mathematical Thinking 3
MATHE 4700C: Mathematics Foundations of Arithmetic 3
MATHE 4800C: Mathematics Foundations in Algebra and Arithmetic 3
Electives in consultation with the advisor 3-9
One of the following options: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Mathematics 2
or
0201I: Action Research in Mathematics Education 3

Total credits 36-42

SECONDARY MATHEMATICS EDUCATION

Stream A – Initial Certification Program

The *Initial Certification Program* is for graduate students who have not taken education courses. This is a program to prepare students with an undergraduate math major to be secondary school mathematics teachers. It provides a broad background in the study of educational psychology, literacy, special education, teaching methodology and curricular issues related to mathematics; it links mathematical content and pedagogy; and it enhances the professional study of mathematics. The graduate program culminates with a master's degree thesis or equivalent project.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1200E: Reading and Writing Across the Curriculum 3
6100E: Teaching Mathematics in Secondary Schools 4
6400E: Curriculum, Instruction and Assessment in Middle and Secondary School Mathematics 4
0600G: Teaching Practicum in Secondary Education 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
Choose three of the following: 9
2700E: Middle and Secondary School Mathematics: Teaching Developmentally 3
6200E: Teaching Problem-Solving Strategies in Mathematics 3
6300E: Enriching the Teaching of Secondary School Mathematics 3
6600E: Strategies for Using Computers in the Mathematics Class 3
6800E: Teaching Mathematics Using Graphing Utilities 3
6900E: The Teaching of Calculus 3
MATHE 1000E: History of Mathematics 3
Two of the following, each chosen from a different area: 6
Algebra
MATHE 2900E: Theory of Equations 3
MATHE 7700E: Modern Algebra 3
Geometry
MATHE 0400E: Foundations of Geometry 3
MATHE 0800E: Transformational Geometry 3
MATHE 1100E: Advanced Euclidean Geometry 3
Discrete Mathematics
MATHE 0700E: Introduction to Discrete Mathematics 3
MATHE 2100E: Probability 3
MATHE 2200E: Mathematical Statistics 3
Analysis
MATHE 0500E: Classic Applications of Calculus I 3
MATHE 0600E: Classic Applications of Calculus II 3
MATHE 2800E: Numerical Analysis 3
MATHE 7500E: Classic Applications of Advanced Calculus 3
Miscellaneous
MATHE 2700E: Theory of Numbers 3
MATHE 3700E: Topology 3
MATHE 6500C: Mathematical Applications in Science & Industry 3
MATHE 3200F: Independent Study and Research in Mathematics (1-3 CR.)
One of the following options: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Mathematics 2
or
0200I: Master's Project 3

Total credits 38-39

Stream B – Professional Certification Program

The *Professional Certification Program* is for graduate students who have completed an undergraduate program preparing them to teach secondary school mathematics and are mutually certified. Students in this program enhance their prior study of mathematics by taking courses in areas not previously studied and more relevant to the secondary school mathematics curriculum. In addition, a wide range of courses linking mathematics content and pedagogy broadens their pro-

fessional training. The program culminates with master's degree thesis or an equivalent project.

Required Courses:

6400E: Curriculum, Instruction and Assessment in Middle and Secondary School Mathematics 4
Five of the following in consultation with the advisor: 15
2700E: Middle and Secondary School Mathematics: Teaching Developmentally 3
6200E: Teaching Problem-Solving Strategies in Mathematics 3
6300E: Enriching the Teaching of Secondary School Mathematics 3
6600E: Strategies for Using Computers in the Mathematics Class 3
6900E: The Teaching of Calculus 3
Algebra
MATHE 2600E: Linear Algebra 3
MATHE 2900E: Theory of Equations 3
MATHE 7700E: Modern Algebra 3
Geometry
MATHE 0400E: Foundations of Geometry 3
MATHE 0800E: Transformational Geometry 3
MATHE 1100E: Advanced Euclidean Geometry 3
Discrete Mathematics
MATHE 0700E: Introduction to Discrete Mathematics 3
MATHE 2100E: Probability 3
MATHE 2200E: Mathematical Statistics 3
Analysis
MATHE 0500E: Classic Applications of Calculus I 3
MATHE 0600E: Classic Applications of Calculus II 3
MATHE 2800E: Numerical Analysis 3
MATHE 7500E: Classic Applications of Advanced Calculus 3
Miscellaneous
MATHE 2700E: Theory of Numbers 3
MATHE 3700E: Topology 3
MATHE 6500C: Mathematical Applications in Science & Industry 3
MATHE 3200F: Independent Study and Research in Mathematics 1-3
Electives in consultation with the advisor 9
One of the following options: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Mathematics 2
or
0200I: Master's Project 3

Total credits 31-32

Stream C – Advanced Certificate Program
The Advanced Certificate program is designed for students who already hold a master's degree in mathematics and are interested in preparing for the teaching of mathematics in secondary schools. This program prepares potential secondary school mathematics teachers by giving them a broad background in the study of educational psychology, literacy, special education, teaching methodology and curricular issues related to mathematics.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language 3
1200E: Reading and Writing Across the Curriculum 3
6100E: Teaching Mathematics in Middle and Secondary Schools 4
6400E: Curriculum, Instruction and Assessment in Middle and Secondary School Mathematics 4
0600G: Teaching Practicum in Secondary Education 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0

Total credits 20

Stream D – Transitional B – New York City Teaching fellows Program
This program is intended for students in the New York City Teaching Fellows Program who hold an undergraduate degree in mathematics or the equivalent. (It is expected that the mathematics coursework be completed with a GPA of 3.0 or better.) The program leads to initial NYS certification to teach secondary school mathematics (New York State Adolescent Certification 7-12).

Required Courses:

0502A: Adolescent Learning in the Urban Context 3
0504A: First Year Teaching Mathematics in an Urban Context 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
0602G: Supervised Teaching at the Middle and Adolescent Level 0
1200E: Reading and Writing Across the Curriculum 3
6101E: Teaching Mathematics in New York City 3
6102E: Teaching and Learning Secondary School Mathematics 3
6401E: Curriculum, Instruction, and Assessment in Mathematics Education 3
Electives in consultation with the advisor 9
One of the following options: 3-4
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Independent Study and Research in Education 2
or
0201I: Action Research in Mathematics Education 3

Total credits 33-34

MIDDLE SCHOOL SCIENCE EDUCATION

Stream A – Initial Certification Program
The Initial Certification Program in middle school science is for graduate students who are interested in teaching science in grades 5-9. This program provides a background in the study of education psychology, literacy, special education, teaching methodology, and curricular issues related to science. It links science content and pedagogy and provides the additional coursework in science needed to meet New York State certification requirements. The program cul-

minates with a master's degree thesis or an equivalent project.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1201E: Middle School Literacy 4
3101E: Teaching Science in Middle Schools 4
3900I: Curriculum and Instruction in Science 4
0600G: Teaching Practicum in Middle Level Education 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
SCI 1403E: Physical Science for Middle School Teachers I 4
SCI 1404E: Physical Science for Middle School Teachers II 4
SCI 4101E: Life Science for Middle School Teachers I 4
SCI 4102E: Life Science for Middle School Teachers II 4
SCI 4103E: Nature of Scientific Knowledge 3
Science electives must be selected in consultation with a science education advisor and depend on your area of specialization 9
Research 3
0200I: Master's Project 3

Total credits 52

Stream B – Professional Certification Program
The professional certification program is for graduate students who have fulfilled the requirements for initial certification. They will complete courses that link the science content and pedagogy of the middle school. The program culminates with a master's degree thesis or an equivalent project.

Required Courses:

3101E: Teaching Science in Middle School 4
3900I: Curriculum and Instruction in Science 4
SCI 1403E: Physical Science for Middle School Teachers I 4
SCI 1404E: Physical Science for Middle School Teachers II 4
SCI 4101E: Life Science for Middle School Teachers I 4
SCI 4102E: Life Science for Middle School Teachers II 4
SCI 4103E: Nature of Scientific Knowledge 3
Science electives must be selected in consultation with a science education advisor and depend on your area of specialization 9
Research 3
0200I: Master's Project 3

Total credits 39

Stream C – Transitional B – New York City Teaching fellows Program

Required Courses:

EDUC 0502A: Adolescent Learning in the Urban Context 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1203E: Middle School Literacy for Teachers 3
3102E: Teaching Science in Middle Schools 3
3901I: Curriculum and Instruction in Science Education 3
0602G: Supervised Teaching at the Middle and Secondary Levels 0
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
SCI 1403E: Physical Science for Middle School Teachers I 4
SCI 4101E: Life Science for Middle School Teachers I 4
SCI 4103E: Nature of Scientific Knowledge 3
One of the following options: 4
SCI 1404E: Physical Science for Middle School Teachers II
or
SCI 4102E: Life Science for Middle School Teachers II
Science electives (to be selected in consultation with a science education advisor and depend on your area of specialization) 6
Research 3
0200I: Master's Project 3

Total credits 39

SECONDARY SCIENCE EDUCATION

Stream A – Initial Certification Program
This initial certification program is for graduate students who have completed an undergraduate major (or the equivalent) in biology, chemistry, earth science, or physics. This program consists of 35 credits in education, fieldwork, and student teaching and leads to initial certification in secondary science plus a master's degree in science education.

Required Courses:

1200E: Reading and Writing Across the Curriculum 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
3100E: Teaching Science in Secondary Schools 4
EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
3900I: Curriculum and Instruction in Science Education 4
Six graduate credits in required science courses (depending on your area of specialization) and six additional graduate credits in science must be selected in consultation with a science education advisor 12
0600G: Teaching Practicum in Secondary Education 3
Research
0200I: Master's Project (3 CR.) 3

Total credits 35

Stream B – Professional Certification Program
For graduate students who have completed an undergraduate major (or the

equivalent) in biology, chemistry, earth science, or physics, plus already have initial certification, we offer a program leading to professional certification and a master's degree in science education. This is a 31 credit program of courses in science and education.

Required Courses:

1200E: Reading and Writing Across the Curriculum 3
3100E: Teaching Science in Secondary Schools 4
Nine graduate credits in science education
plus six graduate credits in science 15
Six additional graduate credits in science or education must be selected in consultation with a science education advisor and depends on your area of specialization 6
Research
0200I: Master's project 3

Total credits 31

Stream C–Advanced Certificate Program
For graduate students who have completed an undergraduate major (or the equivalent) in biology, chemistry, earth science, or physics, we offer an advanced certificate program leading to initial certification. This advanced certificate program consists of 20 credits in education, fieldwork, and student teaching.

Required Courses:

1200E: Reading and Writing Across the Curriculum 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
3100E: Teaching Science in Secondary Schools 4
EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
3900I: Curriculum and Instruction in Science Education 4
0600G: Teaching Practicum in Secondary Education 3

Total credits 20

Stream D – Transitional B – New York City Teaching Fellows Program
This initial certification program is for graduate students who have completed an undergraduate major (or the equivalent) in biology, chemistry, earth science, or physics. This program consists of 31 credits in education, fieldwork, and supervised teaching and leads to initial certification in secondary science plus a master's degree in science education.

Required Courses:

1200E: Reading and Writing Across the Curriculum 3
EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues 0
3100E: Teaching Science in Secondary Schools 4
EDUC 0502A: Adolescent Learning in the Urban Context 3
EDUC 0600A: Issues for Secondary School Teachers:
Special Education, Second Language Acquisition and Literacy 3
3901I: Curriculum and Instruction in Science Education (TF) 3
Six graduate credits in required science courses (depending on your area of specialization) and six additional graduate credits in science must be selected in consultation with a science education advisor 12
0602G: Supervised Teaching at the Middle and Secondary Levels 0
Research
0200I: Master's project 3

Total credits 31

SOCIAL STUDIES EDUCATION

Stream A – Initial Certification Program
The Initial Certification Program is for graduate students who have not taken education courses. This is a program that prepares students with either an undergraduate major in social science or history to teach social studies in the secondary school. Students majoring in a social science must have at least 21 hours in history, which should include six credit hours in World Civilization and six credit hours in American History. The program provides a broad background in the study of educational psychology, literacy, special education, teaching methodology and curricular issues related to social studies; it links social studies content and pedagogy; and it enhances their professional study of social studies. The graduate program culminates with a master's degree thesis or equivalent project.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1200E: Reading and Writing Across the Curriculum 3
2100E: The Teaching of Social Studies in Secondary Schools 4
2300E: Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary School Social Studies 4
0600G: Teaching Practicum in Secondary Education 3
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*
0200I: Master's Project 3
or
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: 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.

Total credits 35-36

Stream B – Professional Certification Program
The Professional Certification Program is for graduate students who have

completed an undergraduate program preparing them to teach secondary school social studies. Students in this program enhance their prior study of social studies by taking courses in areas not previously studied and more relevant to the secondary school social studies curriculum. In addition, a wide range of courses linking social studies content and pedagogy broadens their professional training. The program culminates with a master's degree thesis or an equivalent project.

Required Courses:

1200E: Reading and Writing Across the Curriculum 3
2100E: The Teaching of Social Studies in Secondary Schools 4
Graduate courses in history, economics, political science, geography, anthropology, sociology and content-pedagogy linked courses with advisor's approval 21
One of the following: *3-4*
0200I: Master's project 3
or
EDUC 0000I: Introduction to Educational Research 2
EDUC 0100I: Individual Study in Educational Research 2

Total credits 31-32

Stream C–Advanced Certificate Program

The Advanced Certificate program is designed for students who hold a master's degree in history or a social science and are interested in preparing for the teaching of social studies in secondary schools. Social science majors should possess at least 21 credits hours in history, among them World Civilization and American History. This program prepares potential secondary school social studies teachers by giving them a broad background in the study of educational psychology, literacy, special education, teaching methodology and curricular issues related to social studies.

Required Courses:

EDUC 0500A: Adolescent Learning and Development 3
EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy 3
1200E: Reading and Writing Across the Curriculum 3
2100E: Teaching Social Studies in Secondary Schools 4
2300E: Development of the Secondary School: Philosophy, Urban Issues and Curriculum Development in Secondary School Social Studies 4
0600G: Teaching Practicum in Secondary Education 3

Total credits 20

COURSE DESCRIPTIONS

Each of the following courses carries a designation of EDSE unless otherwise noted. The courses are arranged according to the last place letter.

EDUC 0500A: 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. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

0503A: 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. 3 HR./WK.; 3 CR.

0504A: First Year Teaching Mathematics in an Urban Context
Using the model of problem-based learning (PBL) Teaching Fellows will address issues that arise in their classrooms and schools during their first months of teaching. In addition candidates will be introduced to the mathematical task framework and will plan, teach, and reflect on the implementation of high-level tasks. The New York State Mathematics Core Curriculum process strands will provide the content framework for this course. The goal of this course is to move teacher candidates from the Beginning to the Emerging level of the New Teacher Center at UCSC's Continuum of Teacher Development. Coreq.: EDSE 0602G. 3 HR./WK.; 3 CR.

EDUC 0600A: Issues for Secondary School Teachers: Special Education, Second Language Acquisition and Literacy
The nature of students with disabilities and health-care needs. Effects of disabilities on learning and behavior. Identifying strengths, individualizing instruction, and collaborating to prepare special-needs students for their highest levels of achievement, literacy and independence. Language acquisition and literacy development by native English speakers and English language learners. Developing listening, speaking, reading and writing. Includes 15 hours of fieldwork. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

0300E: 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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

0301E: 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. 3 HR./WK.; 3 CR.

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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

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 also 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. 3 HR./WK.; 3 CR.

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 EDUC 41200. 3 HR./WK.; 3 CR.

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. 4 HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

1203E: Middle School Literacy (Math and Science Middle School Teaching Fellows)
This course will support Teaching Fellows as they learn to identify strengths of literacy learners in content classrooms, individualize instruction based on these assessments, assess textual difficulty, and guide students to develop reading and writing strategies and study skills. 3 HR./WK.; 3 CR.

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. This class will be conducted in lecture/workshop formats. Part of the lesson will be a formal presentation and part will involve the completion of a task in pairs or small groups. Whole class discussions will occur throughout the sessions. Active participation is very important. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Includes 30 hours of fieldwork. 4 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Open only to matriculants or by special permission. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

3100E: Teaching Science in Secondary Schools
Lesson planning, classroom management, cooperative learning, questioning, remediation, enrichment, motivation, homework, testing and assessment, reading, writing and note taking in science. Problem solving, the secondary school curriculum, technology, methodology for students with special needs, learning English as a second language, literacy in the science classroom. Includes 30 hours of fieldwork. 3 HR./WK,; 4 CR.

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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

3102E: Teaching Science in Middle Schools (TF)
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. 3 HR./WK.; 3 CR.

4200E: Problems in Teaching Art
Seminar and practicum in current problems in theory and practice of teaching art pre-K to 12. 3 HR./WK, PLUS 10 HR. FIELDWORK; 3 CR.

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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

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. This course will focus on developing teachers who are moving from the *Applying* to the *Integrating* level of the New Teacher Center at UCSC's Continuum of Teacher Development. 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. Prereq: EDSE 6401E. 3 HR./WK.; 3 CR.

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. This course will focus on developing teachers who are moving from the *Applying* to the *Integrating* level of the New Teacher Center at UCSC's Continuum of Teacher Development. 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. Prereq.: EDSE 6401E. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

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 were mathematical learning and assessment are woven into the fabric of the classroom in a manner that supports the learning of all students. This course will focus on developing teachers who are moving from Emerging to the Applying levels of the New Teacher Center at UCSC's Continuum of Teacher Development for the standards: Planning Instruction and Designing Learning Experiences for All Students and Assessing Student Learning. The course will require candidates to complete classroom-based activities. Pre-req.: EDSE 0504A. 3 HR./WK.; 3 CR

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. 3 HR./WK.; 3 CR.

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 get a better understanding of mathematical concepts with the aid of the newest technology. 3 HR./WK.; 3 CR.

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.
3 HR./WK.; 3 CR.

4300F: Workshop in Art Education
Designed to assist art teachers in meeting selected problems growing out of elementary and secondary teaching of art, or in consulting or supervisory efforts to enhance the subject. Specific needs of students are considered in planning the coursework. Co-req.: EDSE 4301F. 3 HR./WK.; 3 CR.

4301F: Fieldwork: Workshop in Art Education
Thirty-five hours of fieldwork related to the study of teaching art in the classroom, with particular observation of curriculum adaptations to meet the needs of diverse learners. Pass/Fail only Co-req.: EDSE 4300F. 1 HR./WK.; 1 CR.

0600G: Teaching Practicum in Secondary Education
Students will be assigned under supervision to a secondary school as part-time teachers, 15 hours a week. Hours subject to regulations currently in force in the school system. Open only to matriculants. Advance approval required. Equivalent to 6 semester hours of undergraduate student teaching for 225 clock hours minimum. 3 CR.

0602G: 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. 0 CR.

0800G: Teaching Practicum in the Arts
Students teaching at the pre-K to 6 and 7 to 12 levels with a minimum of 30 days, 150 hours, in each setting. Accompanying seminar focuses on the practicum experience, reflecting on it in relation to the teacher preparation program. Includes a minimum of 300 hours of student teaching. 1 HR./WK.; 3 CR.

EDUC 1900G: Workshops on Child Abuse Identification, Violence Prevention and other Professional Issues
Definitions, indicators, and the impact of abuse and neglect on the child; reporting abuse. Violence prevention. Additional workshops include topics such as certification, resume building and professional resources. 2 HR./WK.; 0 CR.

EDUC 0000I: Introduction to Educational Research
The first semester of the research sequence covers the basic concepts needed to evaluated research critically and plan it effectively. Each student will identify a problem in his or her 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. 2 HR./WK.; 2 CR.

0001I: 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. 2 HR./WK.; 2 CR.

EDUC 0100I: Individual Study in Educational Research
Second semester of research sequence. Consideration of the 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. Prereq.: EDUC 0000I. 2 HR./WK.; 2 CR.

0101I: Independent Study in Secondary School Research
In this course, a continuation of EDSE 0001I, 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. Prereq.: EDSE 0001I. 2 HR./WK.; 2 CR.

0200I: 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. 3 HR./WK.; 3 CR.

0201I: 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. Prereq.: EDSE 6102E or 6103E. 3 HR./WK.; 3 CR.

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. Includes 30 hours of fieldwork. 3 HR./WK.; 4 CR.

3901I: Curriculum and Instruction in Science Education (TF)
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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

Anthropology

ANTHE 2000E: Developmental Patterns in Different Cultures
Childrearing, training patterns. Cross-cultural comparisons. Effect of early training and later training on classroom behavior. 3 HR./WK.; 3 CR.

Art (Education students only)

ARTE 0000C: History of Design
Historical and cultural influences and technical developments in the design of objects for use. Art and Art Education majors require advisor's permission. 3 HR./WK.; 3 CR.

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. 2 HR/WK. PLUS GALLERY VISITS; 2 CR.

ARTE 1000F: Ceramics
Clay modeling and ceramics; pottery forms produced by pinch, slab and coil methods; glazing use of the kiln. 3 HR./WK.; 3 CR.

ARTE 1000G: Ceramics: Advanced
Design workshop, including use of potter's wheel, casting and glazing. 3 HR./WK.; 3 CR.

ARTE 1100G: Design in Metal: Advanced Workshop
Techniques and practices in creative design in a variety of metals. 3 HR./WK.; 3 CR.

ARTE 1200G: Design in Wood: Advanced
Design workshop in furniture. 3 HR./WK.; 3 CR.

ARTE 1300F: Design in Wood and Metal
Craft methods and processes; experiences with hand tools and power equipment. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ARTE 1500G: Costume Design
Principles and practices of costume design, including a survey of periods and periods and styles. Prereq.: special permission. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ARTE 5100F: Painting Mediums I
Study and preparation of colors, medium, and grounds for painting in oils and emulsions. Prereq.: 6 credits in painting. Coreq.: ARTE 6100F. 3 HR./WK.; 3 CR.

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. Prereq.: 6 credits in painting; coreq.: ARTE 6200F. 3 HR./WK.; 3 CR.

ARTE 5300C: New York as an Art Center
Study of the development of the arts, their integration into the pattern of metropolitan culture. 3 HR./WK.; 3 CR.

ARTE 5300E: Special Projects I
Designed to give students the opportunity to pursue their specific interests in developing their art and teaching art K to 12. Students are required to design, execute and document their projects as well as present them in class. 3 HR./WK.; 3 CR.

ARTE 6100E: Techniques of Oil Painting: Advanced
Prereq.: ARTE 5100E. 30 hr., plus conf. 3 HR./WK.; 3 CR.

ARTE 6200E: Water Color, Advanced
Prereq.: ARTE 5200E. 3 HR./WK.; 3 CR.

ARTE 6300E: Special Projects II
Course is designed to give students the opportunity to pursue their specific interests in developing their art and teaching art K to 12. Students are required to design, execute and document their projects as well as present them in class. ARTE 5300E is prerequisite. 3 HR./WK.; 3 CR.

ARTE 6100F: Painting Techniques I
Methods of painting in transparent body color and related water mediums. Coreq.: ARTE 5200F. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ARTE B1101: Projects in Painting I
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

ARTE B1102: Projects in Painting II
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

ARTE B1801: Projects in Ceramic Design I
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

ARTE B1802: Projects in Ceramic Design II
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

ARTE B2301: Projects in Printmaking I
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

ARTE B2302: Projects in Printmaking II
Intensive work under faculty supervision. 3 HR./WK.; 3 CR.

Biology (Education students only)

BIOE 0100E: 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. 3 HR./WK.; 3 CR.

BIOE 0200E: 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 0100E. 3 HR./WK.; 3 CR.

BIOE 0500E: The Biological Foundations of Social Behavior
To broaden the student's understanding if 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. 3 HR./WK.; 3 CR.

BIOE 0600E: 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 0500E. 3 HR./WK.; 3 CR.

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. 4 HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

BIOE 1900E: Environmental Conservation
Contribution of modern ecological knowledge to local, national and international problems of conservation of natural resources. Field visits are included. 3 HR./WK.; 3 CR.

BIOE 2000E: Genetics
A study of the mechanisms of heredity, both Mendelian and modern, with application to plant and animal variation. 3 HR./WK.; 3 CR.

BIOE 3000E: Human Biology
An analysis of both the structure and function of the human organism. Topics respiration, nutrition, digestion, circulation, excretion, metabolism and reproduction. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

BIOE 6000E: Basic Ecology
Designed to analyze the biotic and abiotic relationship of plants and animals. Population and community ecology discussed. Model ecosystems analyzed. Field visits are included. 3 HR./WK.; 3 CR.

BIOE 6100E: Human Ecology
Designed to broaden the student's understanding of man's role in nature in relation to his ecosystem. Topics include population, energy cycles, pesticides, solid waste and pollution. 3 HR./WK.; 3 CR.

Chemistry (Education students only)

CHEME 0100E: Modern Concepts in Chemistry I
Chemistry approached from the basis of more recently developed theoretical concepts, with selected applications. Topics include biochemistry, physical chemistry. 3 HR./WK.; 3 CR.

CHEME 0200E: 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. Prereq.: One year of college chemistry. 3 HR./WK.; 3 CR.

CHEME 0600E: Principles of Physical Chemistry
Introduction of the basic principles and concepts of kinetic molecular theory, thermodynamics, solutions, solids and phase equilibria. 3 HR./WK.; 3 CR.

CHEME 0700E: 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. 3 HR./WK.; 3 CR.

CHEME 0800E: 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. Prereq.: CHEME 0200E or one semester of organic chemistry. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

Earth and Atmospheric Science

EASE 1500E: Meteorology
Principles of meteorology applied to weather analysis, and structure composition. Properties of the atmosphere with simple forecasting theory. Lab included. 3 HR./WK.; 3 CR.

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. 4 HR./WK.; 4 CR.

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. Prereq.: EASE 1500E. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS

EASE 5200E: Introduction to Meteorology
Principles and phenomena of weather and climate. Discussion of snow storms, hurricanes, rainbows, Ice Ages. Weather analysis and forecasting. 3 LECT., 3 LAB. HR./WK.; 4 CR.

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. Lab/field trips included. 4 HR./WK.; 4 CR.

EASE 0000E: 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. 3 HR./WK., PLUS FIELD TRIPS; 3 CR.

Economics

ECOE 0200C: 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. 3 HR./WK.; 3 CR.

ECOE 0200D: 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. 3 HR./WK.; 3 CR.

ECOE 0300C: 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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. 3 HR./WK.; 3 CR.

English (Education Students Only)

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. 3 HR./WK.; 3 CR.

ENGLE 1200E: Fundamentals of English
Intensive review of grammar, together with practice in writing. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ENGLE 1800C: Criticism and Appreciation of Poetry
Introduction of new critical devices which can be used in teaching poetry in the secondary schools. 3 HR./WK.; 3 CR.

ENGLE 4400E: Structure and Growth of the English Language
Introductory course in philology; comparative study of English words and their use. 3 HR./WK.; 3 CR.

ENGLE 4500C: The Child and Adolescent in American Fiction
The child as a major American literary theme. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

ENGLE 6300C: The Modern Short Story
Significant short stories of the twentieth century. 3 HR./WK.; 3 CR.

