

Department of  
Civil and  
Environmental  
Engineering

**Undergraduate  
Student  
Handbook**

2011-2012

## Mission of the Department of Civil and Environmental Engineering

The mission of the Civil and Environmental Engineering Department is to educate talented and motivated men and women to become successful professionals through quality undergraduate and graduate programs that place a high priority on student access and interaction with faculty.

### Objectives and Outcomes to Support the Department Mission

**Objective 1: Develop students whose engineering knowledge can meet the challenges of a successful professional career.**

#### Outcomes to Ensure Achievement of Objective:

##### Civil Engineering

- 1a) Students will have the ability to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, geospatial representation, and principles of civil engineering including statics, strength of materials, fluid mechanics, soil mechanics, structural analysis, and three additional engineering science courses selected from materials science, rigid body dynamics, electrical science and thermodynamics.
- 1b) Students will have practical and hands-on laboratory experience solving several types of engineering problems involving measurement of physical phenomena and interpretation of the results.
- 1c) Students will have the opportunity to demonstrate their ability to design a system, component or process to meet desired needs through a capstone design project experience.
- 1d) Students will have the opportunity to demonstrate their ability to identify, formulate and solve engineering problems through a capstone design project experience.
- 1e) Students will have basic proficiency in at least four of the recognized civil engineering focus areas.
- 1f) Students will obtain basic computer skills consistent with applications to engineering problem solving.
- 1g) Students will have experience with individual and team-based approaches to problem-solving in the classroom, laboratory, in an introduction to engineering design course and through a capstone design project experience, to be able to solve real-world open-ended problems that require creativity and risk-taking.

##### Environmental Engineering

- 1a) Students will have the ability to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry and principles of environmental engineering including biogeochemical earth systems, physical chemistry, organic chemistry, microbiology, fluid mechanics, thermodynamics, water resources, applied statistics, and geospatial representation.
- 1e) Students will have basic proficiency in more than one environmental engineering focus area e.g. air, water, land or environmental health.

**Objective 2: Ensure students acquire good communication and leadership skills.**

#### Outcomes to Ensure Achievement of Objective:

- 2a) Students will have the ability to organize effective and concise engineering reports and memos.
- 2b) Students will have the ability to organize and deliver engineering work in a formal oral presentation.
- 2c) Students will have the opportunity to engage in or lead dialogue that contributes to productive work in a disciplinary or multidisciplinary team environment through a capstone design project experience.

**Objective 3: Foster an intellectually stimulating environment for professional development.**

#### Outcomes to Ensure Achievement of Objective:

- 3a) Students will have the ability to function in multi-disciplinary teams.
- 3b) Students will have an understanding of professional, ethical, and environmental responsibility through instruction in the humanities and exposure to and understanding of environmental quality as well as the NSPE Code of Ethics for Professional Engineers.
- 3c) Students will have the broad education necessary to understand the impact of engineering solutions in a contemporary global and national context.
- 3d) Students will recognize the need for life-long learning.

**Objective 4: Develop a relationship between students and faculty that produces a personal interest in the student's education and professional development.**

## TABLE OF CONTENTS

	Page
Mission of the Department of Civil and Environmental Engineering.....	inside front cover
<i>Being a Student at Clarkson and the CEE Department</i> .....	2
Introduction .....	2
Self-reliance.....	2
Professionalism .....	2
Code of Ethics .....	3
<i>Advisors and Advising</i> .....	3
Introduction .....	3
Advisor - Student Relationship .....	3
What is the Advisor's Responsibility?.....	3
What is the Student's Responsibility?.....	3
<i>Curricula</i> .....	4
Introduction .....	4
Curricular Objectives.....	4
ENVIRONMENTAL ENGINEERING CURRICULUM NOTES .....	8
Bachelor of Science – CE and EnvE Majors.....	9
Clarkson Common Experience Curriculum (CCEC) Class of 2010 and later: .....	9
Mathematics Elective .....	9
Professional Electives.....	10
Design Credits from Professional Electives .....	13
ROTC or AFROTC Professional Electives .....	14
Undergraduate Students in Graduate Courses.....	14
Exceptions to Required Courses.....	14
Pass-No Entry Courses .....	14
<i>Professional Concentrations for CE Majors</i> .....	15
Professional Concentration in Architectural Engineering .....	15
Professional Concentration in Construction Engineering Management.....	16
Professional Concentration in Structural Engineering .....	17
Professional Concentration in Environmental Engineering .....	17
<i>Other Options in the CE and EnvE Curricula</i> .....	19
Dual Degree.....	19
Second Degree.....	19
Double Majors .....	19
Engineering MBA-MS 4 + 1 Program .....	19
<i>Student Academic Records</i> .....	19
<i>Changing Majors</i> .....	20
<i>Special Interests</i> .....	20
<i>Transfer Credit</i> .....	20
Advanced Placement Credit .....	20
Cross-Registration .....	20
<i>Writing Across the Curriculum (WAC)</i> .....	20
<i>English as a Second Language Test</i> .....	21
<i>Professional Engineering Exam (PE Exam)</i> .....	21
<i>Graduate School</i> .....	21
<i>Career and Professional Development Center</i> .....	22
Cooperative Education Program.....	22
Semester Abroad .....	22
Summer Employment.....	22
Research Experience for Undergraduates (REU) Programs.....	22
<i>Societies and Activities</i> .....	22

