CIVIL & ENVIRONMENTAL ENGINEERING PROGRAM
Civil engineers are involved in providing the physical infrastructure that supports civilization, including shelter, transportation, water supply and waste disposal and/or recycling. Constructed facilities, their planning, analysis, design, construction, maintenance and operation, are the forte...
of civil engineering. Civil engineers use computational tools, engineered and natural materials and human creativity to design, construct and maintain the physical infrastructure, which supports the quality of life of the Earth’s population.

For the individual who has a strong interest in innovative planning, design and construction, civil engineering offers far ranging opportunities for applying knowledge and creativity in making the world a better place to live.

Students in civil engineering study the two year common core curriculum in engineering, followed by core civil engineering courses in structural engineering, geotechnical engineering, transportation engineering and environmental engineering. These courses are supplemented by elective concentrations in any one of the sub-areas listed above, as well as in the area of construction engineering in cooperation with the School of Architecture.

The Environmental Engineering program brings together dedicated people to study and work on the pressing environmental issues of our time. We prepare students for environmental careers in consulting engineering practice, private industry, national and international research laboratories, government agencies and academia, as well as in many cross-disciplinary areas of engineering, science and public policy. The department maintains close ties with people and organizations in all these career venues through an active research agenda and a vibrant alumni community. Student needs and career objectives are met through a well-crafted, rigorous, and interdisciplinary curriculum that stresses hands-on learning, grounding in fundamentals, and practical experience.

Our long-standing tradition of education in environmental problem solving at Rensselaer spans from the pioneering work on water analysis by William Pitt Mason in the later 1800's to the visionary environmental engineering ideas of Edward J. Kilcawley who introduced environmental engineering as an option in the mid-1940's and as a degree program in the mid-1950's. In addition to the Department of Civil and Environmental Engineering, there are faculty members with teaching and research interests in environmental problem solving in the Departments of Biology, Chemical Engineering, Chemistry, Earth and Environmental Sciences and Applied Math.

There are 14 regular faculty in civil and environmental engineering, with doctorates from internationally recognized programs. Many of the faculty have extensive practical experience, and all are determined to prepare our students for the challenges of civil and environmental engineering careers.

Work and Research Opportunities: There are numerous opportunities for summer employment in the design and construction industries, as well as in co-op assignments. Many of our students take the opportunity to participate in on-campus undergraduate research projects with our faculty.

Graduate Programs: The Department offers graduate opportunities leading to master of science and master of engineering degrees and doctor of philosophy and doctor of engineering degrees in civil engineering, environmental engineering and transportation engineering.

Employment Opportunities: Opportunities for employment are found in both private companies and public, state and federal agencies. Many of our students work in engineering design firms
and agencies and in the construction industry, one of the largest segments of our national economy.

Contact List for CEE

Department Head: Chris Letchford, DPhil (Oxf) letchc@rpi.edu JEC 4052

Associate Head for Academic Affairs: Michael O’Rourke, Ph.D. orourm@rpi.edu JEC 4046

Administrative Staff: Graduate Admissions: Kim Boyce boycek@rpi.edu JEC 4049
General Links:

Advising and Learning Assistance Center:  http://alac.rpi.edu/setup.do
Career Development Center:  http://www.rpi.edu/dept/cdc/
Co-Op / Internships:  http://www.rpi.edu/dept/cdc/students/experience/coop/index.html
Course Catalog:  http://www.rpi.edu/academics/catalog/
International Programs:  http://undergrad.rpi.edu/update.do?catcenterkey=81
Registrar Forms:  http://srfs.rpi.edu/update.do?catcenterkey=29
Student Information System:  http://sis.rpi.edu/
Undergraduate Research Program:  http://www.rpi.edu/dept/cct/apps/undergrad/resources/PDFs/URP_Application_2010.pdf

Civil Engineering Educational Objectives

1. Prepare students to be involved, global citizens with a broad appreciation of the key civil engineering issues and challenges of the 21st Century.
2. Provide students with the technical background needed for the practice of civil engineering and to ensure their competence and literacy in both problem identification and problem solving, including design.
3. Prepare students for leadership in the profession, including civil engineering practice, societal activities, research, licensing, and ethics.
4. Provide students with a broad educational base, including a foundation in math, science, and engineering and exposure to the humanities and social sciences that prepares them for life-long learning.
5. Prepare students to thrive in the modern workplace and the public forums of civil engineering practice through the development of leadership, teamwork, and communication skills.

Undergraduate concentrations include construction, environmental, geotechnical, structural, and transportation engineering. Following the sample four-year schedule is the recommended collection of courses for each of these concentrations.

Environmental Engineering Educational Objectives

While certain objectives of an undergraduate education in engineering are common to all programs, there are subtle but important differences depending upon the student’s chosen field. In this regard, Environmental Engineering baccalaureate will:

1. Prepare students to be involved global citizens with a broad appreciation of the key environmental issues and challenges of the 21st Century.
2. Provide students with a broad educational base, including a foundation in math, science, and engineering and exposure to the humanities and social sciences that will prepare them for lifelong learning.

3. Provide students with the technical background needed for the practice of environmental engineering and to insure their competence and literacy in both problem identification and solving, including design.

4. Prepare students for professional engineering practice, including professional licensing, with awareness of the importance of personal and professional ethics.

5. Prepare students to thrive in the modern workplace and the public forums of environmental engineering practice through the development of leadership, teamwork, and communication skills.

The Rensselaer bachelor’s program in environmental engineering builds upon a broad base of studies in chemistry, life sciences, and engineering sciences culminating in a uniquely structured course sequence. This sequence of courses, as shown on page 22, is designed around the unit operations and transport processes concepts, together with integrated laboratory theory courses. It culminates in senior design courses. This structure presents a unified educational experience in environmental engineering. A minimum of 128 credit hours is required for this curriculum.

CIVIL AND ENVIRONMENTAL ENGINEERING FACULTY

CIVIL ENGINEERING

Tarek Abdoun, Professor
(Geotechnical Engineering)
JEC 4002

Jeff Ban, Assistant Professor
(Transportation)

518-276-6544
email: abdout@rpi.edu
Ricardo Dobry, Professor  
(Geotechnical Engineering)  
JEC 4034  
518-276-6934  
email: dobryr@rpi.edu

Xioakun (Cara) Wang  
Assistant Professor  
(Transportation Engineering)  
JEC 4032  
518-276-2098  
email: wanx19@rpi.edu

Jose Holguin-Veras, Professor  
(Transportation)  
JEC 4030  
518-276-6331  
email: jhv@rpi.edu

Mourad Zeghal, Associate Professor  
(Geotechnical Engineering)  
JEC 4028  
518-276-2836  
email: zeghal@rpi.edu

Chris Letchford, Professor  
(Wind Engineering)  
JEC 4049  
518-276-6362  
email: letchc@rpi.edu

Thomas Zimmie, Professor  
(Geotechnical Engineering)  
JEC 4038  
518-276-6939  
email: zimmmit@rpi.edu

Michael O’Rourke, Professor  
(Structural Engineering)  
JEC 4046  
518-276-6933  
email: orourm@rpi.edu

Michael Symans, Associate Professor  
(Structural Engineering)  
JEC 4044  
518-276-6938  
email: symans@rpi.edu

ENVIRONMENTAL FACULTY

John Reilly, Professor of Practice  
(Transportation Engineering)  
JEC 4024  
518-276-6033  
email: reillj2@rpi.edu

Philippe Baveye, Professor  
Kodak Chair  
(Environmental Engineering)  
JEC 4040  
518-276-3933  
Email: baveyp@rpi.edu

David Rosowsky, Professor  
(Dean of School of Engineering)  
JEC 3004  
518-276-6298  
(Secretary Line) - Audrey Larkin-Zurlo

James Kilduff, Associate Professor  
(Environmental Engineering)  
JEC 4022  
518-276-2042  
email: kilduff@rpi.edu
Marianne Nyman, Associate Professor  
(Environmental Engineering)  
JEC 4042  
518-276-2268  
email: nymanm@rpi.edu

Venkata Ramana Gadhamshetty, Lecturer  
(Environmental Engineering)  
MRC 315  
518-276-6417  
Email: gadhav@rpi.edu

**JOINT APPOINTMENTS**

Mark Shephard, Professor  
Center Director, SCOREC  
(Mechanical Engineering)  
CII 7017, 518-276-6795  
email: shephard@scorec.rpi.edu

William A. Wallace, Professor  
(DSES), CII 5117  
518-276-6854  
email: wallaw@rpi.edu

**ADJUNCT APPOINTMENTS**

**STRUCTURES**  
Mr. James Dall

**GEOTECHNICAL**  
Dr. Carsten Floess

**ENVIRONMENTAL**  
Mr. Gregg Daviero
Responsibilities

Student's responsibilities

• To know their advisor's office hours and advising schedule.
• To make an appointment and prepare for registration advising by reviewing the Catalog, Class-Hour Schedule, and the students Curriculum Advising & Program Planning (CAPP) report.
• To formulate questions regarding curriculum, course selections, career options, etc.
• To be aware of their academic and personal needs and to seek assistance when needed.
• To understand that the role of their advisor is to advise, not to make decisions. Each student needs to realize that it's his or her education at stake, and that, with advisement, they are ultimately responsible for making any final decisions.