ENGLE 6500C: The Short Novel
Analysis and explication of the novella in Western literature.
3 HR./WK.; 3 CR.

History

HISTE 0100F: Historical Method
Evaluation of primary and secondary sources, with emphasis on internal criticism. A survey of American historiography. 3 HR./WK.; 3 CR.

HISTE 0500E: 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.
3 HR./WK.; 3 CR.

HISTE 1700C: The Renaissance
Social and cultural development from the 14th to the early 16th centuries. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

HISTE 3500C: American Social and Cultural History Since 1865
Concentrates on urbanization, industrialization, the new immigration, and the emergence of the modern corporate state. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

HISTE 7000C: African-American History since 1865
Beginning with Reconstruction, African-American political, economic, cultural and ideological evolution will be traced to the present. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

Mathematics

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. 3 HR./ WK.; 3 CR.

MATHE 4700C: Mathematical Foundations in Arithmetic
Survey of mathematical concepts and processes that underlie the curriculum in arithmetic of the elementary and junior high schools. Senior high school mathematics teachers may not take this course for graduate credit without permission of the mathematics advisor. 3 HR./WK.; 3 CR.

MATHE 4800C: Mathematical Foundations in Algebra and 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

MATHE 0400E: Foundations of Geometry
The basic concepts of Euclidean Geometry and the underpinnings of non-Euclidean Geometry. 3 HR./WK.; 3 CR.

MATHE 0500E: 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. 3 HR./WK.; 3 CR.

MATHE 0600E: Classic Applications of Calculus II
Further applications will be taken from fields of population growth, electrical circuits, interest rates, planetary motions and others. 3 HR./WK.; 3 CR.

MATHE 0700E: Introduction to Discrete Mathematics
This course offers an introduction to the field of discrete mathematics beginning with review of number systems and set theory, functions and counting, and continuing with a review of vectors and matrices, Boolean algebra, algorithms and their efficiency. Other topics included graphs, bipartite graphs and matching problems, digraphs, networks, and flows, and appropriate related applications in discrete mathematics. 3 HR./WK.; 3 CR.

MATHE 0800E: 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

MATHE 1100E: Advanced Euclidean Geometry
Extensions and generalization of elementary geometry; higher geometry of triangles, circles, quadrilaterals; constructions, classical problems. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

MATHE 2200E: Mathematical Statistics
Frequency histograms, measures of location and dispersion, correlation and least squares, testing hypotheses, confidence intervals and estimation. Prereq.: a course in probability. 3 HR./WK.; 3 CR.

MATHE 2600E: Linear Algebra
Vector spaces, matrices, systems of linear equations, determinants, linear transformations. 3 HR./WK.; 3 CR.

MATHE 2700E: 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. 3 HR./WK.; 3 CR.

MATHE 2800E: Numerical Analysis
Solution of algebraic equations by iteration interpolation; numerical integration; solution of ordinary differential equations. Prereq.: one year of calculus. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM.; MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

MATHE 3700E: Topology
Examples and classifications of surfaces; metric and topological spaces. 3 HR./WK.; 3 CR.

MATHE 7500E: Classic Applications of Advanced Calculus
Models of physical situations requiring infinite series and/or calculus of several variables will be considered. Models will be selected from vibrating string, heat diffusion, rotational center of mass, incompressible fluid flow and others. 3 HR./WK.; 3 CR.

MATHE 7700E: Modern Algebra
Sets, mappings, equivalence relations, operations, rings, integral domains, isomorphisms. Mathematical induction fields and groups. 3 HR./WK.; 3 CR.

Physics (Education students only)

PHYSE 0100E: 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. Prereq.: one year of college physics. 3 HR./WK.; 3 CR.

PHYSE 0200E: 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. Prereq.: One year of college physics. 3 HR./WK.; 3 CR.

PHYSE 0300E: Introduction to Astronomy
Designed to introduce science educators to the universe, solar system and galaxy. Topics include quasars, pulsars, black holes. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq. PHYSE 1401E. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

Political Science

PSCE 0500E: 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. 3 HR./WK.; 3 CR.

PSCE 0800C: 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. 3 HR./WK.; 3 CR.

Science

SCIE 0300E: 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. 3 HR./WK.; 3 CR.

SCIE 0400E: 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. 3 HR./WK.; 3 CR.

SCIE 1300E: Introduction to Chemistry
Designed to bring together principles and applications of basic chemistry. Topics include inorganic, organic and physical chemistry. 30 HR., PLUS CONF. 3 HR./WK.; 3 CR.

SCIE 1400E: Introduction to Physics
Designed to bring together principles and applications of basic physics. Topics include mechanics, electricity, sound, light and nuclear physics. 3 HR./WK.; 3 CR.

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. 4 HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

SCIE 2100E: Introduction to Botany
A study of the structure and function, diversity and ecology of green and non-green plants. 3 HR./WK.; 3 CR.

SCIE 2200E: Introduction to Zoology
A study of the structure and function, diversity and ecology of invertebrate and vertebrate animals. 3 HR./WK.; 3 CR.

SCIE 2300E: Introduction to Microbiology
A study of the structure and function, diversity and ecology of bacteria, viruses and micro-organisms. 3 HR./WK.; 3 CR.

SCIE 3100E: Aerospace Science
Introduction to aerospace science, including aerodynamics, instruments and systems, meteorology, basic navigation, radio navigation and communication and rocket/missile fundamentals. 3 HR./WK.; 3 CR.

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. 4 HR./WK.; 4 CR.

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. 4 HR./WK.; 4 CR.

SCIE 4103E: Nature of Science
This course will cover four topics relating to the nature of science: (1) the philosophy of science; (2) the social and economic context of science; (3) the history of science; and (4) scientific epistemology in teaching and learning. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. Prereq.: a course in ecology or conservation or permission of the instructor. 3 HR./WK.; 3 CR.

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. 1 HR./WK.; 1 CR.

SCIE 6300F: Molecular Biology
The basic concepts at the cellular and molecular levels of living organisms including metabolism, structure, genetic continuity and response mechanisms. Prereq.: an introductory course in biology or permission of the instructor. 3 HR./WK.; 3 CR.

Sociology

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. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

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. Neighbor-hoods in the metropolis. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

Spanish

SPANE 0200E: 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. 3 HR./WK.; 3 CR.

SPANE 0300E: 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. 3 HR./WK.; 3 CR.

SPANE 0400E: 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

SPANE 3300E: Advanced Spanish Grammar
A selected review of Spanish grammar. Particular emphasis on language problems that arise in the high school classroom. 3 HR./WK.; 3 CR.

SPANE 3400E: Advanced Spanish Phonetics
Analysis of Spanish pronunciation, rhythm and intonation. Practical application of theory to correction of individual speech problems. 3 HR./WK.; 3 CR.

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. Hours to be arranged. Requires sponsorship by an appropriate faculty member and approval of the Advisory Committee. May be taken for one, two, or three credits per semester, and may be repeated for a maximum of six credits. VARIABLE 1-3 CR./SEM. AND MAY BE REPEATED FOR A MAXIMUM OF SIX CREDITS.

FACULTY

Miriam Amit, Professor
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Yael Wyner, Assistant Professor
B.S., Yale Univ.; Ph.D. New York Univ./American Museum of Natural History

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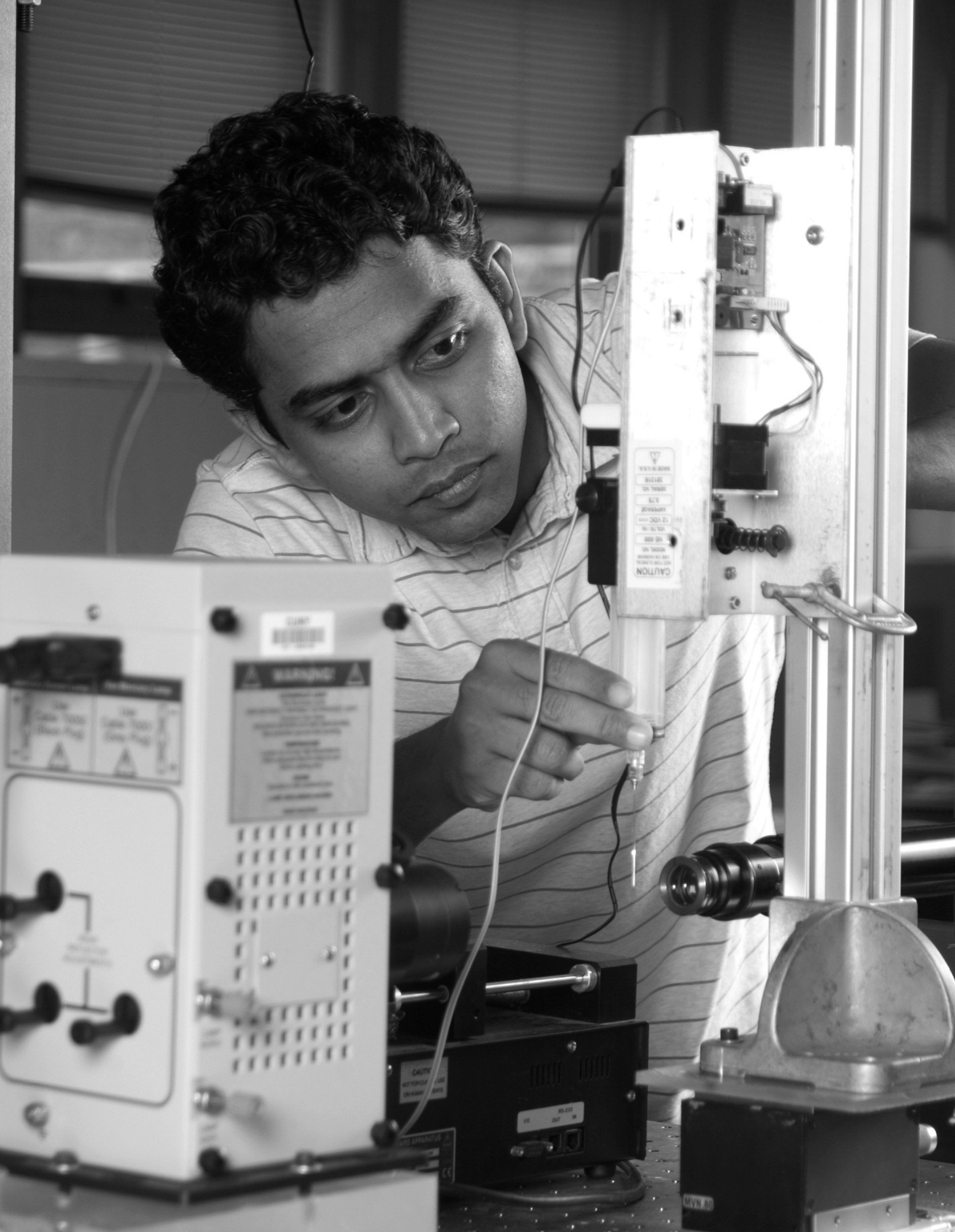

WARNING
CAUTION

Grove School of Engineering

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 and Engineering Management.

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. For admissions information and forms, visit or write the Graduate Office, Grove School of Engineering, ST-152. Additional information is also available on bulletin boards located in Steinman Hall and on our website: http:/www.ccny.cuny.edu.

The Associate Dean for Graduate Studies, Professor M. K. Kassir, ST-152, 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.

The doctoral degree in Computer Science is administered by the Graduate Center of the City University of New York (CUNY). Professor T. Brown, 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, ST-137.

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
Chemical Engineering
Civil Engineering
Electrical Engineering
Mechanical Engineering
Computer Science (through the Graduate Center)

Master of Engineering (M.E.)
Chemical Engineering
Civil Engineering
Electrical Engineering
Mechanical Engineering

Master of Science (M.S.)
Biomedical Engineering
Computer Science
Engineering (interdisciplinary)

Advanced Certificate in Special Topics
Civil Engineering
Engineering Management

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 or the equivalent. Applicants for the computer science programs should possess a Bachelor of Arts or Science degree with a major in computer science.

In exceptional cases where a transcript of the applicant's college record is required but is not immediately available, admission may be granted contingent upon subsequent evaluation of the transcript.

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 whose record is satisfactory but who has specific background deficiencies may be admitted as a matriculated student with conditions. These conditions must be met at the earliest possible time. Students may then apply for matriculation if they have a satisfactory academic average of B or better.

An applicant whose record is unsatisfactory or who does not desire a degree, but who wishes credit for one or more courses may, by permission of the Associate Dean for Graduate Studies, enrolls as a non-matriculated (non-degree) student.

Non-matriculated students may not enroll for more than six credits in one semester. Except for those students who already have a master's degree in their field of study, non-matriculated students may not complete more than 15 graduate credits. All students must maintain at least a B average. Non-matriculated students may apply for matriculation if they complete all entrance deficiencies and complete nine graduate credits in an approved planned program with an average of B or better. It is therefore necessary that students who are interested in applying for matriculation 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. 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 non-credit 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)
SP	satisfactory progress in thesis/project/report (temporary grade)
FIN	F due to unresolved INC

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 an FIN if the work is not completed by six weeks into the second semester following the INC grade. These grades are treated the same as F.

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.

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 obtained from the Admissions Office, The City College of New York, Wille Administration Building, Room 101, 160 Convent Avenue, New York, NY 10031 or online at www.ccny.cuny.edu. For further information, consult with or write to the Associate Dean for Graduate Studies, Graduate Office, Grove School of Engineering ST-152, The City College, New York, NY 10031.

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 permanent resident (green-card holder) must take the Test of English as a Foreign Language (TOEFL), administered internationally by Educational Testing Service, 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. 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 new Internet Based Test (IBT) is required.

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. Application form, available from the Admissions Office.
2. Two letters of recommendation from faculty members personally acquainted with the applicant's academic achievement.
3. An official transcript from each college or university attended, bearing the seal and/or signature of the appropriately authorized college official.
4. A personal statement.
5. Scores for the Graduate Record Examination (GRE) Tests are required. Arrangement to register for the tests can be made by calling 1 - GRE - CALL.Official GRE scores must be reported to the City College Admissions Office – ETS College Code – 2083.

All documents, except those foreign certificates considered irreplaceable, 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: April 15th for the Fall semester and Nov. 15th for the Spring semester.

Financial Assistance
An admissions applicant seeking financial assistance must submit both the admissions and financial forms and supporting documents.

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.

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 or her field.

Second Examination
A student must prepare a research proposal and present it orally to his or her Guidance 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 or her mentor and the Guidance Committee.

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.

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 Registrar's Office 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.

Dissertation examination committees consist of at least four members of the Engineering doctoral faculty and are approved according to procedures detailed in the governance document of each department. The program 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 and the Dean of Graduate Studies. The change in schedule (on the add/drop form) must be forwarded to the Registrar's Office 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 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.

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 in the undergraduate field of specialization and an overall undergraduate minimum average of B minus. Applicants are required to complete the Graduate Admissions Application which shall be accompanied by an official transcript from the College awarding the Bachelor's degree and two letters of recommendations from faculty. The application package can be obtained from the Admissions Office, The City College of New York, Wille Administration Building, Room 101, 160 Convent Avenue, New York, NY 10031 or online: **www.ccny.cuny.edu**. Applicants 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 paper score of 500, or a computer-based score of 173, or an internet-based score of 65 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 Graduate Office, ST-152.

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 3.75 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 mas-

ter's program and apply the twelve (12) certificate credits towards a Master's degree. The specializations offered are (detailed courses are described under Civil Engineering):

Civil Engineering
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 F3800: Management Concepts for Engineers
ENGR F9300: Economics and Investment Analysis of Engineering Projects
ENGR G7600: Engineering Law
ENGR G8500: Project Management
ENGR G9400: Telecommunications Management
ENGR I8000: Decision and Planning Techniques for Engineering Management

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 F9300 and ENGR I8000, 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.

F0000 series: Advanced senior-first year graduate courses. No more than two such courses may generally be credited toward a graduate degree. Three courses are allowed in Electrical Engineering.

G0000 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.

H0000 series: Courses in terminal programs generally credited only toward a master's degree after approval by the student's advisor and the department.

I0000 series: Master's and doctoral courses.

J0000 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.

ENGINEERING GRADUATE COURSES

The courses in Engineering (designated ENGR) may be taken in any of the engineering master's curricula. With approval of the Department and the Dean, these courses may be offered for the degree in lieu of the equivalent number of credits in the student's major field of study.

G0000: Selected Topics in Engineering
Advanced topics in engineering chosen for their current interest to graduate students. Prereq: departmental approval. 3 HR./WK.; 3 CR.

I0000: Seminars
Recent developments in engineering. The students report on assigned subjects. Prereq: departmental approval. CREDIT VARIES.

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. Prereq: Math 39200. 3 HR./WK.; 3 CR.

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. Prereq: ME 25600 or ChE 34200 or CE 35000. 3 HR./ WK.; 3 CR.

I0900: Foundations of Fluid Mechanics II
General theory of compressible, steady and unsteady flows, theory of characteristics. Linear and nonlinear wave propagation. Hypersonic flow. Prereq: ENGR I0800. 3 HR./WK.; 3 CR.

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. Prereq: Math 39200. 3 HR./WK.; 3 CR.

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. Prereq: Math 39200. 3 HR./WK.; 3 CR.

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. Prereq: ENGR I1100. 3 HR./WK; 3 CR.

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. Prereq: ENGR I1100. 3 HR./WK.; 3 CR.

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. Prereqs.: CSc 10100, Math 39200. 3 HR./WK.; 3 CR.

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. Prereq: ENGR I1500. 3 HR./WK.; 3 CR.

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. Prereq: Math 39200, CE I5400, or home department advisor's approval. 3 HR./WK.; 3 CR.

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. Prereqs.: ENGR I1100 and CE 59802 or ME 54200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: ME 25600 or ChE 34100. 3 HR./WK.; 3 CR.

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. Prereq: ChE I2800 or ME I3300. 3 HR./WK.; 3 CR.

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. Prerequisites: Basic undergraduate courses in Mechanics of Materials, Fluid Mechanics and Linear Algebra (including vector field theory). 3 HR./WK.; 3 CR.

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. Prereq: CE I3500. 3 HR./WK.; 3 CR.

I6400: Wave Propagation in Fluids and Solids
Hyperbolic and dispersive, linear and nonlinear 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). Prereq: ENGR I1100 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: ENGR I0800. 3 HR./WK.; 3 CR.

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. Prereq: ENGR I1200. 3 HR./WK.; 3 CR.

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. Prereq: ENGR I3200. 3 HR./WK.; 3 CR.

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. Prereqs.: ENGR I1100 and ENGR I0800. 3 HR./WK.; 3 CR.

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. Prereq: CE I3500 or ME I5400 and ENGR I1100. 3 HR./WK.; 3 CR.

SPECIAL TOPICS IN ENGINEERING MANAGEMENT

F3800: 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. 3 HR./WK.; 3 CR.

F9300: 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. 3 HR./WK.; 3 CR.

G7600: 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. 3 HR./WK.; 3 CR.

G8500: 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. 3 HR./WK.; 3 CR.

G9400: Telecommunications Management
Different aspects of the management of telecommunication networks, including network management functions, instruments and human resources. Topics include: the basic network management function, fault management, performance management, configuration management, security management, accounting and planning. In addition, there will be an overview of network management systems and products. Prereq: EE G6000/46000 or equivalent. 3 HR./WK.; 3 CR.

I8000: 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. 3 HR./WK.; 3 CR.

Department of Biomedical Engineering

Professor John Tarbell, Chair • Department Office: Steinman 404C • Tel: 212-650-6841

GENERAL INFORMATION

The City College offers the following master's degree in Biomedical Engineering:

M.S. (BME)

DEGREE REQUIREMENTS

To obtain the M.S. degree in Biomedical Engineering a student must complete the 30-credit course program described below. The 30 credits of core and elective courses are in four areas: science, biomedical engineering, mathematics and traditional engineering. They are distributed as follows:

Required Courses:
Four or five from the following: 12-15
Biomedical Engineering:
I2000: Cell and Tissue Engineering
I2200: Cell and Tissue Transport
I3000: Neural Engineering and Applied Bioelectricity
I4200: Organ Transport and Pharmacokinetics
I5000: Medical Imaging and Image Processing
I5100: Biomedical Signal Processing
I7100: Cell and Tissue Mechanics
I7300: Cell and Tissue-Biomaterial Interactions
I7700: Microfluidic Devices in Biotechnology
Chemical Engineering:
ChE G5300: Bioprocess Engineering: Principles and Applications

Elective Courses:
Three to five courses from the following: 9-15
Traditional engineering electives (3-6 CR.)
Mathematics electives from the following (3-6 CR.):
ENGR I1100: Introduction to Engineering Analysis
ENGR I1400: Applied Partial Differential Equations
ENGR I1500: Introduction to Numerical Methods
ENGR I1700: Finite Element Methods in Engineering
Biomedical science electives (physiology, biophysics, molecular genetics, neurobiology, microbial biology, cell biology, biochemistry, protein structure and crystallography and medical physics.) related to a research effort. (3-6 CR.)

Additional Requirements 3-6
Students may complete a 6-credit thesis on a topic approved by the Biomedical Engineering Master's Advisor. 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. In special circumstances, a student may replace the 6-credit thesis by a 3-credit report and an additional course.

Total credits **30**
Note: with departmental approval, students may register for one 50000-level undergraduate course 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.

ADVISEMENT

Master's Program
Professor Lucas Parra

Doctoral Program
Professor Susannah Fritton

FACILITIES

There are currently nine Biomedical Engineering research laboratories at City College. These CCNY facilities are amplified by the extensive laboratories at our hospital partners where many of our students do experimental 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.

Microfluidic Devices Laboratory
Our laboratory develops microfluidic devices and nanotechnology that enable measurement, analysis, and imaging of both macromolecules and live cells. Our microdevices are fabricated on site using microcontact printing, which utilizes equipment such as a reactive ion etcher, spin coater, sputtering machine, and high power density UV light. We have utilized these microfluidic devices to facilitate *in vitro* studies of chemotactic cellular activity in collaboration with physicians and researchers from the Hospital for Special Surgery. In addition, our laboratory has adapted these devices to investigate the mechanics of chemotactic migration of oncogenic cells in collaboration with clinicians and researchers at Memorial Sloan Kettering Cancer center. Both investigations utilize nanotechnology to label receptor tyrosine kinase signaling during cellular chemotaxis, adhesion, proliferation, and phenotypic changes. Our nanotechnology incorporates Quantum Dot bioconjugates that are surface functionalized and characterized on site using confocal microscopy, atomic force microscopy, and static light scattering. Our research laboratory has also begun investigation of Quantum Dot delivery into live cells using virosomes, which utilize the electron microscopy facility at the Center for Structural Biology on campus.

Biosensors and Biomaterials Laboratory
This laboratory is focused on the design of novel biomaterials and biosensors from molecules of cellular origin. These molecules include nanostructured self-assembling proteins, membrane protein receptors, and thermostable phospholipids. In most cases the molecules are obtained from cell culture in a lab-scale bioreactor. Molecular engineering and bioconjugate chemistry approaches are applied to alter the properties of the parent molecules purified from cells. In some cases we are building in spectroscopic reporter groups so that the design process is both guided and monitored using biomolecular spectroscopy and surface analysis techniques. The main instrumentations in use in the laboratory are a bioreactor for cell culture and a time-resolved fluorescence microspectrometer for biomaterial imaging and spectroscopy. The lab is also fully equipped for protein purification, with an HPLC/FPLC setup and prep-scale 2D electrophoresis.

Neural Engineering 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; and 2) elucidating the neuronal network dynamics, including non-synaptic mechanisms, facilitating emergent physiological ("gamma"/cognition) and pathological (epilepsy) network oscillations. The 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.

Laboratory for Neural Signals Research
This laboratory focuses on the analysis of neuronal activity with the goal of developing computational models of human information processing and cognition. The research addresses the question of how temporal information is encoded and processed. To this end we record electro-encephalography (EEG) and perform human psychophysics with an emphasis on auditory perception. The laboratory has a sound-damped electromagnetically shielded room for recording EEG. A portable 128-channel system is available with drivers for real-time analysis and closed-loop stimulation. Research grade audio equipment is available to perform auditory perception experiments. 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.

Tissue Mechanics Laboratory
The focus of the Tissue Mechanics Laboratory is to understand the adaptive response of bone to altered mechanical loading, including bone's mechanosensory system. A major focus of the lab is to investigate fluid flow in bone as a possible mechanism of mechanical signal transduction. The facility is also used to study the microstructure of bone tissue and relate it to the gross structure, material properties, and behavior of whole bones. Equipment in the laboratory includes a MTS Mini-Bionix servohydraulic materials testing system along with high-end PCs used for image analysis and finite element modeling.

Laboratory of Multiscale Biomechanics and Functional Imaging
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 Continue 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.

Laboratory for Microfluidic HTS Technology and Tissue Engineering
A major effort in this lab is directed at the development of microfluidic cell chips to study signaling pathways (e.g. apoptosis, inflammation) for the high throughput screening (HTS) of drugs by combining current knowledge in biomedical sciences and advanced technologies in BioMEMS. The second focus is 3D tissue engineering in synthetic extracellular matrices using stem cells and micropatterning technology for regenerative medicine and toxicity studies. The final activity is in thermal medicine combining nanotechnology and heat shock proteins for cancer therapy and tissue injury protection.

COURSE DESCRIPTIONS

I2000: Cell and Tissue Engineering
Application and design of cellular and biomaterial microstructures for use in biomedical engineering applications. This course begins with an introduction to the structure, function, and biosynthesis of cell surface macromolecules, followed by the discussion of current methods and applications in cell and tissue engineering. Topics include matrix molecules and their ligands, construction of biomimetic environments, biomaterials for tissue engineering, tissue engineering in bone and cartilage, and genetic approaches in cell and tissue engineering. Prereq: Undergraduate cell and molecular biology and biochemistry. 3 HR./WK.; 3 CR.

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. Prereq: Undergraduate fluid mechanics or transport course. 3 HR./WK.; 3 CR.

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. Prereq.: An undergraduate circuits course. 3 HR./WK.; 3 CR.

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 for their interested topics. Prereqs.: Undergraduate fluid mechanics or transport course. 3 HR./WK.; 3 CR.

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. Prereq.: Students with no biology background should complete an undergraduate biology course before taking this course. 7 HR./WK.; 6 CR.

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. Prereqs: An undergraduate linear systems course and an undergraduate linear algebra course. 3 HR./WK.; 3 CR.

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. Prereqs: An undergraduate linear systems course and an undergraduate linear algebra course. 3 HR./WK.; 3 CR.

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. Prereq: Undergraduate strength of materials course and ENGR I4200. 3 HR./WK.; 3 CR.

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 biocompatibility; characterization of nonliving biomaterials; reaction of biological molecules with biomaterial surfaces; host response to implants; effects of degradation on implant materials; bioactive surfaces; resorbable implant materials; standardization and regulation of implant materials; *in vitro* and *in vivo* biomaterial testing methods; orthopedic and other specific applications of biomaterials; and introduction to tissue engineering. Prereq: Undergraduate materials or transport course. 3 HR./WK.; 3 CR.