Professional Societies in CEE .....	23
Honor Societies .....	23
Student Awards .....	23
<i>Civil and Environmental Engineering SPEED Teams</i> .....	24
Construction Engineering and Management Team .....	24
Concrete Canoe Team .....	24
Environmental Remediation Team.....	24
Steel Bridge Team.....	24
Timber Bridge Team .....	25
PCI Big Beam Team.....	25
<i>Clarkson Services</i> .....	25
Student Administrative Services Center (SAS).....	25
Student Support Services.....	25
Accommodative Services .....	25
The Counseling Center .....	25
International Student Advising.....	26
The Student Health Center .....	26
Extracurricular Activities .....	26
The Writing Center.....	26
<i>Special Notes</i> .....	26
Clarkson Catalog .....	26
University Regulations .....	26
Courses and Course Descriptions .....	26
Student Telephone Book .....	26
Minors and Concentrations.....	26
<i>Commencement</i> .....	27
<i>Faculty of the Department of Civil and Environmental Engineering</i> .....	28
<i>Listing of Clarkson WWWeb Sites Referenced in Handbook</i> .....	33
 <i>Appendices</i>	
A - Code of Ethics	
B – Dual Degree Form	
C – Double Major Form	
D – Change of Major	
E – Off-Campus Course Work Permission Form	
F – Drop /Add Form	

## WELCOME FROM THE CHAIR

I am very pleased to welcome you to the Department of Civil and Environmental Engineering at Clarkson. I am very glad you are part of the Department this year! Civil and environmental engineers will have a major role in the near future in updating our civil infrastructure and ensuring that the world's population will have access to safe water.

When you read through this Handbook, I would encourage you to consider the possibilities offered by the Civil Engineering (CE) and Environmental Engineering (EnvE) curricula to undergraduate students. Please also keep in mind that our Department has highly ranked graduate programs in environmental and civil engineering. You'll find that those possibilities include not just a variety of degree program offerings, but that these programs also address a wide range of interesting areas and provide you with potential research opportunities.

Your own interest may begin with the desire for a Bachelor of Science in Civil Engineering or a Bachelor of Science in Environmental Engineering. Because the CE major encompasses many different areas you also may concentrate your elective coursework in any of several specialty areas, including architectural, construction, environmental, structural, geotechnical engineering, transportation and traffic systems engineering, or water resources engineering. Within the Civil Engineering degree program you may choose to specialize in four different areas and pursue a professional concentration in Architectural, Construction, Environmental or Structural Engineering. Or, if you would prefer, you can combine all of these and pursue our "traditional" curriculum in Civil and Environmental Engineering.

Being a student in the CEE department at Clarkson is more than attending classes to satisfy a curriculum. A large number of CEE students choose to participate in one or more of several design competitions during their time at Clarkson. I encourage you to get involved in any of the SPEED teams which most often involve students from CEE and from other departments. Together these students work as teams to analyze a problem and then design and build a solution just like in "the real world." For example you may design water or wastewater treatment solutions as part of "Engineers without Borders" for a small town in Ecuador or you may build a steel or timber bridge as part of a competition. Many of the design teams travel to a regional or even national site for their competitions. It can be hard work, but it is always a lot of fun, too!

You can find more information about both undergraduate and graduate offerings in the CEE Department on the World Wide Web; see <http://www.clarkson.edu/cee> and use the navigation bar to find the information you want.

Most CEE faculty members serve as mentors for a number of undergraduate research assistants, some of whom work during the summer months and others work through the academic year. A program currently funded by the National Science Foundation provides special opportunities for undergraduate students from Clarkson and other universities to gain experience in research that is relevant to Civil and Environmental Engineering. Much more information about these opportunities and how you can become involved may be found on the WWWeb. Go to the URL-- <http://www.clarkson.edu/reu/>.