Advisor’s responsibilities

• To be accessible to students throughout the year at posted office hours. If an advisor will be away from campus for an extended period of time, he or she should post the names and office locations of alternate advisors outside their offices, so that students will have other advising resources.
• To set aside designated times for registration advising and individual discussions.
• To be knowledgeable about current curriculum requirements, academic policies and procedures, referrals and resources on campus, and career opportunities in the major field.
• To guide students through academic programs that will complement their personal, educational, and professional interests.

Civil Engineer Bachelor’s Degree Requirements
The requirements of the BSCE program are outlined as follows:

- The BSCE degree requires a minimum of 128 credit hours
- The minimum grade point average (GPA) is 2.0.
- The course content in humanities and social sciences must total a minimum of 22 credit hours, including at least eight credit hours in the humanities and eight credit hours in the social sciences. For information on additional requirements see the School of Humanities, Arts, and Social Sciences section of the course catalog.
- Every Civil or Engineering student is required to take at least two communication-intensive courses. One of these courses must be communication intensive and taught in the School of Humanities, Arts, and Social Sciences A list of H&SS/CI courses is available on the Student Information System (SIS) homepage. The other must be CIVL 4920 CE Capstone Design.
- The student must be registered full-time for a minimum of four semesters. Two semesters of part-time study at Rensselaer will be considered equivalent to one semester of full-time study. In addition, the student must complete a minimum of 48 credit hours at Rensselaer, all of which will be applied to the baccalaureate degree. If a transfer student elects to study abroad or enroll in the co-op program, no more than 12 such credits may apply to the 48 needed for the bachelor’s degree.

A degree candidate must earn the last 30 credits in courses completed on this campus or through a program formally recognized by the Institute. Transfer courses are limited to two courses or eight credits counting toward the student’s last 30 credits and require approval of the director of the Advising and Learning Assistance Center.

**Dual Majors**

Undergraduate students who fulfill all the degree requirements for two curricula and who have met the conditions below will have completed a dual major. They will receive one diploma noting both majors. (1) The student must designate a first-named and second-named major in writing at least one semester prior to graduation, and have the appropriate department(s) approve this designation prior to filing the dual major form with the registrar. (2) Each student will be assigned an adviser in each department who will monitor progress towards degrees in that department. (3) The degree clearance officer in the department will certify that the student has met the degree requirements in that department. (4) The 24-credit-hour mathematics/science requirement and the 24-credit-hour humanities and social sciences requirement will satisfy the Institute requirements for both majors

**REQUIRED NAMED COURSES FOR B.S. IN CIVIL ENGINEERING FIRST YEAR FALL:**
CHEM-1100 - Chemistry I
Principles of chemistry, with particular focus on atomic and molecular structure and bonding, periodicity, basic thermodynamic principles, introduction to acid-base chemistry and elementary chemical equilibrium, and introduction to organic chemistry. Students cannot get credit for both this course and CHEM-1110.
Fall term annually. 4 credit hours

ENGR-1100 - Introduction to Engineering Analysis
An integrated development of linear algebra and statics emphasizing engineering applications and also incorporating computer exercises involving matrix techniques and calculations using available software packages.
Fall, spring, and summer terms annually. 4 credit hours

ENGR-1200 - Engineering Graphics and CAD
An introduction to the techniques for creating solid models of engineering designs. Topics include three-dimensional modeling of parts and assemblies, visualization, orthographic and isometric free-hand sketching, and computer-generated design documentation.
Fall, spring, and summer terms annually. 3 contact hours, 1 credit hour

MATH 1010 - Calculus I
Functions, limits, continuity, derivatives, implicit differentiation, related rates, maxima and minima, elementary transcendental functions, introduction to definite integral with applications to area and volumes of revolution.
Fall and spring terms annually. 4 Credit Hours

FIRST YEAR SPRING:
ENGR-1300 - Engineering Processes
The use of basic machine tools such as lathes, milling machines, drill presses, band saws, and grinders, including micrometers, vernier calipers, and other devices of use in a machine shop or laboratory. Welding techniques and tool making are also considered.
Fall, spring, and summer terms annually. 1 credit hour

MATH-1020 - Calculus II
Techniques and applications of integration, polar coordinates, parametric equations, infinite sequences and series, vector functions and curves in space, functions of several variables, and partial derivatives. Prerequisite: MATH 1010.
Fall and spring terms annually. 4 credit hours

PHYS-1100 - Physics I
The first semester of a two-semester sequence of interactive courses. Topics include linear and angular kinematics and dynamics, work and energy, momentum and collisions, forces and fields, gravitation, oscillatory motion, waves, sound and interference. Corequisite: MATH 1010 or equivalent or permission of instructor.
Fall and spring terms annually. 4 credit hours

SECOND YEAR FALL:
ENGR-2050 - Introduction to Engineering Design
A first course in engineering design which emphasizes creativity, teamwork, communication, and work across engineering disciplines. Students are introduced to the design process through a semester-long project which provides a design-build-test experience. Oral and written communication are important elements of the course. The course meets with ENGR 1010. Prerequisites: ENGR 1100 and ENGR 1200. Corequisite: PHYS 1200. Fall, spring, and summer terms annually. 6 contact hours, 4 credit hours

MATH-2400 - Introduction to Differential Equations
First-order differential equations, second-order linear equations, eigenvalues and eigenvectors of matrices, systems of first-order equations, stability and qualitative properties of nonlinear autonomous systems in the plane, Fourier series, separation of variables for partial differential equations. Prerequisites: MATH 1020 and some knowledge of matrices. Fall and spring terms annually. 4 credit hours

PHYS-1200 - Physics II
The second semester of the two-semester sequence of interactive courses. Topics include electric and magnetic forces and fields, Gauss’s Law, dc and ac circuits, Ampere’s Law and Faraday’s Law, electromagnetic radiation, physical optics, and quantum physics. Prerequisite: PHYS 1100 or equivalent or permission of instructor. Corequisite: MATH 1020. Fall and spring terms annually. 4 credit hours

SECOND YEAR SPRING:
CSCI-1190 - Beginning C Programming for Engineers
This course will teach elementary programming concepts using the C language for engineering students with little or no prior programming experience. Students cannot get credit for this course and any other Computer Science course. Fall and spring terms annually. 1 credit hour

ENGR-2090 - Engineering Dynamics
An integrated development of modeling-and problem-solving techniques for particles and rigid bodies emphasizing the use of free-body diagrams, vector algebra, and computer simulation. Topics covered include the kinematics and kinetics of translational, rotational, and general plane motion, energy and momentum methods. Prerequisites: ENGR 1100 and PHYS 1100. Corequisite: MATH 2400. Fall and spring term annually. 4 credit hours

ENGR-2250 - Thermal and Fluids Engineering I
Application of control volume balances of mass, momentum, energy and entropy in systems of practical importance to all engineers. Identification of control volumes, properties of pure materials, mass and energy conservation for closed and open systems, second law of thermodynamics, Bernoulli equation, fluid statics, forces and heat transfer in external and internal flows, conduction and radiative heat transfer. Prerequisites: ENGR 1100 and PHYS 1100. Corequisite: MATH 2400. Fall, spring, and summer terms annually. 4 credit hours

ENGR-2530 - Strength of Materials
Concept of stress and strain, generalized Hooke’s law, axial load, torsion, pure bending, transverse loading, transformation of stress and strain components in 2-D, design of beams and shafts for strength, deflection of beams, work and energy, columns. Prerequisite: ENGR 1100. Fall, spring and summer terms annually. 4 credit hours
THIRD YEAR FALL:

**CIVL-2030 - Introduction to Transportation Engineering**
Introduction to basic concepts in transportation engineering including planning, design, and operations. Introduces the challenges and issues in modeling transportation problems. Studies of various concepts related to the design of highway facilities, level of service, and demand for transportation services. Concepts related to signal optimization. Policy implications. Basics of transportation planning. Prerequisite: MATH 2400. Corequisite: ENGR 2600. Fall term annually. 4 credit hours

**CIVL-2630 - Introduction to Geotechnical Engineering**
The application of the basic laws and phenomena of science to particulate matter, specifically soils. Basic physical and mechanical structural characteristics of soil. Equilibrium and movement of water. Flow through porous media. Effective stress. Stress-strain-time relations. Basic laboratory work as related to practice. Prerequisite: ENGR 2530. Fall term annually. 6 contact hours, 4 credit hours

**CIVL-2670 - Introduction to Structural Engineering**
Introduction to the elastic behavior of structural components. Analysis of statically determinate systems. Deflection calculations by virtual work and elastic load methods. Analysis of simple statically indeterminate structures. Influence lines. Interaction of structural components. Typical structural engineering loads. Prerequisite: ENGR 2530 or equivalent. Fall term annually. 4 credit hours

**ENVE-2110 - Introduction to Environmental Engineering**
The application of basic principles and equations dealing with water, air, and solid and hazardous wastes; material and energy balances; and chemical and biochemical cycles. Topics include water resources, water quality and pollution, air quality and pollution, solid and hazardous wastes, and environmental legislation. Corequisite: MATH 2400. Fall term annually. 4 Credit Hours

THIRD YEAR SPRING:

