ARTICULATION AGREEMENT

between

The Grove School of Engineering
of
The City College
of
The City University of New York

(Earth System Science & Environmental Engineering Program)

and

Mathematics, Engineering and Computer Science Department
of
LaGuardia Community College
of
The City University of New York

May 21, 2013
This agreement is effective upon signature

LaGuardia Community College

Dr. Paul Arcario
Provost, Senior VP of Academic Affairs

Dr. Ann Feibel
Acting Associate Dean of Academic Affairs

Dr. Abderrazak Belkharraz
Chairperson
Mathematics, Engineering and
Computer Sc. Department

Date: 11/13/2013

The City College of New York

Dr. Maurizio Trevisan
Provost

Dr. Joseph Barba
Dean
Grove School of Engineering

Dr. Laurent Mars
Assistant Dean for Undergraduate
Affairs (Acting)
Grove School of Engineering

Dr. Fred Moshary
Director
Earth System Science &
Environmental Engineering Program

Date:
A. INTRODUCTION

LaGuardia Community College (LaGCC) and the Grove School of Engineering (GSoE) of The City College of New York (CCNY) agree to establish a collaborative educational program in the major of Earth System Science & Environmental Engineering (ESE). Participating students will study mathematics and science subjects, along with pre-engineering courses and common engineering and computer science courses at LaGCC. Upon meeting admission requirements stated below, students will enter GSoE to complete the engineering major degree requirements.

Such an articulation agreement is being created with the objective of providing students at LaGCC with the opportunity to study majors that are not available to them at their home institution.

B. ADMISSION AND TRANSFER PROCEDURES

Counseling, admission, and the transfer of students in this cooperative program will be through the application of the following procedures and policies. Failure to comply with any of the following procedures or policies may result in denial of admission to GSoE.

1. Results from aptitude and achievement tests, records of scholastic achievement, and other pertinent information will be exchanged between institutions to aid both in guiding and in counseling prospective and admitted students. CCNY will provide LaGCC with copies of curriculum planning guides used by advisors at CCNY for each GSoE major.

2. LaGCC is responsible for informing students of the requirements for admission to CCNY’s GSoE and is encouraged to provide each student with a copy of this agreement. Students should also be made aware of the courses offered by LaGCC that can be used to meet graduation requirements in GSoE degree programs (not limited to ESE).

3. LaGCC students become eligible for transfer to GSoE as soon as they have met the following requirements for admission to GSoE.

   a. Satisfied all of the GSOE freshman admission requirements;
   b. Achieved a minimum overall GPA of 2.7 in his/her college courses;
   c. Achieved a minimum 2.5 GPA in college math and science courses, with none of these grades below C;
   d. Passed calculus;
   e. Demonstrated proficiency, evidenced by his/her transcript, in math and science; and
   f. Completed 24 or more college-level credits.

CCNY requires two semesters of calculus (Math 20100 & Math 20200). The math and science GPA is calculated using physics, chemistry and biology courses, and math courses at the precalculus level and above; and proficiency in science must be
demonstrated by completion of a calculus-based general physics course, which at CCNY is Physics 20700.

The cumulative GPA used to determine eligibility for an engineering major will be calculated by the method used at CCNY.

2. Students should submit an online application to the CUNY Admission Office (cuny.edu) by the admission deadline. Application deadline for the Fall and Spring semesters at CCNY are January 1st and September 1st, respectively.

3. The LaGCC program coordinator shall provide the GSoE’s Office of Undergraduate Affairs with the following documents for each student who has applied to CCNY:
   a. A copy of the official LaGCC transcript, showing all grades earned.
   b. List of courses in progress if not shown on transcript

C. AGREEMENT

1. Each school agrees to work together to develop and maintain an articulation agreement that will produce highly skilled engineers.

2. The articulation agreement will be assessed and evaluated by the two schools at least once every 12 months with the goal of keeping the agreement in line with the accreditation requirements and mission of each individual school.

3. Each school will be responsible for notifying the other of any curriculum changes – for example the removal or addition of courses and requisites - that may impact the articulation agreement.

4. Should a change in a school’s mission or accreditation requirements cause it to change its curriculum such that it conflicts with the articulation agreement and a mutual agreement cannot be made between the two schools, the last version of the curriculum (section D) of the articulation agreement will be honored for a period of 12 months after which time the agreement will become null.

