

# WELCOME

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Welcome to the Department of Civil and Environmental Engineering. The intent of this Handbook is to introduce you to the Department, the faculty, and the undergraduate programs and activities. This Handbook also provides details on Department policies, procedures, and requirements that may affect you. Please read this document to become aware of not only the requirements you must meet, but also the opportunities available to you.

You should use this handbook to answer questions, particularly questions relating to graduation requirements.

This Handbook addresses specific rules and policies of the Department of Civil and Environmental Engineering, although it mentions other College and University regulations as well. We have not attempted to include every policy and regulation that you may encounter at UMass; however, the College and University requirements not mentioned in this Handbook still apply to all students.

We sincerely hope that your undergraduate years in the Department of Civil and Environmental Engineering will be rewarding. We are sure that your experiences will form the basis for life-long friendships while also providing a solid foundation for your professional career.

You can find additional information on the website, especially up to date information regarding faculty interests and opportunities for participation in research activities. Visit our web site at: <http://www.ecs.umass.edu/cee/index.html>.

# T HE CEE PROFESSION

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Civil and Environmental Engineering originated as a field involved with civil works - the planning, design, construction, and operation of facilities that serve the public. Today the field is still largely centered in the public arena, although Civil and Environmental Engineers now contribute to society in ways that were never imagined 50 years ago. Civil and Environmental Engineering is a profession dedicated to the needs and progress of humankind. It is a people-serving profession. Civil and Environmental Engineers design and construct facilities that are used every day - roadways, bridges, tunnels, subways, buildings, canals and waterways, drinking water treatment plants, solid waste landfills, wastewater treatment plants, water supply pipe networks, railroads, dams and reservoirs, and even ski lifts and amusement park rides. They analyze and solve problems of water, land, and air pollution and oversee the operation of water supply, pollution control, and hazardous waste control facilities. Civil Engineers participate in city planning and also plan the uses of natural systems, river basins and other public areas. They perform reliability and economic feasibility studies to insure safe and economically efficient outcomes. Using satellite images and global positioning systems, they survey and monitor the environment and assist in overall resource planning and management. They forecast the impacts of climate change and develop plans to mitigate its impact.

The field of Civil and Environmental Engineering is broad and encompasses a variety of interrelated disciplines: structural engineering, environmental engineering, hydraulics, transportation, water resources, geotechnical engineering, construction, engineering mechanics and surveying. *Structural engineering* involves the planning, design, and construction of many different structures - buildings, bridges, towers, dams, offshore structures, and space platforms. Design must consider such factors as forces, temperature, vibration, and the potential effects of earthquakes. *Geotechnical engineering* also involves structures, but concentrates on the ability of the ground to support the structures. In addition, the discipline studies underground construction and structures composed of soil, for example, earthen dams. More recently geotechnical engineers have worked with environmental engineers to assess soil contamination and to ascertain how best to minimize adverse impacts on the public of groundwater contamination. *Transportation engineering* involves the movement of people, goods, and material, whether by road, rail, water, or air. Traditional aspects of transportation engineering, such as highway design, are now augmented by analysis and design of intelligent vehicles and associated road and signaling systems.

During the past fifty years *Environmental Engineering and Water Resources* has increased dramatically in its scope. *Environmental engineering* focuses on the supply of safe drinking water, cleanup of hazardous waste disposal sites, wastewater treatment, and the proper disposal of solid wastes. *Water resources* engineers focus on the analysis and control of water. Water resources engineers provide critical expertise in areas from the study of extreme events, such as floods and droughts, to the design of canals, hydroelectric power facilities, pipelines, and pumping stations.

In brief, Civil and Environmental Engineering is a profession concerned with quality of life and the benefit and progress of humanity and the infrastructure needed to sustain humanity.

# **A**ABOUT THE DEPARTMENT

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The Department of Civil and Environmental Engineering is one of four departments in the College of Engineering. The other departments are Chemical Engineering, Electrical and Computer Engineering, and Mechanical and Industrial Engineering.

## **Department of Civil and Environmental Engineering Mission**

The mission of the Department of Civil and Environmental Engineering is: to educate students at the undergraduate and graduate levels; to conduct research to solve Civil Engineering problems and to discover new knowledge; to offer service to the Commonwealth, the nation, and the Civil Engineering profession; and to develop Civil Engineering leaders.

## **CE Program Educational Objectives**

The Educational Objectives of the UMass Civil Engineering Program describe the accomplishments we expect of our graduates.

1. Graduates will enter the engineering profession or continue with graduate studies.
2. Graduates will be recognized by supervisors and colleagues as possessing the skills needed for a successful engineering career.
3. Graduates will demonstrate leadership in their profession and in their communities through service to professional societies, to charitable organizations and similar civic service activities.
4. Throughout their careers graduates will use educational opportunities to continue to expand their understanding of science and engineering.

## Department Administration

The Head of the Department is Professor Richard N. Palmer. The Associate Department Head is Professor Thomas Lardner. He is in charge of overseeing the undergraduate program. Dr. Lardner coordinates, with the Academic Assistant, Ms. Jodi Ozdarski, the details of advising and registration, and acts on students' curriculum questions. Dr. Lardner also coordinates graduation certification for all undergraduate degrees. The Department's faculty are divided into four program areas: Environmental and Water Resources Engineering, Geotechnical Engineering, Structural Engineering, and Transportation Engineering and Planning. Each student has an Academic Advisor who is on the faculty.

## The Faculty

The faculty in each program are listed below by area.