**ENVE-4310 - Applied Hydrology and Hydraulics**
Physical processes governing occurrence and distribution of precipitation, infiltration, evaporation, and surface water runoff. Statistical hydrology, unit hydrograph theory, and watershed modeling. Floodplain hydrology and open channel hydraulics. Urban hydrology, hydraulics and design of storm sewers, and design of detention structures for flood control. Design project using the Army Corps of Engineers Hydraulic Engineering Center HEC-1 flood hydrograph package. Prerequisite: ENGR 2250 or CHME 4010. Spring term annually. 4 Credit Hours

**ENGR-4760 - Engineering Economics**
The objective is to help engineering students recognize and understand the importance of cost factors that are inherent in all engineering decisions. Development of ability to handle engineering problems that involve economic factors. The course includes economic environment, selections in present economy, value analysis, critical path economy, interest and money-time relationships, depreciation and valuation, capital financing and budgeting, basic methods for undertaking economic studies, risk, uncertainty and sensitivity, selections between alternatives, fixed, increment, and sunk costs, the effects of income taxes in economic studies, replacement
studies, minimum cost formulas, economic studies of public projects, economic studies in public utilities. Effects of inflation are considered at each step. Students cannot obtain credit for both this course and ENGR 4750. 
Spring term annually. 3 Credit Hours

FOURTH YEAR FALL:

ENGR-2600 - Modeling and Analysis of Uncertainty
Appreciation and understanding of uncertainties and the conditions under which they occur, within the context of the engineering problem-solving pedagogy of measurements, models, validation, and analysis. Problems and concerns in obtaining measurements; tabular and graphical organization of data to minimize misinformation and maximize information; and development and evaluation of models. Concepts will be supported with computer demonstration. Applications to problems in engineering are emphasized. Prerequisite: MATH 1010. Fall and spring terms annually. 3 Credit Hours

FOURTH YEAR SPRING:

CIVL-4920 - Civil Engineering Capstone Design
Open-ended design project in which students work in teams. Oral presentations and written reports cover alternates considered, design assumptions, cost, safety, and feasibility. This is a communication-intensive course. Prerequisites: senior status and CIVL 4070 and CIVL 4080, or CIVL 4010 and CIVL 4150, or CIVL 2030 and CIVL 4660 or CIVL 4640 or ENVE 2110 and either ENVE 4200, ENVE 4350, ENVE 4310 or ENVE 4340. Spring term annually. 3 Credit Hours

ENGR-4010 - Professional Development III
Students will study issues associated with working in teams in a modern work environment. Various styles of leadership, the definitions of power and empowerment and their applications in industry and team settings will be studied. Additionally, other topics to be explored include vision, values and attitudes, and organizational culture. The course format will include small and large group discussions, case studies, experiential exercises, and regular participation from industry guests. Offered in conjunction with senior courses. 1 Credit Hour

Additional Requirements
Non-engineering courses graded satisfactory/unsatisfactory are not included within this 128-credit-hour requirement. The Pass/No Credit option can be used only for free electives with something other than a CIVL or ENVE code and the humanities and social sciences electives. All other courses used to satisfy the degree requirements must be taken on a graded basis.

A minimum of 128 credit hours is required for this curriculum. Non-engineering courses grades satisfactory/unsatisfactory cannot be applied toward this 128-credit hour requirement. The Pass/No Credit option can be used only for humanities and social sciences electives (up to 6 credits) and free electives having a department code other than CIVL or ENVE. (No more than 12 credits total can be taken Pass/No Credit). All other courses used to satisfy the degree requirements must be taken on a graded basis.
# CIVIL ENGINEERING CURRICULUM CHECKLIST

<table>
<thead>
<tr>
<th>FIRST</th>
<th>YEAR</th>
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<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM-1100 Chemistry I</td>
<td>4</td>
<td>ENGR-1300</td>
<td>Engineering Processes 1</td>
</tr>
<tr>
<td>MATH-1010 Calculus I</td>
<td>4</td>
<td>MATH-1020 Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>ENGR-1100 Intro. to Eng. Analysis</td>
<td>4</td>
<td>PHYS-1100 Physics I</td>
<td>4</td>
</tr>
<tr>
<td>ENGR-1200 Eng. Graphics &amp; CAD 1</td>
<td>1</td>
<td>Science Elective 2</td>
<td>4</td>
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<td>Hum., Arts or Soc. Sci. El.</td>
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<td>Hum., Arts or Soc. Sci. El.</td>
<td>4</td>
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<tr>
<td>SECOND</td>
<td>YEAR</td>
<td>SECOND</td>
<td>YEAR</td>
</tr>
<tr>
<td>MATH-2400 Intro. to Differential Eqns.</td>
<td>4</td>
<td>ENGR-2090 Engineering Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS-1200 Physics II</td>
<td>4</td>
<td>ENGR 2250 Thermal &amp; Fluids Eng. I</td>
<td>4</td>
</tr>
<tr>
<td>ENGR-2050 Intro. to Eng. Design</td>
<td>4</td>
<td>ENGR 2530 Strength of Materials</td>
<td>4</td>
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<tr>
<td>Hum., Arts or Soc. Sci. El.</td>
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<td>CSCI 1190 Beginning C Prog. for Eng. 3</td>
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<td></td>
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<td>Hum., Arts or Soc. Sci El</td>
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<td>THIRD</td>
<td>YEAR</td>
<td>THIRD</td>
<td>YEAR</td>
</tr>
<tr>
<td>CIVL 2030 Intro to Transp. Eng.</td>
<td>4</td>
<td>CE Design Elective 4</td>
<td>3</td>
</tr>
<tr>
<td>CIVL 2630 Intro to Geotech. Eng.</td>
<td>4</td>
<td>ENVE 4310 Applied Hydrology &amp; Hydr.</td>
<td>4</td>
</tr>
<tr>
<td>CIVL 2670 Intro to Structural Eng.</td>
<td>4</td>
<td>ENGR 4760 Eng. Economics</td>
<td>3</td>
</tr>
<tr>
<td>ENVE 2110 Intro to Env. Eng.</td>
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<td>Professional Develop. II 5</td>
<td>2</td>
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<tr>
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<td></td>
<td>Free Elective</td>
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<tr>
<td>FOURTH</td>
<td>YEAR</td>
<td>FOURTH</td>
<td>YEAR</td>
</tr>
<tr>
<td>ENGR-2600 Modeling &amp; Analys of Uncert</td>
<td>3</td>
<td>CIVL 4920 CE Capstone Design</td>
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<tr>
<td>CE Design Elective 4</td>
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<td>ENGR 4010 Professional Devel. III 6</td>
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<td>Free Elective</td>
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<td>CE Tech. Elective 4</td>
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<tr>
<td>Math and Science Elective</td>
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<td>Free Elective</td>
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<tr>
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<td>Hum., Arts or Soc. Sci. El.</td>
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</tbody>
</table>

1. For these two courses, order does not matter. ENGR-1300 may be replaced with CIVL-2961.
2. Choose either ENGR-1600 or CSCI-1100.
3. Can be satisfied with Computer Science I.
4. Text below lists the allowable courses.
5. This course will be fulfilled from a published list at the start of each semester.
6. Can be taken either semester of the senior year.

128 credits minimum

## CE DESIGN ELECTIVES AND CONCENTRATIONS

### Construction Engineering
- CIVL 4010 Foundation Engineering (Fall)
- CIVL 4070 Steel Design (Fall)
- CIVL 4080 Concrete Design (Spring)
- CIVL 4150 Experimental Soil Mechanics (Spring)

### Structural Engineering
- CIVL 4070 Steel Design (Fall)
- CIVL 4080 Concrete Design (Spring)

### Environmental Engineering
- ENVE 4200 Solid and Hazardous Waste Eng. (Spring)
- ENVE 4340 Physicochemical Processes in Env. Eng. (Spring)
- ENVE 4350 Biological Processes in Env. Eng. (Fall)

### Geotechnical Engineering
- CIVL 4010 Foundation Engineering (Fall)
- CIVL 4140 Geoenvironmental Eng. (Fall)
- CIVL 4150 Experimental Soil Mechanics (Spring)

### Transportation Engineering
- CIVL 4620 Mass Transit Systems (Spring)
- CIVL 4640 Transp. Facility Design & Planning (Spring)
- CIVL 4660 Traffic Engineering (Fall)
- CIVL 4670 Highway Engineering (Spring)

### CEE TECHNICAL ELECTIVES
- CIVL 2040 Professional Practice
- CIVL 4240 Intr. To Finite Elements
- CIVL 4270 Construction Management
- CIVL 4440 Adv. Structural Analysis
Helpful Hints – CE Curriculum

Following the CE template on page 15 will allow one to graduate with a BSCE Degree in 4 years. However, because of Co-op, Semester Abroad, and Transfer, one can deviate from the template and still graduate in four years. Listed below are helpful hints on which deviations from the standard template are possible and which should be avoided.

1) ENGR 2530 Strength of Materials is a prerequisite for both CIVL 2630, Intro. to Geotech and CIVL 2670, Intro. to Structures. Hence, ENGR 2530 should be taken Spring/Sophomore year. If that is not possible, take ENGR 2530 in the summer before Fall/Junior year.

2) The four CEE Intro. courses – CIVL 2030, CIVL 2630, CIVL 2670 and ENVE 2110 – are only offered Fall semester. It is best to take these Fall semester of the Junior year. If taking all four Fall/Junior year is not possible, then take the Intro. courses in your specific area of interest and defer others (i.e., if you are interested in Structures, take CIVL 2670 Fall/Junior year and defer CIVL 2030 or ENVE 2110 to Fall/Senior year.