5. Both colleges must publicize the agreement in the appropriate college publications and bulletins.

4 Updated 5/21/2013
D. CURRICULUM

Table 1. Core courses to be taken at LaGCC by students wishing to transfer to CCNY’s GSoE.

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Cr</th>
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<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSM024</td>
<td>New Student Seminar/Engineering</td>
<td>0</td>
<td>NSS 10000</td>
<td>New Freshman Seminar</td>
<td>0</td>
</tr>
<tr>
<td>SSN 187</td>
<td>Urban Sociology</td>
<td>3</td>
<td>SOC 25100</td>
<td>Urban Sociology</td>
<td>3</td>
</tr>
<tr>
<td>HUA 101</td>
<td>Select any two of the following:</td>
<td></td>
<td>ART 10000</td>
<td>Select any two of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction to Art</td>
<td>6</td>
<td>MUS10100</td>
<td>Intro to Visual Arts</td>
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</tr>
<tr>
<td>HUM 101</td>
<td>Introduction to Music</td>
<td>6</td>
<td>PSY 10200</td>
<td>Introduction to Music</td>
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<td>SSY 101</td>
<td>General Psychology</td>
<td>6</td>
<td>PHIL 30800</td>
<td>Applications of Psychology in MW</td>
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<td>HUP104</td>
<td>Ethics and Moral Issues</td>
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<td>Ethics</td>
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<td>ENG101</td>
<td>Composition I</td>
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<td>Eng 11000</td>
<td>Freshman Composition</td>
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<td>ENG 259</td>
<td>Technical Writing</td>
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<td>Eng 21007</td>
<td>Writing for Engineering</td>
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<td>SCC201</td>
<td>Chemistry 1(3L, 1R, 2Lb)</td>
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<td>Chem 10301</td>
<td>General Chemistry I</td>
<td>4</td>
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<tr>
<td>SCC202</td>
<td>Chemistry 2(3L, 1R, 2Lb)</td>
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<td>Chem 10401</td>
<td>General Chemistry II</td>
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<td>SCP231</td>
<td>General Physics</td>
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<td>General Physics I</td>
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<td>SCP232</td>
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<td>Phys 20800</td>
<td>General Physics II</td>
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<td>MAT201*</td>
<td>Calculus I</td>
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<td>Calculus I</td>
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<td>MAT202*</td>
<td>Calculus II</td>
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<td>Calculus II</td>
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<td>MAT203</td>
<td>Calculus III</td>
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<td>Math 20300</td>
<td>Calculus III</td>
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<tr>
<td>MAT204*</td>
<td>Differential Equations</td>
<td>4</td>
<td>Math 39100</td>
<td>Differential Equations</td>
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<tr>
<td>MAT212</td>
<td>Linear Algebra &amp; Vector Analysis</td>
<td>3</td>
<td>Math 39200</td>
<td>Lin. Algebra &amp; Vector Anal.</td>
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</table>

**Total General Education Credits at LaGCC** 50  **Total General Education Credits Granted at CCNY** 47

* These math courses add up to 12 credit at LaGCC, while at CCNY they add up to only 9 credits

Updated 5/21/2013
Table 2. Major-specific courses to be taken at LaGCC by students wishing to transfer to CCNY’s GSoE.

<table>
<thead>
<tr>
<th>LaGuardia Community college</th>
<th>CITY College Equivalent</th>
<th>Cr. Granted</th>
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<tbody>
<tr>
<td><strong>Core Requirements</strong></td>
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</tr>
<tr>
<td>Course</td>
<td>Description</td>
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<td>CPP 024</td>
<td>COOP Prep for Eng. Science</td>
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<tr>
<td>MAE 101</td>
<td>Engineering Lab. 1/Internship I</td>
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<tr>
<td>MAE 213</td>
<td>Electrical Circuits</td>
<td>3</td>
</tr>
<tr>
<td>MAC 102</td>
<td>Advanced C/C++ Programming</td>
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</tr>
<tr>
<td>MAE 106**</td>
<td>Earth System Science &amp; Eng.</td>
<td>4</td>
</tr>
<tr>
<td>MAE 217**</td>
<td>Systems Analysis of the Earth</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Major Requirement Credits at LaGCC</strong></td>
<td>15</td>
<td><strong>Total Major Requirement Credits Granted</strong></td>
</tr>
</tbody>
</table>

TOTAL NUMBER OF LAGCC CREDITS TRANSFERRED TO CITY COLLEGE 62
TOTAL ADDITIONAL UPPER DIVISION CREDITS TO BE COMPLETED AT CITY COLLEGE 65
TOTAL CREDITS 127

** Course has not yet been fully articulated by CCNY faculty
Table 3. Recommended sequence of courses to be taken at CCNY. Adherence to this sequence will enable students to complete their degree requirements within 2 years of transferring to CCNY. Other sequences may require additional time spent at CCNY. See most recent curriculum sheet for details.