Finally, let me encourage you to contact me directly with any comments or questions while you are a student in the Department of Civil and Environmental Engineering at Clarkson. My telephone on campus is x6490 and my email address is [grimberg@clarkson.edu](mailto:grimberg@clarkson.edu). I'd be pleased to hear from you anytime.

Sincerely yours,

STEFAN GRIMBERG

Chair

## **Being a Student at Clarkson and the CEE Department**

### ***Introduction***

You may have already heard from friends, family members, or guidance counselors that you will experience a different form of education when you enter college; it is not like high school. Now, that does not imply that you should be apprehensive about college, but it does imply that you should keep your eyes open to the new environment and learn to adjust.

### ***Self-reliance***

During the next four years you should find yourself gaining more and more self-reliance. But self-reliance does not mean that you have to do everything yourself; it does mean that you ask for help when you need it and stand on your own two feet when you do not. Developing self-reliance should be one of your goals in college.

### ***Professionalism***

One adjustment to college is to think of yourself as a student - professional; a student who will be a professional engineer. Like any professional position, there are certain expectations that you must fulfill. The best way to meet these expectations is to keep on top of things; do not let yourself fall behind.

Also, do not miss any classes and go to classes prepared; have all your work and reading done, and have questions ready. Participate in the discussions, practice the problems the professors assign, and push yourself to do your best. Make the best of every opportunity presented to you. You are building the base for your professional career; build a strong base.

The professors may not always cover in class everything you need to know, so study beyond the lecture. You will find that the professors are more like guides, and you have to be both the teacher as well as the student more than you had to in high school. That is not saying they do not want to help or teach; they are just forcing you to take a stronger and more active part in your education. They are preparing you for the professional world where there are no obvious teachers. While discussing course material, it is important for you to realize that in most cases individual professors do not establish the content of courses. For you to compete successfully with your peers once you enter the work force, you need to achieve a basic level of competence in many areas. Many courses build upon other courses to achieve this basic level. Therefore, it is essential that certain topics be covered in courses to ensure your ability to compete successfully. While you may feel some courses tax your abilities, the faculty are striving to give you the best opportunities for your careers. By completing the required courses in the CEE curricula, you will have obtained a strong background in the areas of environmental, structural, hydraulic and geotechnical engineering. Through the selection of elective courses, backgrounds in other areas of CEE professional practice, such as transportation, construction, and architectural engineering can be obtained.

Near the end of each semester your professors will give you a "course evaluation form" to fill out. Your constructive comments regarding the course and the professor are taken seriously. Each professor's salary, tenure, and promotion are influenced by the information on the course evaluation forms.

In addition to your evaluations, there is a constant peer review of faculty in our department. The review consists of evaluations by other faculty who sit in on classes and meet with groups of students in the classes to discuss the teaching abilities of the faculty members under review. Reports from these reviews are used as a basis to improve teaching performance if necessary.

## ***Code of Ethics***

Clarkson values personal integrity. Matriculation at Clarkson carries with it the obligation that a student will not claim as his or her own, the work of another, or any work that has not been honestly performed, will not take any examination by improper means, and will not aid and abet another in any dishonesty. Violations of the Code of Ethics are regarded as most serious offenses and render the offenders liable to severe disciplinary action. Alleged violations of the Code of Ethics are dealt with according to the section on the Academic Integrity Committee found in "Clarkson Regulations", which you can find on the WWWeb by selecting "Regulations" at URL <http://www.clarkson.edu/studentaffairs/regulations>. The Code of Ethics of the American Society of Civil Engineers is presented in Appendix A.

## **Advisors and Advising**

### ***Introduction***

The CEE Department has assigned each student an academic advisor. The advisor is a faculty member of the CEE Department. An Advisor-Advisee list with a picture of each CEE faculty member may be found on the wall across from Room 140 Rowley.

You may wish to change your advisor, perhaps because you have developed career interests that overlap those of another member of the CEE faculty, or for other reasons. To make a change, go to the CEE Department Office, Room 140 Rowley. Make an appointment to see either the department Chair or Executive Officer, or talk to a department secretary. Changing an advisor is not difficult; however, the department would like to be aware of any potential conflicts or problems that may have occurred.

### ***Advisor - Student Relationship***

Visit your advisor more frequently than once a semester. Your advisor will become familiar with you, and you with your advisor. This will make the advising process easier and more productive. For example, your advisor will be able to write more effective employment recommendations for you if he/she knows you well. Advisors want to help, but it is important to note that they also have many other things to do as well. Like you, their time is restricted. So, call ahead for an appointment. That way they are not caught off guard and they can be prepared for the meeting with you. Remember -- when they are out of their office or out-of-town it is usually on professional business that is increasing the reputation of the university and therefore the value of your degree.