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. Prereq: BME 31000 and ME 46100; or ME 43300, ME 46100 and BIO 32100; or ChE 31000, ChE 34200, and BIO 32100. 3 HR./WK.; 3 CR.

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. Prereq: Completion of 12 credits toward the master's degree in Biomedical Engineering. 0 CR.

I9800: Project
A research project performed under the supervision of a faculty mentor. A final written report is required. Prereq: approval of the departmental advisor. 3 CR.

I9900: Research for Master's Thesis
Prereq: approval of the departmental advisor. 3-6 CR.

J9900: Research for Doctoral Dissertation
Prereq: approval of the departmental Ph.D. advisor. VARIABLE CR. UP TO 12 CR.

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. 3 HR./WK.; 3 CR.

FACULTY

Marom Bikson, Assistant Professor
B.S. (BME) Johns Hopkins Univ.; Ph.D., Case Western Reserve

Susannah P. Fritton, Associate Professor
B.S. (BME), Tulane Univ., M.S., Ph.D.

Bingmei Fu, Associate Professor
B.S., Univ. of Science and Technology (China), M.Eng.; Ph.D., CUNY

Luis Cardoso Landa, Assistant Professor
B.E. (BME), National Polytechnic Institute (Mexico); Ph.D., Univ. of Paris

Lucas Parra, Associate Professor
B.S. (Physics), Ludwig Maximilian Univ. (Germany), Ph.D., Physics

Mitchell B. Schaffler, Presidential Professor
B.S. (Biology) SUNY Stony Brook; Ph.D. (Anatomy) West Virginia Univ.

John Tarbell, Distinguished Professor and Chair
B.S. (ChE), Rutgers Univ.; Ph.D. (ChE) Univ. of Delaware

Maribel Vazquez, Assistant Professor
B.S. (M.E.), Cornell Univ.; M.S. (M.E.), Massachusetts Inst. of Tech., Sc.D.

Sihong Wang, Assistant Professor
B.S. (BME), Shanghai Jiao Tong Univ.; M.S. (BME), Univ. of Memphis; Ph.D. (BME), Univ. of Texas

Institute for Biomedical Engineering

Professor Stephen Cowin, Director • Institute Office: Steinman 403A • Tel: 212-650-6707

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 a consortium of highly endowed, world-class private medical institutions. The current consortium in the NYCBE consists of the Grove School of Engineering and the Sophie Davis School of Biomedical Education at CCNY, the CUNY Graduate School, and a citywide network of collaborators at most of the premier health care institutions in New York City, where CCNY undergraduate and graduate students are actively engaged in research.

Our current NYCBE 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 an internationally recognized faculty of more than 30 researchers (from CUNY and eight affiliated institutions) in the areas of arterial fluid mechanics and transport, cartilage and ligament mechanics, tissue-biomaterial interaction, microvascular exchange, bone remodeling, renal modeling, quantitative image analysis for diagnostic pathology, biomedical signal processing and instrumentation, pattern recognition and vision. The outstanding quality and diversity of the 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. The faculty have won many of the most prestigious awards and honors in fields related to biomedical engineering, including election to the National Academy of Science, the National Academy of Engineering, and the Institute of Medicine.

CUNY Distinguished Professor Stephen Cowin is the director of the NYCBE.

FACULTY

In addition to the Department of Biomedical Engineering faculty listed in the previous section of this Bulletin, The NYCBE faculty includes more than twenty-five members from CCNY and its affiliated institutions:
M.D., New York Medical College

Adele Boseky
Director of Research, The Hospital for Special Surgery

George Brandon
Associate Medical Professor, Sophie Davis School of Biomedical Education

Nancy Pleshko Camacho
Scientist, The Hospital for Special Surgery

Stephane Carlier
Professor, Intravascular Imaging and Physiology, Cardiovascular Research Foundation

Edward J. Ciaccio
Associate Research Scientist, Pharmacology, Columbia College of Physicians and Surgeons

Stephen B. Doty
Senior Scientist, The Hospital for Special Surgery

Jay Edelman
Assistant Professor, Biology, The City College

Paul S. Frenette
Irene and Dr. Arthur Fishberg Associate Professor, Department of Medicine, Immunobiology Center and Black Family Stem Cell Institute, Mt. Sinai School of Medicine

Marilyn Gunner
Professor, Physics, The City College

Vernon Houston
Associate Professor, Rehabilitation Medicine, New York University

Kung-Ming Jan
Associate Professor, Rehabilitation Medicine, Columbia College of Physicians and Surgeons

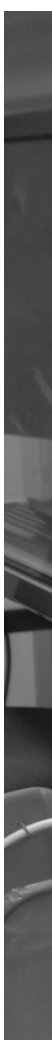
Karl J. Jepsen
Assistant Professor, Orthopedics, Mount Sinai School of Medicine

Themis Lazaridis
Associate Professor, Chemistry, The City College

Gwendalyn J. Randolph
Associate Professor, Gene and Cell Medicine, Mt. Sinai School of Medicine

David S. Rumschitzki
Professor, Chemical Engineering, The City College

Ali Sadegh
Professor, Mechanical Engineering, The City College



Lisa Satlin
Chief, Division of Pediatric Nephrology; Mount Sinai Medical Center Professor, Pediatric Nephrology, Mt. Sinai School of Medicine

Mitchell Schaffler
Professor, Orthopedics, Mount Sinai School of Medicine

Lawrence Sirovich
Professor, Biomathematical Sciences, Mount Sinai School of Medicine

David Spray
Professor, Neuroscience, Albert Einstein College of Medicine

Carol A. Steiner
Professor, Chemical Engineering, The City College

Herb B. Sun
Associate Professor, Orthopaedics, Mt. Sinai School of Medicine

Peter A. Torzilli
Senior Scientist, The Hospital for Special Surgery

Alan Weinstein
Professor, Physiology and Medicine, Weill Medical College of Cornell University

Savio Woo
Professor and Director, Mt. Sinai School of Medicine

Timothy Wright
Senior Scientist, Hospital for Special Surgery, Professor of Applied Biomechanics, Weill Medical College of Cornell University

Department of Chemical Engineering

Professor Alexander Couzis, Chair • Department Office: Steinman 322 • Tel: 212-650-7232

GENERAL INFORMATION

The City College offers the following master's degrees in Chemical Engineering:

M.E. (Ch.E.) (Professional Master's Degree)

M.S. (Engineering)

DEGREE REQUIREMENTS

Professional Master's Degree

Engineering Core Courses: 6

ChE I3300: Advanced Chemical Reaction Engineering (3 CR.)

ChE I4100: Chemical Process Economics (3 CR.)

Engineering Management 6

Two of the following:

ENGR F3800: Management Concepts for Engineers (3 CR.)

ENGR G7600: Engineering Law (3 CR.)

ENGR I8000: Decision and Planning Techniques for Engineers (3 CR.)

Focus Areas in Chemical Engineering 9

Three courses in *one* of the following focus areas:

A. Polymers and Materials

ChE I5500: Interfacial Phenomena (3 CR.)

ChE I5700: Advanced Materials (3 CR.)

ChE I6100: Polymer Science and Engineering (3 CR.)

ChE I6200: Polymer Surfaces and Interfaces (3 CR.)

ChE I6300: Thin Organic Films and their Analysis (3 CR.)

ChE I6400: Rheology of Soft Materials (3 CR.)

ChE I6500: Mechanics of Polymer Melt Processing (3 CR.)

ChE I8900: Nanotechnology (3 CR.)

ChE I9100: Mass Transfer (3 CR.)

ChE I9200: Soft Materials Lab (3 CR.)

B. Solids Processing

ChE I5200: Powder Science and Technology (3 CR.)

ChE I6500: Mechanics of Polymer Melt Processing (3 CR.)

ChE I8100: Fluid-Particle Systems (3 CR.)

C. Systems Engineering

ChE I3000: Chemical Process Simulation (3 CR.)

ChE I4000: Energy Systems Engineering for Global Sustainability (3 CR.)

ChE I5800: Molecular Simulation (3 CR.)

ChE I7700: Process Dynamics and Control (3 CR.)

ChE I8600: Equilibrium Staged Separations (3 CR.)

ChE I8800: Bioseparations (3 CR.)

ChE I9000: Bioprocess Engineering (3 CR.)

Technical Electives 9

Any other three courses in Chemical Engineering. Courses in other areas by approval of the department.

Report 0

ChE I9700: Report (0 CR.)

Total credits 30

M.S. (Engineering) Degree in Chemical Engineering

Required Courses 18-19

ENGR I1100: Introduction to Engineering Analysis (3 CR.)

ChE I0000: Seminar (1 CR.)

ChE I2800: Advanced Chemical Thermodynamics (3 CR.)

ChE I3300: Advanced Chemical Reaction Engineering (3 CR.)

Two of the following three courses*:*

ENGR I0800: Foundations of Fluid Mechanics (3 CR.)

ME I3700: Convection Heat Transfer

ChE I9100: Mass Transfer

Elective Courses 9-15

Three to five additional courses in Chemical Engineering

One of the following:

ChE I9700: Report (0 CR.)

ChE I9900: Thesis Research (3-6 CR.)

ChE I9800: Master's Project (3 CR.)

Total credits 30

Additional Requirements

All full-time graduate students are expected to engage in research.

Thesis: Optional. Requires prior departmental approval.

ADVISEMENT

Masters Program: Professor G. Tardos and J. Lee

Doctoral Program: Professor M. Denn

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 work-station based 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 (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.

Interfacial Chemistry Laboratory
The course provides students with exposure to some 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 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 distribution measurement and particle stability using light backscattering.

Materials Science
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, Flouroscence Microscope, High-Speed Video Camera (1000 fps), three high resolution optical microscopes with image analysis capabilities, Contact Angle Goniometer, Argon Plasma Cleaner, Light Scattering, UV-spectrometer, Atomic Absorption Spectrometer, Refractometer, conFocal Microscope, and an Electron Microscope.

The A.X. Schmidt Computer Laboratory
The Chemical Engineering Department is equipped with a network of 30 PC workstations, half of which are designated for student's coursework. All students have access to the Internet and E-mail. Application software available on the network includes ASPEN, Mathematica, Matlab, and Visio, SuperPro Designer. Many courses make use of the computer network and software. The laboratory is available for unlimited student use. All students are expected to become proficient in its use.

COURSE DESCRIPTIONS

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. Prereqs: Chem 34200, Chem 26300, ChE 32800, ChE 43000, ChE 43200. This course is not open to students who have taken ChE 46700 or its equivalent. 3 HR./WK.; 3 CR.

G0000: Selected Topics in Chemical Engineering
Advanced topics selected for their current interest to graduate students. 3 HR./WK.; 3 CR.

G2400: Viscous Flow I

G2500: Viscous Flow II

G2900: Dynamics and Stability of Chemically Reacting Systems

G3600: Catalyst Design and Catalytic Reaction Engineering

I0000: Seminar
Invited speakers and reports of graduate student research. 1 HR./WK.; 1 CR.

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. Prereq: ENGR I0800. 3 HR./WK.; 3 CR.

I2800: Advanced Chemical Thermodynamics
Classical thermodynamics; batch and flow systems; homogeneous and heterogeneous systems, physical and chemical equilibria, energy effects. Correlation and approximation methods. Prereq: ChE 43000 or ME 33100. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq: ChE I2800 or ME I3300. 3 HR./WK.; 3 CR.

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. Prereq: ChE 43200. 3 HR./WK.; 3 CR.

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. Prereq: ChE I3200 or Phys 55300. 3 HR./WK.; 3 CR.

I4000: 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. Prereq.: Undergraduate degree in engineering, or permission of the instructor. 3 HR./WK.; 3 CR.

I4100: Chemical Process Economics
Basic principles; break-even and shut-down studies; profitability criteria; plant location; market research; project analysis and optimization. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq: ChE 31000 or permission of instructor. 3 HR./WK.; 3 CR.

I5800: Molecular Simulation
Theory and practice of numerical techniques for the simulation ofA0 material properties and transport phenomena at the molecular level. Introduction to *ab initio* and empirical force fields, theoretical background on MonteA0Carlo, molecular dynamics, and related methods.A0 Introduction to biased and accelerated methods, simulation of fluid flows, long-range interactions, phase equilibriums and other topics of current interest.A0Exercises will emphasize computational practice, writing code for particular applications, and the analysis of numerical results. Prereq: ChE I3200 or permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereq: ChE 46700, ChE F6700, or permission of instructor. 3 HR./WK.; 3 CR.

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). Prereq.: Undergraduate degree in engineering, or permission of the instructor. 3 HR./WK.; 3 CR.

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). Prereq.: Undergraduate degree in engineering, or permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereqs.: Undergraduate degree in a physical science or engineering discipline, or permission of instructor. 3 HR./WK.; 3 CR.

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. Prereq.: Undergraduate degree in engineering, or permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereq.: ChE 47700 or EE 37100. 3 HR./WK.; 3 CR.

I8100: Fluid Particle Systems
Basic equations of multi-phase systems; transport processes of rigid and deformable particles; drag coefficients; heat and mass transfer rates; turbulence effects; transport properties of clouds of particles; pipe flow of a suspension; filtration of aerosols; industrial filters. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

I8900: Nanotechnology
Introduction to nanotechnology and its applications in the development and synthesis of soft materials. Prereq.: ChE I2800 and Engr I9100. 3 HR./WK.; 3 CR.

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. Prereq.: ChE I2800 and Engr I9100. 3 HR./WK.; 3 CR.

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. Prereq: Engr I0800. 3 HR./WK.; 3 CR.

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. Prereq.: Undergraduate degree in engineering, or permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereq: completion of 12 credits toward the master's degree in ChE. Not applicable for credit toward the Ph.D. 0 CR.

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. Prereq: written departmental approval. 3 CR.

I9900: Research for the Master's Thesis
Variable CR., up to 6 CR.

J9900: Research for the Doctoral Dissertation
Variable CR., up to 12 CR.

Other Engineering Courses

Other appropriate Engineering courses are listed under Graduate Engineering courses in the front section of the Grove School of Engineering.

I0800: Foundations of Fluid Mechanics I

I0900: Foundations of Fluid Mechanics II

I1100: Introduction to Engineering Analysis

I1200: Functions of a Complex Variable

I1300: Transform Methods in Engineering

I1400: Applied Partial Differential Equations

I1500: Introduction to Numerical Methods

I2200: Biofluid Mechanics

I2400: Turbulent Flows

I3600: Conduction Heat Transfer

I3700: Convection Heat Transfer

I3800: Radiation Heat Transfer

I8000: Decision and Planning Techniques for Engineering Management

I9100: Mass Transfer

J0100: Fluid Dynamic Stability

FACULTY

Sanjoy Banerjee, Distinguished Professor
B.S. (ChE), IIT (India); Ph.D., Univ. of Waterloo (Canada)

Alexander Couzis, Herbert G. Kayser Professor and Chair
B.S. (Ch.E.), National Technical Univ. (Greece); M.S., (Ch.E.) Univ. of Michigan, Ph.D (Ch.E.)

Morton M. Denn, Albert Einstein Professor
B.S.E. (Ch.E.), Princeton Univ.; Ph.D., Univ. of California (Davis)

M. Lane Gilchrist, Jr., Assistant Professor
B.Ch.E., Louisiana State Univ.; Ph.D., Univ. of California (Davis)

Leslie L. Isaacs, Professor
B.Sc.(Ch.E.), Columbia Univ.; Ph.D., M.I.T.

Ilona Kretzschmar, Assistant Professor
Diploma (Chemistry), Technical Univ. of Berlin

Jae W. Lee, Associate Professor
B.S. (Ch.E.), Seoul National Univ.; Ph.D., Carnegie Mellon Univ.

Charles Maldarelli, Professor
B.S. (Ch.E.), Columbia Univ., M.S.(Ch.E.), D.Eng.Sc.(Ch.E.)

Jeffrey Morris, Associate Professor
B.A., Georgia Institute of Technology; M.S., California Institute of Technology, Ph.D. (Ch.E.)

Irven Rinard, Professor
B.Ch.E., Univ. of Delaware; M.Sc., M.I.T., Sc.D. (Ch.E.)

David S. Rumschitski, Herbert G. Kayser 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. Engrg.), Univ. of Pennsylvania, Ph.D. (Ch.E.)

Gabriel Tardos, Professor
Dipl. Eng., Polytech. Bucharest, Roumania; M.Sc. (M.E.), Technion, Israel, D.Sc.

Raymond Tu, Assistant Professor
B.S. (Ch.E.), Univ. of Florida; Ph.D., Univ. of California (Santa Barbara)

PROFESSORS EMERITI

Andreas Acrivos, Albert Einstein Professor Emeritus
Robert A. Graff
Morris Kolodney
Harvey L. List
Robert Pfeffer
Reuel Shinnar
Herbert Weinstein

The Energy Institute

Professor Sanjoy Banerjee, Director; Professor Emeritus Reuel Shinnar, Co-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 John Fillos, Chair • Department Office: Steinman 135 • Tel: 212-650-8000

GENERAL INFORMATION

The City College offers the following master's degrees in Civil Engineering:

M.E. (C.E.) (Professional Master's Degree)

M.S. (Engineering) (Degree is awarded to students who do not have a bachelor's degree in engineering)

PROGRAMS AND OBJECTIVES

For the Professional Master's degree, the Department of Civil Engineering offers programs of graduate study in the following areas:

Structural Engineering and Mechanics
Water Resources and Environmental Engineering
Transportation

DEGREE REQUIREMENTS

Required Courses by Specialization

Structural Engineering and Mechanics

Civil Engineering:
H1000: Analytical Methods in Civil Engineering 3
I3000: Structural Dynamics 3
I1700: Finite Element Methods in Engineering 3
I3500: Applied Elasticity and Plasticity 3

Water Resources and Environmental Engineering

Civil Engineering:
H1000: Analytical Methods in Civil Engineering 3
H0700: Advanced Hydraulics 3
H6300: Groundwater Hydrology and Contamination 3
H7500: Unit Operations in Environmental Engineering 3

Transportation

Civil Engineering:
H1000: Analytical Methods in Civil Engineering 3
H0200: Transportation Economics 3
I2200: Transportation Asset Management 3
I2400: Analytical Techniques in Transportation 3
I2600: Urban Transportation Planning 3

Elective Courses

Other graduate courses 9-18
Report/Project/Thesis 0-6
At least one of the following courses:
I0000: Seminar (1 CR.)
I9700: Master's Report (0 CR.)
I9800: Master's Project (3 CR.)
I9900: Master's Thesis (6 CR.)

Total credits 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.

ADVISEMENT

Environmental Engineering
Professor V. Diyamandoglu

Water Resources Engineering
Professor R. Khanbilvardi

Structural Engineering and Mechanics
Professor F.B. Lin

Transportation
Professor C. McKnight

ADVANCED CERTIFICATE IN SPECIAL TOPICS IN CIVIL ENGINEERING

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.

A. Structures

H5300: Advanced Structural Design
55000: Advanced Reinforced Concrete
I5400: Elastic and Inelastic Analysis of Structures

And one of the following:

H5200: Bridge Engineering
H5100: Prestressed Concrete
59000: Foundation Engineering

B. Environmental Engineering

57100: Environmental Engineering Analysis
H7500: Unit Operations in Environmental Engineering
H7600: Unit Processes in Environmental Engineering

And one of the following:

H7400: Industrial Wastewater Treatment
I7000: Wastewater Treatment Plant Design

C. Water Resources Engineering

H6300: Groundwater Hydrology and Contamination
H0700: Advanced Hydraulics
H1200: Engineering Hydrology

And one of the following:

I6300: Water Resource Modeling
H0800: Applied Hydraulics in Engineering

D. Transportation

Three courses from the following list:

CE 52000: Traffic Engineering

CE I2000: Travel Demand Forecasting

CE I2200: Transportation Asset Management

CE I2600: Urban Transportation Planning

CE H2100: Design of Flexible and Rigid Pavement

CE I2300: Pavement Management Systems

CE G4900: Transportation Network Analysis

One of the following:

CE I2900: Transportation Project Evaluation or

ECO C0014: Transportation Investment Policy

Plus an approved transportation elective. (The elective can be from the list above).

LABORATORIES

Computational Facilities

The Department has two computational laboratories equipped with PC's. A separate laboratory, equipped with high-speed workstations, supports the research activities of faculty and Ph.D candidates. All workstations are networked and connected to the Internet.

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, a 1000-ft. pipe loop system for biostability studies in drinking water and all conventional experimental devices used in determination of chemical dose requirements. 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, ion chromatograph, water quality autoanalyzer, UV-visible double beam spectrophotometer with stopped-flow device, and phase contrast/epiflouresence research microscope. Field monitoring equipment includes water quality monitors with multiple probes and flourometers.

Transportation Engineering Laboratory

The Transportation Engineering Laboratory has personal computers with peripherals to provide students with opportunities to work with traffic and transportation software for course work and transportation research. The laboratory has a variety of software,

including SOAP84, HCS, PASSER II-90, TRANSYT-7F, NETSIM, AAP, PRIMAVERA, and Maptitute for GIS. The Laboratory also contains basic equipment necessary to conduct traffic engineering studies such as traffic counters and measuring wheels.

Highway and Airfield Laboratory
The Highway and Airfield Laboratory offers facilities for investigating the properties of the basic materials and mixtures that comprise pavements. A variety of strength and stability equipment, and other apparatus are available for determining rheological and physical properties and for experiments in designing and testing bituminous mixes. The additional facilities of the Soils and Materials Laboratories make possible the study of mineral aggregates and their blends, soil-stabilization phenomena, and mix-design and properties of Portland cement concrete. Other facilities in the Chemical Engineering Department's Materials Research Laboratory extend the capacity to conduct thermo-analytic studies on standard and composite materials.

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, a strong frame system for quasi-static and dynamic testing of structural system and a computer based visualization and image correlation system for damage detection in structural systems being tested on the strong floor.

COURSE DESCRIPTIONS

G0000: Selected Topics in Civil Engineering
Advanced topics chosen for their current interest to graduate students. 3 HR./WK.; 3 CR.

G1300: Wind Effects on Structures

G2500: Construction Engineering

G3400: Impacts of Transportation Systems

G4200: GIS Transportation Data Modeling

G4500: Advanced Transportation Analysis

G4700: Pavement Management Systems

G7100: Water and Wastewater Treatment

G7300: Surface Water Quality Modeling

G7400: Remediation Technologies for Hazardous Wastes and Sites

G9100: Water Resources Systems Analysis

H0200: Transportation Economics
The basic economics of transportation and the tools of economic analysis used to analyze transportation activities, firms and government policies. Prereqs: undergraduate courses in economics and calculus. 3 HR./WK.; 3 CR.

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. Prereq: CE 36500. 3 HR./WK.; 3 CR.

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. Prereq: CE 36500. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

H1200: 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. Prereqs: CE 36500. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

H4100: Highway and Airport Construction
Overview of highway and airport engineering and construction; highway 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. Prereq: CE 33500. 3 HR./WK.; 3 CR.

H4500: Urban Public Transportation
Historic development of urban transportation, including rail, bus, shared ride, and demand response modes, and market; multi and intermodal and system issues. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

H5100: Prestressed Concrete
Properties of prestressed concrete materials. Simple, composite and continuous prestressed beams. Prestressed rigid frames, buildings and bridges. Prereqs: CE 33500, CE 44100. 3 HR./WK.; 3 CR.

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. Prereqs: CE 44000, CE 44100, CE 44200. 3 HR./WK.; 3 CR.

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. Prereqs: CE 44200, CE 33500. 3 HR./WK.; 3 CR.

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. Prereqs.: CE 34000, CE44100, and CE44200. 3 HR/WK.; 3 CR.

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. Prereq: CE 35000. 3 HR./WK.; 3 CR.

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. Prereq: CE 48000 or departmental approval. 3 HR./WK.; 3 CR.

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. Prereq: graduate standing. 3 HR./WK.; 3 CR.

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. Prereq: CE 57100. 3 HR./WK.; 3 CR.

H7500: Unit Operations in Environmental Engineering
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. Prereq: CE 57100. 3 HR./WK.; 3 CR.

H7600: Unit Processes in Environmental Engineering
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. Prereq: CE 57100; coreq: CE H7700. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

H8300: Air Pollution and Control
Descriptive meteorology. Origin and transport of contaminants. Purpose and procedure for air pollution surveys. Control of air pollution emissions. The Clean Air Act. Indoor air pollution. Prereq: CE 38000. 3 HR./WK.; 3 CR.

H8400: Solid Waste Management
Generation of solid wastes. Municipal solid waste characterization, collection processing and disposal. Energy and resource recovery. Hazardous waste generation, collection, processing and disposal. Use of landfills and incinerators. Regulatory and economic aspects of urban solid waste issues. Prereq: CE 38000. 3 HR./WK.; 3 CR.

H9000: Advanced Foundation Engineering
Review of settlement and bearing capacity analysis. Subsurface investigation and nondestructive geophysical testing. Ground improvement techniques. Geogrid and geotextile applications. Sheet-pile walls. Deep excavations and support systems. Slurry walls and containment barrier. Tieback and tiedown anchoring. Cellular cofferdams. Artificial ground freezing and testing. Hard and soft tunneling. Prereq: CE 59000. 3 HR./WK.; 3 CR.

I0000: Seminars
Recent developments in civil engineering; students report on assigned subjects. Topics to be announced. VARIABLE CR.

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. Prereqs: CE 44000 and CE 53000; pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq.: CE I1700. 3 HR/WK.; 3 CR.

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. Prereq: CE I2400, or approval of the instructor. 3 HR./WK.; 3 CR.

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. Prereqs: Undergraduate degree or permission of the instructor. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereq: basic probability and statistics (e.g. CE 26400). 3 HR./WK.; 3 CR.

I2600: Urban Transportation Planning
Transportation planning in context of U.S. policy, TEA21 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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Prereqs: CE 43500 and CE 44000; pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq: CE 53000; pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq: CE I3500. 3 HR./WK.; 3 CR.

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. Pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq: CE H3500. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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 nonlinearity. Plastic Hinge Method. Geometric nonlinearity. Flexible members and theory of large deformations. Prereq: CE 44000. 3 HR./WK.; 3 CR.

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. Prereqs: CE 53000, CE 44000; pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq: CE I3000. 3 HR./WK.; 3 CR.

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. Prereqs: CE 26400, CE 44000. 3 HR./WK.; 3 CR.

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. Prereqs: CE 56100, CE H1000; knowledge of a programming language. 3 HR./WK.; 3 CR.

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. Prereq: CE H6400. 3 HR./WK.; 3 CR.

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. Prereq: CE I3000. 3 HR./WK.; 3 CR.

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. Prereqs: CE 34500, CE 44000, CE 53000; pre- or co-req.: H1000. 3 HR./WK.; 3 CR.

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. Prereq: completion of nine CE credits applicable to master's degree. 0 CR.

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. Prereq: completion of nine CE credits applicable to master's degree. 3 CR.

I9900: Research for the Master's Thesis
6 CR.

J9900: Research for the Doctoral Dissertation
Variable CR.