<table>
<thead>
<tr>
<th>LAGUARDIA CC</th>
<th>CCNY - ESE</th>
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<tbody>
<tr>
<td>YEAR 3 - SEMESTER 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENGR 10300: Analysis Tools for Engineers</td>
</tr>
<tr>
<td></td>
<td>ME 35600: Fluid Mechanics</td>
</tr>
<tr>
<td></td>
<td>CE 26400: CE Data Analysis</td>
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<tr>
<td></td>
<td>ENGR 23000: Thermodynamics</td>
</tr>
<tr>
<td></td>
<td>BIO 10100: Foundations of Biology I</td>
</tr>
<tr>
<td></td>
<td>Liberal Arts</td>
</tr>
<tr>
<td></td>
<td><strong>Total/semester</strong></td>
</tr>
<tr>
<td>YEAR 3 - SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ME 43000: Thermal Sys. Anal</td>
</tr>
<tr>
<td></td>
<td>Technical Elective I</td>
</tr>
<tr>
<td></td>
<td>ENGR 30100: Intro to Remote Sensing</td>
</tr>
<tr>
<td></td>
<td>ENGR 59910: Geographic Information Sci</td>
</tr>
<tr>
<td></td>
<td>Liberal Arts</td>
</tr>
<tr>
<td></td>
<td><strong>Total/semester</strong></td>
</tr>
<tr>
<td>YEAR 4 - SEMESTER 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CE 365000: Hydraulics &amp; Hydrology</td>
</tr>
<tr>
<td></td>
<td>CE 37200: Environmental Impact Analysis</td>
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<tr>
<td></td>
<td>ENGR 59869: ESE Design I</td>
</tr>
<tr>
<td></td>
<td>Technical Elective II and III</td>
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<tr>
<td></td>
<td>Liberal Arts</td>
</tr>
<tr>
<td></td>
<td><strong>Total/semester</strong></td>
</tr>
<tr>
<td>YEAR 4 - SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENGR 59870: ESE Design II</td>
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<tr>
<td></td>
<td>CE 47400: Environmental Engineering</td>
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<tr>
<td></td>
<td>Technical Elective IV</td>
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<tr>
<td></td>
<td>Technical Electives V and VI</td>
</tr>
<tr>
<td></td>
<td><strong>Total/semester</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
</tr>
</tbody>
</table>
Table 4. List of technical electives. A minimum of three of the six technical electives must be in engineering. All electives must be approved by an advisor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE 34200</td>
<td>Transport Phenomena II</td>
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<tr>
<td>CE 40100</td>
<td>Fundamentals of Engineering</td>
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<tr>
<td>CE 45100</td>
<td>Environ. Water Resources</td>
<td>3</td>
</tr>
<tr>
<td>CE 57100</td>
<td>Water Quality Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EE 20500</td>
<td>Linear System Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>EE 31100</td>
<td>Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EE 33000</td>
<td>Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>EE 35700</td>
<td>Electrical Power</td>
<td>3</td>
</tr>
<tr>
<td>EE 42800</td>
<td>Photonics Lab</td>
<td>1</td>
</tr>
<tr>
<td>EE 45500</td>
<td>Elements of Power Sys</td>
<td>3</td>
</tr>
<tr>
<td>EE 46200</td>
<td>Photonics Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ME 32200</td>
<td>Computer Methods in Engr</td>
<td>3</td>
</tr>
<tr>
<td>ME 43300</td>
<td>Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>ME 47100</td>
<td>Energy Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 53600</td>
<td>Energy Conversion</td>
<td>3</td>
</tr>
<tr>
<td>ME 54700</td>
<td>Environmental Control</td>
<td>3</td>
</tr>
<tr>
<td>ME 55600</td>
<td>Advanced Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 53700</td>
<td>Turbomachinery Design</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55400</td>
<td>Reactor Physics and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55500</td>
<td>Reactor Thermal Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55600</td>
<td>Nuclear Reactor Design, Operation and Safety</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 59950</td>
<td>Special Topics in Earth System and Env. Eng</td>
<td>3</td>
</tr>
<tr>
<td>Engr 5110X</td>
<td>Spec Projects in ESE</td>
<td>3</td>
</tr>
<tr>
<td>Engr 55680</td>
<td>Special Topics in RS</td>
<td>3</td>
</tr>
<tr>
<td>Engr 59803</td>
<td>Industrial Ecology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 30800</td>
<td>Earth Syst Mod/Databases</td>
<td>3</td>
</tr>
<tr>
<td>EAS 31700</td>
<td>Satellite Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 31800</td>
<td>Fundamentals of Atmos Sci</td>
<td>3</td>
</tr>
<tr>
<td>EAS 32800</td>
<td>Global Hazards</td>
<td>3</td>
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<tr>
<td>EAS 41300</td>
<td>Environmental Geochem</td>
<td>3</td>
</tr>
<tr>
<td>EAS 43900</td>
<td>Mineral/Energy Resources</td>
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</tr>
<tr>
<td>EAS 48800</td>
<td>Climate Change</td>
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</tr>
<tr>
<td>EAS 56100</td>
<td>Geophysics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 44600</td>
<td>Ground Water Hydro</td>
<td>3</td>
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<tr>
<td>Chem 24300</td>
<td>Quant Analysis</td>
<td>3</td>
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<tr>
<td>Chem 26100</td>
<td>Organic Chemistry I</td>
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<td>Chem 26300</td>
<td>Organic Chemistry II</td>
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<td>Chem 33100</td>
<td>Physical Chemistry Lab I</td>
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<tr>
<td>Chem 33200</td>
<td>Physical Chemistry II</td>
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<td>Chem 40600/01</td>
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<td>Course</td>
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<td>-----------------------------</td>
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<tr>
<td>Chem 40700</td>
<td>Environ Organic Chem</td>
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<td>Chem 43400</td>
<td>PChem &amp; Chem Instr Lab</td>
<td>2</td>
</tr>
<tr>
<td>Phys 32100</td>
<td>Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 32300</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 45200</td>
<td>Optics</td>
<td>3</td>
</tr>
</tbody>
</table>