### **Environmental and Water Resources Engineering**

David P. Ahlfeld  
Casey Brown  
Caitlyn Butler  
David W. Ostendorf  
Richard Palmer  
Chul Park  
Mi-Hyun Park  
David A. Reckhow\*  
John E. Tobiason

### **Geotechnical Engineering**

Ching S. Chang  
Don J. DeGroot\*  
Carlton L. Ho  
Alan J. Lutenecker

### **Structural Engineering**

Alice Alipour  
Sanjay Arwade  
Sergio Breña\*  
Scott A. Civjan  
Thomas J. Lardner  
Behrouz Shafei

### **Transportation Engineering**

John Collura\*  
Song Gao  
Michael A. Knodler  
Daiheng Ni

\*Coordinator of Program Area

### Emeritus Faculty

Alexander Chajes – Structural Engineering  
James K. Edzwald - Environmental Engineering  
Ernest T. Selig - Geotechnical Engineering  
Paul W. Shuldiner - Transportation Engineering  
Michael S. Switzenbaum - Environmental Engineering

### Adjunct Faculty

Peggi Clouston – UMass, Building Materials and Wood Technology  
Donald Fisher- UMass, Dept. of Mechanical & Industrial Engineering  
Kathleen L. Hancock - Virginia Polytechnic Institute & State University  
Sharon C. Long – University of Wisconsin  
David A. Noyce – University of Wisconsin

## **The Staff**

The Civil and Environmental Engineering Department has a number of people who provide invaluable support services to students. Undergraduates usually have the most contact with the Academic Assistant, Ms. Jodi Ozdarski, 226 Marston Hall, 545-0686, [ozdarski@ecs.umass.edu](mailto:ozdarski@ecs.umass.edu). **If you have a question and are not certain whom to see, she is the best person to ask.** In addition to these academic support people, there are also a number of staff who provide the faculty with support on their research.

## **Facilities**

Department facilities are located in Marston Hall, Gunness Laboratory and Engineering Lab II. The main department office is located in Marston 224. Undergraduate instructional laboratory space is available in Marston Hall and Gunness Laboratory. Computer access is available in Marston 23, 112 and 114, as well as several other locations maintained by the College of Engineering. Student design rooms and study areas are also available in Marston and Gunness.

## **Other Services**

As an undergraduate, two services of the College of Engineering are important to you. The **Office of Student Affairs (OSA)**, located in Marston 126, works closely with the Department to assist with advising and preregistration and to maintain records. **Engineering Computer Services (ECS)** provides extensive computer services, support personnel, and maintain the computer rooms. ECS is also responsible for assigning to you an account through which you can gain access to email and the World Wide Web. The ECS office is in Marcus 100.

## **Getting Information**

Communication between students and the department is very important. The primary mode of communication from the department to students starts with your OIT email address. Therefore, you should check your email frequently. General interest announcements will be broadcast by email and posted on the department's webpage (<http://cee.umass.edu/>). The main Department Undergraduate Notice Board is located just outside the main office (MRST 224) and is also used to provide information. The Department publishes "The Bridge" for undergraduates four times a year: at the beginning of each semester, and before Fall and Spring preregistration periods. "The Bridge" is available on-line.

# **T**HE CIVIL ENGINEERING CURRICULUM

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The goal of the Civil Engineering curriculum is to produce well educated and well informed civil engineers who can operate at the cutting-edge of Civil Engineering practice. Many of our graduates either proceed directly into graduate school or return for graduate education after several years of professional experience. The degree is accredited by the Engineering Accreditation Commission of the Accrediting Board for Engineering and Technology (EAC/ABET) and the curriculum includes a mixture of humanities, social science, physical science, communications, and engineering courses. Many of the basic science and engineering courses are taken in the first two years, followed by engineering courses in the areas of Environmental and Water Resources Engineering, Geotechnical Engineering, Structural Engineering, and Transportation Engineering. In addition, the curriculum has sufficient flexibility to allow concentration in one or more of these areas in the senior year. Some courses are a lecture format, while others rely heavily on interaction among students in small groups to complete design projects. In addition, several courses have laboratory sessions to provide hands-on engineering experience. Because Civil Engineering is a people-serving profession where practitioners have direct contact with clients and the public, the curriculum provides for courses in the humanities and social sciences. In addition, the curriculum requires two writing courses. The design courses have an emphasis on verbal and written communication. In addition to fulfilling course requirements, all seniors must complete a survey that assesses their undergraduate education prior to graduation.

## **University General Education Requirements**

For students enrolling after Fall 2010, the University general education requirements that you must meet in order to graduate are given below. **It is your responsibility to fulfill these requirements.**

**Social World Courses.** You must take four courses (see Diversity Requirement below) consisting of:

- **One** course in Social and Behavioral Science (SB); Economics 103 or 104, which is required in the Civil and Environmental curriculum, fulfills this requirement.
- **One** course in the Arts, which can be in Literature (AL); or Visual and Performing Arts (AT).
- **One** course in Historical Studies (HS).
- **One** additional course with a designation of AL, AT, SB, I or SI.

**Diversity.** One of the four Social World courses must have a Global diversity designation (G) **and** one must have a United States diversity designation (U).

**Writing.** The University requires two writing courses: a 3-credit course in the freshman year, EnglWP 112 - College Writing, and a 3-credit course in the junior year, ENGIN 351 - Writing in Engineering.

**Biological Science.** The University General Education policy requires that you take a 4 credit course in the Biological Sciences. Courses that qualify for this elective are identified by the University with a “BS” designation. Various departments offer courses with the BS designation. Those that are offered each semester are listed in SPIRE. While a variety of worthwhile courses are listed each semester, the following courses are suggested:

Anthropology 103: Human Origins and Variations  
BioChem 100: My DNA  
Biology 105: Biology of Social Issues  
Biology 106: Human Biology  
Biology 108: Biodiversity  
Building Materials and Wood Technology 201: Introduction to Wood Science  
Environmental Sciences 101: Introductory Environmental Biology  
Microbiology 160: Biology of Cancer and AIDS  
Nutrition 130: Nutrition for a Healthy Lifestyle  
Plant, Soil and Insect Sciences 115: Plants, Soils and the Environment  
Plant, Soil and Insect Sciences 106: Soils

## **Engineering Science and Engineering Design Components**

The Department requires a minimum of 32 hours of Engineering Science (ES) and 16 hours of Engineering Design (ED). These are minimum requirements. Since the required courses in the curriculum do not contain the minimum Engineering Science and Engineering Design credits to meet these requirements, shortfalls in these two areas must be made up from CEE elective courses.

All courses in the Department have credits that are designated as Engineering Science and Engineering Design. The Engineering Science and Engineering Design credit content of Civil Engineering elective courses is tabulated in Appendix A.