3) CIVL 4920, CE Capstone Design is only offered Spring semester. If you will be taking 4 ½ years to complete your degree, arrange your courses so that the Capstone pre-requisite (two design course sequence) is completed prior to Spring/Senior year.

4) Except for ENGR 2530, Strength of Materials, one can take most required ENGR courses, specifically ENGR 2090, 2250, 4760, 2600 whenever you have the prerequisite/co-requisite completed.

5) If you are planning to be away from campus for either the Co-op or Study Abroad program, the best time to pursue these programs is the spring semester, junior year.
Environmental Engineering Bachelor’s Degree Requirements

The requirements of the BSEE program are outlined as follows:

- The BSEE degree requires a minimum of 128 credit hours
- The minimum grade point average (GPA) is 1.80.
- The course content in humanities and social sciences must total a minimum of **24 credit hours**, including at least **eight credit hours** in the humanities and **eight credit hours** in the social sciences. For engineering students, four of these credits are satisfied with Professional Development courses (PDI, II and III). For more information on additional requirements see the School of Humanities, Arts, and Social Sciences section of the course catalog.
- Every Civil or Environmental student is required to take at least **two communication-intensive courses**. One of these courses must be communication intensive and taught in the School of Humanities, Arts, and Social Sciences. A list of H&SS/CI courses is available on the Student Information System (SIS) homepage. The other must be either CIVL 4910 (for Civil students) or ENVE 4180 (for Environmental students).
- The student must be registered full-time for a minimum of four semesters. Two semesters of part-time study at Rensselaer will be considered equivalent to one semester of full-time study. In addition, the student must complete a minimum of **48 credit hours** at Rensselaer, all of which will be applied to the baccalaureate degree. If a transfer student elects to study abroad or enroll in the co-op program, no more than 12 such credits may apply to the 48 needed for the bachelor’s degree.

A degree candidate must earn the last 30 credits in courses completed on this campus or through a program formally recognized by the Institute. Transfer courses are limited to two courses or eight credits counting toward the student’s last 30 credits and require approval of the director of the Advising and Learning Assistance Center.

**Dual Majors**

Undergraduate students who fulfill all the degree requirements for two curricula and who have met the conditions below will have completed a dual major. They will receive one diploma noting both majors. (1) The student must designate a first-named and second-named major in writing at least one semester prior to graduation, and have the appropriate department(s) approve this designation prior to filing the dual major form with the registrar. (2) Each student will be assigned an adviser in each department who will monitor progress towards degrees in that department. (3) The degree clearance officer in the department will certify that the student has met the degree requirements in that department. (4) The 24-credit-hour mathematics/science requirement and the 24-credit-hour humanities and social sciences requirement will satisfy the Institute requirements for both majors.
REQUIRED NAMED COURSES FOR B.S. IN ENVIRONMENTAL ENGINEERING

FIRST YEAR FALL:
CHEM-1100 - Chemistry I
Principles of chemistry, with particular focus on atomic and molecular structure and bonding, periodicity, basic thermodynamic principles, introduction to acid-base chemistry and elementary chemical equilibrium, and introduction to organic chemistry. Students cannot get credit for both this course and CHEM-1110. Fall term annually. 4 credit hours

ENGR-1100 - Introduction to Engineering Analysis
An integrated development of linear algebra and statics emphasizing engineering applications and also incorporating computer exercises involving matrix techniques and calculations using available software packages. Fall, spring, and summer terms annually. 4 credit hours

ENGR-1200 - Engineering Graphics and CAD
An introduction to the techniques for creating solid models of engineering designs. Topics include three-dimensional modeling of parts and assemblies, visualization, orthographic and isometric free-hand sketching, and computer-generated design documentation. Fall, spring, and summer terms annually. 3 contact hours, 1 credit hour

MATH 1010 - Calculus I
Functions, limits, continuity, derivatives, implicit differentiation, related rates, maxima and minima, elementary transcendental functions, introduction to definite integral with applications to area and volumes of revolution. Fall and spring terms annually. 4 Credit Hours

FIRST YEAR SPRING:
ENGR-1300 - Engineering Processes
The use of basic machine tools such as lathes, milling machines, drill presses, band saws, and grinders, including micrometers, vernier calipers, and other devices of use in a machine shop or laboratory. Welding techniques and tool making are also considered. Fall, spring, and summer terms annually. 1 credit hour

MATH-1020 - Calculus II
Techniques and applications of integration, polar coordinates, parametric equations, infinite sequences and series, vector functions and curves in space, functions of several variables, and partial derivatives. Prerequisite: MATH 1010. Fall and spring terms annually. 4 credit hours

PHYS-1100 - Physics I
The first semester of a two-semester sequence of interactive courses. Topics include linear and angular kinematics and dynamics, work and energy, momentum and collisions, forces and fields, gravitation, oscillatory motion, waves, sound and interference. Corequisite: MATH 1010 or equivalent or permission of instructor. Fall and spring terms annually. 4 credit hours

SECOND YEAR FALL:
ENGR-2250 - Thermal and Fluids Engineering I
Application of control volume balances of mass, momentum, energy and entropy in systems of practical
importance to all engineers. Identification of control volumes, properties of pure materials, mass and energy conservation for closed and open systems, second law of thermodynamics, Bernoulli equation, fluid statics, forces and heat transfer in external and internal flows, conduction and radiative heat transfer. Prerequisites: ENGR 1100 and PHYS 1100. Corequisite: MATH 2400.
Fall, spring, and summer terms annually. 4 credit hours

ENVE-2110 - Introduction to Environmental Engineering
The application of basic principles and equations dealing with water, air, and solid and hazardous wastes; material and energy balances; and chemical and biochemical cycles. Topics include water resources, water quality and pollution, air quality and pollution, solid and hazardous wastes, and environmental legislation.
Corequisite: MATH 2400.
Fall term annually. 4 Credit Hours

MATH-2400 - Introduction to Differential Equations
First-order differential equations, second-order linear equations, eigenvalues and eigenvectors of matrices, systems of first-order equations, stability and qualitative properties of nonlinear autonomous systems in the plane, Fourier series, separation of variables for partial differential equations. Prerequisites: MATH 1020 and some knowledge of matrices.
Fall and spring terms annually. 4 credit hours

PHYS-1200 - Physics II
The second semester of the two-semester sequence of interactive courses. Topics include electric and magnetic forces and fields, Gauss’s Law, dc and ac circuits, Ampere’s Law and Faraday’s Law, electromagnetic radiation, physical optics, and quantum physics. Prerequisite: PHYS 1100 or equivalent or permission of instructor. Corequisite: MATH 1020. Fall and spring terms annually. 4 credit hours

SECOND YEAR SPRING:
CSCI-1190 - Beginning C Programming for Engineers
This course will teach elementary programming concepts using the C language for engineering students with little or no prior programming experience. Students cannot get credit for this course and any other Computer Science course. Fall and spring terms annually. 1 credit hour

ENGR-2050 - Introduction to Engineering Design
A first course in engineering design which emphasizes creativity, teamwork, communication, and work across engineering disciplines. Students are introduced to the design process through a semester-long project which provides a design-build-test experience. Oral and written communication are important elements of the course. The course meets with ENGR 1010. Prerequisites: ENGR 1100 and ENGR 1200. Corequisite: PHYS 1200.
Fall, spring, and summer terms annually. 6 contact hours, 4 credit hours

ENGR-2600 - Modeling and Analysis of Uncertainty
Appreciation and understanding of uncertainties and the conditions under which they occur, within the context of the engineering problem-solving pedagogy of measurements, models, validation, and analysis. Problems and concerns in obtaining measurements; tabular and graphical organization of data to minimize misinformation and maximize information; and development and evaluation of models. Concepts will be supported with computer demonstration. Applications to problems in engineering are emphasized. Prerequisite: MATH 1010. Fall and spring terms annually. 3 Credit Hours

THIRD YEAR FALL
CHEM-2250 - Organic Chemistry I
Structure and chemical behavior of organic molecules with particular emphasis on reaction mechanisms as pathways for understanding their reactions. Stereocchemistry, synthesis, and spectroscopic methods for the identification of organic functional groups are among the topics included. Prerequisite: CHEM 1100 or 1110 or equivalent. Fall term annually. 3 Credit Hours

ENVE-4330 - Introduction to Air Quality
Quantitative introduction to the engineering methods for the study of air quality. Topics include: estimation procedures for air pollution emissions; indoor air quality problems, impacts and control strategies; sources, impacts and control strategies for greenhouse gases; dispersion modeling for point sources; pollutant acidification of lakes; urban source apportionment modeling; chemistry of stoichiometric and non-stoichiometric combustion; regulations for mobile and stationary pollution sources; control devices for motor vehicle and stationary source emissions; assessment methods for human exposure to air pollutants. Prerequisites: CHEM 1100, and CHME 4010 or ENGR 2250. Fall term annually. 3 Credit Hours