**General Education/Liberal Arts electives**

ESE students must take six approved courses for a total of 18 credits of which at least 6 credits must be at the 20000 level or higher. A list of approved courses is posted on the School of Engineering web site at [http://www.ccny.cuny.edu/engineering/genreq.html](http://www.ccny.cuny.edu/engineering/genreq.html). Each course falls into one or more general education clusters, specified in the list. The six courses must collectively occupy at least three clusters. The four clusters are: (f) Professional and Ethical Responsibilities, (g) Communication, (h) Global and Societal Context, and (j) Contemporary Issues. Engr 27600 (Engineering Economics) is an accepted 20000 level course.

Transferability of liberal arts courses between LaGCC and CCNY can be viewed online on CUNY TIPPS: [http://tipps.cuny.edu](http://tipps.cuny.edu)
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Mathematics, Engineering and Computer Science Department of
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September 23, 2013

ADDENDUM

LaGCC-CCNY ESE Articulation Agreement ADDENDUM

October 1, 2013
LaGuardia Community College

Dr. Abderrazak Belkharraz
Chairperson
Mathematics, Engineering and Computer Sc. Department

Date:

CCNY Grove School of Engineering

Dr. Laurent Mars
Assistant Dean for Undergraduate Affairs (Acting)
Grove School of Engineering

Dr. Fred Moshary
Director
Earth System Science & Environmental Engineering Program

Date: 10/1/2013

LaGCC-CCNY ESE Articulation Agreement ADDENDUM

October 1, 2013
CURRICULUM

Following a meeting on September 18, 2013, both LaGCC and CCNY School of Engineering agree to revise the curriculum as follows.

Table 1. Core courses to be taken at LaGCC by students wishing to transfer to CCNY’s GSoE.