### ***What is the Advisor's Responsibility?***

The advisor is there to help you; help may include career advice, or help in choosing courses. Each advisor will meet with each advisee during course selection week. The advisor will have a sign-up sheet posted outside of his or her office door prior to course selection week so that you can make an appointment. The advisor prepares for these meetings by knowing the curriculum well. That means knowing substitute courses, course options available, and the best courses for a certain area of interest. Finally, the advisor must know you, the student. Knowing your goals and interests will help him/her to suggest courses that suit you. After discussing your curriculum, the advisor will electronically acknowledge that the advising meeting has taken place thereby authorizing you to self-enroll in the selected courses.

### ***What is the Student's Responsibility?***

The student, not the advisor, is responsible for meeting Clarkson's graduation requirements. Therefore, begin now to plan your Clarkson career. Then you can go into the course selection meeting with your choices for classes pre-selected. Try to see your advisor early in the semester. That way many details and problems can be ironed out before the busy course selection period. Course selection for the fall term is held in March and for the spring term in October. Consult the CEE curriculum sheet relevant to your graduation year. All courses offered by the CEE Department are posted at course selection time.

Planning ahead is often of particular importance to transfer students. Within the two and sometimes fewer

years that transfer students need to complete degree requirements, a carefully planned sequence of courses is often necessary in order to take the prerequisite courses needed for more advanced courses of particular interest.

## **Curricula**

### ***Introduction***

Included in this section are the CEE curricular objectives and the requirements for degree completion. Also included are the elective options, special interest concentrations, and information concerning the Clarkson Common Experience Curriculum and the Fundamentals of Engineering (FE) exam that is a first step toward obtaining professional license. Other options beyond the Civil Engineering (CE) and/or Environmental Engineering (EnvE) majors can be earned, such as dual degrees, a second degree and double majors. Those also are explained.

Course descriptions may be found on Clarkson's Student home page (<http://www.clarkson.edu/sas>). Computers connected to the Academic Network are available in 163 CAMP, the ERC, student dormitories and various computer laboratories. Course information may be obtained at the Student Administrative Services (SAS) located in Cubley-Reynolds Ross-Brooks center core, or in the Civil and Environmental Engineering Office, Room 140 Rowley Laboratories.

### ***Curricular Objectives***

A common objective of both the Civil Engineering (CE) and Environmental Engineering (EnvE) undergraduate programs is to provide graduates with engineering knowledge that can meet the challenges of a successful professional career. Science and engineering science courses form the majority of both the CE and also the EnvE curricula in the first two years. These courses provide the base for the professionally oriented courses in the junior and senior years.

### ***Bachelor of Science Civil Engineering (CE)***

The Civil Engineering curriculum is designed to provide all graduates with a theoretical foundation as well as design experience in the areas of structures, geotechnical, water resources and environmental engineering. This foundation is typically achieved in the junior year and enables students to use the senior year to select elective courses in areas where their particular interests have developed. In the senior year a capstone design course culminates the development of design skills that were first introduced in first semester of the sophomore year.

Through the selection of professional electives, students can take courses in an area of civil engineering that is not covered by the required courses, such as architectural, construction and transportation engineering. Courses acceptable as professional electives are listed on page 10 of this handbook. The CE curriculum provides for nine professional electives. These elective courses enable students to create programs of study unique to each individual as well as provide both depth and breadth in the student's preparation for professional practice.

Examples of the use of professional electives to meet specific career objectives are shown at the bottom of the CE curriculum sheet (page 5). By satisfying the courses shown in the "checklist" on the CE curriculum sheet, a student can qualify for a professional concentration in architectural engineering, construction engineering management, environmental engineering, or structural engineering. In contrast, some students utilize their professional electives to build as diverse of an educational base as possible as preferred by many employers. However, no single approach is recommended. The guiding principle being that the student and faculty advisor create a program of study that best satisfies the student's individual career objectives.