THIRD YEAR SPRING:
ENVE-4310 - Applied Hydrology and Hydraulics
Physical processes governing occurrence and distribution of precipitation, infiltration, evaporation, and surface water runoff. Statistical hydrology, unit hydrograph theory, and watershed modeling. Floodplain hydrology and open channel hydraulics. Urban hydrology, hydraulics and design of storm sewers, and design of detention structures for flood control. Design project using the Army Corps of Engineers Hydraulic Engineering Center HEC-1 flood hydrograph package. Prerequisite: ENGR 2250 or CHME 4010. Spring term annually. 4 Credit Hours

ENVE-4320 - Environmental Chemodynamics
The movement of chemicals in air, water, and soil is presented to demonstrate the relation of physiochemical principles in the behavior of chemicals in the environment. Topics include chemical and thermal equilibrium at environmental interfaces, transport fundamentals, and the fate and transport of chemicals in various environmental compartments. Prerequisites: ENVE 2110 or CHME 2010. Corequisite: ENGR 2250 or CHME 4010. Spring term annually. 3 credit hours

ENVE-4340 - Physicochemical Processes in Environmental Engineering
Physical and chemical processes governing water quality in natural and engineered systems with applications to potable water treatment. Topics include reactor dynamics, coagulation and flocculation, sedimentation, filtration, gas transfer, adsorption and ion exchange, and membrane processes. A design project for which students develop a computer model of an environmental process is required. Prerequisite: ENGR 2250 or CHME 4010. Spring term annually. 3 credit hours

FOURTH YEAR FALL:
ENGR-4010 - Professional Development III
Students will study issues associated with working in teams in a modern work environment. Various styles of leadership, the definitions of power and empowerment and their applications in industry and team settings will be studied. Additionally, other topics to be explored include vision, values and attitudes, and organizational culture. The course format will include small and large group discussions, case studies, experiential exercises, and regular participation from industry guests. Offered in conjunction with senior courses. 1 Credit Hour

ENVE-4150 - Environmental Engineering Laboratory
A laboratory course on experimental analysis of natural and engineered environmental processes. Emphasis is
placed on planning of experiments, data evaluation, and report writing. Prerequisite: ENVE 2110 or permission of instructor.

Fall term annually. **4 Credit Hours**

**ENVE-4350 - Biological Processes in Environmental Engineering**
The study of biochemical and biological processes common to environmental engineering. Introductory physiology, biochemistry and ecology of bacteria, yeasts, fungi. Laboratory work in microbial techniques. Development of reaction rate and mass balances on biological reactors for pollution control. Topics covered include biogeochemical cycling, thermodynamics of biodegradative processes, activated sludge, trickling filters, stabilization ponds, sludge treatment and digestion, bioremediation, hazardous waste treatment, biological metal cycling and biological solid waste treatment processes. Prerequisite: ENVE 4320.

Fall term annually. **4 Credit Hours**

**FOURTH YEAR SPRING:**
**ENVE-4180 - Environmental Process Design**
The design of equipment, processes, and systems of interest in environmental engineering through application of scientific, technological and economic principles. Emphasis is placed on problem formulation and conceptual, analytical and decision aspects of open-ended design situations. Students will integrate knowledge and skills gained in previous and concurrent courses, and learn research techniques to find and use resources from the technical literature. Health and safety issues are presented. Professional development topics are presented including professional ethics and registration. This is a writing intensive course. Students will develop communication skills through proposal preparation, report writing, oral presentation. Prerequisite: ENVE 2110 and senior standing.

Spring term annually. **3 Credit Hour**

**ERTH-4180 - Environmental Geology**
A consideration of technical and scientific aspects of key geo-societal issues. Case studies and analysis of current and historic data bases will be used to illustrate topics including, but not limited to, climate modification, energy resources, future energy, water resources, water pollution, and health risks posed by lead, mercury, and emerging pollutants.

Spring term annually. **4 Credit Hours**
A minimum of 128 credit hours is required for this curriculum. Non-engineering courses grades satisfactory/unsatisfactory cannot be applied toward this 128-credit hour requirement. The Pass/No Credit option can be used only for humanities and social sciences electives (up to 6 credits) and free electives having a department code other than CIVL or ENVE. (No more than 12 credits total can be taken Pass/No Credit). All other courses used to satisfy the degree requirements must be taken on a graded basis.
## ENVIRONMENTAL ENGINEERING CURRICULUM CHECKLIST

<table>
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<tr>
<th>FIRST</th>
<th>YEAR</th>
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<td>Hum., Arts or Soc. Sci. El.</td>
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</table>

¹ May be taken in any order in the first two semesters. ENGR-1300 may be replaced by ENGR-1310 or CIVL-2961.
² Choose CHEM-1200 and either BIOL-1010 or another biology course chosen in consultation with adviser. Order does not matter.
³ ENGR-2250 may be replaced by CHME-4010.
⁴ Choose either PSYC-4170 or STSS-4840.
⁵ Multidisciplinary engineering elective. Must be an engineering course, chosen in consultation with the adviser (e.g., ENGR-1600, ENGR-4760, CIVL-2630, CIVL 2630, ISYE-4260, ENGR-2530.
⁶ Technical electives must be selected in consultation with the program adviser (e.g., ENVE-4200, ENVE-4240, ENVE-4210, ENVE-4110). With adviser approval, courses from other disciplines may also be taken. These include Civil Engineering, Chemical Engineering, and Earth and Environmental Sciences (for example, CIVL 2630, CIVL 4150, CHME 4030, ERTH 4710, and others).

128 credits minimum

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**Helpful Hints – ENVE Curriculum**

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23
Following the ENVE curriculum template will allow one to graduate with a BSEE Degree in 4 years. However, because of Co-op, Semester Abroad, and Transfer, one can deviate from the template and still graduate in four years. Listed below are helpful hints on which deviations from the standard template are possible and which should be avoided.

1) ENGR 2250 Thermal Fluids Engineering is a prerequisite for several courses in the Junior year. Hence, ENGR 2250 should be taken in the Sophomore year, but can be taken in either semester.

2) Students interested in environmental issues related to soils (landfill design, soil remediation) are encouraged to take Intro. to Geotechnical Engineering, CIVL 2670. It is only offered in the Fall semester. Note that ENGR 2530 Strength of Materials is a prerequisite for CIVL 2670, and can be taken during the summer semester if desired.

3) ENVE 4180, Environmental Process Design, is a capstone design course offered only in the Spring semester. You should arrange your courses to complete ENVE design courses prior to taking ENVE 4180. These include ENVE 4330 Introduction to Air Quality, ENVE 4310 Applied Hydrology and Hydraulics, ENVE 4340 Physicochemical Processes, and ENVE 4350 Biological Processes.

4) If you are planning to be away from campus for either the Co-op or Study Abroad program, the best time to pursue these programs is the spring semester, junior year.
Registration

When: Registration for the Spring semester generally occurs in early November. Registration for the Fall semester occurs the preceding Spring, usually in early April. Exact dates are included in the Academic Calendar.

How: Use the Student Information System (SIS) to register for your courses.

Where: There are no assigned rooms for registration. You can register for your classes using any computer with Internet access.

Time tickets
As a student here at Rensselaer, you are issued a "time ticket," which assigns you a specific window of time during which you may register for the next semester. Your time ticket will be sent to your RPI email address, 2 - 3 weeks before registration.

Your registration time is assigned based on the number of credit hours you have earned as a student. The table to the right shows the range of earned credit hours associated with each class. Please note that classes which are still in progress or courses which have been graded as "incomplete" do not count towards earned credits, nor do transferred courses and Advanced Placement (AP) credit.

CAPP reports
Your Curriculum Advising and Program Planning (CAPP) report is a planning and advising tool -- available only to undergraduate students -- that allows you to track the progress you're making toward your Bachelor's Degree. You can access your CAPP report via the main menu of the Student Information System (SIS).
Professional/Student Societies

**ASCE (American Society of Civil Engineers) - Faculty Advisor: Prof. Thomas Zimmie, JEC 4038**

With 160,000 members nationwide, the American Society of Civil Engineers is the predominate organization of Civil Engineers in the U.S. The Rensselaer student chapter organizes events, lectures by practicing Civil Engineers, as well as the annual Steel Bridge and Concrete Canoe competition. Attendance at student chapter lectures is a great way to determine if Civil Engineering is for you.

RPI's ASCE chapter holds a meeting usually every other Wednesday in Low 4050. The meetings are open to anyone interested in civil engineering and are designed to be a relaxed place for students to learn some practical knowledge about what is going on in the Civil Engineering world. (Free pizza and drinks are served). For those who like what they see, becoming a member of ASCE means having access to the many social, community service and networking opportunities that are offered throughout the year.