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<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>SCC 202</td>
<td>Chemistry 2(3L, 1R, 2Lb)</td>
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<td>Chem 10401</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>SCP 231</td>
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<td>4</td>
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<td>General Physics I</td>
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<td>Phys 20800</td>
<td>General Physics II</td>
<td>4</td>
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<td>MAT 201*</td>
<td>Calculus I</td>
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<td>Math 20100</td>
<td>Calculus I</td>
<td>3</td>
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<tr>
<td>MAT 202*</td>
<td>Calculus II</td>
<td>4</td>
<td>Math 20200</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MAT 203</td>
<td>Calculus III</td>
<td>4</td>
<td>Math 20300</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MAT 204*</td>
<td>Differential Equations</td>
<td>4</td>
<td>Math 39100</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total General Education Credits at LaGCC** | **47** | **Total General Education Credits Granted at CCNY** | **44**

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* These math courses add up to 12 credit at LaGCC, while at CCNY they add up to only 9 credits

Table 2. Major-specific courses to be taken at LaGCC by students wishing to transfer to CCNY’s GSoE.

<table>
<thead>
<tr>
<th>LaGuardia Community College</th>
<th>CITY College Equivalent</th>
<th>Cr. Granted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course</strong></td>
<td><strong>Description</strong></td>
<td><strong>Cr</strong></td>
</tr>
<tr>
<td>CPP 024</td>
<td>COOP Prep for Eng. Science</td>
<td>0</td>
</tr>
<tr>
<td>MAE 101</td>
<td>Engineering Lab. 1/Internship I</td>
<td>1</td>
</tr>
<tr>
<td>MAE 213</td>
<td>Electrical Circuits</td>
<td>3</td>
</tr>
<tr>
<td>MAC 102</td>
<td>Advanced C/C++ Programming</td>
<td>3</td>
</tr>
<tr>
<td>MAE 106**</td>
<td>Earth System Science &amp; Eng.</td>
<td>4</td>
</tr>
<tr>
<td>MAE 217**</td>
<td>Systems Analysis of the Earth</td>
<td>4</td>
</tr>
<tr>
<td>Total Major Requirement Credits at LaGCC</td>
<td>15</td>
<td>Total Major Requirement Credits Granted</td>
</tr>
</tbody>
</table>

TOTAL NUMBER OF LAGCC CREDITS TRANSFERRED TO CITY COLLEGE 59

TOTAL ADDITIONAL UPPER DIVISION CREDITS TO BE COMPLETED AT CITY COLLEGE 68

TOTAL CREDITS 127

** Course has not yet been fully articulated by CCNY faculty
Table 3. Recommended sequence of courses to be taken at CCNY. Adherence to this sequence will enable students to complete their degree requirements within 2 years of transferring to CCNY. Other sequences may require additional time spent at CCNY. See most recent curriculum sheet for details.

<table>
<thead>
<tr>
<th>LAGUARDIA CC</th>
<th>CCNY - ESE</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 3 - SEMESTER 1</td>
<td></td>
</tr>
<tr>
<td>ENGR 10300: Analysis Tools for Engineers</td>
<td>2</td>
</tr>
<tr>
<td>ME 35600: Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CE 26400: CE Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 23000: Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Math 39200: Linear Algebra &amp; Vector Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total/semester</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td>YEAR 3 - SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td>BIO 10100: Foundations of Biology I</td>
<td>4</td>
</tr>
<tr>
<td>ME 43000: Thermal Sys. Anal</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective I</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 30100: Intro to Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 59910: Geographic Information Sci</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total/semester</strong></td>
<td><strong>16</strong></td>
</tr>
<tr>
<td>YEAR 4 - SEMESTER 1</td>
<td></td>
</tr>
<tr>
<td>CE 365000: Hydraulics &amp; Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CE 37200: Environmental Impact Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 59869: ESE Design I</td>
<td>2</td>
</tr>
<tr>
<td>Technical Elective II and III</td>
<td>6</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total/semester</strong></td>
<td><strong>17</strong></td>
</tr>
<tr>
<td>YEAR 4 - SEMESTER 2</td>
<td></td>
</tr>
<tr>
<td>ENGR 59870: ESE Design II</td>
<td>3</td>
</tr>
<tr>
<td>CE 47400: Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective IV</td>
<td>3</td>
</tr>
<tr>
<td>Technical Electives V and VI</td>
<td>6</td>
</tr>
<tr>
<td>Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total/semester</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>68</strong></td>
</tr>
</tbody>
</table>