## **Advising Process**

All students in the Department have a faculty advisor. Ideally, this advisor tracks your progress throughout your career in the department. However, due to interruptions, such as faculty sabbaticals or leaves, assignments may change. You must meet with your advisor twice a year during the registration/advising periods to decide on courses for the upcoming semester. However, you should feel free at any time to make an appointment with your advisor if you have questions or concerns. Your advisor is here to help you. Office number, telephone number and the email address of your advisor is listed in your SPIRE account.

Students and advisors meet at the advising for preregistration period usually an evening event to facilitate advising. The Department and Office of Student Affairs will notify you of the Department advising and preregistration night. Before meeting with your advisor you should obtain your registration material from the Academic Assistant (or in OSA if you have not yet declared Civil Engineering as your major). You need to:

1. Read the instructions;
2. Decide on your course selections (to the extent you can);
3. Fill in the course selection form (again, to the extent you can) before meeting with your advisor.

You and your advisor will discuss your choices, and your advisor will answer any questions that you may have, and give you a copy of your completed course schedule form. This allows you to register on SPIRE. To avoid problems with students signing up for courses without having an opportunity to discuss their programs with their advisor or to register for courses without the proper prerequisites (see Appendix B), we require all students to meet with their advisors. **You will not be able to register on SPIRE without having seen your advisor. A hold will be placed on your SPIRE account if you do not attend the advising session.**

## **Engineering Management Minor**

### **What is the Engineering Management Minor?**

- An interdisciplinary minor which provides engineering students with background in the areas of finance, accounting, marketing, and management.
- Offered through the College of Engineering and the Isenberg School of Management.
- Potential employers are attracted to students who are business savvy.
- Students will acquire skills in decision making for the business environment.
- Requires 15 credits, most beyond the courses taken for the engineering major.

### **Who qualifies for the Engineering Management Minor?**

- All full-time undergraduate engineering students with a GPA of 3.0 or higher and have declared an engineering major. Given the limited number of slots available, admission to the minor is highly competitive.

### **What will I study?**

The curriculum is divided into two parts:

#### 1. Required Foundation Courses (12 credits)

- Principles of Management (MANAGMNT 301)
- Introduction to Accounting (ACCOUNTG 221)
- Corporate Finance (FINOPMGT 301)
- Fundamentals of Marketing (MARKETNG 301)

#### 2. Integrative Experience (3 Credits, Required)

- Technology Management Seminar – SCH-MGMT 597 or 797

### 3. Additional Recommended Courses

- ECON 103 Introduction to Microeconomics
- ECON 104 Introduction to Macroeconomics
- CE-ENGIN 270 Civil Engineering Systems Analysis
- M&I-ENGIN 353 Engineering Economic Decision Making
- SCH-MGMT/ENGIN 593 Design of Experiments

#### How do I apply?

- Students in their second semester freshman year who meet the requirements may apply.
- Applications are available at: [http://www.umass.edu/ug\\_programguide/engmgt.html](http://www.umass.edu/ug_programguide/engmgt.html) or in the Office of Student Affairs in 126 Marston Hall.
- Submit completed applications to Kathleen Rubin, Assistant Dean, Office of Student Affairs, 126 Marston Hall.

For additional information, speak to one of the following faculty advisors:

#### **College of Engineering**

- Thomas Lardner, Civil & Environmental Engineering, [lardner@ecs.umass.edu](mailto:lardner@ecs.umass.edu)
- Ana Muriel, Mechanical and Industrial Engineering, [muriel@ecs.umass.edu](mailto:muriel@ecs.umass.edu)
- Dennis Goeckel, Electrical and Computer Engineering, [goeckel@ecs.umass.edu](mailto:goeckel@ecs.umass.edu)
- Erin Baker, Mechanical and Industrial Engineering, [edbaker@ecs.umass.edu](mailto:edbaker@ecs.umass.edu)

#### **Isenberg School of Management**

- Soren Bisgaard, Isenberg School of Management, [bisgaard@som.umass.edu](mailto:bisgaard@som.umass.edu)
- Alan Robinson, Isenberg School of Management, [agr@som.umass.edu](mailto:agr@som.umass.edu)
- Joseph Stokes, Isenberg School of Management, [jcs@som.umass.edu](mailto:jcs@som.umass.edu)

# Civil Engineering Curriculum

The breakdown of courses by academic year is meant as a guide of a potential graduation path only. Student curriculum will be modified to fit individual student needs.

## Curriculum for Students Entering the University after June 2010

<u>Freshman Year</u>			
EngIWP 112 - College Writing	3	CE-ENGIN 121 - CE Measurements	3
ENGIN 111 - Intro to Civil Engrg	3	Chem 112 - Engrg Chemistry	4
Chem 111 - Engrg Chemistry	4	Math 132 - Calculus II	4
Math 131 - Calculus I	<u>4</u>	Physics 151 - Gen. Physics I	<u>4</u>
	14		15
<u>Sophomore Year</u>			
Economics 103 or 104	4	CE-ENGIN 270 – Sys. Anal. & Econ. for CE	3
CE-ENGIN 240 - Statics	3	CE-ENGIN 241 & 241A - Strength of Materials	4
CE-ENGIN 260 - Statistics	3	CE-ENGIN 250 - Thermo, Heat Trans., & Energy	3
Math 233 - Multivariable Calculus	3	Math 331 - Ordinary Differential Equations	3
Physics 152 - Gen. Physics II	<u>4</u>	Social World Elective	<u>4</u>
	17		17
<u>Junior Year</u>			
CE-ENGIN 310 - Trans. Systems	3	CE-ENGIN 320 - Soil Mechanics	4
CE-ENGIN 331 - Structural Analysis	3	ENGIN 351 - Writing in Engineering	3
CE-ENGIN 357 - Princ. of Fluid Mech.	3	CE-ENGIN 433 or 434 - Concrete/ Steel Design	3
CE-ENGIN 370 - Env. Engrg. Princ.	4	Biological Science (BS)	<u>4</u>
Social World Elective	<u>4</u>		14
	17		
<u>Senior Year</u>			
Social World Elective	4	CE-ENGIN 486 - Civil Engrg Design Project	4
Civil Engineering Electives*	<u>9</u>	Civil Engineering Electives*	6
	13	Free Elective	<u>3</u>
			13

Total Credit Hours Required -- **120**

\* One course is required in the Environmental and Water Resources, Geotechnical and Transportation area.