# CIVIL ENGINEERING CURRICULUM<sup>1</sup>

Faculty Advisor	Student Name	Student Number	Class Year						
<b>FRESHMAN - FALL</b>		Design Credit <sup>2</sup>	Semester	Grade	<b>FRESHMAN - SPRING</b>		Design Credit <sup>2</sup>	Semester	Grade
CM 131 General Chem. I (4 cr)					CM 132 General Chem. II (4 cr)				
ES110 or PH 131 Fund. Physics I					PH131 or PH 132 Fund. Physics II (4 cr)				
UNIV 190 Clarkson Seminar					Knowledge Area (KA) Elective				
MA 131 Calculus I					MA 132 Calculus II				
FY/PE 100 First Year Seminar (0 cr)					ES 100 Intro Computer (2 cr)				
<b>SOPHOMORE - FALL</b>					<b>SOPHOMORE - SPRING</b>				
CE 212 Intro. Eng. Des. (F)	1.5				ES 222 Strength of Materials				
ES 220 Statics					ES elective*				
ES elective* (ES260 recommended)					ES 330 Fluid Mechanics				
MA 231 Calculus III					MA 232 Differential Equations				
PH132 or Elective – KA or UC					University Course (UC) Elective				
<b>JUNIOR AND SENIOR YEARS</b>									
Elective - KA or UC					CE 310 Geotechnical Engineering I (S)	1			
CE 301 Geospatial Analysis & Appl. (S)					EC350 Econ. Principles / Engineering Economics				
CE 320 Structural Analysis (F)	1				ES elective*				
CE 330 Water Resources I (F)	1				CE 441 Reinforced Concrete Design (F) OR CE 442 Steel Design (S)	3			
CE 340 Intro. Environmental Eng (S)	1				CE 490 Sr. Design (Str., Trans., Geo.) (S) OR CE 491 Sr. Design (Water R./Envir.) (S) OR CE 492 Sr. Design (Building) (S) OR CE 493 Sr. Design (Transportation) S	3			
Math Elective					<input checked="" type="checkbox"/> <b>Checklist to monitor progress towards Professional Concentration</b>				
Professional Elective					Architectural Engineering	Construction Engineering Management	Environmental Engineering	Structural Engineering	
Professional Elective					<input type="checkbox"/> CE448 <input type="checkbox"/> CE446 or CE447 <input type="checkbox"/> CE415 or CE515 <input type="checkbox"/> CE441 <input type="checkbox"/> CE442 <input type="checkbox"/> CE492 <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> CE405, CE411, CE420 or CE520, CE421 or CE521, CE542, CE544, ME444, CE538, CE453 or CE553, CE455 or CE555, CE457 or CE557, ME310, ME411, IH406, CE486 or CE586	<input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> CE405, CE406, CE411 <input type="checkbox"/> CE415 or CE515 <input type="checkbox"/> CE 441 <input type="checkbox"/> CE 442 <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> CE407, OS466, OM480, OM351, IH309 or IH416, LW466, PHIL341	<input type="checkbox"/> CE340 or CH250 or CH220 <input type="checkbox"/> CE491 or MP401 <input type="checkbox"/> CM241 or CM 371 or CH 210 <input type="checkbox"/> BY320, or BY222 and BY224 (4 cr) <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> CE430, CE478, CE479, CE480, CE481 or CE581, CE577, CE580, CE582, CE583, CE584, CE586, CE587, CE589, CH434, ES464, ES532, IH406 or IH416, CH 474/ES 434	<input type="checkbox"/> CE420 or CE520 <input type="checkbox"/> CE415 or CE515 <input type="checkbox"/> CE441 <input type="checkbox"/> CE442 <input type="checkbox"/> CE490 or CE492 <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> CE411, CE421 or CE521, CE544, ME444, CE438 or CE538, CE401 or CE501, CE447, CE448, CE455 or CE555, CE453 or CE553, CE457 or CE557	
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									

\* Eligible ES elective courses are: ES260 Materials Science; ES223 Rigid body Dynamics; ES250 Electrical Circuits; and ES340 Thermodynamics

<sup>1</sup> All courses are 3 credits unless otherwise noted.

<sup>2</sup> A total of 16.5 design credits is required.

<sup>3</sup> Or other course designated by CEE Department Chair

## ***Bachelor of Science Environmental Engineering (EnvE)***

Working in one of the most exciting fields of engineering today, Environmental engineers provide the knowledge, leadership, and guidance needed to improve the quality and insure the sustainability of our natural world — from the water we drink, to the air we breathe, to the soil that produces our life-sustaining vegetation. Environmental engineers play a major —and increasingly proactive — role in prevention and control of pollution of all kinds and in efforts to deal with global warming.

If you want the opportunity to work at a job that can take you into the field and out of the office, then environmental engineering may be just right for you. Environmental engineers develop and implement technologies to solve problems like meeting clean water supply needs and protecting public health, addressing the air pollution issues of acid rain and global warming, and reducing pollution while maintaining and improving the quality of life we enjoy. They are in high demand in industry and government. They work for large corporations, consulting companies, and many start their own businesses.

As an environmental engineer, you might find yourself making water safer to drink, cleaning up a hazardous waste site, or designing a system to make manufacturing more environmentally sustainable. You might help apply and enforce environmental laws. You might work for a municipality, a state agency concerned with conservation, health, or agriculture, or a federal agency such as the Environmental Protection Agency.