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Table 4. List of technical electives. A minimum of three of the six technical electives must be in engineering. All electives must be approved by an advisor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE 34200</td>
<td>Transport Phenomena II</td>
<td>3</td>
</tr>
<tr>
<td>CE 40100</td>
<td>Fundamentals of Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE 45100</td>
<td>Environ. Water Resources</td>
<td>3</td>
</tr>
<tr>
<td>CE 57100</td>
<td>Water Quality Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EE 20500</td>
<td>Linear System Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>EE 31100</td>
<td>Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EE 33000</td>
<td>Electromagnetics</td>
<td>3</td>
</tr>
<tr>
<td>EE 35700</td>
<td>Electrical Power</td>
<td>3</td>
</tr>
<tr>
<td>EE 42800</td>
<td>Photonics Lab</td>
<td>1</td>
</tr>
<tr>
<td>EE 45500</td>
<td>Elements of Power Sys</td>
<td>3</td>
</tr>
<tr>
<td>EE 46200</td>
<td>Photonics Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ME 32200</td>
<td>Computer Methods in Engr</td>
<td>3</td>
</tr>
<tr>
<td>ME 43300</td>
<td>Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>ME 47100</td>
<td>Energy Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>ME 53600</td>
<td>Energy Conversion</td>
<td>3</td>
</tr>
<tr>
<td>ME 54700</td>
<td>Environmental Control</td>
<td>3</td>
</tr>
<tr>
<td>ME 55600</td>
<td>Advanced Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 55700</td>
<td>Turbomachinery Design</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55400</td>
<td>Reactor Physics and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55500</td>
<td>Reactor Thermal Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 55600</td>
<td>Nuclear Reactor Design, Operation and Safety</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 59950</td>
<td>Special Topics in Earth System and Env. Eng</td>
<td>3</td>
</tr>
<tr>
<td>Engr 5110X</td>
<td>Spec Projects in ESE</td>
<td>3</td>
</tr>
<tr>
<td>Engr 55680</td>
<td>Special Topics in RS</td>
<td>3</td>
</tr>
<tr>
<td>Engr 59803</td>
<td>Industrial Ecology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 30800</td>
<td>Earth Syst Mod/Databases</td>
<td>3</td>
</tr>
<tr>
<td>EAS 31700</td>
<td>Satellite Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>EAS 31800</td>
<td>Fundamentals of Atmos Sci</td>
<td>3</td>
</tr>
<tr>
<td>EAS 32800</td>
<td>Global Hazards</td>
<td>3</td>
</tr>
<tr>
<td>EAS 41300</td>
<td>Environmental Geochem</td>
<td>3</td>
</tr>
<tr>
<td>EAS 43900</td>
<td>Mineral/Energy Resources</td>
<td>3</td>
</tr>
<tr>
<td>EAS 48800</td>
<td>Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>EAS 56100</td>
<td>Geophysics</td>
<td>3</td>
</tr>
<tr>
<td>EAS 44600</td>
<td>Ground Water Hydro</td>
<td>3</td>
</tr>
<tr>
<td>Chem 24300</td>
<td>Quant Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Chem 26100</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>Chem 26300</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>Chem 27200</td>
<td>Organic Chemistry Lab</td>
<td>2</td>
</tr>
<tr>
<td>Chem 33100</td>
<td>Physical Chemistry Lab I</td>
<td>2</td>
</tr>
<tr>
<td>Chem 33200</td>
<td>Physical Chemistry II</td>
<td>3</td>
</tr>
</tbody>
</table>

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October 1, 2013
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 40600/01</td>
<td>Environmental Chem.</td>
<td>3</td>
</tr>
<tr>
<td>Chem 40700</td>
<td>Environ Organic Chem</td>
<td>3</td>
</tr>
<tr>
<td>Chem 43400</td>
<td>PChem &amp; Chem Instr Lab</td>
<td>2</td>
</tr>
<tr>
<td>Phys 32100</td>
<td>Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 32300</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Phys 45200</td>
<td>Optics</td>
<td>3</td>
</tr>
</tbody>
</table>

**General Education/Liberal Arts electives**

ESE students must take six approved courses for a total of 18 credits of which at least 6 credits must be at the 20000 level or higher. A list of approved courses is posted on the School of Engineering website at [http://www.ccny.cuny.edu/engineering/genreq.html](http://www.ccny.cuny.edu/engineering/genreq.html). Each course falls into one or more general education clusters, specified in the list. The six courses must collectively occupy at least three clusters. The four clusters are: (f) Professional and Ethical Responsibilities, (g) Communication, (h) Global and Societal Context, and (j) Contemporary Issues. Engr 27600 (Engineering Economics) is an accepted 20000 level course.

Transferability of liberal arts courses between LaGCC and CCNY can be viewed online on CUNY TIPPS: [http://tipps.cuny.edu](http://tipps.cuny.edu)