OTHER ENGINEERING COURSES

Other appropriate Engineering courses are listed under Graduate Engineering courses in the front section of the Grove School of Engineering.

I0800: Foundations of Fluid Mechanics I

I1100: Introduction to Engineering Analysis

I1400: Applied Partial Differential Equations

I2000: Random Processes in Engineering Mechanics

I5200: Behavior of Inelastic Bodies and Structures

I6400: Wave Propagation in Fluids and Solids

J4000: Perturbation Techniques

J5000: Theory of Elasticity

FACULTY

Anil Agrawal, Professor
B.Tech. (C.E.), IIT (India); M.Eng.(C.E.), Univ. of Tokyo; Ph.D. (C.E.), Univ. of California (Irvine); P.E. (New York)

Cynthia Chen, Assistant Professor
B.A., Nan Kai Univ.; M.S., NJIT; Ph.D., University of California (Davis)

Vasil Diyamandoglu, Assistant Professor
B.S.(C.E.), Bogazici Univ. (Istanbul, Turkey), M.S.(C.E.); Ph.D.(C.E.), Univ. of California (Berkeley)

John Fillos, Professor and Chair
B.E. (C.E.), The City College; M.S. (C.E.), New York Univ., Ph.D.; P.E. (New York)

Michel Ghosn, Professor
B.S. (C.E.), Case Western Reserve Univ., M.S. (C.E.), Ph.D. (C.E.)

Mumtaz Kassir, Professor and Associate Dean of Engineering
B.S. Tech., Univ. of Manchester (England); M.S., Stanford Univ.; Ph.D., Lehigh Univ.

Reza M. Khanbilvardi, Professor
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Claire E. McKnight, Associate Professor
B.Arch., Univ. of Illinois, M.U.P., Ph.D. (Public Policy Analysis)

Robert E. Paaswell, Distinguished Professor
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B.Tech. (C.E.), Indian Inst. of Technology (New Delhi); M.S. (Struct. Engr.), Univ. of Toledo; Ph.D. (Struct. Engr. and Materials) Northwestern Univ.

Hansong Tang, Assistant Professor
B.S. (M.E.) Wuhan Univ., M.S. (C.E.); D.Sc. (Math), Peking Univ.; Ph.D. (C.E.), Georgia Tech.

Charles Vörösmarty, Professor
B.S. (Biological Sciences), Cornell Univ; M.S. (C.E.), Univ. of New Hampshire; Ph.D. (Engineering Systems Design)

Ann E. (Beth) Wittig, Assistant Professor
B.S., Univ. of California (L.A.); Ph.D., Univ. of Texas (Austin)

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B.S. (A.E.) Tsinghua Univ.; M.S. (C.E.) Univ. of Wisconsin, Ph.D.

PROFESSORS EMERITI

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Environmental Science and Engineering Institute

Institute Office: Steinman 136 • 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.

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 o 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 multinational 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 Computer Science

Professor Douglas Troeger, Chair • Department Office: NAC 8/206 • Tel: 212-650-6631

GENERAL INFORMATION

The City College offers the following master's degree in Computer Science:

M.S. (C.Sc.)

DEGREE REQUIREMENTS

Required Courses **18**
Choose *six* courses (3 CR. EACH) from those listed below with *at least two* courses in each area.

Computation Theory
Computer Science:
I0600: Fundamental Algorithms
I0900: Graph Theory and Algorithms
I1200: Topics in Algorithms, including any course numbered I12XX
I1400: Analysis of Parallel Algorithms
I2000: Introduction to Theoretical Computer Science
I2100: Finite Automa and Models of Computation
I2200: Theory of Computability
I2400: Formal Language Theory
I2600: Computational Complexity
I2800: Topics in the Theory of Computing
I4800: Algebraic Coding Theory
I4900: Computer Security
I6000: Mathematics for the Analysis of Algorithms

Computer Organization and Software
Computer Science:
I0400: Operating Systems
I0700: Compiler Construction
I0800: Topics in Software Systems, including any course numbered I08XX
I1000: Database Systems I
I1100: Database Systems II
I2300: Symbolic Computation
I4200: Computer Architecture
I4300: Computer Communication
I4330: Advanced Topics in Internet Programming
I4600: Topics in Computer Architecture
I4700: Topics in Computer Communications, including any course numbered I47XX

Computing Methodologies and Mathematical Computing
Computer Science:
I0500: Computer Graphics
I1500: Artificial Intelligence
I1600: Natural Language Processing
I1800: Topics in Artificial Intelligence
I1900: Pattern Recognition and Machine Learning
I3100: Seminar in Information Systems, including any course numbered I31XX
I6100: Mathematical Programming I
I6200: Mathematical Programming II
I6300: Decision Analysis
I6400: Topics in System Simulation
I6600: Probabilistic Models in Computer Science
I6700: Topics in Scientific and Statistical Computing, including any course numbered I67XX

Additional Requirements **12**
Students must either:

1. complete 3 courses numbered I1000 - I6800 in Computer Science **and** one course with number I96XX and its associated zero-credit report I9700; or
2. with permission of the department, complete 3 courses numbered I1000 - I6800 or I96XX **and** a 3 credit project (CSc I9800) under the direction of a member of the faculty; or
3. with permission of the department, complete 2 courses numbered I1000 - I6800 or I96XX **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.

Total credits **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.

COURSE DESCRIPTIONS

I0400: Operating Systems
Underlying theoretical structure of operating systems; input-output and storage systems, data management and processing; assembly and executive systems, monitors; multiprogramming. Prereq: CSc 33200 or an equivalent undergraduate course. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 32200 and Math 34600 or equivalent. 3 HR./WK.; 3 CR.

I0600: Fundamental Algorithms
An intensive study of advanced non-numerical programming techniques. Data repre-

sentation; list, tree and string manipulation algorithms. Recursive programming. Introduction to searching and sorting. Storage management algorithms. Comparative efficiency of algorithms. Prereq: CSc 22000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and CSc 30400 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 33200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc 32200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and CSc 33200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc I1000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and CSc 30400 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and CSc 30400 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and CSc 30400 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 44800, or CSc I1500 or equivalent. 3 HR./WK.; 3 CR.

I1800: Topics in Artificial Intelligence
Selected topics from expert systems, automated systems and robotics; automated reasoning; computer vision. Prereq: CSc 44800 or CSc I1500 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000, 22100 and Math 34600 or equivalent. 3 HR./WK.; 3 CR.

I1900: Pattern Recognition and Machine Learning
Generalization and classification; pattern recognition and perception; concept formation; remembering and forgetting; learning and hypothesis formation. Prereq: CSc 44800 or CSc I1500 or equivalent, and knowledge of Linear Algebra. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 30400 or equivalent. 3 HR./WK.; 3 CR.

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 modelling 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). Prereq: CSc 30400 or CSc I2000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc 30400 or CSc I2000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 30400 or CSc I2000, or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc 30400 or CSc I2000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 30400 and CSc I2000 or CSc I0600. 3 HR./WK.; 3 CR.

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. Prereq: CSc I2000 or departmental approval. 3 HR./WK.; 3 CR.

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. Prereqs: CSc I1000. 3 HR./WK.; 3 CR.

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. Prereq: strong background in Economics and permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 34200/34300 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 34200/34300 and CSc 32200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22100 or equivalent. 3 HR./WK.; 3 CR.

I4600: Topics in Computer Architecture
Selected topics from the current literature in computer architecture. Prereq: CSc 34200/34300 or CSc I4200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 32200 and good programming knowledge. 3 HR./WK.; 3 CR.

I4700: Topics in Computer Communications
Selected topics from the current literature in computer communications. Prereq: CSc I4300 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 30400 and CSc 34200 or equivalent. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 30400 and CSc 22000 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc 22000 or CSc I0600. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 or CSc I0600, and Math 34600 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc I6100. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 or CSc I0600, and an undergraduate course in probability. 3 HR./WK.; 3 CR.

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. Prereqs: CSc 22000 and 21700 or equivalent. 3 HR./WK.; 3 CR.

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. Prereq: CSc 22000 or CSc I0600. 3 HR./WK.; 3 CR.

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. Prereq: CSc 22000 or CSc I0600. 3 HR./WK.; 3 CR.

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. Prereq: Permission of the instructor. 3 HR./WK.; 3 CR.

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. Prereqs: Math 20300, 34600 and a working knowledge of C or Fortran. 3 HR./WK.; 3 CR.

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. Prereq: advanced graduate standing and permission of the instructor. 3 HR./WK.; 3 CR.

I9700: Report
Co-req: CSc I96XX, 0 CR.; SATISFIES NON-COURSE REQUIREMENT.

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. Prereq: departmental approval. 3 CR.; satisfies non-course requirement

I9900: Research for Master's Thesis
Departmental approval required. 6 CR.; satisfies non-course requirement.

FACULTY

Michael Anshel, Professor
B.A. (Math), Adelphi Univ., M.S., Ph.D.

Gilbert Baumslag, Distinguished Professor
B.S., Univ. of Witwatersrand (South Africa), D.Sc.; Ph.D., Univ. of Manchester (England)

Octavio Betancourt, Professor
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Gary S. Bloom, Professor
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Peter Brass, Associate Professor
Dipl. Math, Dr. Rer. Nat. (Math), Technical Univ. of Braunschwieg

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Irina Gladkova, Associate Professor
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B.A., Univ, of Penn.; Ph.D., MIT

Akira Kawaguchi, Associate Professor
B.S. (Admin. Engr.), Keio Univ. (Japan), M.S.; M.S., Columbia Univ., Ph.D.

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B.S. (Math), SUNY (Stony Brook); M.S. (C.Sc.), The City College; Ph.D. (C.Sc.), CUNY

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Abbe Mowshowitz, Professor
B.S. (Math), Univ. of Chicago; M.S. (Math), Univ. of Michigan, Ph.D. (C.Sc.)

Janos Pach, Distinguished Professor
M.S. (Math), Eotovis Univ. (Hungary); Ph.D.; Doctorate, Hungarian Academy of Sciences

Kaliappa Ravindran, Professor
B.E. (E.E.), Indian Institute of Science, M.E. (C.Sc.); Ph.D. (C.Sc.), Univ. of British Columbia

George G. Ross, Professor
B.S. (Ch.E.), Cooper Union; M.S. (Ch.E.), New York Univ., M.S. (Math), Ph.D.

William E. Skeith, Assistant Professor
B.S. (Math), Pepperdine Univ., BA (CSc); Univ. of Los Angeles, MA (Math), Ph.D.

Douglas R. Troeger, Associate Professor and Chair
A.B. (Phil), Brown Univ., Sc. B. (Chem); M.Sc., Ph.D. (Math), Stevens Inst. of Tech.

Michael Vulis, Associate Professor
B.S. (Math), Leningrad State Univ. (Russia); M.S. (C.Sc.), CUNY, Ph.D. (Math)

Jie Wei, Associate 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
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Jianting Zhang, Assistant 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, Professor
B.S., (CSc.), Tsinghua Univ., M.E., Ph.D.

PROFESSORS EMERITI

Stefan A. Burr
Stanley Habib
Valentin F. Turchin

Department of Electrical Engineering

Professor Roger Dorsinville, Chair • Department Office: Steinman 602 • Tel: 212-650-7248

GENERAL INFORMATION

The City College offers the following master's degrees in Electrical Engineering:

M.E. (E.E.) (Professional Master's Degree)

M.S. (Engineering) (Degree is awarded to students who do not have a bachelor's degree in engineering)

DEGREE REQUIREMENTS

Professional Master's Degree

Engineering Core Courses 12

Four courses from *one* of the following concentrations (all courses are three credits):

A. Computer Engineering

F5700: Digital Integrated Circuits
F6000: Computer Communications Systems
F6400: Computer-Aided Digital VLSI Design
G3800: VLSI Design for Testability Technology I
G3900: VLSI Design for Testability Technology II
I5501: Introduction to Robotics
I5502: Advanced Topics in Mobile Robotics
I6500: Communications Protocol Engineering
I9400: High Speed Networks
I2200: Image Processing
I2300: Digital Computers I
I2400: Digital Computers II
I2700: Parallel Computer Architecture
I4700: Introduction to Neural Networks
I6100: Integrated Circuits: Design and Fabrication I
I6200: Integrated Circuits: Design and Fabrication II
I7000: Local Area Networks

B. Systems Engineering

F5300: Digital Signal Processing
F5600: Elements of Control Theory
G3400: Analysis of Random Systems
I0100: Probability and Stochastic Processes
I0400: Signal Theory
I0500: Theory of Linear Systems
I1600: Digital Signal Processing Algorithms
I2200: Image Processing
I4100: Introduction to Modern Control Theory
I4700: Introduction to Neural Networks

C. Telecommunications Engineering

F5100: Communication Electronics
F5200: Fiber Optic Communications I
F6000: Computer Communication Systems
F6300: Wireless Communication
I6500: Communications Protocol Engineering
I6700: IP Routing
I6800: Telecommunication Network Element Engineering
I7500: Wireless Multimedia Networks
I9400: High Speed Networks
I0100: Probability and Stochastic Processes
I7000: Local Area Networks
I7100: Statistical Communication Theory
I7300: Digital Communication
I7400: Data Communications
I8300: Fiber Optic Communications II

D. Photonics Engineering

F5200: Fiber Optic Communications I
F5400: Physical Electronics I
F5800: Introduction to Lasers
F6200: Principles of Photonics Engineering
I0300: Electrodynamics
I0800: Physical Electronics II
I8200: Electro-Optics
I8300: Fiber Optic Communications II
I8500: Optical Signal Processing

E. Electronics/Communication

F5100: Communication Electronics
F5200: Fiber Optic Communications I
F5400: Physical Electronics I
F5700: Digital Integrated Circuits
F6300: Wireless Communications
F6400: Computer-Aided Digital VLSI Design
I0100: Probability and Stochastic Processes
I0800: Physical Electronics II
I3200: Analog Integrated Circuits
I3600: MOS Devices and Circuits
I6100: Integrated Circuits: Design and Fabrication I
I6200: Integrated Circuits: Design and Fabrication II
I7100: Statistical Communication
I8300: Fiber Optic Communications II

Engineering Management Courses 3

One course from the following:

ENGR F3800: Management Concepts for Engineers
ENGR F9300: Economics and Investment Analysis of Engineering Projects
ENGR G7600: Engineering Business and Law
ENGR G8500: Project Management
ENGR G9400: Telecommunications Management
ENGR I8000: Decision and Planning Techniques for Engineering Management

Technical Electives: 9-15
Take courses from any of the above concentration areas, or any I0000 and J0000 course that may be offered except Engineering Management courses.

Report/Project/Thesis: 0-6
At least *one* of the following courses:
I0000: Seminar (1 CR.)
I9600: Master's Report (0 CR.)
I9700: Master's Project (3 CR.)
I9900: Master's Thesis (6 CR.)

Total credits 30
Note: A minimum GPA of 3.0 is required for graduation.

M.S. (Engineering) Degree
At least *four* courses from one of the specific concentration areas A, B, C, D, or E above: 12
At least *two* of the following courses:6
Electrical Engineering:
I0100: Probability and Stochastic Processes
I0500: Theory of Linear Systems
Engineering:
I0600: Applied Algebra
I1100: Engineering Analysis
I1200: Functions of Complex Variables
At least *one* of the following courses: 0-6
Electrical Engineering:
I0000: Seminar (1 CR.)
I9600: Master's Report (0 CR.)
I9700: Master's Project (3 CR.)
I9900: Master's Thesis (6 CR.)
Elective Courses 6-12
Additional Graduate Electrical Engineering courses (from F0000, I0000, and J0000 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.

Total credits 30

ADVISEMENT

Master's Program
Professor Yi Sun
Professor Hongjoon Kim

Doctoral Program
Professor Samir Ahmed

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) is a consortium of five universities led by CCNY.
- University Research Center for Optical Sensing and Imaging (COSI) sponsored by NASA.
- Communication and Networks Alliance sponsored by Army Research Lab; this consortium of industrial and academic institutions is headed by Telecordia.
- New York State Center for Advanced Technology (CAT) in Ultrafast Photonics.

CCNY Centers:

- Center for Information Networking and Telecommunciations (CINT)
- Institute for Ultrafast Spectroscopy and Lasers (IUSL)
- International Center for Environmental Resources and Development (ICERD)
- Photonics Engineering Center

Research Laboratories
Telecommunications Networking, Local Area Network, Optical Networking, Optical Communication, Photonics Application, Photonics Simulations Lab, Nonlinear Optics Laboratory, Optical Remote Sensing Laboratory, Remote Sensing/Geographical Information Systems Computer, Microelectronics Electronics, Robotics, and Devices Fabrication Lab.

Other Research Facilities
Research equipment includes: Multi-wavelength Laser Radar (LIDAR) observatory. Mobile Remote Sensing Facility, Modelocked pico and femtosecond Ti: Sapphire lasers and Ti: Sapphire regenerative amplifier systems; Picosecond Q-switched, modelocked Nd: YAGand synchronously pumped tunable dye laser system. Picosecond Q-switched, modelocked Nd: YAG and dye laser/amplifier systems. Femtosecond CPM dye laser/copper vapor laser pumped dye amplifier systems; Fosterite lasers. Nanosecond Q-switched Nd: YAG and tunable optical parametric oscillator systems; large and small frame Argon ion lasers and cw tunable dye laser; semiconductors diode lasers; streak cameras; spectrophotometers and multichannel optical analyzers; high dynamic range cooled CCD detectors, intensified reticon diode arrays, vidicon detectors, spatial light modulator, and thermal infrared imaging camera; vacuum deposition facilities for metals and polymers; cryogenic refrigerators and cryostats refrigerators and cryostats, high resolution microscopes, wedge bouncer, IC probe stations, and darkroom and mask fabrication facilities; spectrum analyzers, digital pattern generator and error detector, network analyzer; multi gigasample/second digitizing oscilloscopes, 60 GHz communication signal analyzer, analog oscilloscopes; multimedia communication facilities and ATM switches; Wireless Communications Facilities.

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.

COURSE DESCRIPTIONS

F5100: 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. Prereq: EE 31200. 3 HR./WK.; 3 CR.

F5200: 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. 3 HR./WK.; 3 CR.

F5300: 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. 3 HR./WK.; 3 CR.

F5400: 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. Prereq: EE 33300, EE 33900. 3 HR./WK.; 3 CR.

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. Prereq: EE 37100. 3 HR./WK.; 3 CR.

F5700: 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. 3 HR./WK.; 3 CR.

F5800: 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. Prereqs: EE 33300. 3 HR./WK.; 3 CR.

F5900: 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. Prereq: EE 44400. 3 HR./WK.; 3 CR.

F6000: 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, packet radio networks, multiple access schemes and network protocols. Prereq: EE I0100. 3 HR./WK.; 3 CR.

F6200: 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. Prereq: EE 33300. 3 HR./WK.; 3 CR.

F6300: 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. 3 HR./WK.; 3 CR.

F6400: 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. Prereq: EE44100, EE44400 and EE45700 (or equivalent). 3 HR./WK.; 3 CR.

F6500: 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. Prereq: EE 33300, EE 33900. 3 HR./WK.; 3 CR.

F6600: 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. Prereq: EE F6000 or EE 46000. 3 HR./WK.; 3 CR.

G3400: Analysis of Random Systems
Analysis of dynamic systems with random inputs, including: definitions of discrete and continuous random processes and the Markov property, processes with independent increments, Wiener and Poisson processes, forward and backward Kolmogorov equations, introduction to stochastic differential equations and the Ito calculus, and applications involving stochastic stability and optimal filtering. Prereq: EE I0100. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

I5501: 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. Prereq: EE 37100. 3 HR./WK.; 3 CR.

I5502: 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. Prereq: EE I5501. 3 HR./WK.; 3 CR.

I6500: Communications Protocol Engineering
Open Systems Interconnection (OSI) reference model; modeling communication protocols; communications protocol specification languages; real-life protocol specifications; verification of communication protocols; conformance testing methods; synchronization issues in testing; test representation languages. Pre/coreq: EE 46000. 3 HR./WK.; 3 CR.

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. Prereq: F6000 or instructor approval. 3 HR./WK.; 3 CR.

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. Prereq.: EE 46000, 3 HR./WK.; 3CR.

I7500: Wireless Multimedia Networks
Advances in wireless communications, especially in the area of bandwidth and mobility, made it possible for users to communicate using multi-media, ranging from low rate applications as in wireless sensor networks to high rate applications as in HDTV. This course emphasizes current and future wireless networking technologies to support a wide range of applications, including WPAN, WLAN, WMAN, and WWAN. 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. Prereq: EE F6000 and EE F6300. 3 HR./WK., 3 CR.

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. Prereq: EE F6000 or Instructor's approval. 3 HR./WK.; 3 CR.

I0000: Seminar
Invited speakers and reports of graduate student research. 1 HR./WK.; 1 CR.

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. 3 HR./WK.; 3 CR.

I0400: Signal Theory
Signal representations and transforms; Banach and Hilbert signal spaces; Orthogonal decompositions, wavelets; duality; signal theory in distribution spaces; convergence, differentiation and convolution of distributions; Laplace and Fourier transforms of distributions; systems theory in distribution spaces, convolutional systems; operational calculus; spectral properties of signals; generalized sampling theory. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

I0800: Physical Electronics II
Classical and quantum theory of harmonic crystals, Phonons and phonon dispersion relations, plasmons, polaritons, polarons, optical processes and excitations, dielectrics and ferroelectrics, diamagnetism, paramagnetism, ferromagnetism, superconductivity. Prereq.: EE F5400. 3 HR./WK.; 3 CR.

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. Prereqs: EE 30600 and EE F5300. 3 HR./WK.; 3 CR.

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. Prereqs: EE F5300 and EE I0100. 3 HR./WK.; 3 CR.

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. Prereq: EE F5400. 3 HR./WK.; 3 CR.

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. Prereq: EE I2300. 3 HR./WK.; 3 CR.

I3200: Analog Integrated Circuits
Design of analog integrated circuits. Modeling of integrated circuits components. Current mirrors; Differential ampli-

fiers with active loads; Band gap references; operational amplifiers; Feedback; Noise in integrated circuits. Prereq: EE34200. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

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. Coreq: EE I0100. 3 HR./WK.; 3 CR.

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. 3 HR./WK.; 3 CR.

I6200: Integrated Circuits: Design and Fabrication II
Circuit layout for silicon Ics. Thin film and thick LSI and VLSI design film circuits. Analog and digital system applications. Measurement and testing, assembly, yield, failure and reliability. Prereq.: EE I6100. 3 HR./WK.; 3 CR.

I7000: Local Area Networks
LAN topology (bus, ring, star, tree, etc.). Transmission media. IEEE 802 protocol standards. Accessing schemes, ALOHA, carrier, sense multiple access (CSMA/CD), token passing, polling, reservations schemes, etc. Circuit switching LAN's, blocking probabilities, Erlang's formula and private branch exchange (PBX). Interconnection of LAN's, TCP-IP protocol. Prereq: EE I7300. 3 HR./ WK.; 3 CR.

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. Prereq: EE I0100. 3 HR./WK.; 3 CR.

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. Prereq: EE I0100. 3 HR./WK.; 3 CR.

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. Prereq: EE 10100. 3 HR./WK.; 3CR.

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. Prereq: EE17300. 3 HR./WK.; 3 CR.

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. Prereq.: EE F6200. 3 HR./WK.; 3 CR.

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). Prereq: EE F5200. 3 HR./WK.; 3 CR.

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. Prereq.: EE F6200. 3 HR./WK.; 3 CR.

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. Prereq: completion of 15 credits toward the master's degree in EE. 0 CR.

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. Prereq: departmental master's advisor's approval. 3 CR. CREDIT WILL BE GRANTED FOR EITHER I9700 OR I9900, NOT BOTH.

I9800: Graduate Laboratory
Experimental project. Topic must be approved by a faculty member as well as the departmental master's advisor. 3 CR.

I9900: Research for the Master's Thesis
Prereq: departmental master's advisor's approval. 6 CR. CREDIT WILL BE GRANTED FOR EITHER I9700 OR I9900, NOT BOTH.

J0000: Advanced Seminar
Advanced developments in electrical engineering. Students and instructor report on topics of interest. Prereq: departmental Ph.D. advisor's approval. CREDIT VARIES.

J2700: Multidimensional Signal Processing
Multidimensional signals and systems. DFT, FIR, IIR filters design. Stability. Prereqs: EE F5300 and ENGR I1200. 3 HR./WK.; 3 CR.

J9900: Research for Doctoral Dissertation
Variable credit (12 CR. MAXIMUM)

R0100: Special Topics in Advanced Electrical Engineering.
Prereq: Third-level standing in the doctoral program.

FACULTY

Samir Ahmed, Herbert Kayser Professor
B.A., Cambridge Univ., M.A.; Ph.D., Univ. College (UK)

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Joseph Barba, Professor and Dean, School of Engineering
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Mohamed Zahran, Assistant Professor
B.S., Cairo Univ. (Egypt), M.S.; Ph.D., Univ. of Maryland

PROFESSORS EMERITI

Abraham Abramowitz
Egon Brenner
Shee-Ming Chen
George J. Clemens
Vincent Deltoro
Demos Eitzer
Cecile Froehlich
Irving Meth
Donald L. Schilling
Robert Stein
Herbert Taub
Fred Thau
Richard Tolimieri
Louis Weinberg

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

The City College offers the following master's degrees in Mechanical Engineering:

M.E. (M.E.) Professional Master's Degree

M.S. (Engineering)

DEGREE REQUIREMENTS

Professional Master's Degree

Engineering Core Courses 9

Mechanical Engineering:

G0200: Applied Fluid Mechanics

G4000: Applied Stress Analysis

Engineering:

I1100: Introduction to Engineering Analysis

Technical Electives 15-21

Five to *seven* courses from the following list:

Mechanical Engineering:

G0300: Computer Aided Manufacturing

G0500: Mechanical Vibrations

G0600: Thermal Systems Design

G2300: Heating, Ventilating and Air Conditioning

G4100: Mechatronics: Principles and Practice

G4300: Non-Newtonian Fluid Mechanics

G4400: Nano/Micromechanics

G4500: Mechanics and Physics of Material Behavior

G4600: Computational Fluid Dynamics

G4700: Physical Properties of Materials

G4800: Auto Safety Design

G4900: Advanced Topics in Fluid Dynamics

G5000: Advanced Computational Fluid Dynamics

I3100: Steam and Gas Turbines

I3600: Conduction Heat Transfer

I3700: Convection Heat Transfer

I6200: Advanced Concepts in Mechanical Vibrations

I6500: Computer Aided Design

I6700: Composite Materials

I6900: Experimental Methods in Fluid Mechanics

Engineering:

I1700: Finite Element Methods in Engineering

I4200: Continuum Mechanics

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

F3800: Management Concepts for Engineers (3 CR.)

F9300: Economics and Investment Analysis of Engineering Projects (3 CR.)

G7600: Engineering Law (3 CR.)

G8500: Project Management (3 CR.)

I8000: Decision and Planning Techniques for Engineers (3 CR.)

Report/Project/Thesis: 0-6

Mechanical Engineering:

I9700: Report (0 CR.)

I9800: Project (3 CR.)