ES/ED Component in Required Courses:

28 Hours Engineering Science  
11 Hours Engineering Design

ES/ED needed in CE Elective Courses to satisfy Department ES/ED requirements:

4.0 Hours Engineering Science  
5.0 Hours Engineering Design

## CEE Electives

The CEE Curriculum allows for CE-ENGIN electives to be selected by the student depending on the student's particular interest. One elective must be in Environmental & Water Resources Engineering; one must be in Geotechnical Engineering and one must be in Transportation Engineering. The following electives are provided by the Department. CEE electives offered at the 200 level and below can be used only to fulfill the Free Elective in the CEE Curriculum. Courses at the 500 level are only open to students with a GPA of 3.0 or above, or consent of the instructor. **Undergraduates may not take 600 level courses.**

### Environmental and Water Resources Engineering

- CE-ENGIN 462 Water Resources Engineering and Sustainability
- CE-ENGIN 469 Water Supply and Wastewater Collection
- CE-ENGIN 471 Water and Wastewater Systems
- CE-ENGIN 473 Groundwater
- CE-ENGIN 476 Solid and Hazardous Waste Management
- CE-ENGIN 560 Hydrology
- CE-ENGIN 561 Open Channel Flow
- CE-ENGIN 572 Environmental Engineering Analysis
- CE-ENGIN 573 Environmental Engineering Microbiology
- CE-ENGIN 575 Advanced Solid and Hazardous Waste Management
- CE-ENGIN 577 Surface Water Quality Modeling
- CE-ENGIN 579 Air Quality

### Geotechnical Engineering

- CE-ENGIN 421 Foundation Engineering
- CE-ENGIN 423 Engineering Geology
- CE-ENGIN 515 Pavement Design
- CE-ENGIN 523 Ground Improvement and GeoConstruction
- CE-ENGIN 525 Environmental Geotechnology
- CE-ENGIN 527 Earthquake Engineering

### Structural Engineering

- CE-ENGIN 342 Dynamics
- CE-ENGIN 432 Advanced Structural Analysis
- CE-ENGIN 433 Design of Reinforced Concrete Structures
- CE-ENGIN 434 Design of Steel Structures
- CE-ENGIN 535 Matrix Analysis of Structures
- CE-ENGIN 536 Advanced Topics in Reinforced Concrete Design
- CE-ENGIN 540 Strength of Materials II
- CE-ENGIN 541 Structural Dynamics
- CE-ENGIN 542 Advanced Topics in Steel Design
- CE-ENGIN 548 Finite Element Method
- CE-ENGIN 549 Structural Stability
- CE-ENGIN 550 Introduction to Bridge Engineering
- CE-ENGIN 590C Prestressed Concrete

### Transportation Engineering

CE-ENGIN 410 Public Transportation Systems  
CE-ENGIN 411 Traffic Engineering  
CE-ENGIN 418 Intelligent Transportation Systems  
CE-ENGIN 450 Highway Location and Geometric Design  
CE-ENGIN 509 Transportation System Analysis  
CE-ENGIN 510 Public Transportation Systems  
CE-ENGIN 511 Traffic Engineering  
CE-ENGIN 516 Transportation Design  
CE-ENGIN 518 Intelligent Transportation Systems  
CE-ENGIN 520 Traffic Flow Theory and Simulation I  
CE-ENGIN 521 Traffic Flow Theory and Simulation II

### General Civil Engineering

CE-ENGIN 211 Perspectives on the Evolution of Structures  
CE-ENGIN 275 AutoCAD in Civil Engineering  
CE-ENGIN 290B History & Heritage of Civil & Environmental Engineering  
CE-ENGIN 455 Spatial Analysis for Civil Engineers  
CE-ENGIN 485 Civil Engineering Construction Methods  
CE-ENGIN 490A Sustainable Aspects of Civil & Environmental Engineering Design  
CE-ENGIN 597G GIS for Engineers

### Other Electives

Students may find other electives outside of the CEE Department that support their educational plans. However, in general only CEE courses may satisfy CEE electives.

## **Transferring Courses**

Students occasionally may wish to take courses at other institutions and then have their credits transferred to UMass to fulfill a requirement. This most often happens for summer courses, but also for students studying abroad. Please note that **prior approval is required for all courses to be completed at another institution that wish to be transferred**, i.e., UMass Lowell, WPI, Holyoke Community College, etc. A prior approval form can be obtained in 126 Marston Hall.

Different offices on the campus depending on the type of course to be taken grant permission for prior approval.

- **General Education Requirements:** i.e., Social World, English Writing, Biological Science, etc. Prior approval is granted through the Records office in the Registrar, 207 Whitmore Building (545-0555).
- **College of Engineering Requirements:** i.e., Chemistry 1, Engin 111, Physics 152/154, Calculus 1 etc. Prior approval is granted through the Director of Recruitment and Transfer Affairs, 126 Marston Hall (545-2035). **Course Description is required; Syllabus is preferred.**
- **Major Departmental Requirements:** i.e., Statics, Strength of Materials, etc.

Prior approval is granted through the Director of Recruitment and Transfer Affairs in conjunction with the Associate Department Head and key Faculty, 126 Marston Hall (545-2035). **Course Description is required; Syllabus is preferred.**

In general, the Department will not transfer engineering courses from programs not accredited by ABET to satisfy UMass CE-ENGIN course requirements. In some cases, courses from unaccredited programs will be accepted if these courses do not contain engineering design components. (See section on Study Abroad and National Exchange programs).

**NOTE: Transfer course grades do not transfer; only credit for the course completed with a C or above will transfer to UMass.**

## **Course Substitution**

Substitutions for Civil Engineering courses are made rarely and will be made only with the recommendation of the Associate Department Head in consultation with a faculty member who teaches that course. A Substitution Form for Civil Engineering courses will be added to the student's file when a substitution is approved or disapproved.

Substitutions for courses involving University or College of Engineering requirements must be recommended by the student's advisor and approved by the Associate Department Head and the College Transfer Program Office.