The EnvE Curriculum is designed for a career in environmental research, system modeling, or process design. All EnvE majors are provided with a theoretical foundation as well as design experience in the area of water resources, environmental quality, systems, hazards, and treatment processes. This foundation is typically achieved in the junior year and enables students to use the senior year to select elective courses in areas where their particular interests have developed. In the senior year a capstone design course culminates the development of design skills.

Through the selection of professional electives, students can take courses in an area of environmental engineering that is not covered by the required courses, such as Air Pollution Control and Industrial Hygiene. Courses acceptable as professional electives are listed on page 10. The EnvE curriculum provides for six professional electives. At least three of these professional electives must be selected from engineering topics to satisfy accreditation requirements. These elective courses enable students to create programs of study unique to each individual as well as provide both depth and breadth in the student's preparation for professional practice. Students who anticipate working as environmental engineers within an integrated civil and environmental engineering enterprise are recommended to take ES222-Strength of Materials and CE310-Geotechnical Engineering I, that are essential for the design of landfills as well as a more quantitative understanding of groundwater and soil interactions.

The core professional courses, thesis option, and the CE and EnvE double major option are given at the bottom of the EnvE curriculum sheet (page 7). EnvE and CE double majors are recommended to take ES250-Electrical Science rather than ES223-Rigid Body Dynamics. This is to provide some background in electrical circuits used in environmental measurements. Suggested professional electives that meet varied career objectives are shown following the EnvE curriculum sheet (page 7). Regarding the choice of professional electives, no single approach is recommended. The guiding principle being that the student and faculty advisor create a program of study that best satisfies the student's individual career objectives.

# ENVIRONMENTAL ENGINEERING CURRICULUM<sup>1</sup>

Faculty Advisor		Student Name		Student Number		Class Year			
<b>FRESHMAN - FALL</b>		Design Credit <sup>2</sup>	Semester	Grade	<b>FRESHMAN – SPRING</b>		Design Credit <sup>2</sup>	Semester	Grade
CM 131 General Chem. I (4 cr)					CM 132 General Chem. II (4 cr)				
ES110 or PH 131 Fund. Physics I					PH131 or PH 132 Fund. Physics II (4 cr)				
UNIV 190 Clarkson Seminar					Knowledge Area (KA) Elective				
MA 131 Calculus I					MA 132 Calculus II				
FY/PE 100 First Year Seminar (0 cr)					ES 100 Intro Computer (2 cr)				
<b>SOPHOMORE - FALL</b>					<b>SOPHOMORE - SPRING</b>				
CE 212 Intro. Eng. Des. (F)		1.5			CE 340 Intro to Environmental Eng (S)				
ES 220 Statics					BY 320 Microbiology				
CH210 Chemical Engineering Principles I					ES 330 Fluid Mechanics				
MA 231 Calculus III					MA 232 Differential Equations				
CH220 Chemical Engineering Principles II					PH132 or Elective – University Course (UC) or KA				
<b>JUNIOR AND SENIOR YEARS</b>									
Elective – KA or UC					Elective – KA or UC				
CM 241 Organic Chemistry (F)					EC 350 Econ. Principles & Engineering Economics				
CE 330 Water Resources I (F)		1			ES 340 Thermodynamics I				
CE 479 Water & Wastewater Treatment <b>OR</b> CE 480 Chemical Fate & Trans. in Envir't		2 1			STAT 383 Applied Statistics				
CE 313 Biogeochemical Earth Systems (F) <b>OR</b> CE435/535 Groundwater Hydrology and Geochemistry <sup>3</sup> (F)					CE 491 Sr. Design (Envir./ Wat. Res) (S)		3		
CE 301 Geospatial Analysis & Appl. (S)					<b>Checklist to monitor progress and options</b>				
Core Professional Course					Core Professional Courses	Thesis Option	Double Major Option		
Core Professional Course					Core Professional Courses <b>must</b> include three of these courses: <input type="checkbox"/> CE 479 (2) or CE 480 (1) not previously counted <input type="checkbox"/> CE 482/582 Systems (2) <input type="checkbox"/> CE 486 Ind Ecology (1) <input type="checkbox"/> ES 432 Risk Anals (1.5) <input type="checkbox"/> CE 481 Haz Waste (1.5)  () = design credits	Students are <b>encouraged</b> to work with a professor in their senior year to utilize CE 495 and CE 496 as two of the professional electives in order to prepare an undergraduate thesis. <input type="checkbox"/> CE 495 <input type="checkbox"/> CE 496	If a student desires a double major in both Civil and Environmental Engineering, the following courses should be selected as professional electives: <input type="checkbox"/> ES 222 Strength <input type="checkbox"/> ES 250 Electrical Sci. or ES223 Rigid Body D. <input type="checkbox"/> ES 260 Material Sci. <input type="checkbox"/> CE 310 Geotech I (1) <input type="checkbox"/> CE 320 Str. Anal. (1) <input type="checkbox"/> CE 441 Reinforced Concrete Design (3) or CE 442 Steel Design (3)		
Core Professional Course									
Core Professional Course									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									
Professional Elective									

<sup>1</sup> All courses are 3 credits unless otherwise noted.