I9900: Research for the Master's Thesis (6 CR.)

G0400: Industry Oriented Design Project (3 CR.)

Total credits 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.

ADVISEMENT

Master's Program
Professor C. Bapat
T-218; 212-650-5214

Doctoral Program
Professor Y. Andreopoulos
T-253, 212-650-5206

THE M.S. DEGREE

The M.S. degree is awarded to students who do not have a bachelor's degree in engineering.

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, bioengineering and heat transfer.

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 of traumatic brain injury (TBI), blunt head impacts, mainly due to vehicular collisions, contact sports or falls; investigating cervical spine injuries and instabilities due to contact sport and automobile accidents; biodynamic modeling and simulations to access human and machine interaction, and development of computational models for the prediction of long-term bone adaptation and design of bone implants.

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 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 scanning electron microscope equipped with a high-temperature tensile stage, a servo-hydraulic universal testing machine with an environmental chamber, a computer controlled drop weight impact tester with an environmental chamber, a gas gun for high-speed ballistic impact, 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, a microhardness tester, and an optical bench with holographic/interferometric setups.

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.

Computational Fluid Dynamics Facilities for Mesoscopic Modeling and Simulation
A 48-processor SUN system based on 750 MHZ ultrasparc3 chips with a peak performance of about 1.5 GB per processor, 24 GB of RAM, 864 GB of disk space and a Dolphin SCI interconnect; an 97-node Microway Beowulf cluster, which is composed of 40-nodes AMD Athlon processors and 57-nodes AMD Opteron 64-bit processors; high performance and general purpose desktop workstations.

Computer Aided Design and Engineering (CAD/CAE) Facilities
The Department of Mechanical Engineering has established a state-of-the-art Computer Aided Design Laboratory which is used for engineering analysis and design. It consists of twenty-six Dell Pentium 4 computers, a Dell PowerEdge server, two HP Color LaserJet network printers, an HP LaserJet 5100tn printer, and a Sony LCD projector and whiteboard. The Department also has a Multimedia Distance Learning Facility which includes twenty-five Pentium 4 PCs, document camera, LCD projector and whiteboard. In addition, the Department maintains twenty-eight SUN UNIX workstations and sixteen Pentium 4 PCs in its other three computer laboratories. These systems are equipped with mechanism design, mathematics, finite element, boundary element and computer-aided manufacturing software including PRO-ENGINEER, Solid Works, LS-DYNA, ABAQUS, MathCAD, MATLAB, Mathematica, FLUENT, Working Model, COMSOL, and MasterCAM.

COURSE DESCRIPTIONS

G0000: Selected Topics in Mechanical Engineering
Advanced topics selected for their timeliness and current interest. VARIABLE CR.

G0200: Applied Fluid Mechanics

G0300: Computer Aided Manufacturing

G0400: Industry Oriented Design Project

G0500: Mechanical Vibrations

G0600: Thermal Systems Design

G2300: Heating, Ventilating and Air Conditioning

G4000: Applied Stress Analysis

G4100: Mechatronics: Principles and Practice

G4300: Non-Newtonian Fluid Mechanics

G4400: Nano/Micromechanics

G4500: Mechanics and Physics of Material Behavior

G4600: Computational Fluid Dynamics

G4700: Physical Properties of Materials

G4800: Auto Safety Design

G4900: Advanced Topics in Fluid Dynamics

G5000: Advanced Computational Fluid Dynamics

I0000: Seminars
Recent developments in mechanical engineering and related fields; economic and social effects. The students report on assigned subjects. Prereq: departmental approval. VARIABLE CR.

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. Prereqs: ME 33100, ME 35600. 3 HR./WK.; 3 CR.

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. Prereq.: Math 39200 and ME 43300, or ChE 34200. 3 HR./WK.; 3 CR.

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. Prereq.: ME 43300 or ChE 34200. 3 HR./WK.; 3 CR.

15800: 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. Prereq.: ME 24700 or equivalent. 3 HR./WK.; 3 CR.

I6200: Advanced Concepts in Mechanical Vibrations
Natural modes of vibrations in continuous systems. Approximate methods, including Rayleigh-Ritz, Galerkin's Method, and Holtzer's Method. Transform methods for solution of continuous systems, the method of characteristics. Random excitations. Prereq.: ME I6000. 3 HR./WK.; 3 CR.

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. Prereq.: ME 14500, ME 33000, ME 47200 (or equivalent) Math 39200. 3 HR./WK.; 3 CR.

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. Prereq.: ME 33000 or equivalent. 3 HR./WK.; 3 CR.

16800: 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. Prereq: Math 39100 or equivalent. 3 HR./WK.; 3 CR.

I6900: Experimental Methods in Fluid Mechanics
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. 3 HR./WK.; 3 CR.

J0200: Computation and Modeling of Turbulent Flows
Discusses and introduces state-of-the-art engineering calculation methods for turbulent flows with or without heat transfer, and presents a general introduction to the physics of turbulence necessary for mathematical description and modeling of physical phenomena in turbulent flow. Prereqs: Math 39200, ME 35600. 3 HR./WK.; 3 CR.

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. Prereq: completion of 12 credits toward the master's degree in Mechanical Engineering. 0 CR.

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. Prereq: written departmental approval. 3 CR.

I9900: Research for the Master's Thesis
6 CR.

J9900: Research for the Doctoral Dissertation
Variable CR. up to 12 CR.

Other Engineering Courses

Other appropriate Engineering courses are listed in the engineering introductory section of this *Bulletin* and include the following:

I0800: Foundation of Fluid Mechanics I

I0900: Foundation of Fluid Mechanics II

I1100: Engineering Analysis

I1400: Applied Partial Differential Equations

I1500: Introduction to Numerical Methods

I1700: Finite Element Methods in Engineering

I2400: Turbulent Flows

I3200: Statistical Thermodynamics

I4200: Continuum Mechanics

I5200: Behavior of Inelastic Bodies and Structures

I6400: Wave Propagation in Solids and Fluids

I9100: Mass Transfer

J5000: Theory of Elasticity

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

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Sheldon Weinbaum, Distinguished Professor
B.A.E., Rensselaer Polytechnic Inst.; S.M., Harvard Univ., Ph.D.

Honghui Yu, Associate Professor
B.S. (Applied Math), Tsinghua Univ., M.E. (Solid Mech.); Ph.D., Princeton Univ.

PROFESSORS EMERITI

Antonio Baldo
Myron Levitsky
Gerard G. Lowen
Anton L. Steinhauser
Henry T. Updegrove, Jr.

Appendices

Appendix A

GOVERNANCE

The Governance of The City College is the concern of all its members. All its constituencies—students, faculty, and administration—contribute to the maintenance and development of the College; each of the constituencies has its particular area of concern.

Because each constituency has the right to govern itself in areas that are its exclusive concern and responsibility, the Governance Charter sets forth the powers and organization of the various bodies within the College, and guarantees their autonomy on matters exclusively within their jurisdiction. But because the constituencies are interrelated, and because all must participate in the well being of the College as a whole, the Governance Charter also provides for communication between constituencies and advisory roles and joint participation on matters of mutual or general concern.

The following governance bodies carry out these duties.

The Undergraduate Student Senate and the Graduate Student Council, elected annually from and by their appropriate constituencies, represent the interests of the students. It is from among these bodies that student representation on college-wide bodies is drawn for consultative purposes.

The Faculty of each school (organized into a representative, elected council when there are more than 100 faculty members) approve courses, curricula, degree requirements, and criteria for student progress and retention. The College of Liberal Arts and Science has a general Faculty Council, plus one each for its divisions—Education, Humanities and the Arts, Science and Social Science. Each of the College's professional schools—the CUNY Medical School, Engineering, and Architecture—also has its own Faculty.

The Faculty Senate draws its elected representatives from the constituent academic units of the College and deals with such college-wide matters as academic freedom, educational policy, the role of administrators, and the allocation of the College's resources. Senators are elected by the faculty for three-year terms. In addition to the faculty, the following are members ex officio, without vote: the President, all deans and vice presidents, and representatives of the student senates.

The Policy Advisory Council serves as a consultative body to the President on all major policy matters affecting the College and its members. It draws its members from all groups at the College, including the part-time instructional staff and the non-teaching staff.

ALUMNI ASSOCIATION OF THE COLLEGE

The first graduating class of 1853 of the New York Free Academy (as The City College of New York was originally known) organized the Alumni Association to form a community of friends with a shared experience and common goals. In 1913, the Association was incorporated, and is governed by a Board of Directors. At the Annual Meeting held in the Spring, dues paying members elect the officers of the corporation who guide its affairs. Officers who are elected annually include the President, three Vice Presidents, Secretary, Treasurer and Historian. In addition, thirty-six Directors from the membership-at-large are selected for staggered three-year terms. Two to three Directors from each of the special interest groups (affiliate groups and constituent societies), including their respective Presidents, are elected annually for one-year terms. Completing the Board of Directors are Honorary Directors selected by the President of the Corporation, and Life Directors, who are former Presidents. The Board of Directors meets a minimum of five times a year.

The purpose and objectives of the Alumni Association are to advance the interests and welfare of the College, foster a spirit of fraternity/sorority and goodwill among graduate, service alumni and to offer financial, technical and networking support for today's students.

Representing special concerns, interests and educational specialties, the Association serves as the umbrella or parent to twelve affiliate groups and two constituent societies including Alumni Varsity, Architecture Alumni, Art Alumni, Asian Alumni, Black Alumni, Center for Worker Education Alumni, Communications Alumni, Education Alumni, Latino Alumni, Nursing Alumni, Political Science Alumni, Science Alumni and the Business and Economics Alumni Society and Engineering School Alumni. The groups are each governed by a voluntary Board of Directors with officers and conduct activities to benefit alumni and today's students.

In recognition of the growing geographical diversity of alumni, the chartering of Alumni Chapters began after World War II. Fifty dues paying members living in a city outside the New York metropolitan area can secure a charter from the Alumni Association as an official chapter. There are currently ten active chapters across the country including Washington D.C.; Palm Beach; South Florida; Northern California; Southern California; Orange County/San Diego, California; Northern Nevada; Houston, Texas; Southern New Jersey and Greater Phoenix, Arizona.

Appendix B

APPENDIX B.1

Rules and Regulations for the Maintenance of Public Order Pursuant to Article 129-A of the Education Law

The tradition of the University as a sanctuary of academic freedom and center of informed discussions is an honored one, to be guarded vigilantly. The basic significance of that sanctuary lies in the protection of intellectual freedom: the rights of professors to teach, of scholars to engage in the advancement of knowledge, of students to learn and express their views, free from external pressures or interference. These freedoms can flourish only in an atmosphere of mutual respect, civility, and trust among teachers and students, only when members of the University community are willing to accept self-restraint and reciprocity as the condition upon which they share in its intellectual autonomy.

Academic freedom and the sanctuary of the University campus extend to all who share these aims and responsibilities. They cannot be invoked by those who would subordinate intellectual freedom to political ends, or who violate the norms of conduct established to protect that freedom. Against such offenders the University has the right, and indeed the obligation, to defend itself. We accordingly announce the following rules and regulations to be in effect at each of our colleges which are to be administered in accordance with the requirements of due process as provided in the Bylaws of the Board of Trustees.

With respect to enforcement of these rules and regulations we note that the Bylaws of the Board provide that:

"THE PRESIDENT. The president, with respect to his education unit, shall:

Have the affirmative responsibility of conserving and enhancing the educational standards of the college and schools under his jurisdiction;

Be the advisor and the executive agent of the Board and of his respective College Committee and as such shall have the immediate supervision with full discretionary power in carrying into effect the Bylaws, resolutions, and policies of the Board, the lawful resolutions of the several faculties;

Exercise general superintendence over the concerns, officers, employees, and students of his educational unit"

A. Rules

1. A member of the academic community shall not intentionally obstruct and/or forcibly prevent others from the exercise of their rights. Nor shall he intervene with the institution's educational processes or facilities, or the rights of those who wish to avail themselves of any of the institution's instructional, personal, administrative, recreational, and community services.

2. Individuals are liable for failure to comply with lawful directions issued by representatives of the University/College when they are acting in their official capacities. Members of the academic community are required to show their identification cards when requested to do so by an official of the college.

3. Unauthorized occupancy of University/College facilities or blocking access to or from such areas is prohibited. Permission from appropriate college authorities must be obtained for removal, relocation, and use of University/College equipment and/or supplies.

4. Theft from, or damage to University/College premises of property, or theft of or damage to property of any person on University/College premises is prohibited.

5. Each member of the academic community or an invited guest has the right to advocate his position without having to fear abuse, physical, verbal, or otherwise, from others supporting conflicting points of view. Members of the academic community and other persons on the college grounds shall not use language or take actions reasonably likely to provoke or encourage physical violence by demonstrators, those demonstrated against, or spectators.

6. Action may be taken against any and all persons who have no legitimate reason for their presence on any campus within the University/College, or whose presence on any such campus obstructs and/or forcibly prevents others from the exercise of the rights or interferes with the institution's educational processes or facilities, or the rights of those who wish to avail themselves of any of the institution's instructional, personal, administrative, recreational, and community services.

7. Disorderly or indecent conduct on University/College-owned or controlled property is prohibited.

8. No individual shall have in his or her possession a rifle, shotgun, or firearm or knowingly have in his possession any other dangerous instruments or material that can be used to inflict bodily harm on an individual or damage upon a building or the grounds of the University/College without the written authorization of such educational institution. Nor shall any individual have in his possession any other instrument or material which can be used and is intended to inflict bodily harm on any individual

or damage upon a building or the grounds of the University/College.
9. Any action or situation which recklessly or intentionally endangers mental or physical health or involves the forced consumption of liquor or drugs for the purpose of initiation into or affiliation with any organization is prohibited.
10. The unlawful manufacture, distribution, dispensation, possession, or use of illegal drugs or other controlled substances by University students or employees on University/College premises, or as part of any University/College activities is prohibited.

Employees of the University must also notify the College Personnel Director of any criminal drug statute conviction for a violation occurring in the workplace not later than (5) days after such conviction.
11. The unlawful possession, use, or distribution of alcohol by students or employees on University /College premises or as part of any University/College activities is prohibited.

B. Penalties
1. Any student engaging in any manner in conduct prohibited under substantive Rules 1-11 shall be subject to the following range of sanctions as hereafter defined in the attached Appendix: admonition, warning, censure, disciplinary probation, restitution, suspension, expulsions, ejection, and/or arrest by the civil authorities.
2. Any tenured or non-tenured faculty member, or other member of the instructional staff, or member of the classified staff engaging in any manner in conduct prohibited under substantive Rules 1-11 shall be subject to the following range of penalties: warning, censure, restitution, fine not exceeding those permitted by law or by the Bylaws of The City University of New York or suspension with/without pay pending a hearing before an appropriate college authority, dismissal after a hearing, ejection, and/or arrest by the civil authorities, and, for engaging in any manner in conduct prohibited under substantive rule 10, may, in the alternative, be required to participate satisfactorily in an appropriately licensed drug treatment or rehabilitation program. A tenured or non-tenured faculty member, or other member of the instructional staff, or member of the classified staff charged with engaging in any manner in conduct prohibited under substantive Rules 1-11 shall be entitled to be treated in accordance with applicable provisions of the Education Law, or the Civil Service Law, or the applicable collective bargaining agreement, or the Bylaws or written policies of The City University of New York.
3. Any visitor, licensee, or invitee, engaging in any manner in conduct prohibited under substantive Rule 1-11 shall be subject to ejection, and/or arrest by the civil authorities.
4. Any organization which authorized the conduct prohibited under substantive rules 1-11 shall have its permission to operate on campus rescinded.

Penalties 1-4 shall be in addition to any other penalty provided by law or The City University Trustees.

Sanctions Defined:

A. Admonition.
An oral statement to the offender that he/she has violated university rules.

B. Warning.
Notice to the offender, orally or in writing, that continuation or repetition of the wrongful conduct, within a period of time stated in the warning, may cause far more severe disciplinary action.

C. Censure.
Written reprimand for violation of specified regulation, including the possibility of more severe disciplinary sanction in the event of conviction for the violation of any University regulation within a period stated in the letter of reprimand.

D. Disciplinary Probation.
Exclusion from participation in privileges or extracurricular University activities as set forth in the notice of disciplinary probation for a specified period of time.

E. Restitution.
Reimbursement for damage to or misappropriation of property. Reimbursement may take the form of appropriate service repair or otherwise compensate for damages.

F. Suspension.
Exclusion from classes and other privileges or activities as set forth in the notice of suspension for a definite period of time.

G. Expulsion.
Termination of student status for an indefinite period. The conditions of readmission, if any is permitted, shall be stated in the order of expulsion.

H. Complaint to Civil Authorities.

I. Ejection.

APPENDIX B.2

ARTICLE XV – STUDENTS*

Section 15.0. PREAMBLE.
Academic institutions exist for the transmission of knowledge, the pursuit of truth, the development of students, and the general well-being of society. Student participation, responsibility, academic freedom, and due process are essential to the operation of the academic enterprise. As members of the academic community, students should be encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth.

Freedom to learn and to explore major social, political, and economic issues are necessary adjuncts to student academic freedom, as is freedom from discrimination based on racial, ethnic, religious, sex, political, and economic differentiations.

Freedom to learn and freedom to teach are inseparable facets of academic freedom. The concomitant of this freedom is responsibility. If members of the academic community are to develop positively in their freedom; if these rights are to be secure, then students should exercise their freedom with responsibility.

Section 15.1. CONDUCT STANDARD DEFINED.

Each student enrolled or in attendance in any college, school or unit under the control of the board and every student organization, association, publication, club or chapter shall obey the laws of the city, state and nation, and the by-laws and resolutions of the board, and the policies, regulations, and orders of the college.

The faculty and the student body at each college shall share equally the responsibility and the power to establish, subject to the approval of the board, more detailed rules of conduct and regulations in conformity with the general requirement of this article.

This regulatory power is limited to the right of students to the freedoms of speech, press, assembly and petition as applied to others in the academic community and to citizens generally.

Section 15.2. STUDENT ORGANIZATIONS

A. Any group of students may form an organization, association, club or chapter by filing with the duly elected student government organization of the college or school at which they are enrolled or in attendance and with an officer to be designated by the faculty of the college or school at which they are enrolled or in attendance (1) the name and the purposes of the organization, association, club or chapter, (2) the names and the addresses of its president and secretary or other officers corresponding in function to president and secretary.

However, no group, organization or student publication with a program against the religion, race, ethnic origin or identification or sex of a particular group or which makes systematic attacks against the religion, race, ethnic origin or sex of a particular group shall receive support from any fees collected by the college or be permitted to organize or continue at any college or school. No organizations, military or semi-military in character, not connected with established college or school courses, shall be permitted without the authorization of the faculty and the duly elected student government and the board.

B. Extra-curricular activities at each college or school shall be regulated by the duly elected student government organization to insure the effective conduct of such college or school as an institution of higher learning and for the prevention of activities which are hereafter proscribed or which violate the standards of conduct of the character set forth in bylaw 15.1. Such powers shall include:

1. The power to charter or otherwise authorize teams (excluding intercollegiate athletics), publications, organizations, associations, clubs or chapters, and, when appropriate in the exercise of such regulatory power, the power to refuse, suspend or revoke any charter or other authorization for cause after hearing on notice.
2. The power to delegate responsibility for the effective implementation of its regulatory functions hereunder to any officer or committee which it may appoint. Any aggrieved student or group whose charter or other authorization has been refused, suspended or revoked may appeal such adverse action by such officer or committee of student government to the duly elected student government. On appeal an aggrieved student or group shall be entitled to a hearing following the due process procedures as set forth in section 15.3. Following such hearing the duly elected student government shall have the authority to set aside, decrease or confirm the adverse action.

C. Any person or organization affiliated with the college may file charges with an office of the dean of students** alleging that a student publication has systematically attacked the religion, race, ethnic origin, or sex of a particular group, or has otherwise contravened the laws of the city, state or nation, or any bylaw or resolution of the board, or any policy, regulation or order of the college, within a reasonable period of time after such occurrence. If the dean of students determines, after making such inquiries as he/she may deem appropriate, that the charges are substantial, he/she shall attempt to resolve the dispute, failing which he/she shall promptly submit the charges to the faculty-student disciplinary committee for disposition in accordance with the due process procedures of section 15.3. thereof.

If the committee sustains the charges or any part thereof against the student publication, the committee shall be empowered to (1) reprimand the publication, or (2) recommend to the appropriate funding bodies the withdrawal of budget funds. The funding body shall have the authority to implement fully, modify or overrule the recommendations.

D. Each college shall establish a student elections review committee in consultation with the various student governments. The student elections review committee shall approve the election procedures and certify the results of elections for student governments, and student body referenda.

E. Student government elections shall be scheduled and conducted, and newly elected student governments shall take office, in accordance with policies of the board, and implementing regulations.

Section 15.3. STUDENT DISCIPLINARY PROCEDURES.

Complaint Procedures:

A. Any charge, accusation, or allegation which is to be presented against a student, and, which if proved, may subject a student to disciplinary action, must be submitted in writing in complete detail to the office of the dean of students promptly by the individual, organization or department making the charge.

B. The chief student affairs officer of the college or his or her designee will conduct a preliminary investigation in order to determine whether disciplinary charges should be preferred. The chief student affairs officer or his or her designee will advise the student of the charge(s) against him or her, consult with other parties who may be involved or who have information regarding the incident, and review other relevant evidence. Following this preliminary investigation, which shall be concluded within thirty (30) calendar days of the

filing of the complaint, the chief student affairs officer or designee shall take one of the following actions:

1. Dismiss the matter if there is no basis for the allegation(s) or the allegation(s) does not warrant disciplinary actions. The individuals involved shall be notified that the complaint has been dismissed;
2. Refer the matter to conciliation. If a matter is referred to conciliation the accused student shall receive a copy of the notice required pursuant to section 15.3.e. of this bylaw; or prefer formal disciplinary charges.
3. Prefer formal disciplinary charges.

Conciliation Conference:

C. The conciliation conference shall be conducted by the counselor in the office of the dean of students or a qualified staff or faculty member designated by the chief student affairs officer. The following procedures shall be in effect at this conference:

1. An effort will be made to resolve the matter by mutual agreement.
2. If an agreement is reached, the counselor shall report his/her recommendation to the chief student affairs officer for approval and, if approved, the complainant shall be notified.
3. If no agreement is reached, or if the student fails to appear, the counselor shall refer the matter back to the chief student affairs officer who will prefer disciplinary charges.
4. The counselor is precluded from testifying in a college hearing regarding information received during the conciliation conference.

Notice of Hearing and Charges:

D. Notice of the charge(s) and of the time and place of the hearing shall be personally delivered or sent by the chief student affairs officer of the college to the student at the address appearing on the records of the college, by registered or certified mail and by regular mail. The hearing shall be scheduled within a reasonable time following the filing of the charges or the conciliation conference. Notice of at least five business days shall be given to the student in advance of the hearing unless the student consents to an earlier hearing.

E. The notice shall contain the following:

1. A complete and itemized statement of the charge(s) being brought against the student including the rule, bylaw or regulation he/she is charged with violating, and the possible penalties for such violation.
2. A statement that the student has the following rights:
to present his/her side of the story;
to present witnesses and evidence on his/her behalf;
to cross-examine witnesses presenting evidence against the student;
to remain silent without assumption of guilt; and
to be represented by legal counsel or an advisor at the student's expense.
A warning that anything the student says may be used against him/her at a non-college hearing.

Faculty-Student Disciplinary Committee Procedures:

F. The following procedures shall apply at the hearing before the faculty-student disciplinary committee:

1. The chairperson shall preside at the hearing. The chairperson shall inform the student of the charges, the hearing procedures and his or her rights.
2. After informing the student of the charges, the hearing procedures, and his or her rights, the chairperson shall ask the student charged to plead guilty or not guilty. If the student pleads guilty, the student shall be given an opportunity to explain his/her actions before the committee. If the student pleads not guilty, the college shall present its case. At the conclusion of the college's case, the student may move to dismiss the charges. If the motion is denied by the committee the student shall be given an opportunity to present his or her defense.
3. Prior to accepting testimony at the hearing, the chairperson shall rule on any motions questioning the impartiality of any committee member or the adequacy of the notice of the charge(s). Subsequent thereto, the chairperson may only rule on the sufficiency of the evidence and may exclude irrelevant, immaterial or unduly repetitive evidence. However, if either party wishes to question the impartiality of a committee member on the basis of evidence which was not previously available at the inception of the hearing, the chairperson may rule on such a motion. The chairperson shall exclude all persons who are to appear as witnesses, except the accused student.
4. The college shall make a record of each fact-finding hearing by some means such as a stenographic transcript, a tape recording or the equivalent. A disciplined student is entitled upon request to a copy of such a transcript, tape or the equivalent without cost.
5. The student is entitled to a closed hearing but has the right to request an open public hearing. However, the chairperson has the right to hold a closed hearing when an open public hearing would adversely affect and be disruptive of the committee's normal operations.
6. The college bears the burden of proving the charge(s) by a preponderance of the evidence.
7. The role of the faculty-student disciplinary committee is to listen to the testimony, ask questions of the witnesses, review the testimony and evidence presented at the hearing and the papers filed by the parties and render a determination as to guilt or innocence. In the event the student is found guilty, the committee shall then determine the penalty to be imposed.
8. At the end of the fact-finding phase of the hearing, the student may introduce additional records, such as character references. The college may introduce a copy of the student's previous disciplinary record, where applicable, provided the student was shown a copy of the record prior to the commencement of the hearing. The disciplinary record shall be submitted to the committee in a sealed envelope and shall not be opened until after the committee has made its findings of fact. In the event the student has been determined to be guilty of the charge or charges the records and documents

introduced by the student and the college shall be opened and used by the committee for dispositional purposes, i.e., to determine an appropriate penalty if the charges are sustained.

9. The committee shall deliberate in closed session. The committee's decision shall be based solely on the testimony and evidence presented at the hearing and the papers filed by the parties.

10. The student shall be sent a copy of the faculty-student disciplinary committee's decision within five days of the conclusion of the hearing. The decision shall be final subject to the student's right of appeal.

11. Where a student is represented by legal counsel the president of the college may request that a lawyer from the general counsel's office appear at the hearing to present the college's case.

Section 15.4. APPEALS.

A. An appeal from the decision of the faculty-student disciplinary committee may be made to the president who may confirm or decrease the penalty but not increase it. His/her decision shall be final except in the case of dismissals or suspension for more than one term. An appeal from a decision of dismissal or suspension for more than one term may be made to the appropriate committee of the board. Any appeal under this section shall be made in writing within fifteen days after the delivery of the decision appealed from. This requirement may be waived in a particular case for good cause by the president or board committees as the case may be. If the president is a party to the dispute, his/her functions with respect to an appeal shall be discharged by an official of the university to be appointed by the chancellor.

Section 15.5. COMMITTEE STRUCTURE.

A. Each faculty-student disciplinary committee shall consist of two faculty members and two student members and a chairperson. A quorum shall consist of the chair and any two members. Hearings shall be scheduled at a convenient time and efforts shall be made to insure full students and faculty representation.