**SEP - (Society of Environmental Professionals)- Faculty Advisor: Prof. Kilduff, JEC 4022**

The purposes of the Chapter are:

- To promote student interest in the environment
- To provide an avenue for the exchange of information and ideas between students and members of professional Associations
- To provide a common ground where students from various disciplines related to air, waste, and water environment management can advance their understanding of environmental management through an organized exchange of knowledge
- To promote a better understanding of the scope and opportunities in air, waste, and water environment management
- To present educational programs of general interest topics in the science of air, waste, and water environment management, as well as other related technological fields
- To encourage its members to participate in the Associations’ conferences, meetings, and social events
NEES@RPI
150 g-ton Capacity Centrifuge

NEES AT RENSSELAER POLYTECHNIC INSTITUTE

The NEES equipment site at Rensselaer Polytechnic Institute (NEES@RPI) specializes in geotechnical engineering using the geotechnical centrifuge for pioneering experiments in the behavior of soils and foundations under cyclic and dynamic loads. Commissioned in 1989, the facility consists of:

- A 150 g-ton geotechnical centrifuge
- A one and two-dimensional in-flight earthquake shakers
- Laminar and split containers
- A 4-degree-of-freedom robot with in-flight capabilities

MAJOR EQUIPMENT

The Geotechnical Centrifuge can carry a 1500 kg payload to 160 g at an effective radius of 2.7m. Model containers sit on one of two shake tables. The 2D Shaker is designed to conduct more realistic in-flight earthquake simulations, where the base of 2D laminar container is subjected to two prototype horizontal components of earthquake shaking, while the centrifuge is spun up to 100g. A wide variety of motions can be produced with the shaker, including 1D & 2D acceleration time histories comprised of periodic, aperiodic, random, or scaled earthquake signals. The large 1D shaker is a servo-hydraulically controlled system which produces 1D (horizontal) shaking in response to an applied input voltage signals. It is designed for studies in which application of input motions to the base of a model container is desired. Maximum payload is 250 kgf with a maximum table displacement of 6.35 mm and a nominal shaking frequency range of 0-350 Hz.

Model containers at RPI are available as share beam type laminar or split-box. The 2D laminar box, 594mm diameter and approx. 400mm high, is designed specifically for use with the 2D shaker. The container is constructed with 45 twelve-sided lightweight aluminum alloy rings arranged in a stack with roller bearings separating the rings. The split box containers are available with dynamic motion in two horizontal direction (± 4cm horizontal, 0-4cm vertical). The two halves of the vertically enabled split box may be actuated independently, consecutively, or simultaneously to facilitate a wide variety of strain paths. The in-flight robot conducts a number of operations in flight without having to stop the centrifuge. This significantly enhances the realism of physical simulations and combined real-time tests with other facilities. Robot operations include in-flight sand and clay model construction; ground excavation; injection of contaminants or chemical stabilizers into the groundwater; placement of soil reinforcement in clay slopes; pile driving static cone penetration and vane in situ testing; use of static/cyclic/dynamic loading devices at selected locations of the soil or soil-structure model.

RESEARCH

Research at NEES@RPI includes both static and earthquake responses and employs, as needed, the adjacent cyclic soils, laboratory and computers for small soil sample, soil characterization and for analysis of centrifuge model tests.

Researchers collaborate on a number of such projects utilizing these technologies as applied to such problems as understanding ground rupture effects on critical lifelines to the study of the effects of liquefaction during lateral spreading near pile foundation.
Undergraduate Research Program

Departmental faculty are involved in four areas of research - Environmental, Geotechnical, Structures and Transportation. URP opportunities exist in each. They allow students to interact with faculty on their research, apply knowledge learned in the classroom setting, publish journal articles and books alongside faculty and receive credit or supplemental income.

Finding a Project
Most students will solicit URP projects by contacting departmental professors – those they have had in class and others. The key is to determine a project that will interest you as well as finding a faculty member that may want to work with you on a project.

Credit or Funding
You can either earn credit hours (between one and four) for participating in an URP project or you can be paid for the project. If you choose credit, the decision on the number of credit hours is usually decided by the student and the participating faculty member. Being paid to participate in a URP project can help a student offset some of the costs of college, such as books, lab fees, activities or incidentals that may come up. In the past, students who have participated in the URP for pay have earned up to $3,000 per semester. The majority of participants earn $400 per semester. URP funding comes from two sources:
- Your sponsoring faculty member or department
- The Office of Undergraduate Education

The faculty sponsor or department is responsible for the financial support of your research. In addition, the Office of Undergraduate Education pays URP participants a maximum of $400 per semester in the form of matching funds.
Most projects expect eight to twelve hours of work per week.

The URP application should be submitted to the Department Coordinator, Tasha McDonough.
### Department of Civil and Environmental Engineering
#### Research Areas and Related Faculty

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<thead>
<tr>
<th>Earthquake Engineering</th>
<th>Structural Engineering</th>
<th>Geotechnical Engineering</th>
<th>Transportation Engineering</th>
<th>Computational Mechanics</th>
<th>Pollutant Fate and Transport</th>
<th>Water Treatment</th>
<th>Site Remediation &amp; Bioremediation</th>
<th>Water Resources &amp; Microscopic Activity of Microorganisms</th>
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**International Programs**

Many students at Rensselaer study abroad, usually during their junior or senior years. It is important to plan ahead if you wish to study abroad so that you can still take all the courses required to graduate. A list of study abroad options can be found at: [http://undergrad.rpi.edu/update.do?catcenterkey=84](http://undergrad.rpi.edu/update.do?catcenterkey=84)

For more information on study abroad programs, go to the Office of International Programs, located in Walker 4103, or see the Office of Undergraduate Education website at [http://undergrad.rpi.edu](http://undergrad.rpi.edu) > Office of International Programs.

**Cooperative Education**

Rensselaer's Co-op program offers a way to apply classroom experience in a business setting. That's important for two reasons:

- As you apply newly-learned technical skills, you will gain an understanding of office dynamics that can only be learned through experience.
- Just as important, you will gain experience that will look good on your resume.

Two things you should consider when planning your co-op assignment are the type of co-op that best suits your needs, and where the co-op assignment fits in your academic plan (please see Helpful Hint #5, page 15 & 17).

For more information on Co-op programs, please go to the following website: [http://www.rpi.edu/dept/cdc/coop/coopoverview.html](http://www.rpi.edu/dept/cdc/coop/coopoverview.html)
Co-Terminal BS/MS or BS/ME Program

What Is It?

- The Co-Terminal Graduate degree program offers Rensselaer undergraduates with strong academic records the opportunity to earn both a Bachelor’s and Master’s degree in 5 years while extending their financial aid.

What is the Advantage?

- Undergraduate financial aid will be continued for co-terminal students through their 9th and 10th semester's of study.
- Upon graduation, student will earn both their BS and ME/MS degrees simultaneously.

How does it Work?

- Admissions standards for the co-terminal program are the same as those required for Rensselaer's traditional master's programs
- Co-terminal applications should preferably be submitted before the end of applicants’ junior year
- Student must:
  - *Departmental Requirement is 3.2 GPA*
  - Have completed 90 credits of coursework (including AP credits, transfer credits, and courses in progress)

How do I Apply?

- Application is made to the Graduate Admissions Office through the Civil and Environmental Engineering Department. The application form is available online through the Graduate Admissions Office website. The Graduate Plan of Study Form is available on the Office of Graduate Education website.

Frequently Asked Questions:

**Admission**

1. **What if the courses I list on the Plan of Study change?**

   If the courses listed change, an updated plan must be filed with your Department, the Graduate School, and the Office of the Registrar.

**Financial Aid, Tuition and Fees**

1. **Can I receive both Undergraduate Financial Aid and Graduate TA/RA aid?**

   No - If you receive a Graduate TA/RA you are no longer eligible for undergraduate financial aid.

2. **Do I have to file a FAFSA for my 5th year to get the Undergraduate aid?**
Yes - you must file a FAFSA, if you receive need based aid

3. **I have a TA from my department. Do I need to notify anyone?**

   No - your department works with the Graduate School to ensure that your TA is processed appropriately. Once you accept a graduate TA, you are no longer eligible for undergraduate financial aid.

**Academic**

1. **When/how does a student get assigned a graduate adviser?**

   Co-terminal students will continue to work with their undergraduate adviser and should contact their department to be assigned a graduate advisor.

2. **How many credits will I be eligible to register for?**

   For undergraduate students, the maximum number of credit hours is 21. For graduate students, the maximum is 15 credit hours. If most of your courses in a particular semester are at the 6000 level, the 15 credit hour limit would apply.

3. **Should I apply for my undergraduate degree if I will be registered into an 11th semester?**

   If you are continuing into an 11th semester, you will no longer be eligible for undergraduate aid. You should apply for your bachelor's degree at that point.

4. **When do I receive my BS degree? I was supposed to graduate in May but I will be completing 2 more semesters to receive my Master's degree under the co-terminal program?**

   You will receive both degrees at the end of your 10th semester. You should file a degree application with the Office of the registrar for each degree at the beginning of the semester in which you will actually graduate with both degrees. See the academic calendar for deadline information.

5. **Can I use a course for both my undergraduate and graduate degree?**

   No - credits applied toward satisfying requirements of the undergraduate degree cannot be used to satisfy the requirements for the master's degree.

6. **I finished my 9th semester but decided not to continue in the master's program. How do I receive my BS degree?**

   You must first, formally withdraw from the co-terminal program. This is done using the [Graduate Student Request for Change of Status form](#).
You must then file a Degree Application for the next graduation date. Rensselaer has three official graduation dates - the end of August, the end of December, and end of May. Check the academic calendar for application submission deadlines.

7. Can I still designate courses as Pass/No Credit?

Co-terminal students are subject to graduate degree program guidelines after they've earned the minimum number of 128 credits required for their bachelor’s degree. Any courses taken after a student has reached the minimum will be subject to graduate level policies, and graduate policies prohibit designating a graduate course as Pass/No Credit.

8. Can I participate in the Commencement ceremony with my class?

You must meet the criteria for participation and file a petition, available in the Registrar's Office.