<sup>2</sup> A total of 16.5 design credits is required.

<sup>3</sup> If CE435/535 is selected the curriculum must include either CE477 Atmospheric Chemistry or CE480 Chemical Fate and Transport in the Environment

## ENVIRONMENTAL ENGINEERING CURRICULUM NOTES

### SUGGESTED KNOWLEDGE AREA or SOC/HUM ELECTIVES

EC 360 Environmental Economics  
EV 430 (POL 371) Environmental Law  
POL 470 (SOC 470) Environmental Policy

EV 342 (PHIL 370) Environmental Ethics  
EV 480 (PHIL 480) Environmental Philosophy Seminar  
COMM 428 Public Debate and the Environment

### SUGGESTED PROFESSIONAL ELECTIVES

BY 222/224 Ecology + Lab  
BY 328 Conservation Biology  
BY 431 Limnology  
\*CE 310 Geotechnical Engineering I  
CE 430 Water Resources Engineering II  
  
CE 477 Atmospheric Chemistry  
CE 478 Solid Waste Management and Landfill Design  
CE 433/ES533 Human Exposure Analysis  
CH 434 Air Pollution Control  
CH 351 Mass Transfer & Stage-Wise operations  
CH 465 Biochemical Eng  
CM 406 Treatment of Experimental Data

CM 430 Colloids and Interfaces  
CM 221 Spectroscopy  
CM 460 Biochemistry I  
\*ES 222 Strength of Materials  
ES 405 Design of Exp. and Analysis of Data  
ES 436 Global Climate Change: Science, Engineering & Policy  
ES 464 Corrosion Eng  
EV 430 Environmental Law  
EHS 309 Industrial Hygiene  
EHS 406 Industrial Hygiene Control Methods  
EHS/BY 416 Principles of Toxicology and Epidemiology  
OM 331 Operations & Supply Chain Management.  
SB 361 Supply Chain Environmental Management

\* Recommended Electives

## ***Bachelor of Science – CE and EnvE Majors***

The graduation requirements of the Civil and Environmental Engineering Department are shown, by semester, on the curriculum sheets (page 5 for CE and page 7 for EnvE majors). In order to graduate, the student must have passed a minimum of 120 credit hours of appropriate course work and have a minimum cumulative total grade point average of 2.000 and a 2.000 GPA in courses with a CE designator. Courses cannot be taken on Pass/No-entry basis to satisfy graduation requirements. Upon graduation you will receive a Bachelor of Science Degree. The Civil and Environmental Engineering Department is registered with the NY State Education Department as having a program in Civil Engineering and also a program in Environmental Engineering. The Department's CE and EnvE programs are accredited by The Accreditation Board for Engineering and Technology (ABET). Graduation from the accredited CE and EnvE programs enables you to take the Fundamentals of Engineering (FE) and Professional Engineering (PE) Examinations.

### ***Clarkson Common Experience Curriculum (CCEC) Class of 2010 and later:***

Each student must complete 6 courses (18 hours) in the required knowledge areas (KA). The 6 courses include UNIV 190 Clarkson Seminar and EC350 Micro and Engineering Economics. University courses (UC) are interdisciplinary and cover at least two knowledge areas. The required six knowledge areas are:

1. the nature of cultures and societies (CSO),
2. contemporary and global issues (CGI),
3. the imaginative arts and their role in society (IA),
4. science and technology, including their relationship to society (STS),
5. economic and organizational concepts and decision-making (EC), and
6. methods for studying and explaining individual and group behavior (IG).

The list of appropriate KA associations of courses is listed at <http://www.clarkson.edu/sas> under Master Schedule Fall or Spring, under Knowledge Area, Communication, and Technology Courses.