## **Independent Study Courses**

CEE 396, 496 and 596 - Independent Study/Special Problems and CEE 397, 497 and 597 - Special Topics must be arranged between an individual student and faculty member. These courses can be taken to satisfy electives within the Civil Engineering curriculum. However, since the content of these courses change from instructor to instructor, the Engineering Science and Engineering Design components are not fixed. Thus if students wish to arrange for one of these six courses they must consult with a faculty member to make an outline of the course (at the beginning of the semester) conforming to the ABET format and determine the ABET components (Course Objectives and Course Outcomes, as well as Engineering Science and Engineering Design credits) of the course. This outline will then be forwarded to the Associate Department Head so that the content of the course can be included in your file. No grades in these six courses will be forwarded to the Registrar's Office until the ABET outline is completed and a copy of the final report (or appropriate deliverable) is submitted.

Several other requirements related to these courses should be noted:

1. No more than three credits from these six courses may be used to satisfy the Civil Engineering Curriculum requirements.
2. None of these courses may be used to satisfy the Environmental & Water Resources, Geotechnical or Transportation elective requirements, but they can be used to satisfy the other two CEE Elective slots or the Free Elective slot.
3. None of these courses may be used to satisfy a Civil Engineering Elective or Free Elective if a student is already using Honors Project credit (CEE 499T) to satisfy either of these slots.

# **The Commonwealth Honors College**

The Commonwealth College is a way for motivated students to enrich their studies through interdisciplinary seminars, enriched honors courses, community service opportunities, and individual research. Creativity, innovation and exploration are the qualities the College encourages. Entering first-year students are admitted to Commonwealth College on the basis of academic achievement in high school, test scores, and an essay by the student. Entering transfer students may be admitted either by invitation or by applying to the college during the first month of their entering semester if they have a 3.2 grade point average or higher from their previous institution. Others may apply based on their academic record at the University. All students may enroll in Honors sections of courses.

The following is a summary of the CEE Commonwealth Honors College requirements. A checklist summarizing the honors program requirements is provided in Appendix D and should be used by students to ensure that they fulfill all of the requirements.

## **Foundation and General Education Requirements**

College Writing (ENGLWP 112H, 112, equivalent or exemption). Two honors Gen. Ed. courses are required, one of which must be an interdisciplinary course. Honors Math, Chemistry and Physics courses can be used to meet the disciplinary Gen. Ed. requirement. The Honors College offers a number of interesting interdisciplinary Gen. Ed. Courses that can also be used to meet the Social World gen ed requirements.

Honors students complete four honors Gen Ed courses, including honors College Writing and one of the two required Honors-College seminars, Honors 291A: Ideas that Changed the World (4-credit, general-education interdisciplinary-honors course). The second Honors College Seminar, Honors 391A: Special Topics (1-credit seminars on a wide variety of topics) is a separate breadth-of-study requirement offered by departmental faculty.

## **Major Requirements**

Two honors courses must be taken from CEE, one must be at the 300 level or higher. As all CEE 500 level courses are approved honors, 500 level CEE classes may be used to meet this requirement. ENGIN 351H can also be used to meet this requirement.

## **Culminating Experience**

In addition to the above courses, each student must take CEE 499Y and CEE 499T. During the first semester the student forms an advisory committee, writes a proposal, and initiates the research project. During the second semester the research is completed and a report is written and defended. Three credits of honors research can be substituted for a CEE technical elective. Students using honors research as a CEE elective must make an outline of the course (at the beginning of the semester) conforming to the ABET format and determine the ABET components (course objectives, course outcomes, as well as engineering science and design credits for the course). The same form used for independent studies may be used.

## **Thesis Scheduling**

In the interest of fostering class cohesion among the CEE seniors completing Commonwealth Honors College honors theses (hereafter, theses), making their work more visible within the department, and lending increased gravity to the act of completing and submitting a senior

thesis, the following milestone dates will be enforced to ensure the successful completion of theses.

1. **April 8 (or the subsequent Tuesday if April 8 is a weekend or holiday): Thesis draft due.** A complete draft of the thesis is to be submitted to the advisor electronically or in print as specified by the advisor.
2. **April 15 (or the subsequent Tuesday if April 15 is a weekend or holiday): Oral presentations and poster session.** Each student will make an oral presentation of his or her findings in a public session. Each student will also prepare a poster for display in a public session. The scheduling of oral presentations will be directed by the Commonwealth Honors College advisor who will also provide a template for the poster.
3. **April 22 (or the subsequent Tuesday if April 22 is a weekend or holiday): Thesis due.** Two printed copies to be submitted to Jodi Ozdarski by 4:00 PM for reading and grading by the committee members. No extensions. Grades deducted at 1/3 of a letter grade for the first day late and an additional 1/3 of a letter grade for each additional late week or part thereof. For example, a thesis that is one day late cannot receive a grade higher than A-, and a thesis that is 8 days late cannot receive a grade higher than B+, and a thesis that is 9 days late cannot receive a grade higher than B.

### **For More Information**

The CEE Honors Program advisor is Dr. Michael Knodler. His office is located in 216 Marston Hall or you can contact him at 545-0228 or by email: [mknodler@ecs.umass.edu](mailto:mknodler@ecs.umass.edu).

## **Second Degree Students**

For students interested in earning a second B.S. degree, the University requires 30 credits above and beyond those earned for the first B.S. degree from University of Massachusetts, and 45 additional credits for students with degrees from another institution. In addition, all College and Department requirements must be met. Since the College and Department requirements generally exceed 45 credits, the University requirement is often not an issue. Students should understand that Second Degree Students do not have previous courses transferred to the University. Instead, where appropriate, requirements are noted as having been satisfied. The Associate Department Head determines whether previously taken courses satisfy Department requirements.

## **Study Abroad and National Exchange**

Participation in study abroad or national exchange provides a way for students to enrich and diversify their education, learn about other cultures, people and environments or gain proficiency with a foreign language. For many students, the study abroad or national exchange experience stimulates new ideas about their work after graduation. In the increasingly globalized economy and job-market, international experience may be seen as especially valuable to future employers.

Careful planning of your program of study opens up the possibility to study at schools without engineering programs or in English language programs in non-English speaking countries.

Students can accomplish this by taking extra engineering courses at UMass for one or two semesters and saving their general education, biological science, and free electives to take at another college.