Co-terminal application: [http://admissions.rpi.edu/graduate/Co-TerminalBS-MS_Application_and_Procedures.pdf](http://admissions.rpi.edu/graduate/Co-TerminalBS-MS_Application_and_Procedures.pdf)
Graduate Program

Areas of Study/Degrees

<table>
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<tr>
<th>Civil Engineering, M.Ss, M.Eng., Ph.D.</th>
<th>Typical Degree Requirements</th>
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<tr>
<td>Environmental Engineering, M.S., M.Eng., Ph.D.</td>
<td>M.S. 30 credits (24-27 coursework, 3-6 thesis)</td>
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<tr>
<td>Transportation Engineering, M.S., M.Eng., Ph.D.</td>
<td>M.Eng. 30 credits coursework</td>
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<td>Ph.D. 42 credits beyond B.S. plus doctoral thesis</td>
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Research Areas

We offer a wide range of disciplines that are sufficiently flexible to accommodate individual interests, but the main research areas of interest are separated into several broad categories:

- Earthquake Engineering (Civil)
- Structural Engineering (Civil)
- Geotechnical Engineering (Civil)
- Transportation Engineering (Civil)
- Pollutant Fate and Transport (Environmental)
- Water & Resources Treatment (Environmental)
- Waste Treatment (Environmental)
- Site Remediation and Bioremediation (Environmental)
- Environmental Systems (Environmental)
- Environmental Biotechnology (Environmental)
- Indoor Air Quality and Water Quality (Environmental)

Admission

Submit on-line at: http://gradadmissions.rpi.edu/

Deadlines are January 1 for Summer and Fall admission and August 15 for Spring admission

You will need: a well-written Statement of Background & Goals; official transcripts from all colleges attended; at least 2 letters of recommendation (preferably from faculty); official GRE scores (general test only, minimum 550 Verbal/550 Quantitative/4.0 Analytical) and official TOEFL or IELTS scores (required for all international applicants, minimum 570 TOEFL or IELTS minimum 6.5); Bachelor’s GPA 3.0 or higher; non-refundable application fee.

Financial Aid/Tuition

Awards are made based on merit, not on need, and priority is given to doctoral candidates. Apply for financial aid through the admission application, no separate form is required.

Financial aid is available in the form of Fellowships, Teaching Assistantships and Research Assistantships.

International students are eligible for all forms of aid except some fellowships that require US citizenship.

Tuition for the 2011-2012 academic year is $41,600; fees and insurance are $1,104; Living expenses, books and supplies can vary widely but are estimated at approximately $14,475.

Contact Us

Kimberly Boyce, Department Admissions Coordinator, Department of Civil and Environmental Engineering
Phone: 518-276-6941
Email: boycek@rpi.edu
http://www.cee.rpi.edu
GRADUATE APPLICATION INSTRUCTIONS

All applicants must submit the following materials for their application to be complete and forwarded for departmental review. Submit all materials in one envelope to Graduate Admissions by the application deadline. (Please do not send to individual departments.)

Note: All applicants should pay particular attention to requirements that apply to specific departments (please see Graduate Admission Requirements).

1. Completed graduate application
2. Nonrefundable application fee of $75
3. Statement of Background and Goals
4. Resume
5. Portfolio, if applicable
6. Two letters of recommendation
7. Official transcripts, in English, of all postsecondary education
8. Official evidence, in English, of any postsecondary degrees earned
9. Official GRE, GRE Subject Tests, or GMAT scores reported from ETS
10. Official TOEFL or IELTS scores, if applicable
11. The ETS Personal Potential Index (PPI) is encouraged

Applicant’s name and date of birth should be printed clearly on all documents.

CONTACT US

If you have any questions during the application process, please feel free to contact us Monday through Friday, 8:30 a.m. – 5 p.m. Eastern time (excluding holidays).

Graduate Admissions
Rensselaer Polytechnic Institute
110 8th Street Troy, NY 12180-3590
Phone (518) 2766216 Fax (518) 2764072
Email gradadmissions@rpi.edu

Rensselaer seeks diverse and well qualified candidates for study in all graduate programs. This application may be used for full or part time degree programs at the Troy campus of Rensselaer. All applicants must submit the completed application with all supporting documents to Graduate Admissions.

Graduate Admissions will review all of the documents, notify the applicant of missing items, and forward files to the appropriate department for academic review and an admission decision. Graduate Admissions will notify the applicant of the admission decision by email.

A student’s ability to pay for the education has no bearing whatsoever on the admission decision.
Scholarships, fellowships, teaching and research assistantships are awarded by academic departments and the Graduate School. Both admissions and aid decisions are made on the basis of the candidate’s qualifications and suitability to the department’s research activities and needs.

Because admission is highly competitive, and resources for supporting graduate students may be limited, not all admissible candidates will receive offers of financial support. Students who wish to be considered for any form of financial support should submit the application and supporting documentation no later than the January 1 deadline for the fall or summer semester or no later than the August 15 deadline for the spring semester. A decision of financial support may or may not accompany the admission decision.
INSTRUCTIONS

Applicants may apply only to one degree program per term. Multiple applications for one term are not permitted.

1. Complete Application Form
   • Please be sure to include variations of your name as it appears on your official documents (i.e., passport)
   • Complete this application for full or part time degree programs delivered on the Troy campus of Rensselaer. Mail all supporting credentials to Graduate Admissions
     Rensselaer Polytechnic Institute
     110 8th Street Troy, NY 12180-3590

2. Nonrefundable $75 Application Fee
   • If you do not wish to submit payment by credit card, a money order or check drawn on a U.S. bank, payable to Rensselaer Polytechnic Institute, may be mailed to the above address. Include the full name, date of birth, and address of the applicant on money order or check. Do not send cash or stamps.
     • The application fee is waived for Rensselaer alumni, current Rensselaer students (matriculating and non-matriculating), employees, and employee spouses.

3. Statement of Background and Goals (including current work/academic activities)
   • Upload a one or two page statement that includes the following information:
     ▶ Your full name and date of birth
     ▶ Your primary educational and research interests
     ▶ An outline of your research experience and a list of any publications and academic honors
     ▶ A description of your background in fields particularly relevant to your study objectives—including any relevant industrial/work or research experience
     ▶ A discussion of specific research topics and methods you might pursue in your thesis research
     ▶ Information outlining your current work/study activities
   • Applicants to the Lally School of Management and Technology M.S. and MBA programs are required to submit answers to the following questions in lieu of the Statement of Background and Goals.
     ▶ Two themes that underlie the Lally MBA are innovation and technology, particularly as these relate to entrepreneurship, financial analysis, and international business development. Tell the story of your career so far and how the Lally MBA would expand your options in these or other areas and enable you to attain the career goals you are considering (max. 500 words).
     ▶ Given our emphasis on innovation and entrepreneurship in both technological entrepreneurship and finance, students who succeed at Lally tend to be creative individuals who are fascinated with new products and new business ideas and are especially good at identifying new opportunities. Please send us an example of your creative thinking. This could be, but should in no way be limited to, one of the following:
The only restrictions are that it cannot be larger than 2 cubic feet (1 ft x 1 ft x 2 ft), no heavier than 50 pounds, and if you upload (or send) a written document, no longer than 1,500 words. If you submit something other than a written work, you must also submit a description of not more than 500 words explaining your submission.

4. Resume

5. Portfolio (see Graduate Admission Requirements)

6. Two letters of recommendation

Rensselaer requires two letters of recommendation. Recommendations may be submitted electronically or by postal mail. Please obtain recommendations from two individuals who have supervised your work on the job or at school; we recommend that at least one is a faculty member or an academic dean or adviser familiar with your academic performance.

7. Official transcripts, in English, of all postsecondary education

- Official transcripts of all undergraduate and graduate studies must be submitted. Student printed or downloaded copies of transcripts are not accepted.
  - If you are currently attending a university, a final transcript must be submitted upon completion of your course work. If you have completed your degree, the award of degree must be noted on the transcript. See #8.
  - If your school does not release official transcripts directly to students, you must request that the school mail the official copy directly to Graduate Admissions.
- All international transcripts must be recorded in English or officially translated to English. Transcripts in the original language must accompany all translated documents. Uncertified translations, or translations by students, will not be accepted.
  - Degree seeking students must submit official transcripts from every postsecondary institution attended, whether or not a degree was completed.
  - Do not submit secondary school (high school) exam results or transcripts.

8. Official evidence, in English, of postsecondary degrees earned

If transcripts of previous or current study do not include the award of degree, include a certified copy of the diploma or other official evidence that the degree has been awarded.

9. Official test scores — please see Graduate Admission Requirements for specific departmental requirements Rensselaer Code 2757
• Official test scores are required and must be requested from the testing organization.
• Copies of these scores may be sent to Graduate Admissions, but will be used only until official scores are received.
• GRE or GMAT reports should reflect test scores dated within five years. Older scores are not available from ETS.
• Please be aware that it may take up to four weeks for official test scores to be received by Graduate Admissions.
• The average credentials for admitted students include GRE scores of 550 (verbal), 765 (quantitative), 695/4.5 (analytical).
• Applicants are encouraged to take the Personal Potential Index test and to submit scores.