B. The president shall select in consultation with the head of the appropriate campus governance body or where the president is the head of the governance body, its executive committee, three (3) members of the instructional staff of that college to receive training and to serve in rotation as chair of the disciplinary committee. If none of the chairpersons appointed from the campus can serve, the president, at his/her discretion, may request that a chairperson be selected by lottery from the entire group of chairpersons appointed by other colleges. The chairperson shall preside at all meetings of the faculty-student disciplinary meetings and decide and make all rulings for the committee. He/she shall not be a voting member of the committee but shall vote in the event of a tie.

C. The faculty members shall be selected by lot from a panel of six elected annually by the appropriate faculty body from among the persons having faculty rank or faculty status. The student members shall be selected by lot from a panel of six elected annually in an election in which all students registered at the college shall be eligible to vote. In the event that the student or faculty panel or both are not elected, or if more panel members are needed, the president shall have the duty to select the panel or panels which have not been elected. No individuals on the panel shall serve on the panel for more than two consecutive years.

D. In the event that the chairperson cannot continue, the president shall appoint another chairperson. In the event that a student or faculty seat becomes vacant and it is necessary to fill the seat to continue the hearing, the seat shall be filled from the faculty or student panel by lottery.

E. Persons who are to be participants in the hearings as witnesses or have been involved in preferring the charges or who may participate in the appeals procedures or any other having a direct interest in the outcome of the hearing shall be disqualified form serving on the committee.

Section 15.6. SUSPENSION OR DISMISSAL.

The board reserves full power to dismiss or suspend a student, or suspend a student organization for conduct which impedes, obstructs, or interferes with the orderly and continuous administration and operation of any college, school, or unit of the university in the use of its facilities or in the achievement of its purposes as an educational institution.

The chancellor or chancellor's designee, a president or any dean may in an emergency or extraordinary circumstances, temporarily suspend a student, or temporarily suspend the privileges of a student organization or group for cause, pending an early hearing as provided in bylaw section 15.3. to take place within not more than seven (7) school days. Prior to the commencement of a temporary suspension of a student, the college shall give such student an informal oral explanation of the evidence supporting the charges and the student may present informally his/her explanation or theory of the matter. When a student's presence poses a continuing danger to person or property or an ongoing threat of disrupting the academic process, notice and opportunity for denial and explanation may follow suspension, but shall be given as soon as feasible thereafter.

Section 15.7. THE UNIVERSITY STUDENT SENATE.

There shall be a university student senate responsible, subject to the board, for formulation of university-wide student policy relating to the academic status, role, rights and freedoms of the students. The authority and duties of the university student senate shall not extend to areas of interest which fall exclusively within the domain of the student governments of the constituent units of the university. Consistent with

the authority of the board of trustees in accordance with the education law and the bylaws of the board of trustees, the university student senate shall make its own bylaws providing for the election of its own officers, the establishment of its own rules and procedures, for its internal administration and for such other matters as is necessary for its existence. The university student senate shall have the full rights and responsibilities accorded student organizations as provided in these bylaws. The delegates and alternate delegates to the university student senate shall be elected by their respective constituencies, or by their student governments from the elected members of the respective student governments.

Section 15.8. COLLEGE PLANS.
The provisions in a duly adopted college governance plan shall not be inconsistent with the provisions contained in this article.

APPENDIX B.3

CUNY Policy on Academic Integrity

Academic Dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, and expulsion, as provided herein.

Definitions and Examples of Academic Dishonesty
Cheating is the unauthorized use or attempted use of material, information, notes, study aids, devices or communication during academic exercise.

The following are some examples of cheating, but by no means is it an exhaustive list:

Copying from another student during an examination or allowing another to copy your work.

Unauthorized collaboration on a take home assignment or examination.

Using notes during a closed book examination.

Taking an examination for another student, or asking or allowing another student to take an examination for you.

Changing a graded exam and returning it for more credit.

Submitting substantial portions of the same paper to more than one course without consulting with each instructor.

Preparing answers or writing notes in a blue book (exam booklet) before an examination.

Allowing others to research and write assigned papers or do assigned projects, including use of commercial term paper services.

Giving assistance to acts of academic misconduct/dishonesty.

Fabricating data (all or in part).

Submitting someone else's work as your own.

Unauthorized use during an examination of any electronic devices such as cell phones, palm pilots, computers or other technologies to retrieve or send information.

Plagiarism is the act of presenting another person's ideas, research or writings as your own. The following are some examples of plagiarism, but by no means is it an exhaustive list:

Copying another person's actual words without the use of quotation marks and footnotes attributing the words to their source.

Presenting another person's ideas or theories in your own words without acknowledging the source.

Using information that is not common knowledge without acknowledging the source.

Failing to acknowledge collaborators on homework and laboratory assignments.

Internet Plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and "cutting and pasting" from various sources without proper attribution.

Obtaining Unfair Advantage is any activity that intentionally or unintentionally gives the student an unfair advantage in his/her academic work over another student.

The following are some samples of obtaining an unfair advantage but by no means is it an exhaustive list:

Stealing, reproducing, circulating, or otherwise gaining advance access to examination materials.

Depriving other students of access to library materials by stealing, destroying, defacing, or concealing them.

Retaining, using or circulating examination materials which clearly indicate that they should be returned at the end of the exam.

Intentionally obstructing or interfering with another students' work.

Falsification of Records and Official Documents
The following are some examples of falsification, but by no means is it an exhaustive list:

Forging signatures of authorization.

Falsifying information on an official academic record.

Falsifying information on an official document such as a grade report, letter of permission, drop/add form, ID card, or other college documents.

FACULTY SENATE OF THE CITY COLLEGE PROCEDURES TO ADDRESS VIOLATIONS OF THE CUNY POLICY ON ACADEMIC INTEGRITY

WHEREAS the College must develop a range of procedures to implement the University's Academic Integrity Policy, and
WHEREAS the College's Office of Academic Standards and the Faculty Senate's Education Policy Committee have collaborated to develop faculty procedures to address violations of the CUNY Policy on Academic Integrity, therefore BE IT RESOLVED THAT the Faculty Senate endorses the procedures specified below.

Faculty Procedures to Address Violations of the CUNY Policy on Academic Integrity

A. Informal Resolution Procedure
When a faculty member suspects there has been a violation of academic policy. He/she should meet with the students to discuss the matter.

If the student does not deny the charge and agrees to an informal penalty, the instructor may impose an academic sanction.

It is strongly recommended that the faculty member file a faculty report form with the office of the Academic Integrity Official (AIO) in NA 5/216 within 15 business days of the incident. The office of the AIO will provide the student with a copy and maintain a record of the incident.

B. Formal Resolution Procedure
When a faculty member suspects there has been a violation of academic policy, he/she should meet with the student to discuss the matter.

If the student denies the charge, and the faculty member seeks an academic and/or disciplinary sanction, the faculty member must file a faculty report form within fifteen days to the AIO in NA 5/216. The office of the AIO will provide the student with a copy.

While the case is under review by the AIO, the faculty member shall not assign a permanent grade, whether for the particular assignment(s) in question or for the course as a whole.

For the purpose of reporting grades to the Registrar, the faculty member shall use the grade of PEN until the case is resolved by the AIO.

The AIO will promptly inform the faculty member and the student when the case ids resolved.

C. The Academic Integrity Office
In cases requiring a formal resolution, the AIO will review all original and relevant documentation submitted by the faculty member and will contact the student regarding the charges and request a written appeal from the student. The AIO will make every attempt to resolve the case prior to further referral. If there is no mutually acceptable resolution, the responsibility of the review will be forwarded to the Academic Integrity Committee or, if disciplinary sanctions are sought, to the Faculty Student Disciplinary Committee.

RESOLUTION PASSED:
DECEMBER 16, 2004

APPENDIX B.4

The City College University of New York Policy on Acceptable Use of Computer Resources

Introduction
City College's computer resources are dedicated to the support of the university's mission of education, research and public service. In furtherance of this mission, City College respects, upholds and endeavors to safeguard the principles of academic freedom, freedom of expression and freedom of inquiry.

City College recognizes that there is a concern among the university community that because information created, used, transmitted or stored in electronic form is by its nature susceptible to disclosure, invasion, loss, and similar risks, electronic communications and transactions will be particularly vulnerable to infringements of academic freedom. City College's commitment to the principles of academic freedom and freedom of expression includes electronic information. Therefore, whenever possible, City College will resolve doubts about the need to access City College computer resources in favor of a user's privacy interest.

However, the use of City College computer resources, including for electronic transactions and communications, like the use of other university-provided resources and activities, is subject to the requirements of legal and ethical behavior. This policy is intended to support the free exchange of ideas among members of the City College community and between the City College community and other communities, while recognizing the responsibilities and limitations associated with such exchange.

Applicability
This policy applies to all users of City College computer resources, whether affiliated with City College or not, and whether accessing those resources on a City College campus or remotely.

This policy supersedes the City College policy titled "City College Computer User Responsibilities" and any college policies that are inconsistent with this policy.

Definitions
"City College Computer resources" refers to all computer and information technology hardware, software, data, access and other resources owned, operated, or contracted by City College. This includes, but is not limited to, personal computers, handheld devices, workstations, mainframes, minicomputers, servers, network facilities, databases, memory, and associated peripherals and software, and the applications they support, such as e-mail and access to the internet.

"E-mail" includes point-to-point messages, postings to newsgroups and listservs, and other electronic messages involving computers and computer networks.

Rules for Use of City College Computer Resources
1. Authorization. Users may not access a City College computer resource without authorization or use it for purposes beyond the scope of authorization. This includes attempting to circumvent City College computer resource system protection facilities by hacking, cracking or similar activities, accessing or using another person's computer account, and allowing another person to access or use the user's account. This provision shall not prevent a user from authorizing a colleague or clerical assistant to access information under the user's account on the user's behalf while away from a City College campus or because of a disability. City College computer resources may not be used to gain unauthorized access to another computer system within or outside of City College. Users are responsible for all actions performed from their computer account that they permitted or failed to prevent by taking ordinary security precautions.
2. Purpose. Use of City College computer resources is limited to activities relating to the performance by City College employees of their duties and responsibilities. For example, use of City College computer resources for private commercial or not-for-profit business purposes, for private advertising of products or services, or for any activity meant solely to foster personal gain, is

prohibited. Similarly, use of City College computer resources for partisan political activity is also prohibited.

Except with respect to City College employees other than faculty, where a supervisor has prohibited it in writing, incidental personal use of computer resources is permitted so long as such use does not interfere with City College operations, does not compromise the functioning of City College computer resources, does not interfere with the user's employment or other obligations to City College, and is otherwise in compliance with this policy.

3. Compliance with Law. City College computer resources may not be used for any purpose or in any manner that violates City College rules, regulations or policies, or federal, state or local law. Users who engage in electronic communications with persons in other states or countries or on other systems or networks may also be subject to the laws of those other states and countries, and the rules and policies of those other systems and networks. Users are responsible for ascertaining, understanding, and complying with the laws, rules, policies, contracts, and licenses applicable to their particular use.

Examples of applicable federal and state laws include the laws of libel, obscenity and child pornography, as well as the following:

Family Educational Rights and Privacy Act

Electronic Communications Privacy Act

Computer Fraud and Abuse Act

New York State Freedom of Information Law

New York State Law with respect to the confidentiality of library records

Examples of applicable City College rules and policies include the following:

Sexual Harassment Policy

Policy on Maintenance of Public Order

Web Site Privacy Policy

Gramm-Leach-Bliley Information Security Program

University Policy on Academic Integrity

Information Security policies

4. Licenses and Intellectual Property. Users of City College computer resources may use only legally obtained, licensed data or software and must comply with applicable licenses or other contracts, as well as copyright, trademark and other intellectual property laws.

Much of what appears on the internet and/or is distributed via electronic communication is protected by copyright law, regardless of whether the copyright is expressly noted. Users of City College computer resources should generally assume that material is copyrighted unless they know otherwise, and not copy, download or distribute copyrighted material without permission unless the use does not exceed fair use as defined by the federal Copyright Act of 1976. Protected material may include, among other things, text, photographs, audio, video, graphic illustrations, and computer software.

5. False Identity and Harassment. Users of City College computer resources may not employ a false identity, mask the identity of an account or computer, or use computer resources to engage in abuse of others, such as sending harassing, obscene, threatening, abusive, deceptive, or anonymous messages within or outside City College.

6. Confidentiality. Users of City College computer resources may not invade the privacy of others by, among other things, viewing, copying, modifying or destroying data or programs belonging to or containing personal or confidential information about others, without explicit permission to do so. City College employees must take precautions to protect the confidentiality of personal or confidential information encountered in the performance of their duties or otherwise.

7. Integrity of Computer Resources. Users may not install, use or develop programs intended to infiltrate or damage a computer resource, or which could reasonably be expected to cause, directly or indirectly, excessive strain on any computing facility. This includes, but is not limited to, programs known as computer viruses, Trojan horses, and worms.

8. Disruptive Activities. City College computer resources must not be used in a manner that could reasonably be expected to cause or does cause, directly or indirectly, unwarranted or unsolicited interference with the activity of other users. This provision explicitly prohibits chain letters, virus hoaxes or other intentional e-mail transmissions that disrupt normal e-mail service. Also prohibited are spamming, junk mail or other unsolicited mail that is not related to City College business and is sent without a reasonable expectation that the recipient would welcome receiving it, as well as the inclusion on e-mail lists of individuals who have not requested membership on the lists, other than the inclusion of members of the City College community on lists related to City College business. City College has the right to require users of City College computer resources to limit or refrain from other specific uses if, in the opinion of the IT director at the user's college, such use interferes with efficient operations of the system, subject to appeal to the President or, in the case of central office staff, to the Chancellor.

9. City College Names and Trademarks. City College names, trademarks and logos belong to the university and are protected by law. Users of City College computer resources may not state or imply that they speak on behalf of City College or use a City College name, trademark or logo without authorization to do so. Affiliation with City College does not, by itself, imply authorization to speak on behalf of City College.

10. Security. City College employs various measures to protect the security of its computer resources and of users' accounts. However, City College cannot guarantee such security. Users are responsible for engaging in safe computing practices such as guarding and not sharing their passwords, changing passwords regularly, logging out of systems at the end of use, and protecting private information, as well as for following City College's Information Security policies and procedures. Users must report incidents of Information Security policy non-compliance or other security

incidents to City College's Chief Information Officer and Chief Information Security Officer.

11. Filtering. City College reserves the right to install spam, virus and spyware filters and similar devices if necessary in the judgment of City College's Office of Information Technology or a college IT director to protect the security and integrity of City College computer resources. Notwithstanding the foregoing, City College will not install filters that restrict access to e-mail, instant messaging, chat rooms or websites based solely on content.

12. Confidential Research Information. Principal investigators and others who use City College computer resources to store or transmit research information that is required by law or regulation to be held confidential or for which a promise of confidentiality has been given, are responsible for taking steps to protect confidential research information from unauthorized access or modification. In general, this means storing the information on a computer that provides strong access controls (passwords) and encrypting files, documents, and messages for protection against inadvertent or unauthorized disclosure while in storage or in transit over data networks. Robust encryption is strongly recommended for information stored electronically on all computers, especially portable devices such as notebook computers, Personal Digital Assistants (PDAs), and portable data storage (e.g., memory sticks) that are vulnerable to theft or loss, as well as for information transmitted over public networks. Software and protocols used should be reviewed and approved by City College's Office of Information Technology.

13. City College Access to Computer Resources. City College does not routinely monitor, inspect, or disclose individual usage of its computer resources without the user's consent. In most instances, if the university needs information located in a City College computer resource, it will simply request it from the author or custodian. However, City College IT professionals and staff do regularly monitor general usage patterns as part of normal system operations and maintenance and might, in connection with these duties, observe the contents of web sites, e-mail or other electronic communications. Except as provided in this policy or by law, these individuals are not permitted to seek out contents or transactional information, or disclose or otherwise use what they have observed. Nevertheless, because of the inherent vulnerability of computer technology to unauthorized intrusions, users have no guarantee of privacy during any use of City College computer resources or in any data in them, whether or not a password or other entry identification or encryption is used. Users may expect that the privacy of their electronic communications and of any materials contained in computer storage in any City College electronic device dedicated to their use will not be intruded upon by City College except as outlined in this policy.

City College may specifically monitor or inspect the activity and accounts of individual users of City College computer resources, including individual login sessions, e-mail and other communications, without notice, in the following circumstances:

a. when the user has voluntarily made them accessible to the public, as by posting to Usenet or a web page;

b. when it is reasonably necessary to do so to protect the integrity, security, or functionality of City College or other computer resources, as determined by the college chief information officer or his or her designee, after consultation with City College's chief information officer or his or her designee;

c. when it is reasonably necessary to diagnose and resolve technical problems involving system hardware, software, or communications, as determined by the college chief information officer or his or her designee, after consultation with City College's chief information officer or his or her designee;

d. when it is reasonably necessary to protect City College from liability, or when failure to act might result in significant bodily harm, significant property loss or damage, or loss of significant evidence, as determined by the college president or a vice president designated by the president, after consultation with the Office of General Counsel and the Chair of the University Faculty Senate (if a City College faculty member's account or activity is involved) or Vice Chair if the Chair is unavailable;

e. when there is a reasonable basis to believe that City College policy or federal, state or local law has been or is being violated, as determined by the college president or a vice president designated by the president, after consultation with the Office of General Counsel and the Chair of the University Faculty Senate (if a City College faculty member's account or activity is involved) or Vice Chair if the Chair is unavailable;

f. when an account appears to be engaged in unusual or unusually excessive activity, as indicated by the monitoring of general activity and usage patterns, as determined by the college president or a vice president designated by the president and the college chief information officer or his or her designee, after consultation with City College's chief information officer or his or her designee, the Office of General Counsel, and the Chair of the University Faculty Senate (if a City College faculty member's account or activity is involved) or Vice Chair if the Chair is unavailable; or

g. as otherwise required by law.

In those situations in which the Chair of the University Faculty Senate is to be consulted prior to monitoring or inspecting an account or activity, the following procedures shall apply: (i) the college president shall report the completion of the monitoring or inspection to the Chair and the City College employee affected, who shall also be told the reason for the monitoring or inspection, except where specifically forbidden by law; and (ii) if the monitoring or inspection of an account or activity requires physical entry into a faculty member's office, the faculty member shall be advised prior thereto and shall be permitted to be present to observe, except where specifically forbidden by law.

A City College employee may apply to the General Counsel for an exemption from some or all of the circumstances under which City College may inspect and monitor computer resource activity and accounts, pursuant to subparagraphs (a)-(f) above, with respect to a City College computer resource used solely for the collection, examination, analysis, transmission or storage of confidential research data. In considering such application, the General Counsel shall have the right to require the employee to affirm in writing that the computer resource will be used solely for the confidential research. Any application for exemption should be made prior to using the computer resource for the confidential research.

City College, in its discretion, may disclose the results of any general or individual monitoring or inspection to appropriate City College personnel or agents, or law enforcement or other agencies. The results may be used in college disciplinary proceedings, discovery proceedings in legal actions, or otherwise as is necessary to protect the interests of the college.

In addition, users should be aware that City College may be required to disclose to the public under the New York State Freedom of Information Law communications made by means of City College computer resources in conjunction with college business.

Any disclosures of activity of accounts of individual users to persons or entities outside of City College, whether discretionary or required by law, shall be approved by the General Counsel and shall be conducted in accordance with any applicable law. Except where specifically forbidden by law, City College employees subject to such disclosures shall be informed promptly after the disclosure of the actions taken and the reasons for them.

The Office of General Counsel shall issue an annual statement of the instances of account monitoring or inspection that fall within categories (d) through (g) above. The statement shall indicate the number of such instances and the cause and result of each. No personally identifiable data shall be included in this statement.

See City College's Web Site Privacy Policy for additional information regarding data collected by City College from visitors to the City College website at www.ccny.cuny.edu

14. Enforcement. Violation of this policy may result in suspension or termination of an individual's right of access to City College computer resources, disciplinary action by appropriate City College authorities, referral to law enforcement authorities for criminal prosecution, or other legal action, including action to recover civil damages and penalties.

Violations will normally be handled through the college disciplinary procedures applicable to the relevant user. For example, alleged violations by students will normally be investigated, and any penalties or other discipline will normally be imposed, by the Office of Student Affairs.

City College has the right to temporarily suspend computer use privileges and to remove from City College computer resources material it believes violates this policy, pending the outcome of an investigation of misuse or finding of violation.

15. Additional Rules. Additional rules, policies, guidelines and/or restrictions may be in effect for specific computers, systems, or networks, or at specific computer facilities at the discretion of the directors of those facilities. Any such rules which potentially limit the privacy or confidentiality of electronic communications or information contained in or delivered by or over City College computer resources will be subject to the substantive and procedural safeguards provided by this policy.

16. Disclaimer. City College shall not be responsible for any damages, costs or other liabilities of any nature whatsoever with regard to the use of City College computer resources. This includes, but is not limited to, damages caused by unauthorized access to City College computer resources, data loss, or other damages resulting from delays, non-deliveries, or service interruptions, whether or not resulting from circumstances under the City College's control.

Users receive and use information obtained through City College computer resources at their own risk. City College makes no warranties (expressed or implied) with respect to the use of City College computer resources. City College accepts no responsibility for the content of web pages or graphics that are linked from City College web pages, for any advice or information received by a user through use of City College computer resources, or for any costs or charges incurred by a user as a result of seeking or accepting such advice or information.

City College reserves the right to change this policy and other related policies at any time. City College reserves any rights and remedies that it may have under any applicable law, rule or regulation. Nothing contained in this policy will in any way act as a waiver of such rights and remedies.

Last Updated: 7/25//07

APPENDIX B.5

Workplace Violence Policy and Procedures

The City University of New York has a long-standing commitment to promoting a safe and secure academic and work environment that promotes the achievement of its mission of teaching, research, scholarship and service. All members of the University community-students, faculty and staff- are expected to maintain a working and learning environment free from violence, threats of harassment, violence, intimidation or coercion. While these behaviors are not prevalent at the University, no organization is immune.

The purpose of this policy is to address the issue of potential workplace violence in our community, prevent workplace violence from occurring to the fullest extent possible, and set forth procedures to be followed when such violence has occurred.

Policy

The City University of New York prohibits workplace violence. Violence, threats of violence, intimidation, harassment, coercion, or other threatening behavior towards people or property will not be tolerated. Complaints involving workplace violence

will not be ignored and will be given the serious attention they deserve. Individuals who violate this policy may be removed from University property and are subject to disciplinary and/or personnel action up to and including termination, consistent with University policies, rules and collective bargaining agreements, and/or referral to law enforcement authorities for criminal prosecution. Complaints of sexual harassment are covered under the University's Policy Against Sexual Harassment.

The University, at the request of an employee or student, or at its own discretion, may prohibit members of the public, including family members, from seeing an employee or student on University property unless necessary to transact University-related business. This policy particularly applies in cases where the employee or student suspects that an act of violence will result from an encounter with said individual(s).

Scope

All faculty, staff, students, vendors, contractors, consultants, and others who do business with the University, whether in a University facility or off-campus location where University business is conducted, are covered by this policy. This policy also applies to other persons not affiliated with the University, such as former employees, former students, and visitors. When students have complaints about other students, they should contact the Office of Student Affairs at their campus.

Definitions

Workplace violence is any behavior that is violent, threatens violence, coerces, harasses or intimidates others, interferes with an individual's legal rights of movement or expression, or disrupts the workplace, the academic environment, or the University' ability to provide services to the public. Examples of workplace violence include, but are not limited to:

1. Disruptive behavior intended to disturb, interfere with or prevent normal work activities (such as yelling, using profanity, verbally abusing others, or waving arms and fists).
2. Intentional physical contact for the purpose of causing harm (such as slapping, stabbing, punching, striking, shoving, or other physical attack).
3. Menacing or threatening behavior (such as throwing objects, pounding on a desk or door, damaging property, stalking, or otherwise acting aggressively; or making oral or written statements specifically intended to frighten, coerce, or threaten) where a reasonable person would interpret such behavior as constituting evidence of intent to cause harm to individuals or property.
4. Possessing firearms, imitation firearms, knives or other dangerous weapons, instruments or materials. No one within the University community, shall have in their possession a firearm or other dangerous weapon, instrument or material that can be used to inflict bodily harm on an individual or damage to University property without specific written authorization from the Chancellor or the college President regardless of whether the individual possesses a valid permit to carry the firearm or weapon.

Reporting of Incidents

1. General Reporting Responsibilities

Incidents of workplace violence, threats of workplace violence, or observation of workplace violence are no to be ignored by any member of the University community. Workplace violence should promptly be reported to the appropriate University official (see below). Additionally, faculty, staff, and students are encouraged to report behavior hat they reasonably believe poses a potential for workplace violence as defined above. It is important that all members of the University community take this responsibility seriously to effectively maintain a safe working and learning environment.

2. Imminent or Actual Violence

Any person experiencing or witnessing imminent danger or actual violence involving weapons or personal injury should call the Campus Public Safety Office immediately, or call 911.

3. Acts of Violence Not Involving Weapons or Injuries to Persons

Any person who is the subject of a suspected violation of this policy involving violence without weapons or personal injury, or is a witness to such suspected violation, should report the incident to his/her supervisor, or in lieu thereof, to their respective Campus Public Safety Office. Students should report such incidents to the Office of Student Affairs at their campus or in lieu thereof, their campus Public Safety Office. The Campus Public Safety Office will work with the Office of Human Resources and the supervisor or the Office of Student Affairs on an appropriate response.

4. Commission of a Crime

All individuals who believe a crime has been committed against them have the right, and are encouraged, to report the incident to the appropriate law enforcement agency.

5. False Reports

Members of the University community who make false and malicious complaints of workplace violence, as opposed to complaints which, even if erroneous, are made in good faith, will be subject to disciplinary action and/or referral to civil authorities as appropriate.

6. Incident Reports

The University will report incidents of workplace violence consistent with the College Policies for Incident Reporting Under the Campus Security Policy and Statistical Act (Clery Act).

Confidentiality

The University shall maintain the confidentiality of investigations of workplace violence to the extent possible. The University will act on the basis of anonymous complaints where it has a reasonable basis to believe that there has been a violation of this policy and that the safety and well being of members of the University community would be served by such action.

Retaliation

Retaliation against anyone acting in good faith who has made a complaint of workplace violence, who has reported

witnessing workplace violence, or who has been involved in reporting, investigating, or responding to workplace violence is a violation of this policy. Those found responsible for retaliatory action will be subject to discipline up to and including termination.

APPENDIX B.6

Notice of Access to Campus Crime Statistics, the Campus Security Report, and Information on Registered Sex Offenders

The College Advisory Committee on Campus Safety will provide upon request all campus crime statistics as reported to the U.S. Department of Education, as well as the annual campus security report. The campus security report includes: (1) the campus crime statistics for the most recent calendar year and the two proceeding calendar years; (2) campus policies regarding procedures and facilities to report criminal actions or other emergencies on campus; (3) policies concerning the security of and access to campus facilities; (4) policies on campus law enforcement; (5) a description of campus programs to inform students and employees to be responsible for their own security and the security of others; (6) campus crime prevention programs; (7) policy concerning the monitoring through the police of criminal activity at off-campus locations of students organizations officially recognized by the college; (8) policies on illegal drugs, alcohol, and underage drinking; (9) where information provided by the State on registered sex offenders may be obtained (also see below); and (10) policies on campus sexual assault programs aimed at the prevention of sex offenders and procedures to be followed when a sex offense occurs. This information is maintained pursuant to the federal Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act.