## **Transferring CEE Courses from National Exchange or Study Abroad Programs<sup>1</sup>**

It is the student's responsibility to see that the following requirements are met:

- Students studying at ABET EAC accredited or substantially equivalent<sup>2</sup> Civil Engineering programs may transfer up to two (2) CEE courses into the department from a study abroad or national exchange program.
- Students studying at institutions not accredited by ABET EAC may transfer up to two (2) CEE courses into the department from a study abroad or national exchange program; however, none of these courses may carry design credits<sup>3</sup>.
- Obtain prior approval from the Associate Department Head for your coursework at the other institution. If changes occur, contact him immediately by email ([lardner@ecs.umass.edu](mailto:lardner@ecs.umass.edu)). General education courses taken abroad are evaluated by the international programs office.
- The following information is needed for engineering courses that you plan to take away from UMass: a catalog description, a syllabus and text book used (email the instructor to obtain a copy of the most recent syllabus). Bring that information to the CEE faculty member who teaches the equivalent course at UMass. Obtain his/her written approval that the course fulfills the intent of the equivalent course before you leave.
- Keep all course materials (syllabus, course notes, exams, project reports, etc.). These will be needed by the professor teaching the equivalent course at UMass to determine credit and fulfillment of requirements upon your return.
- Remember that, just as at UMass, you may not get the courses you want while away due to prerequisite requirements, time conflicts or enrollment limitations. Plan for a few different options.

## **For More Information**

**The International Programs Office** has information on universities abroad that have reciprocal exchange programs with UMass Amherst:

William S. Clark International Center, University of Massachusetts, Amherst 01003. Phone (413) 545-2710, email: [abroad@ipo.umass.edu](mailto:abroad@ipo.umass.edu). Or check out their web site at: <http://www.umass.edu/ipo/>

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<sup>1</sup> Note: These requirements do not apply to students who initially transfer to UMass from another institution.

<sup>2</sup> **The Accreditation Board for Engineering and Technology (ABET)** website has information about ABET Engineering Accreditation Commission (EAC) programs and engineering programs in other countries that meet the requirements for substantial equivalency recognition (<http://www.abet.org/>).

<sup>3</sup> See Appendix A for a complete list of CEE courses carrying Engineering Design (ED) credits.

**National Student Exchange office** has information about U.S. colleges and universities that have reciprocal exchange programs with the UMass Amherst:

Contact: Sheila Brennan, Coordinator in 614 Goodell, Phone: 545-5351, E-mail: [sbrennan@casiac.umass.edu](mailto:sbrennan@casiac.umass.edu), or check out their website at: [http://www.umass.edu/ug\\_programguide/otheracadopp/nsep.html](http://www.umass.edu/ug_programguide/otheracadopp/nsep.html)

# ACADEMIC REGULATIONS

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## Admission to the CE Major

College of Engineering students may be admitted to the Civil Engineering major if maintaining a cumulative GPA of 2.0 or better and grades of C or better in the following courses: Math 131, ENGIN 111 (or equivalent), Chem 111 and EngIWP112.

## Grading

The official grading system of the University is: A (4.000), A- (3.700), B+ (3.300), B (3.000), B- (2.700), C+ (2.300), C (2.000), C- (1.700), D+ (1.300), D (1.000), F (0.0), Inc (Incomplete: 0), P (Pass: no effect on cumulative average), W (Withdrawn: no effect on cumulative average), Y (year-long course in progress: no effect on cumulative average), Aud (Audit: no effect on cumulative average or on credit toward graduation), and NR (no grade roster was submitted by instructor for the entire class).

Grades may be changed only at the request of the instructor of the course and with the approval of both the Head of the Department and the Academic Dean of the College in which the course is offered. No course marked F, Inc, W, Y, Aud, or NR earns graduation credit. Students may repeat up to five courses for which they have received grades of C-, D or F, and only the last grade received in the course is included in the computation of the cumulative grade point average. The grades received in both the original course and the repeated enrollment remains on the student's record. Students may not enroll in a course more than twice without the approval of their academic advisor or undergraduate dean. This repeat policy applies only to courses taken at University of Massachusetts Amherst. Students should discuss with their advisor whether or not they should repeat a course. **No courses in the Civil Engineering curriculum can be taken pass/fail.**

For graduation, students must have an overall cumulative GPA of at least 2.0 overall and a cumulative GPA of at least 2.0 in the Civil Engineering major. The Civil Engineering major includes all CEE courses (along with MIE 210 and 211 if applicable).

## Incomplete Grades

Incomplete grades may be given only to undergraduate students who are passing a course at the time of the request for incomplete grade and who are not able to complete the coursework because of medical or personal problems. Students normally have until the end of the following semester to complete the work. The instructor may request an extension of this deadline if it is appropriate to do so. When the work is completed, the instructor will complete a Change of Grade card to indicate the course is completed and will inform the Academic Assistant so that notations will be made in the appropriate files. Grades of Incomplete will be

counted as a grade of F until resolved and will, if not resolved by the end of the following semester, automatically be converted to an F. Please note that bona fide reasons for a request for an incomplete grade are generally for severe medical or personal reasons.

## **Academic Status**

Students are in good academic standing when their cumulative grade point average is 2.00 or above. This requirement applies to full-time and part-time students, and applies equally to those who were admitted as first year and as transfer students. The Registrar's Office will issue a credit alert service indicator to all students who have earned less than an average of 12 graduation credits per semester.

Students whose semester grade point average is less than 2.00 will be placed on Academic Warning. Once placed on Academic Warning, an academic advising hold will be placed on your account. In order to lift the hold you must consult with the Undergraduate Program Director.

Students whose cumulative average falls below 2.00 will be placed on Academic Probation. Students who have been placed on Academic Probation or who have received a second consecutive Academic Warning should contact their academic dean. Students on Probation who fail to achieve or maintain good standing in any subsequent semester will be placed on Academic Suspension unless an appeal is approved. Suspended students may not enroll in the succeeding Fall or Spring semester. Suspension is a one semester separation from the University including Continuing & Professional Education. Following one semester on Academic Suspension, students who file an Application for Readmission with the Registrar's Office (by April 1 for the Fall semester or October 15 for the Spring semester) are entitled to re-enroll. Upon readmission, students returning from suspension shall confer with their academic deans prior to re-enrollment.