10. Official TOEFL or IELTS scores, if applicable

The TOEFL or IELTS is required of all international applicants whose native language is not English. A minimum TOEFL score of 230 CBT/89 iBT/570 PBT is required for admissions consideration. Many departments require a higher TOEFL score. Please see Graduate Admission Requirements for details. In lieu of TOEFL, a student may submit IELTS (International English Language Testing System) scores. Only the academic format is acceptable and a minimum score of 6.5 is required for all departments and programs. Additional information about the test may be found on the IELTS website at www.ielts.org. TOEFL/IELTS scores older than two years are no longer available and will not be considered. The TOEFL/IELTS requirement is waived for applicants currently enrolled in fulltime studies in the U.S. and who will have completed two academic years of course work in the U.S. immediately prior to enrolling at Rensselaer.
Reapplication for Graduate Admission

Rensselaer does not postpone/defer admission for graduate study to a later term. Rensselaer maintains prior application documents for two years only. Non-matriculated students wishing to apply for degree status must submit a complete graduate application. Applicants who are applying within two years of the prior application must submit the following:

- Graduate application form
- Nonrefundable $75 application fee
- Updated Statement of Background and Goals (including current work/academic activities)
- Updated Resume
- One additional letter of recommendation. If applicant is currently enrolled in a course of study, the recommendation should be from an academic adviser.
- Official transcripts for all course work taken since submission of the prior application
- Official score reports of all tests (GRE, GMAT, TOEFL, IELTS, etc.) taken since submission of prior application.

Financial Assistance

- Funding for graduate study is based on an applicant’s academic record, recommendations, and the relevance of the applicant’s area of interest to the department’s research efforts. The possible sources of financial support are your department of intent, outside fellowships, and Rensselaer’s Office of Financial Aid. Academic departments are the most important sources of funding for the majority of graduate students. To be considered for financial aid, be sure to check the appropriate item on the financial aid section of the application form. More than seventy percent of Rensselaer’s fulltime graduate students are funded by research assistantships, teaching assistantships, corporate, national, or university fellowships.

- **Applying for Financial Assistance** Start early. Please visit http://gradadmissions.rpi.edu for more information on funding sources. Many external funding sources have application deadlines earlier than Rensselaer’s admission and financial aid deadlines. Except for Rensselaer financial aid awards, you will need to file a separate application for each type of financial aid.

- **Office of Financial Aid** Rensselaer Polytechnic Institute 110 8th Street Troy, NY 12180-3590 Phone (518) 2766813 Fax (518) 2764797 Email financial_aid@rpi.edu

- **Rensselaer Institutional Assistance** Graduate assistantships are awarded by academic departments on the basis of scholastic accomplishments, academic promise, and competence. Appointments are made on an annual basis. The positions usually require 20 hours of work each week under the guidance of Rensselaer faculty. Continuation of Rensselaer financial assistance depends on satisfactory academic standing, research or teaching performance, and aid availability.

- **Teaching Assistants** Students assist Rensselaer faculty in their classroom and laboratory activities, gaining valuable experience as researchers, scholars, and teachers. Departments provide stipends and full tuition waivers. Master's students may spend a maximum of one year with internal support; doctoral students may spend a maximum of two years with internal support. Continued support can then be provided by means of research assistantships.

- **Research Assistants** Students work with the faculty in research related tasks that further the student’s own graduate career and development as a researcher, scholar, and professional.
Research assistants are paid a stipend and are given a full waiver of tuition.

- **Graduate Fellowships** Outstanding students may be awarded a university supported Rensselaer Graduate Fellowship Award, which carries a full tuition and fees scholarship and a minimum stipend of $18,000 per academic year. Students are nominated by their departments for Rensselaer Graduate Fellowship consideration.

- **Departmental Fellowships and Scholarships** Some departments may offer additional opportunities for support of graduate students. Contact your intended department for information concerning eligibility requirements and selection criteria. Please see Graduate Admission Requirements for department contact information.

- **External Assistance** Applicants to Rensselaer graduate programs are encouraged to seek external funding sources. Many federal agencies, foundations, and corporations offer financial assistance through fellowships, scholarships, and grants to finance graduate study. Contact agencies directly regarding the application process for these funding opportunities.

- **Loan Programs**
  - **Federal Stafford Loan** U.S. citizens and permanent residents are eligible to receive up to $20,500 under the Federal Stafford Loan Program each year. Eligibility for all federal loan programs is determined by the Rensselaer Financial Aid Office after a review of the Free Application for Federal Student Aid (FAFSA). To obtain the FAFSA, call the Federal Student Aid Information Center at (800) 433-3243 or go online at http://www.fafsa.ed.gov. Be sure to use the institutional code number (002803) to ensure that Rensselaer Polytechnic Institute receives the results of the FAFSA analysis.
  - **Federal PLUS Loan** A new federal loan is available to graduate and professional students who are U.S. citizens or eligible noncitizens. The Federal PLUS Loan supplements the Federal Stafford loans currently available and allows students to borrow up to the full cost of education, including books, living expenses, and more. Application instructions to apply for a Federal PLUS Loan are available at http://financialaid.rpi.edu or by contacting the Financial Aid Office directly.
  - **Private Alternative Loan** The Financial Aid Office has researched a variety of private lenders who offer loans. For international students, the alternative loan companies require a U.S. citizen as a cosigner. An alternative loan brochure is available from the Financial Aid Office and may be found at http://financialaid.rpi.edu.

- **Notification and Acceptance of Financial Assistance** Notification of financial aid begins in January for the fall semester. The Graduate School and each department communicate directly with the selected recipients. Rensselaer subscribes to the Resolution of the U.S. Council of Graduate Schools, which sets an April 15 deadline for the offer and acceptance of financial assistance.

**Establishing Financial Support**

International applicants seeking a student visa (F-1/J-1) and whose financial support will be provided by a source other than Rensselaer must provide official documentation that sufficient funding is available to cover university fees, books, supplies, tuition, and living expenses for themselves and their dependents (if accompanied by family members) for the entire duration of their study at Rensselaer. To assist you, a brief description of acceptable sources of support follows.
- **Rensselaer Financial Award** Your department will provide Graduate Admissions with a copy of your financial aid award. Students accompanied by family members must provide proof of financial support for their dependents for the duration of their study.

- **Self Support** If you have personal savings and intend to use this money for your financial support, a bank official must verify the funds that you have indicated are available. Self-supported students must have sufficient funding to cover the entire duration of their program as funding for years subsequent to the first is generally not available for those not receiving a first-year award.

- **Parents/Individual Sponsors** If your parents or others are willing to sponsor your studies, they should indicate the amount of support they will provide. Your parent/sponsors must have an official of their bank include a current bank statement (certified and signed by the bank official) to verify their ability to provide the necessary funds for the duration of your program.

4. **Government or Sponsoring Agency** Should your government or an international organization or foundation sponsor you, indicate the name of the agency and include a letter, signed by an authorized representative, detailing the terms of your award. The letter should provide the following information:

- Will the sponsoring agency pay your tuition, fees, and living expenses?
- What is the duration of the sponsorship: one year, two years, or renewable until the degree is awarded?
- Will your sponsor cover living expenses for your spouse and/or children to accompany you during your studies?

5. **Other** You may have other sources of support (sponsors) not included above. Once you are admitted, you will be required to submit current financial support documents, including official bank statements signed by an official of the bank, that indicate the amount and source of support.

**Please Note**
- If your program requires more than one academic year to complete, the official bank documentation or sponsor letter must show the likelihood for future funding through a sufficient bank balance or a bank officer’s statement that assets and income are adequate to cover all tuition and living expenses for the duration of your program. Generally, this would be 2 years for M.S./MFA study.
- All documents must be in English and show the conversion of the national currency into U.S. dollars. Such statements must be dated within three months of the request for the I-20A-B/DS-2019.
- Immigration eligibility documents (I-20A-B/DS-2019) will be issued for full-time study and only when an applicant has been officially admitted, has established satisfactory English
proficiency and financial support, and has confirmed his/her intent to enroll. Conditional documents are not issued.

- The official cost of attendance required for issuing the I-20A-B/DS-2019 is announced in March each year. An annual increase of 4 to 8 percent may be expected.

**Visa Information**

- After receiving the immigration document (I-20A-B/DS-2019), each student must apply through a United States Embassy or Consulate for the appropriate visa to enter the United States.
- Any student entering the United States using documents issued by Rensselaer must register for the semester for which admission is granted.
- Verification of arrival and enrollment is electronically tracked through the Student and Exchange Visitor Information System (SEVIS). Any failure to arrive at Rensselaer and enroll as a full-time student will be reported to the U.S. Bureau of Customs and Immigration Services (BCIS, formerly Immigration and Naturalization Service or INS).
Frequently Asked Questions

What do I do if a class I want to register for is full?
Meet with the instructor of the course and request to be admitted to the course. If the class is a core/required course every effort will be made to accommodate the request. If this is an elective course you may be asked to take it in a subsequent semester.

How do I add/drop a course?
You may use the Student Information System (SIS) to add or drop courses. Generally speaking, from the beginning of the semester, you will have two weeks to add courses and eight weeks to drop them. Please refer to the Academic Calendar for specific add and drop deadline dates. If you wish to petition to add or drop classes after the published deadline, you may do so using a Late Add/Drop Form. Please note that after the instructor’s signature (if required), the form must also be approved by the Advising and Learning Assistance Center.