The campus crime statistics and the annual campus security report are available at the reference desk of the library and the college website at www.ccny.cuny.edu/public_safety/crime_stats.html . If you wish to be mailed copies of the campus crime statistics and the annual campus security report, you should contact Paul F. Occhiogrosso, Esq., Dean of Faculty & Staff Relations and Counsel to the President; Records Access Officer at (212) 650-8276 and copies will be mailed to you within 10 days. The U.S. Department of Education's website address for campus crime statistics is www.ed.gov/security/InstDetail.asp (then input City College of New York of The City University of New York).

In accordance with the federal Campus Sex Crimes Prevention Act, registered sex offenders now are required to register the name and address of any college at which he/she is a student or employee. The New York State Division of Criminal Justice maintains a registry of convicted sex offenders and informs the college's chief security (public safety) officer of the presence on campus of a registered sex offender as a student or employee. You may contact the college's chief security officer Pat Morena, Director of Public Safety and Security, located in the NA building, in the 4th floor, room 201, or you may contact him at (212) 650-6911 to obtain information about Level 2 or Level 3 registered sex offenders on campus. To obtain information about Level 3 offenders, you may contact the Division's registry website at www.criminaljustice.state.ny.us/nsor/sor_about.htm and then click on "Search for Level 3 Sex Offenders" or access the directory at the college's public safety department or police precinct. To obtain information about Level 2 offenders, you need to contact the public safety department, local police precinct in which the offender resides or attends college, or the Division's sex offender registry at 800-262-3257.

APPENDIX B.7

Article XVI – Student Activity Fees and Auxiliary Enterprises

Section 16.1. STUDENT ACTIVITY FEE

The student activity fee is the total of the fees for student government and other student activities. Student activity fees, including student government fees collected by a college of the university shall be deposited in a college central depository and, except where earmarked by the board, allocated by a college association budget committee subject to review by the college association as required in these bylaws.

Section 16.2. STUDENT ACTIVITY FEES USE – EXPENDITURE CATEGORIES

Student activity fee funds shall be allocated and expended only for the following purposes:

Extracurricular educational programs;

Cultural and social activities;

Recreational and athletics programs;

Student government;

Publications and other media;

Assistance to registered student organizations;

Community service programs;

Enhancement of the college and university environment;

Transportation, administration and insurance related to the implementation of these activities;

Student services to supplement or add to those provided by the university;

Stipends to student leaders.

Section 16.3 STUDENT GOVERNMENT FEE

The student government fee is that portion of the student activity fee levied by resolution of the board, which has been established for the support of the student government activities. The existing student government fees now in effect shall continue until changed. Student government fees shall be allocated by the duly elected student government, or each student government where more than one duly elected student government

exists, for its own use and for the use of student organizations, as specified in section 15.2 of these by laws, provided, however, that the allocation is based on a budget approved by the duly elected student government after notice and hearing, subject to review of the college association. Where more that one duly elected student government exists, the college association shall apportion the student government fees to each student government in direct proportion to the amount collected from members of each student government.

Section 16.4. STUDENT GOVERNMENT ACTIVITY DEFINED

A student government activity is any activity operated by and for the students enrolled at any unit for the university provided, (1) such activity is for the direct benefit of the students enrolled at the college, (2) that participation in the activity and the benefit thereof is available to all students enrolled in the unit or student government thereof, and (3) that the activity does not contravene the laws of the city, state or nation, or the published rules, regulations, and orders of the university or the duly established college authorities.

Section 16.5. COLLEGE ASSOCIATION

A. The college association shall have responsibility for the supervision and review over college student activity fee supported budgets. All budgets of college student activity fees, except where earmarked by the board to be allocated by another body, should be developed by a college association budget committee and recommended to the college association for review by the college association prior to expenditure. The college association shall review all college students activity fee, including student government fee allocations and expenditure for conformance with the expenditure categories defined in Section 16.2 of this article and the college association shall disapprove any allocation or expenditure it finds does not so conform, or is inappropriate, improper, or inequitable.

B. A college association shall be considered approved for purposes of this article if it consists of thirteen (13) members, its governing documents are approved by the college president and the following requirements are met:

1. The governing board of the college association is composed of:
   The college president or his/her designee as chair.
   Three administrative members appointed by the college president.
   Three faculty members appointed by the college president from a panel whose size is twice the number of seats to be filled and the panel is elected by the appropriate college faculty governance body.
   Six student members comprised of the student government president(s) and other elected students with the student seats allocated on a basis which will provide representation to each government, where more than one exists, as nearly as practicable in proportion to the student activity fees provided by the students from the respective constituencies.
2. The college association structure provides a budget committee composed of members of the governing board, at least a majority of whom are students selected in accordance with section 16.5.(b) (1)(iv) of these bylaws. The budget committee shall be empowered to receive and review student activity fee budget requests and to develop a budget subject to the review of the college association. The college association may choose to not approve the budget or portions of the budget if in their opinion such items are inappropriate, improper, or inequitable. The budget shall be returned to the budget committee with the specific concerns of the college association noted for further deliberation by the budget committee and subsequent resubmittal to the college association. If the budget is not approved within thirty (30) days those portions of the budget voted upon and approved by the college association board will be allocated. The remainder shall be held until the college association and the budget committee agree.
3. The governing documents of the college association have been reviewed by the board's general counsel and approved by the board.

Section 16.6. MANAGEMENT AND DISBURSEMENT OF FUNDS

The college and all student activity fee allocating bodies shall employ generally accepted accounting and investment procedures in the management of all funds. All funds for the support of student activities are to be disbursed only in accordance with approved budgets and be based on written documentation. A requisition for disbursements of funds must contain two signatures; one, the signature of a person with responsibility for the program; the other the signature of an approved representative of the allocating body.

Section 16.7. REVENUES

All revenues generated by student activities funded through student activity fees shall be placed in a college central depository subject to the control of the allocating body. The application of such revenues to the account of the income generating organization shall require the specific authorization of the allocating body.

Section 16.8. FISCAL ACCOUNTABILITY HANDBOOK

The chancellor or his/her designee shall promulgate regulations in a fiscal accountability handbook, to regulate all aspects of the collection, deposit, financial disclosure, accounting procedures, financial payments, documentation, contracts, travel vouchers, investments and surpluses of student activity fees and all other procedural and documentary aspects necessary, as determined by the chancellor or his/her designee to protect the integrity and accountability of all student activity fee funds.

Section 16.9. COLLEGE PURPOSES FUND

A. A college purposes fund may be established at each college and shall be allocated by the college president. This fund may have up to twenty-five(25) percent of the unearmarked portion of the student activity fee earmarked to it by resolution of the board, upon the

presentation to the board of a list of activities that may be properly funded by student activity fees that are deemed essential by the college president.

B. Expenditures from the college purposes fund shall be subject to full disclosure under section 16.13. of these bylaws.

C. Referenda of the student body with respect to the use and amount of the college purposes fund shall be permitted under the procedures and requirements of section 16.12. of these bylaws.

Section 16.10. AUXILIARY ENTERPRISE BOARD

A. The auxiliary enterprise board shall have responsibility for the oversight, supervision and review over college auxiliary enterprises. All budgets of auxiliary enterprise funds and all contracts for auxiliary enterprises shall be developed by the auxiliary enterprise budget and contract committee and reviewed by the auxiliary enterprise board prior to expenditure or execution.

B. The auxiliary enterprise board shall be considered approved for the purposes of this article if it consists of at least eleven(11) members, its governing documents are approved by the college president and the following requirements are met:

1. The governing board is composed of the college president or his/her designee as chair, plus an equal number of students and the combined total of faculty and administrative members.
2. The administrative members are appointed by the college president.
3. The faculty members are appointed by the college president from a panel whose size is twice the number of seats to be filled and the panel is elected by the appropriate college faculty governance body.
4. The student members are the student government president(s) and other elected students and the student seats are allocated on a basis which will provide representation to each government, where more than one exists, as nearly as practicable, in proportion to the student enrollment by headcount from the respective constituencies.
5. The auxiliary enterprise board structure provides for a budgets and contract committee composed of a combined total of faculty and administrative members that is one more than the number of student members. The budget and contract committee shall be empowered to develop all contract and budget allocation proposals subject to the review and approval of the auxiliary enterprise board.
6. The governing documents of the auxiliary enterprise board have been reviewed by the board's general counsel and approved by the board.

Section 16.11. THE REVIEW AUTHORITY OF COLLEGE PRESIDENTS OVER STUDENT ACTIVITY FEE ALLOCATING BODIES AND AUXILIARY ENTERPRISE BOARDS

A. The president of the college shall have the authority to disapprove any student activity fee, including student government fee, or auxiliary enterprise allocation or expenditure, which in his or her opinion contravenes the laws of the city, state, or nation or any bylaw or policy of the university or any policy, regulation, or order of the college. If the college president chooses to disapprove an allocation or expenditure, he or she shall consult with the general counsel and vice chancellor for legal affairs and thereafter communicate his or her decision to the allocating body or auxiliary enterprise board.

B. The president of the college shall have the authority to suspend and send back for further review any student activity fee, including student government fee, allocation or expenditure which in his/her opinion is not within the expenditure categories defined in section 16.2. of this article. The college association shall, within ten (10) days of receiving a proposed allocation or expenditure for further review, study it and make a recommendation to the president with respect to it. The college president shall thereafter consider the recommendation, shall consult with the general counsel and vice chancellor for legal affairs, and thereafter communicate his/her final decision to the allocating body as to whether the allocation or expenditure is disapproved.

C. The chancellor or his/her designee shall have the same review authority with respect to university student activity fees that the college president has with respect to college student activity fees.

D. All disapprovals exercised under this section shall be filed with the general counsel and vice chancellor for legal affairs.

E. Recipients of extramural student activity fees shall represent an annual report to the chancellor for the appropriate board committee detailing the activities, benefits and finances of the extramural body as they pertain to the colleges where students are paying an extramural fee.

Section 16.12. REFERENDA

A referendum proposing changes in the student activity fee shall be initiated by a petition of at least ten (10) percent of the appropriate student body and voted upon in conjunction with student government elections.

A. Where a referendum seeks to earmark student activity fees for a specific purpose or organization without changing the total student activity fee, the results of the referendum shall be sent to the college association for implementation.

B. Where a referendum seeks to earmark student activity fees for a specific purpose or organization by changing the total student activity fee, the results of such a referendum shall be sent to the board by the president of the college together with his/her recommendation.

C. At the initiation of a petition of at least ten(10) percent of the appropriate student body, the college president may schedule a student referendum at a convenient time other than in conjunction with student government elections.

D. Where the referendum seeks to affect the use or amount of student activity fees in the college purposes fund, the results of the referendum

shall be sent to the board by the college president together with his/her recommendation.

Section 16.13. DISCLOSURE

A. The college president shall be responsible for the full disclosure to each of the student governments of the college of all financial information with respect to student activity fees.

B. The student governments shall be responsible for the full disclosure to their constituents of all financial information with respect to student government fees.

C. The student activity fee allocating bodies shall be responsible for the full disclosure of all financial information to its membership, to the college and to the student governments with respect to all of its activities.

D. The auxiliary enterprise board shall be responsible for the full disclosure of all financial information to its membership, to the college and to the student governments with respect to auxiliary enterprises.

E. For purposes of the foregoing paragraphs, full disclosure shall mean the presentation each semester of written financial statements which shall include, but need not be limited to, the source of all fee income by constituency, income from other sources creditable to student activity fee accounts, disbursements, transfers, past reserves, surplus accounts, contingency and stabilization funds. Certified independent audits performed by a public auditing firm shall be conducted at least once each year.

Section 16.14. STIPENDS

The payment of stipends to student leaders is permitted only within those time limits and amounts authorized by the board.

APPENDIX B.8

New York State Education Law, Article 5: S 224-a. Students unable because of religious beliefs to Register or attend classes on certain days.

1. No person shall be expelled from or be refused admission as a student to an institution of higher education for the reason that he or she is unable, because of his or her religious beliefs, to register or attend classes or to participate in any examination, study or work requirements on a particular day or days.

2. Any student in an institution of higher education who is unable, because of his or her religious beliefs, to attend classes on a particular day or days shall, because of such absence on the particular day or days, be excused from any examination or any study or work requirements.

3. It shall be the responsibility of the faculty and of the administrative officials of each institution of higher education to make available to each student who is absent from school, because of his or her religious beliefs, an equivalent opportunity to register for classes or make up any examination, study or work requirements which he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the institution for making available to the said student such equivalent opportunity.

4. If registration, classes, examinations, study or work requirements are held on Friday after four o'clock post meridian or on Saturday, similar or makeup classes, examinations, study or work requirements or opportunity to register shall be made available on other days, where it is possible and practicable to do so. No special fees shall be charged to the student for these classes, examinations, study or work requirements or registration held on other days.

5. In effectuating the provisions of this section, it shall be the duty of the faculty and of the administrative officials of each institution of higher education to exercise the fullest measure of good faith. No adverse or prejudicial effects shall result to any student because of his or her availing himself or herself of the provisions of this section.

6. Any student, who is aggrieved by the alleged failure of any faculty or administrative officials to comply in good faith with the provisions of this section, shall be entitled to maintain an action or proceeding in the supreme court of the county in which such institution of higher education is located for the enforcement of his or her rights under this section.

6-a. It shall be the responsibility of the administrative officials of each institution of higher education to give written notice to students of their rights under this section, informing them that each student who is absent from school, because of his or her religious beliefs, must be given an equivalent opportunity to register for classes or make up any examination, study or work requirements which he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the institution for making available to such student such equivalent opportunity.

7. As used in this section, the term "institution of higher education" shall mean any institution of higher education, recognized and approved by the regents of the University of the State of New York, which provides a course of study leading to the granting of a post-secondary degree or diploma. Such term shall not include any institution which is operated, supervised or controlled by a church or by a religious or denominational organization whose educational programs are principally designed for the purpose of training ministers or other religious functionaries or for the purpose of propagating religious doctrines. As used in this section, the term "religious belief" shall mean beliefs associated with any corporation organized and operated exclusively for religious purposes, which is not disqualified for tax exemption under section 501 of the United States Code.

APPENDIX B.9

Notification Under FERPA of Student Rights Concerning Education Records and Directory Information

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. The FERPA rights of students are:

The right to inspect and review your education records.

Students should submit to the registrar, dean, head of the academic department, or other appropriate official, written requests that identify the record(s) they wish to inspect. If the records are not maintained by the college official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

All requests shall be granted or denied in writing within 45 days of receipt. If the request is granted, you will be notified of the time and place where the records may be inspected. If the request is denied or not responded to within the 45 days, you may appeal to the college's FERPA appeals officer. Additional information regarding the appeal procedures will be provided to you if a request is denied.

The right to request the amendment of the student's education records that the student believes are inaccurate or misleading.

You may ask the college to amend a record that you believe is inaccurate or misleading. You should write to the college official responsible for the record, clearly identify the part of the record you want changed, and specify why it is inaccurate or misleading.

If the college decides not to amend the record as requested by you, the college will notify you of the decision and advise you of your right to a hearing before the college's FERPA appeals officer regarding the request for amendment. Additional information regarding the hearing procedures will be provided to you when notified of your right to a hearing.

The right to consent to disclosure of personally identifiable information contained in your education records, except to the extent that FERPA authorizes disclosure without consent.

One exception which permits disclosure without consent is disclosure to college officials with legitimate educational interests. A college official is a person employed by the university in an administrative, supervisory, academic or research, or support staff position; a person or company with whom the university has contracted; a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another college official in performing his or her tasks.

A college official has a legitimate educational interest if access is reasonably necessary in order to perform his or her instructional, research, administrative or other duties and responsibilities.

Upon request, the college discloses education records without consent to officials of another college or school in which the student seeks or intends to enroll.

You may appeal the alleged denial of FERPA rights to the:

General Counsel and Vice Chancellor for Legal Affairs
The City University of New York
535 East 80th Street
New York, NY 10021

The right to file a complaint with the U.S. Department of Education concerning alleged failures by the college to comply with the requirements of FERPA. The name and address of the Office that administers FERPA are:

Family Policy Compliance Office
U.S. Department of Education
600 Independence Avenue, SW
Washington, D.C. 20202-4605

The college will make the following "directory information" concerning current and former students available to those parties having a legitimate interest in the information: name, attendance dates (periods of enrollment), address, telephone number, date and place of birth, photograph, e-mail address, full or part-time status, enrollment status (undergraduate, graduate, etc.), level of education (credits) completed, major field of study, degree enrolled for, participation in officially recognized activities and sports, height and weight of athletic team members, previous school attended, and degrees, honors and awards received. By filing a form with the Registrar's Office, you may request that any or all of this directory information not be released without your prior written consent. This form is available in the Registrar's Office and may be filed, withdrawn, or modified at any time.

APPENDIX B.10

No. 8. A. AMENDMENT TO THE POLICY ON WITHHOLDING STUDENT RECORDS
RESOLVED, That the existing Board of Trustees policy with respect to the withholding of student records as last amended on February 22, 1993, Cal. No. 7.c., be amended as follows:

Students who are delinquent and/or in default in any of their financial accounts with the college, the university or an appropriate state or federal agency for which the university acts as either a disbursing or certifying agent, and students who have not completed exit interviews as required by the Federal Perkins Loan Program, the federal Family Education Loan Programs, the William D. Ford Federal Direct Loan Program, and the Nursing Student Loan Program, are not to be permitted to complete registration, or issued a copy of their grades, a transcript of academic record, certificate, or degree, nor are they to receive funds under the federal campus-based student assistance programs or the federal Pell Grant Program unless the designated officer, in exceptional hardship cases and consistent with federal and state regulations, waives in writing the application of this regulation.

APPENDIX B.11

Freedom of Information Law Notice

Requests to inspect public records at the college should be made to the Registrar Customer Manager, Lucian Pinckney (160 Convent Avenue, Administration Building, Room 102 (212) 650-7850). Public records are available for inspection and copying by appointment only at a location to be designated. You have the right to appeal a denial of a request for access to records to the CUNY General Counsel and Vice Chancellor for Legal Affairs. Copies of the CUNY procedures for Public Access to Public Records Pursuant to Article 6 of the Public Officers Law and the appeal form are available at the reference desk of the library and the college website.

APPENDIX B.12

Special Provisions for Students in the Military

The following policies apply to students who leave CUNY to fulfill military obligations.

I. Students called up to the reserves or drafted before the end of the semester.
Grades. In order to obtain a grade, a student must attend 13 weeks (five weeks for summer session).

Refunds. A student called up to the reserves or drafted who does not attend for sufficient time to qualify for a grade is entitled to a 100% refund of tuition and all other fees except application fees.

II. Students who volunteer (enlist) for the military.
Grades. Same provision as for students called up to the reserves. In order to obtain a grade, a student must attend 13 weeks (five weeks for summer session).

Refunds. The amount of the refund depends upon whether the withdrawal is before the 5th week of classes.

Withdrawal before the beginning of the 5th calendar week (3rd calendar week for summer session): 100% refund of tuition and all other fees except application fees.

Withdrawal thereafter: 50% refund.

III. Other Provisions for Military Service:
Resident Tuition Rates. These lower rates are applicable to all members of the armed services, their spouses and their dependent children, on full-time active duty and stationed in the State of New York.

Re-enrollment of Veterans. Veterans who are returning students are given preferred treatment in the following ways:

Veterans who were former students with unsatisfactory scholastic records, may be readmitted with a probation program.

Veterans, upon their return, may register even after normal registration periods, without late fees.

Granting of college credit for military service and armed forces instructional courses.

Veterans returning too late to register may audit classes without charge.

Late Admissions. Veterans with no previous college experience are permitted to file applications up to the date of registration, and are allowed to begin classes pending completion of their application and provision of supporting documents.

Readmission Fee. Upon return from military service, a student will not be charged a Readmission Fee to register at the same college.

Veterans Tuition Deferrals. Veterans are entitled to defer the payment of tuition pending receipt of veterans' benefits.

New York National Guard Tuition Waivers. Active members of the New York National Guard, who are legal residents of New York State and who do not have a baccalaureate degree, are eligible for a tuition waiver for undergraduate study.

APPENDIX B.13

Notification of Student Immunization Requirements

Students who do not submit proof of measles, mumps and rubella (MMR) immunization or who fail to return the meningococcal meningitis response form within a statutory grace period shall be prohibited from attending the institution. For additional information, you should contact the Wellness and Counseling Center located in the Science Building (MR), Room 15, at the following number (212) 650-8222.

Public Health Law 2165 requires that post-secondary students be immunized against measles, mumps, and rubella (MMR).

All registered full-time students and part-time students born on or after January 1, 1957 who are enrolled for at least six, but fewer than twelve semester hours (or equivalent) per semester in an approved degree program or registered certificate program must submit proof of MMR immunization. Students may be exempt from the required MMR immunizations for religious or medical reasons. To qualify for a religious exception, students must submit a signed statement, or in the event the student is a minor (under 18), a signed statement from their parent or guardian, that they hold sincere and genuine religious beliefs that prohibit immunization. To qualify for medical exception, students must submit a written statement from a licensed physician or nurse practitioner indicating that such immunization may be detrimental to their health.

Public Health Law 2167 requires that post-secondary institutions provide written information about meningococcal meningitis to its students and that students complete, sign, and return a meningococcal meningitis response form. Public Health Law 2167 does not require that students be immunized against meningitis.

Public Health Law 2167 requires colleges to distribute written information about meningococcal meningitis disease and vaccination and students to complete, sign and return to the col-

lege, a meningococcal meningitis response form that: (a) confirms that the college has provided the information about meningococcal meningitis; and (b) indicates that either: (1) the student has received immunization against meningococcal meningitis within the 10 years preceding the date of the response form; or (2) the student has decided against receiving the vaccination. This law applies to students, who are enrolled in at least six semester hours (or the equivalent) per semester. No student may be exempt from receiving information or returning the response form.

APPENDIX B.14

Policy for City College Pages on the World Wide Web WWW PAGES Published by Faculty, Staff and Students

Faculty, staff, and students may create WWW pages for use in their various academic and administrative duties and activities and may install them on City College web servers. The contents of individuals' WWW pages published on the City College web servers must comply with the General Rules on Information Content stated in this policy.

Individuals' WWW pages are not College publications and the contents of these pages do not necessarily represent the views of the College.

Individual departments and administrative units may define additional conditions for the creation and installation of WWW pages by faculty, staff, and students under their supervision. Any such additional conditions must be consistent with this overall policy but may include more detailed guidelines and, where necessary and appropriate, additional restrictions.

Recognized student organizations may create WWW pages and may install them on a City College web server. After verification by a designated member of the Office of the Dean of Students that the student organization is active and officially recognized by the College, a link may be created from an official City College home page to the student organization's home page.

Student organization WWW pages are not College publications and their contents do not necessarily represent the views of the College.

The contents of student organization WWW pages must comply with the General Rules on Information Content stated in this policy.

Terms and Conditions of Use
Any person who uses the WWW facilities at City College consents to all of the provisions of this policy and agrees to comply with all of its terms and conditions and with all applicable local, state, and federal laws and regulations.

Any user of the WWW whose actions involving the WWW violate this, or any other College policy or regulation, may be subject to limitations or eliminations of WWW privileges as well as other disciplinary actions.

APPENDIX B.15

Policy Against Sexual Harassment

Policy Statement
It is the policy of The City University of New York to promote a cooperative work and academic environment in which there exists mutual respect for all University students, faculty, and staff. Harassment of employees or students based upon sex is inconsistent with this objective and contrary to the University policy of equal employment and academic opportunity without regard to age, sex, sexual orientation, alienage or citizenship, religion, race, color, national or ethnic origin, handicap, and veteran or marital status. Sexual harassment is illegal under State, and City laws, and will not be tolerated within the University.

The University, through its colleges, will disseminate this policy and take other steps to educate the University community about sexual harassment. The University will establish procedures to ensure that investigations of allegations of sexual harassment are conducted in a manner that is prompt, fair, thorough, and as confidential as possible under the circumstances, and that appropriate corrective and/or disciplinary action is taken as warranted by the circumstances when sexual harassment is determined to have occurred. Members of the University community who believe themselves to be aggrieved under this policy are strongly encouraged to report the allegations of sexual harassment as promptly as possible. Delay in making a complaint of sexual harassment may make it more difficult for the college to investigate the allegations.

A. Prohibited Conduct
It is a violation of University policy for any member of the University community to engage in sexual harassment or to retaliate against any member of the University community for raising an allegation of sexual harassment, for filing a complaint alleging sexual harassment, or for participating in any proceeding to determine if sexual harassment has occurred.

B. Definition of Sexual Harassment
For purposes of this policy, sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, and other oral or written communications or physical conduct of a sexual nature when:

submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic standing;

submission to or rejection of such conduct by an individual is used as a basis for employment or academic decisions affecting such individual; or

such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile or abusive work or academic environment.

Sexual harassment can occur between individuals of different sexes or of the same sex. Although sexual harassment most often exploits a relationship between individuals of unequal power (such as between faculty/staff member and student, supervisor and employee, or tenured and untenured faculty members), it may also occur between individuals of equal power (such as between fellow students or co-workers), or in some circumstances even where it appears that

the harasser has less power than the individual harassed (for example, a student sexually harassing a faculty member). A lack of intent to harass may be relevant to, but will not be determinative of, whether sexual harassment has occurred.

C. Examples of Sexual Harassment
Sexual harassment may take different forms. Using a person's response to a request for sexual favors as a basis for an academic or employment decision is one form of sexual harassment. Examples of this type of sexual harassment (known as quid pro quo harassment) include, but are not limited to, the following:

requesting or demanding sexual favors in exchange for employment or academic opportunities (such as hiring, promotions, grades, or recommendations);

submitting unfair or inaccurate job or academic evaluations or grades, or denying training, promotion, or access to any other employment or academic opportunity, because sexual advances have been rejected.

Other types of unwelcome conduct of a sexual nature can also constitute sexual harassment, if sufficiently severe or pervasive that the target does find, and a reasonable person would find, that an intimidating, hostile or abusive work or academic environment has been created. Examples of this kind of sexual harassment (known as hostile environment harassment) include, but are not limited to, the following:

sexual comments, teasing, or jokes;

sexual slurs, demeaning epithets, derogatory statements, or other verbal abuse.

APPENDIX B.16

THE CITY UNIVERSITY OF NEW YORK – STUDENT COMPLAINT PROCEDURE

RESOLVED, that the procedures for handling student complaints about faculty conduct in formal academic settings be adopted, effective February 1, 2007.