Academic Dismissal is a permanent separation from the University. Students who are readmitted after any Academic Suspension and fail to achieve or maintain good standing in any subsequent semester will be placed on Academic Dismissal unless an appeal is approved.

## **Course Enrollments and Withdrawals**

**Add Period.** Students may add a course, with the written permission of the instructor through the **first 14 calendar days** of the semester beginning with the first day of classes.

**Drop Period.** Students may drop courses:

- with no record on the transcript if the course is dropped during **the first 14 calendar days** of the semester, beginning with the first day of classes.
- with a "W" recorded on the transcript, if the course is dropped from the **15th through the 46th calendar day (mid-semester)**.
- with an "F" recorded if the course is dropped **after the 46th calendar day** of the semester (unless a late "W" is approved by the Dean because of extenuating circumstances).

Note that faculty members are allowed to drop students who are absent from the first two classes and who have failed to make special arrangements with the instructor. However, students must then complete the appropriate withdrawal form, or the course remains on the students' record. A "W" does not affect a student GPA and the course can be re-taken in later semesters.

## **Auditing**

A registered undergraduate student may audit a course provided that:

- you officially elect the class as an audit,
- the instructor can accommodate you in the class,
- you satisfy the instructor regarding your preparation and motivation for auditing the class,
- you satisfy all the criteria for a successful audit as stipulated in advance by the instructor, and
- you pay all special fees associated with the course.

An audited course does not contribute to graduation credits but does show on the student's transcript with zero credit and a grade of "AUD."

## **Academic Honesty**

As noted in the *University Undergraduate Catalogue*, "The University requires honesty of all of its members in their academic work. Honesty is necessary to the learning process and is integral to the atmosphere of genuine inquiry and intellectual curiosity which the University seeks to foster."

The University has an Academic Honesty Policy, which along with discipline and appeal procedures may be found at the Dean of Students Office website: [http://www.umass.edu/dean\\_students/codeofconduct/acadhonesty/#policy](http://www.umass.edu/dean_students/codeofconduct/acadhonesty/#policy). Students are urged to read and follow this policy. Any act of academic dishonesty is taken seriously by the CEE Department and discipline will follow.

In addition to being part of the University, Civil Engineering students are part of a profession, which further demands honesty and integrity. As noted in the American Society of Civil Engineers (ASCE) Code of Ethics, "engineers uphold, and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the enhancement of human welfare and the environment;
2. being honest and impartial and serving with fidelity the public, their employers, and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines."

In addition, Fundamental Canon number 6 of the Code of Ethics, states that "Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession."

## Student Organizations

The **American Society of Civil Engineers** is a group of 100+ civil engineering students that participate in a variety of professional, social and community service events. Each month, we sponsor a meeting with a short presentation from an outside professional and free pizza for all attendees. We participate in intercollegiate design competitions, like the Concrete Canoe, Steel Bridge, and Seismic Design competitions. We host community service events including Habitat for Humanity, Holiday Food Drive, and Relay for Life. Our members play on intramural teams, go on construction field trips, tailgate UMass football and hockey games and attend career fairs and other professional development activities.

Feel free to ask any of the ASCE student officers about what we do, or visit our website at <http://www.ecs.umass.edu/asce/>. Please join our facebook group, at <http://www.facebook.com/group.php?gid=2200728910>.

President - Matt Soltys

Vice President - Zach Bemis

Corresponding Secretary - Molly Coughlin

Recording Secretary - Derek Bellucci

Treasurer - Alex Lovejoy

Publicity Officer - Tom Rogg

Sophomore Liaison - Alex Lovejoy

Events Coordinator - Tomer Soran

Faculty Advisor - Carlton Ho

Students interested in construction may also wish to join in the **Student Chapter of the Associated General Contractors (AGC)**. Like ASCE, AGC participates in a wide range of activities, hosts field trips and general speakers, etc.

Students interested in transportation may wish to join in the **Student Chapter of the Institute of Transportation Engineers (ITE)**. ITE supports activities aimed at the technical and professional development of its members as well as social and community service based initiatives. Annual activities include but are not limited to:

- Hosting a monthly members meeting,
- Organization of technical field trips,
- Co-sponsoring of the weekly transportation seminar,
- Attendance at state, section, district, and national ITE meetings,
- Participation in the Adopt-A-Highway Program on Route 116,
- Hosting of an annual joint NEITE / UMass Technical meeting, and
- Support of the annual Thinkfest Day at Merrimack College.

Students interested in trying their hands at designing and implementing sustainable engineering solutions in developing countries may wish to join the **Student Chapter of Engineers Without Borders (EWB)**. EWB is a non-profit humanitarian organization established to partner with developing communities worldwide in order to improve their quality of life. This partnership involves the implementation of sustainable engineering projects, while involving and training internationally responsible engineers and engineering students. The University of Massachusetts Amherst Student Chapter of EWB plans to continue working on water and sanitation projects in Kenya and in the Brazilian Amazon Rain forest this year and plan to send travel teams to both locations. Please contact the chapter president Gary Hinds ([ghinds@student.umass.edu](mailto:ghinds@student.umass.edu)).

**Chi Epsilon** is the Civil Engineering Honor Society. Juniors and Seniors in the top one-third of their class (based on GPA) are invited to join. The organization holds regular meetings and is involved in a variety of activities, including:

- Assisting with the Student Response to Instruction (SRTI),
- Arranging review sessions for the Fundamentals of Engineering Exam,
- Arranging for Department social functions,
- Making presentations at Freshman orientation sessions,
- Hosting professional seminars such as a Graduate School information seminar,
- Assisting faculty with open houses, and
- Participation in National Engineers week.

There are other College-wide organizations, including Tau Beta Pi, Society of Women Engineers (SWE), National Society of Black Engineers (NSBE), and Society of Hispanic Professional Engineers (SHPE) that may be of interest to students.

## **Scholarships and Awards**

There are numerous Departmental and college scholarships available to students. Students are invited to submit an application. The application deadline is in early February. A faculty committee makes selection and awards are made for the following academic year. For more information on College of Engineering scholarships, see the Assistant Dean, Kathleen Rubin in 131 Marston Hall, [rubin@ecs.umass.edu](mailto:rubin@ecs.umass.edu), (545-2035).

## **Undergraduate Research**

For students with the ability and desire, there are opportunities to become involved in research during their undergraduate studies. Generally, arrangements are made individually between a student and a faculty member. However, there are several other possibilities. The College of Engineering Alumni Association offers awards, which provide \$500 for an undergraduate to work with a faculty member on a research project. During the summer a couple of options are available. The Office of Student Affairs announces summer research opportunities early during the spring semester. These opportunities are available through different funding sources for research at UMass Amherst or at other universities nation-wide. Look for additional information on these research experiences for undergraduate students in OSA, Marston 126.

## **Engineer In Training**

The first step toward professional registration is to become an Engineer in Training (EIT). To become an EIT you must pass the Fundamentals of Engineering (FE) Exam, often called the EIT exam. This exam is independent of your academic endeavors and your performance has no bearing on your academic standing. There are several sections in the exam, many corresponding to undergraduate courses. The exam is offered twice a year, and most students take the exam during the last semester of their senior year. Preceding the exam, the student chapter of Chi Epsilon organizes a series of review sessions to “reacquaint” students with material from courses taken in previous years.

The Department strongly recommends that students take the EIT exam as an undergraduate. Sitting for the eight hour exam on a Saturday may not seem exciting especially during your senior year. However, it is very advantageous to take the exam while the material is fresh and you have just mastered many of the topics that are on the exam. For most students being a professional Civil Engineer is a goal, and the EIT is on the critical path for achieving this goal.

Further information about the FE exam, dates, and deadlines can be found on the National Council of Examiners for Engineering and Surveying website: [www.ncees.org](http://www.ncees.org).

## **Co-Op and Summer Employment**

Cooperative Education (Co-Op) is defined as a paid, pre-professional experience in industry, business or government in which the experience is directly related to your course of study. A Co-Op is traditionally a 6 month period of employment during either the Spring semester and Summer or Summer and Fall semesters. Students should start looking for Co-ops as early as the fall semester of your sophomore year for the following summer or semester.

Co-Ops are a great opportunity to enter a leading organization from the ground up and provide students with professional references, a competitive wage, and a break from their course work, and valuable real world hands on experience that future employers will require of new employees.

These opportunities are coordinated with the Director of Field Experience, 114 Marston Hall, 577-0595, and announcements of openings are posted outside 126 Marston Hall. Another opportunity to find a co-op is during the Civil Engineering Career Fair held in the Gunness Student Center each semester.

# AFTER GRADUATION

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Graduation may seem like a long way off, but it will be here sooner than you think. To be prepared, consider these opportunities before you receive your diploma.

## **Graduate Education**

After completing their B.S., many students continue to graduate school to better prepare themselves for the demands of modern Civil and Environmental Engineering practice. In many cases, the M.S. degree is thought of as the entry-level professional degree. In addition, an advanced degree can lead to faster advancement and higher levels of responsibility. It is not too early to start thinking about graduate school.

Graduate education typically concentrates in one of the sub-disciplines of Civil Engineering and falls within one of the programs of the department. Graduate Programs in Environmental and Water Resources Engineering, Geotechnical Engineering, Transportation Engineering, and Structural Engineering are all available from UMass-Amherst. Information about each of the programs is available on the CEE Department website.

## **Employment**

Civil engineers have a diversity of post-graduate opportunities available to them. Employment opportunities are good and include private consulting firms, industrial firms of all types, construction firms, research and development groups, and governmental agencies at the local, state and national level. Having said all this - How do you get the job you want?

The Campus Career Network offers assistance in many ways, primarily arranging for interviews between potential employers and students. Announcements of interview possibilities are distributed regularly and are posted outside the Department office. The Campus Career Network also provides an electronic resume service. Some companies will allow you as a student to “shadow” an employee for a day. This arrangement lets you see firsthand what the employee’s job entails and also allows you to make valuable contacts.

Many of the best job opportunities are with firms and agencies that do not routinely interview on campus because they are relatively small compared to the industrial “giants” that recruit large number of MIEs, ECEs and ChEs, etc. Therefore, you must make every opportunity to make contacts when you can and learn about job openings wherever you can. Being active in student organizations helps in terms of making contacts and demonstrating professional interests outside the classroom.

## **Civil Engineering Career Fair**

The CEE Department will be hosting a CEE Career Fair – “Civil Fair” each semester in the Gunness Student Center. Employers are invited in to meet with students and discuss their current employment opportunities.

## **Professional Registration**

Engineers are licensed to practice engineering in each state in the U.S. While not required for all jobs, professional registration is very important for civil engineers since they are often the design authority on projects that impact public safety. As such, most states require that plans, specifications and designs for engineering projects receive final approval from a registered professional engineer. All professions, including law, medicine, and engineering require licensing; we cannot overemphasize the importance of becoming registered.

A professional engineer’s (PE) license is obtained after examination and after having gained suitable job experience, usually under the direction of a PE. Two exams must be passed. As previously discussed, the first exam, Part A, is the “Fundamentals of Engineering (FE) Examination” which earns you the title “Intern Engineer” (often called “Engineer in Training” or EIT). Part A is best taken during your senior year when material from courses is still fresh in your mind (see the earlier section on the FE exam). Part B can be taken after four years of suitable experience and after suitable supervision. Successful completion of both exams allows you to use the title of “Professional Engineer” in the state in which you took the exams. Though the exam is standardized nationwide, licensing is by individual state. Registration in other states may usually be obtained by reciprocity rather than taking another exam. (There are a few exceptions to this policy, such as for structural engineers in California).

## **Keeping in Touch**

As Seniors, before you graduate, we ask each of you to fill out a questionnaire about your undergraduate experiences and your career objectives. Some questions are statistical in nature, to get a sense of average salaries and types of employment, for example.

The Department places a high value on contact with our graduates. Alumni help keep us in touch with current practices in the field, return to present seminars to students, serve on advisory committees and often donate funds for lab equipment, scholarships, seminar series and the like. Alumni also look to us for future qualified employees. While it may seem far in the future, you are likely to be in a position where you will be looking for students to hire.