EXPLANATION: Although the University and its Colleges have a variety of procedures for dealing with student related issues, those procedures generally have not covered student complaints about faculty conduct in the classroom or other formal academic settings. The University respects the academic freedom of the faculty and will not interfere with it as it relates to the content or style of teaching activities. At the same time, however, the University recognizes its responsibility to establish procedures for addressing student complaints about faculty conduct that is not protected by academic freedom and not addressed in other procedures. The proposed procedures will accomplish this goal.

PROCEDURES FOR HANDLING STUDENT COMPLAINTS ABOUT FACULTY CONDUCT IN ACADEMIC SETTINGS

I. Introduction. The University and its Colleges have a variety of procedures for dealing with student-related issues, including grade appeals, academic integrity violations, student discipline, disclosure of student records, student elections, sexual harassment complaints, disability accommodations, and discrimination. One area not generally covered by other procedures concerns student complaints about faculty conduct in the classroom or other formal academic settings. The University respects the academic freedom of the faculty and will not interfere with it as it relates to the content or style of teaching activities. Indeed, academic freedom is and should be of paramount importance. At the same time the University recognizes its responsibility to provide students with a procedure for addressing complaints about faculty treatment of students that are not protected by academic freedom and are not covered by other procedures. Examples might include incompetent or inefficient service, neglect of duty, physical or mental incapacity and conduct unbecoming a member of the staff.

II. Determination of Appropriate Procedure. If students have any question about the applicable procedure to follow for a particular complaint, they should consult with the chief student affairs officer. In particular, the chief student affairs officer should advise a student if some other procedure is applicable to the type of complaint the student has.

III. Informal Resolution. Students are encouraged to attempt to resolve complaints informally with the faculty member or to seek the assistance of the department chairperson or campus ombudsman to facilitate informal resolution.

IV. Formal Complaint. If the student does not pursue informal resolution, or if informal resolution is unsuccessful, the student may file a written complaint with the department chairperson or, if the chairperson is the subject of the complaint, with the academic dean or a senior faculty member designated by the college president. (This person will be referred to below as the "Fact Finder.")

A. The complaint shall be filed within 30 calendar days of the alleged conduct unless there is good cause shown for delay, including but not limited to delay caused by an attempt at informal resolution. The complaint shall be as specific as possible in describing the conduct complained of.

B. The Fact Finder shall promptly send a copy to the faculty member about whom the complaint is made, along with a letter stating that the filing of the complaint does not imply that any wrongdoing has occurred and that a faculty member must not retaliate in any way against a student for having made a complaint. If either the student or the faculty member has reason to believe that the department chairperson may be biased or otherwise unable to deal with the complaint in a fair and objective manner, he or she may submit to the academic dean or the senior faculty member designated by the college president a written request stating the reasons for that belief; if the request appears to have merit, that person may, in his or her sole discretion, replace the department chairperson as the Fact Finder.

C. The Fact Finder shall meet with the complaining student and faculty member, either separately or together, to discuss the complaint and to try to resolve it. The Fact Finder may seek the assistance of the campus ombudsman or other appropriate person to facilitate informal resolution.

D. If resolution is not possible, and the Fact Finder concludes that the facts alleged by the student, taken as true and viewed in the light most favorable to the student, establish that the conduct complained of is clearly protected by academic freedom, he or she shall issue a written report dismissing the complaint and setting forth the reasons for dismissal and send a copy to the complaining student, the faculty member, the chief academic officer and the chief student affairs officer. Otherwise, the Fact Finder shall conduct an investigation. The Fact Finder shall separately interview the complaining student, the faculty member and other persons with relevant knowledge and information and shall also consult with the chief student affairs officer and, if appropriate, the college ombudsman. The Fact Finder shall not reveal the identity of the complaining student and the faculty member to others except to the extent necessary to conduct the investigation. If the Fact Finder believes it would be helpful, he or she may meet again with the student and faculty member after completing the investigation in an effort to resolve the matter. The complaining student and the faculty member shall have the right to have a representative (including a union representative, student government representative or attorney) present during the initial meeting, the interview and any post-investigation meeting.

E. At the end of the investigation, the Fact Finder shall issue a written report setting forth his or her findings and recommendations, with particular focus on whether the conduct in question is protected by academic freedom, and send a copy to the complaining student, the faculty member, the chief academic officer and the chief student affairs officer. In ordinary cases, it is expected that the investigation and written report should be completed within 30 calendar days of the date the complaint was filed.

V. Appeals Procedure. If either the student or the faculty member is not satisfied with the report of the Fact Finder, the student or faculty member may file a written appeal to the chief academic officer within 10 calendar days of receiving the report. The chief academic officer shall convene and serve as the chairperson of an Appeals Committee, which shall also include the chief student affairs officer, two faculty members elected annually by the faculty council or senate and one student elected annually by the student senate. The Appeals Committee shall review the findings and recommendations of the report, with particular focus on whether the conduct in question is protected by academic freedom. The Appeals Committee shall not conduct a new factual investigation or overturn any factual findings contained in the report unless they are clearly erroneous. If the Appeals Committee decides to reverse the Fact Finder in a case where there has not been an investigation because the Fact Finder erroneously found that the alleged conduct was protected by academic freedom, it may remand to the Fact Finder for further proceedings. The committee shall issue a written decision within 20 calendar days of receiving the appeal. A copy of the decision shall be sent to the student, the faculty member, the department chairperson and the president.

VI. Subsequent Action. Following the completion of these procedures, the appropriate college official shall decide the appropriate action, if any, to take. For example, the department chairperson may decide to place a report in the faculty member's personnel file or the president may bring disciplinary charges against the faculty member. Disciplinary charges may also be brought in extremely serious cases even though the college has not completed the entire investigative process described above; in that case, the bringing of disciplinary charges shall automatically suspend that process. Any action taken by a college must comply with the bylaws of the University and the collective bargaining agreement between the University and the Professional Staff Congress.

VII. Campus Implementation. Each campus shall implement these procedures and shall distribute them widely to administrators, faculty members and students and post them on the college website.

VIII. Board Review. During the spring 2009 semester, the Chancellery shall conduct a review of the experience of the colleges with these procedures, including consultation with administrators, faculty and students, and shall report the results of that review to the Board of Trustees, along with any recommended changes.

Appendix C

Section 494C(j) of the Higher Education Act of 1965, as amended, provides that a student, faculty member, or other person who believes he or she has been aggrieved by an institution of higher education has the right to file a written complaint.

In New York State, a complaint may be filed by any person with reason to believe that an institution has acted contrary to its published standards or that conditions at the institution appear to jeopardize the quality of the institution's instructional programs or the general welfare of its students. Any person who believes he or she has been aggrieved by an institution on or after May 4, 1994, may file a written complaint with the State Education Department within three years of the alleged incident.

How to File a Complaint

1. The person should first try to resolve the complaint directly with the institution by following the internal complaint procedures provided by the institution. An institution of higher education is required to publish its internal complaint procedure in a primary information document such as the catalog or student handbook. (The Department suggests that the complainant keep copies of all correspondence with the institution.)

2. If a person is unable to resolve the complaint with the institution or believes that the institution has not properly addressed the concerns, he or she may send a letter or telephone the Postsecondary Complaint Registry to request a complaint form. Please telephone (212) 951-6493 or write to:

New York State Education Department
Postsecondary Complaint Registry
One Park Avenue, 6th Floor
New York, NY 10016

3. The Postsecondary Complaint Registry Form should be completed, signed, and sent to the above address. The completed form should indicate the resolution being sought and any efforts that have been made to resolve the complaint through the institution's internal complaint processes. Copies of all relevant documents should be included.

4. After receiving the completed form, the Department will notify the complainant of its receipt and make any necessary request for further information. When appropriate, the Department will also advise the institution that a complaint has been made and, when appropriate, the nature of the complaint. The complainant will also be notified of the name of the evaluator assigned to address the specific complaint. The evaluator may contact the complainant for additional information.

5. The Department will make every effort to address and resolve complaints within ninety days from receipt of the complaint form.

Complaint Resolution

Some complaints may fall within the jurisdiction of an agency or organization other than the State Education Department. These complaints will be referred to the entity with appropriate jurisdiction. When a complaint concerns a matter that falls solely within the jurisdiction of the institution of higher education, the complainant will be notified and the Department will refer the complaint to the institution in question and request that the matter receive a review and response.

Upon conclusion of the Department's complaint review or upon a disposition of the complaint by referral to another agency or organization, or to the institution of higher education, the Department will issue a written notice to the complainant describing the resolution of the complaint. The complainant may contact the Department evaluator directly for follow-up information or for additional assistance.

Appendix D

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Govind, Shubha Biology
Grace, Cynthia Psychology
Grant, Keith Theatre and Speech
Green, Michael Chemistry
Green, Venus History
Greenberger, Daniel Physics
Greenwood, John D. Philosophy
Gross, Barry M. Electrical Engineering
Grossberg, Michael Computer Science
Grossman, Edward H. Mathematics
Guilhamet, Leon M. English
Gunner, Marilyn Physics
Gupta, Amita Childhood Education
Gutman, Marta Architecture
Guyden, Jerry Biology
Habib, Ibrahim Electrical Engineering
Hacker, Marilyn English
Ham, Ethan Art
Hamilton, Jo-Ann D. English
Handy, Ellen Art
Hanning, Barbara R. Music
Hartman, Hope Leadership and Special Education
Haslip-Viera, Gabriel Sociology
Helgesen, Martin Library
Helmreich, William B. Sociology
Hermanuz, Ghislaine Architecture
Hernandez, Ramona Sociology
Hinton, Laura English
Ho, Ping-Pei Electrical Engineering
Hoffman-Brandt, Denise Architecture
Hoffman, Lily M. Sociology
Holober, Mike Music
Hoobler, Raymond T. Mathematics
Horn, Bradley Architecture
Horvitz, Jon C. Psychology
Hoskins, Sally G. Biology
Hrbacek, Karel Mathematics
Hu, Danian History
Huang, Carol Leadership and Special Education
Hubbard, Karen Biology
Indych, Anna Art
Isaacs, Leslie L. Chemical Engineering
Jablonsky, Stephen Music
James, Catti Art
Janakiraman, Anuradha Biology
Jans, Urs Chemistry
Jeffries, Leonard Political Science
Jenkins, Chadwick Music
Jiji, Latif Mechanical Engineering
John, George Chemistry
Johnson, David History
Johnson, Gretchen Childhood Education
Jorgenson, Jay Mathematics
Judell, Brandon Theatre and Speech
Jurist, Elliot Psychology
Kaku, Michio Physics
Kalia, Ravi History
Kaminetzky, Lee Mathematics
Kassir, Mumtaz K. Civil Engineering
Kawaguchi, Akira Computer Science
Kay, Phillip Media and Communication Arts
Keller, Edward Media and Communication Arts
Kellman, Mitchell H. Economics
Kennedy, Debra SEEK
Kenyon, Patricia Earth and Atmospheric Sciences
Khalil, Mounir A. Library
Khanbilvardi, Reza M. Civil Engineering
Killen, Andreas History
Kornhauser, Anne M. History
Kim, Hongjoon Electrical Engineering
King, William Psychology
Kleyn, Tatiana Childhood Education
Koblick, Rebecca Library
Kolder Ronald Physics
Koplik, Joel Physics
Kopperman, Ralph D. Mathematics
Kowach, Glen Chemistry
Kozel, Paul D. Music
Krakowski, Andrzej Media and Communication Arts
Kranc, George M. Electrical Engineering

Kratka, Amy Foreign Languages and Literature
Kretzschmar, Ilona Chemical Engineering
Krinsky, John Political Science
Kumar, Devendra Computer Science
Laderman, Carol Anthropology
Lakshman, Mahesh Chemistry
Lamboy, Edwin Secondary Education
Landa, Luis Biomedical Engineering
Landau, Zeph Mathematics
Lascar, Claudia Library
Laskin, Pamela English
Laurich, Robert Library
Lazaridis, Themis Chemistry
Leadon, Francis Architecture
Lee, Jae W. Chemical Engineering
Lee, John J. Biology
Lee, Myung J. Electrical Engineering
Lee, Soyoung Childhood Education
Lee, Taehun Mechanical Engineering
Leonhard, Philip Sociology
Lemons, Daniel E. Dean, CWE/Biology
Lenzer, Matthias Physics
Lerner, Bettina Foreign Languages and Literature
Levin, Kate Theatre and Speech
Levin, Michael E. Philosophy
Levinson, Jack Sociology
Levitt, Jonathan R. Biology
Lew, Herman Media and Communication Arts
Li, Christine Biology
Li, Jacqueline Jie Mechanical Engineering
Liaw, Been-Ming B. Mechanical Engineering
Lin, Feng-Bao Civil Engineering
Liu, Huabei Civil Engineering
Llonch, Fabian Architecture
Lombardi, John R. Chemistry
Lopez, Iris D. Sociology
Lu, Zhou Economics
Lubell, Michael Physics
Lucci, Stephen J. Computer Science
Luo, Johnny Earth and Atmospheric Science
Lynch, Arthur D. Psychology
Macari, Hanque Architecture
MacGowan-Gilhooly, Adele Childhood Education
Madamopoulos, Nicholas Electrical Engineering
Mahani, Sheyesteh Civil Engineering
Makse, Hernan Physics
Maldarelli, Charles Chemical Engineering
Malone, Charles Childhood Education
Manassah, Jamal T. Electrical Engineering
Manning, Tanya Secondary Education
Marcus, Jane English
Marcus, Michael B. Mathematics
Marinoff, Louis Philosophy
Matos, Julio Theatre and Speech
Mazzola, Elizabeth English
McCracken, Daniel D. Computer Science
McCrann, Grace-Ellen Library
McDonald, Kathlene Childhood Education
McKnight, Claire E. Civil Engineering
McLurkin, Denis Childhood Education
Melara, Robert Psychology
Mendelsohn, Loren D. Library
Mercado, Juan Carlos Foreign Languages and Literatures
Meriles, Carlos Physics
Miletta, Alexander Childhood Education
Miller, Renata K. English
Milstein, Glen Psychology
Mirsky, Mark English
Mittelman, Roy Foreign Languages and Literatures
Moderegger, Hajoe Art
Morgenstern, Mira Political Science
Morris, Jeffrey Chemical Engineering
Mosenkis, Daniel Mathematics
Moshary, Fred Electrical Engineering
Mowshowitz, Abbe Computer Science
Murphy, Geraldine English
Naddeo, Barbara History
Nagler, Matthew Economics
Nair, V.P. Physics
Nazon, Marie SEEK
Nesmith, Eugene Theatre and Speech
Netzer, Sylvia Art
Neujahr, James L. Childhood Education
Nguyen, Truong Thao Electrical Engineering
Norton, Nadjwa Childhood Education
O'Donnell, Shaugn Music
Ocken, Stanley Mathematics
Oppenheimer, Paul E. English
Oreffice, Sonia Economics
O'Scanlain, Seamus Library
Osin, Denis Mathematics
Paaswell, Robert E. Civil Engineering
Pach, Janos Computer Science
Paik, Leslie Sociology
Paolinio, David Foreign Languages and Literature
Pappas, Nicholas Philosophy
Parker, Neville A. Civil Engineering
Parra, Lucas Biomedical Engineering
Patitucci, John Music
Perl, Jonathan Music
Petricevic, Vladmir Physics
Petty-Roberts, Adrienn History
Pezzano, Mark Biology
Pieslak, Jonathan Music
Pignataro, Thea Mathematics
Pittson, Suzanne Music
Polychronakos, Alexis Physics
Poros, Marista Sociology
Posamentier, Alfred Dean, Education/Secondary Education
Potts, Kathleen Theatre and Speech
Proudfoot, Ruth E. Psychology
Punnoose, Alexander Physics
Raboteau, Emily English
Rader, Laura Leadership and Special Education
Raia, Frederica Earth and Atmospheric Science
Raj, Rishi Mechanical Engineering
Ranalli, George Dean, Architecture/Architecture
Rassi, Babak Media and Communication Arts
Ratner, Andrew Secondary Education
Ravindran, Kaliappa Computer Science
Reeves, Scott Music
Renique, Gerardo History
Reynolds, Fred Dean, Humanities & Arts/English
Rich, Andrew Political Science
Rinard, Irven H. Chemical Engineering
Ring, Rochelle M. Mathematics
Rings, Sherri SEEK
Ro, Tony Psychology
Roberts, Jennifer Foreign Languages and Literatures
Roberts, Sylvia Leadership and Special Education
Rockwell, Robert F. Biology
Rodriguez-Contreras, Adrian Biology
Rorschach, Elizabeth Secondary Education
Rosario, Margaret Psychology
Rosen, Jeffrey J. Psychology
Rosenberg, Clifford History
Ross, George G. Computer Science
Ross, Randolph Secondary Education
Rossow, William Electrical Engineering
Roth, Millicent Psychology
Roytman, Leonid M. Electrical Engineering

Rumschitski, David S. Chemical Engineering
Ryan, Kevin Chemistry
Saadawi, Tarek N. Electrical Engineering
Sadegh, Ali M. Mechanical Engineering
Salame, Issa Chemistry
Salcedo, Julio Architecture
Saleque, Shireen Biology
Saltz, Ina Art
Salwen, Michael Secondary Education
Samad-Matias, M.A. Anthropology
Sank, Diane Anthropology
Sarachik, Myriam P. Physics
Sargut, Gokse Economics
Schaffler, Mitchell Biomedical Engineering
Scheinberg, Norman Electrical Engineering
Schmeltzer, David Physics
Schonfeld, Irvin Psychology
Schuetz, Jenny Economics
Schwinger David Mathematics
Semel, Susan Secondary Education
Senie, Harriet Art
Seo, Sang-Woo Electrical Engineering
Shachmurove, Yochanan Economics
Shattuck, Mark Physics
Shankar, Kameshwari Economics
Shell, Niel Mathematics
Shen, Aidong Electrical Engineering
Shpilrain, Vladimir Mathematics
Silber, Irina InterdisciplinaryArts and Sciences
Silverstein, Brett Dean, Social Science/Psychology
Simms, Simon A. Chemistry
Simon, Lisa Childhood Education
Skeith, William Computer Science
Slade, Arietta Psychology
Small, Gillian Biology
Smiley, Ellen E. Psychology
Smith, Beverly Secondary Education
Smith, Frederick W. Physics
Sobel, Kenneth M. Electrical Engineering
Sorkin, Michael Architecture
Sourian, Eve Foreign Languages and Literatures
Spears, Arthur K. Anthropology
Spielman, Arthur J. Psychology
Staloff, Darren History
Starcevic, Elizabeth Foreign Languages and Literatures
Stark, Ruth Chemistry
Stein, Achva Architecture
Stein, Judith S. History
Steinberg, Mark Chemistry
Steinberg, Richard Secondary Education
Steiner, Carol A. Chemical Engineering
Steiner, Jeffrey Earth and Atmospheric Sciences
Stern, Nancy Childhood Education
Stewart, Charles C. Library
Stober, Marvin Leadership and Special Education
Strycharz, Jennifer Childhood Education
Strzewzewski, Mary Ruth Foreign Languages and Literatures
Stylianou, Despina Secondary Education
Subramaniam, Kolluru Civil Engineering
Sudha, Sharma Biology
Sun, Yi Electrical Engineering
Tag, Nancy Media and Communication Arts
Tamargo, Maria Chemistry
Tang, Hansong Civil Engineering
Tarbell, John Biomedical Engineering
Tardos, Gabriel I. Chemical Engineering
Tarlow, Lynn Secondary Education
Tartter, Vivien Psychology
Taylor, Shea Library
Tchernichovski, Ofer Biology
Tedesco, Marco Earth and Atmospheric Science
Terragni, Elisa Architecture
Thayer, Stephen Psychology
Thayer, Tom Art
Thompson, Gordon E. English
Tian, Yinli Electrical Engineering
Tibaldi, Antonio Media and Communication Arts
Tinajero, Araceli Foreign Languages and Literatures
Troeger, Douglas R. Computer Science
Tu, Jiufeng Physics
Tu, Raymond Chemical Engineering
Tuber, Steven B. Psychology
Uwazurike, Chudi P. Sociology
Uyar, Umit Electrical Engineering
Valdes, Vanessa Foreign Languages and Literature
Valladares, Michelle English
Valle, Jan Childhood Education
Van Nort, Sydney Library
Vazquez, Maribel Biomedical Engineering
Veeser, H. Aram English
Venkatesh, Tadmiri R. Biology
Vietze, Deborah Psychology
Villa, Robin Library
Vitaklov, Sergey A. Physics
Voiculesco, Ioana Mechanical Engineering
Volkmann, Christian Architecture
Vorosmarty, Charles Civil Engineering
Vulis, Michael Computer Science
Wachtel, Paul L. Psychology
Wall, Diana Anthropology
Wall, Edward Childhood Education
Wallace, Michele English
Wallman, Joshua Biology
Walser, Ardie D. Electrical Engineering
Wang, Sihong Biomedical Engineering
Watkins, Charles Mechanical Engineering
Wei, Jie Computer Science
Weiner, Ross Economics
Weinstein, Lissa Psychology
Weintraub, Annette Art
Weintraub, Lee Architecture
Weiss, Andrea Media and Communication Arts
Weissman, David Philosophy
Wilgus, Ann Childhood Education
Williams, Gregory H. President
Williamson, June Architecture
Willinger, David P. Theatre and Speech
Wilner, Joshua English
Winslow, Margaret A. Earth and Atmospheric Sciences
Wittig, Ann Civil Engineering
Wolberg, George Computer Science
Wyner, Yael Secondary Education
Xiao, Jizhong Electrical Engineering
Yali, Ann-Marie Psychology
Yang, Fan Civil Engineering
Yawn, Christopher Leadership and Secondary Education
Yu, Honghui Mechanical Engineering
Yu, Zhonghua Chemistry
Yurkovska, Ellen Library
Zahran, Mohamed Electrical Engineering
Zajc, Barbara Chemistry
Zhang, Pengfei Earth and Atmospheric Sciences
Zhu, Zhigang Computer Science
Zuzolo, Ralph C. Biology

Appendix I

APPROVED GRADUATE DEGREE PROGRAMS

		HEGIS CODE
THE COLLEGE OF LIBERAL ARTS AND SCIENCE		
Art	M.A./M.F.A.	1002.00
Biochemistry	M.A., Ph D.*	0414.00
Biology	M.A., Ph D.*	0401.00
Chemistry	M.A., Ph D.*	1905.00
Creative Writing	M.A./M.F.A.	1507.00
Economics	M.A., B.A./M.A.	2204.00
English	M.A., B.A./M.A.	1501.00
Geology	M.A.	1914.00
History	M.A., B.A./M.A.	2205.00
International Relations	M.A.	2210.00
Language and Literacy	M.A.	1505.00
Management Economics	M.A.	2299.00
Mathematics	M.A., B.A./M.A.	1701.00
Media Arts Production	M.F.A.	1099.00
Mental Health Counseling	M.A.	2104.10
Music	M.A.	1005.00
Physics	M.A.	1902.00
Psychology	M.A., B.A./M.A.	2001.00
Public Administration	M.P.A.	2102.00
Sociology	M.A., B.A./M.A.	2208.00
Spanish	M.A.	1105.00

*Offered jointly by The City College and The City University Graduate School and University Center

		HEGIS CODE
THE SCHOOL OF EDUCATION		
Art Education "K-12"	M.A.	0831.00
Bilingual Childhood Education	M.S.Ed.	0899.00
Bilingual Extension Certificate	Certificate	0899.00
Bilingual Special Education	M.S.Ed.	0808.00
Childhood Education	M.S.Ed., Cert.	0802.00
Early Childhood Education	M.S.Ed., Cert.	0823.00
Educational Theater	M.S.Ed	1007.00
English Education "7-12"	M.A., Adv. Cert.	1501.01
Entry Level Leader	Adv. Cert.	0828.00
Literacy "Birth-6" and "6-12"	M.S.Ed., Adv. Cert.	0830.01
Mathematics Education "7-12"	M.A., Adv. Cert.	1701.01
Mathematics Education 5-9"	M.S.Ed.	0804.03
School Building Leader	M.S.Ed.	0828.00
School District Leader	Adv. Cert.	0827.00
Science Education "7-12"	M.A., Adv. Cert.	0834.00
Science Education "5-9"	M.S.Ed.	0804.04
Social Studies Education "7-12"	M.A., Adv. Cert.	2201.01
Special Education "1-6" and "5-9"	M.S.Ed.	0808.00
Teaching English as a Second Language	M.S.	1508.00
THE SCHOOL OF ENGINEERING		
Biomedical Engineering	M.S., Ph D.	0905.00
Chemical Engineering	M.E., Ph D.	0906.00
Civil Engineering	M.E., Adv. Cert., Ph D.	0908.00
Computer Science	M.S.	0701.00
Electrical Engineering	M.E., Adv. Cert., Ph D.	0909.00
Engineering Management	Adv. Cert.	0913.00
Interdisciplinary Engineering	M.S.	0901.00
Mechanical Engineering	M.E., Ph D.	0910.00
THE SCHOOL OF ARCHITECTURE		
Architecture	M.A., M.Arch	0202.00
Landscape Architecture	M.L.A.	0204.00
Urban Design	M.U.P.	0206.00

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DIRECTIONS TO THE CITY COLLEGE CAMPUS

By Train

IRT #1 local to 137th Street and Broadway, walk up 138th Street three blocks to Convent Avenue.

IND "A" or "D" express or "B" or "C" local to 145th Street and St. Nicholas Avenue, walk west one block to 145th Street and Convent Avenue, then south to 138th Street.

IRT #4 or #5 express or #6 local to 125th Street and Lexington Avenue, change there for the M-100 or M-101 bus to Amsterdam Avenue and 138th Street, walk east one block to Convent Avenue.

Metro North to 125th Street and Park Avenue, change there for the M-100 or M-101 bus to Amsterdam Avenue and 138th Street, walk east one block to Convent Avenue.

Note: City College operates shuttle buses between the campus, The Towers, and the 125th Street (St. Nicholas) as well as between the campus and 145th Street (St. Nicholas) subway station and an off-campus parking garage.

By Bus

M-18 to Amsterdam Avenue and 138th, walk east one block to Convent Avenue (temporary route).

M-4 or M-5 to Broadway and 137th Street, walk up 138th Street three blocks to Convent Avenue.

M-100 or M-101 to Amsterdam Avenue and 138th, walk east one block to Convent Avenue.

M-11 to 135th and Amsterdam Avenue, change to the M-100 or M-101 or walk north to 138th Street, then east one block to Convent Avenue.

BX-19 to 145th and Convent Avenue, walk south on Convent Avenue to 138th Street.

By Car

From the West Side: Westside Highway traveling north, exit at 125th Street, right to Amsterdam Avenue, left to 133rd Street, right one block to Convent Avenue. Traveling south from the George Washington Bridge, exit at 125th Street, first left onto 132nd Street, one block to Broadway, left to 133rd Street, right two blocks to Convent Avenue.

From the East Side: Triborough Bridge to Harlem River Drive, exit at 135th Street to end, turn right on St. Nicholas Avenue, then left onto 141st Street, make left on Convent Avenue to campus.

Parking on Campus

Parking on campus is extremely limited. Parking permits are sold on annual basis. Please check the website: www.ccny.cuny.edu/public_safety/parking.html for complete details.

Notes