EC150-Microeconomics should not be taken as a KA elective by CE or EnvE majors as it duplicates most of the material covered in EC350. Students who transfer to the CE or EnvE after taking EC150 or EC151 may satisfy the EC350 graduation requirement by taking EC200 that is simply the Engineering Economics portion of EC350 (usually the last one-third of the semester). EC200 is a one (1) credit course. For more information please see the CEE Executive Officer in Rowley 140A. In addition to the KA and UC requirements, the Clarkson Common Experience curriculum requires a minimum of six (6) communication points to be accumulated before graduation. At least two communication points should be from 300 and 400 level courses within the student's major. The following CEE courses have one communication point: CE212, CE320, CE340, CE480, CE490, CE491, CE492, and CE493.

### ***Professional Experience Class of 2010 and later:***

All students participate in a project-based professional experience such as co-op, internship, directed research, or community project clearly related to the student's professional goals. For more information see <http://clarkson.edu/engineering/CSOEProfExpWorksheet.pdf>. The Career Development Center provides help and guidance for finding appropriate co-ops and internships.

### ***Mathematics Elective***

The EnvE curriculum requires specifically STAT 383-Applied Statistics. For the CE curriculum

Mathematics elective courses should be of sufficient rigor as to require MA 132 (Calculus II) or MA 231 (Calculus III) or MA 232 (Differential Equations) as prerequisite. For example, MA 211, MA 321, MA 330, MA 331, MA 332, MA 339, MA 362, MA 377, STAT 381 and STAT 383 are all appropriate mathematics electives.

**Note: SB 284 Statistics or STAT282-General Statistics may not be selected to satisfy neither the Mathematics nor a Professional Elective. Mathematics electives and mathematics courses taken as professional electives must require at least Calculus II as a prerequisite.**

Area of Emphasis	Recommended Mathematics Course
Environmental Engineering (Concentration in CE)	STAT 383 Applied Statistics (best) MA 339 Applied Linear Algebra MA 377 Numerical Methods
Water Resources Engineering	STAT 383 Applied Statistics MA 339 Applied Linear Algebra
Geotechnical Engineering	STAT 383 Applied Statistics MA 339 Applied Linear Algebra MA 331 Fourier Series and Boundary Value Problems MA 377 Numerical Methods
Structural Engineering	MA 339 Applied Linear Algebra STAT 383 Applied Statistics MA 377 Numerical Methods MA 331 Fourier Series and Boundary Value Problems
Transportation Engineering	STAT 383 Applied Statistics
Architectural Engineering	STAT 383 Applied Statistics

### ***Professional Electives***

Professional elective courses enable a student to create a program of study that satisfies his or her particular interests. These courses are also intended to provide both depth and breadth in the student's preparation for professional practice. Regarding the acceptability of courses as professional electives the itemized rules given below should be applied within PeopleSoft. Any other course can be considered on a case-by-case basis on condition that both the student and advisor agree that the course is professionally relevant, is of reasonable rigor, and does not contain a significant amount of material already in the student's program, with the Department Chair or the Executive Officer making the final endorsement in any case-by-case matter. The "Professional Elective Approval Form" (page 12) needs to be processed and filed in the student's departmental file, as well as with SAS with a Request for Exception form for such cases to document that the student has satisfied the graduation requirements. An accompanying justification statement, explaining the reasons why the course that is not listed as a normally acceptable professional elective is required to satisfy specific career objectives is also needed.

Courses to be Professional Electives:

- a) Any ES 2xx course
- b) Any 3xx, 4xx, or 5xx course with the designator CS, AE, ES, ME, CE, CH, EE, BY, CM, IH, MA, or PH except for ES 300
- c) Maximum of three (3) courses from the School of Business. Professional electives from the School of Business can have the designators of AC, FN, IS, LW, MK, OM, OS, and SB.

Professional electives from the School of Business need not have the (BUS) designator.

- d) Any one (1) COMM course
- e) CM 241, BY 221 & 224, PHIL 341 or EV 342, EV 430, CS 141 or EE 261, CE240
- f) Any CE 002, 004, 006, etc. transfer course (even numbers only)
- g) One (1) MP 3xx or 4xx course or a total of three (3) credits from the list of courses that are determined to be credit-bearing MP courses (see next item)
- h) HP 300, HP 390
- i) HP 490 if the student completes the Honors program
- j) Any two (2) of MS 4xx, AS 4xx for a maximum total of six (6) credits if the student completes the ROTC program

Students must still fulfill the minimum 16.5 design credit requirement for graduation.

### **MP Courses**

In order for a MP course to be considered for a Professional Elective, it should have the same rigor and course content as CE 490 or CE 491 or CE492 or CE493. If an instructor of an MP course wants to have students earn course credit for their course, they must present justification to the Undergraduate Committee for that decision. The Undergraduate Committee would make a determination that would hold for three (3) years. After three years, the justification would need to be updated and the Undergraduate Committee would revisit the assignment of the course as a course that can be used as a Professional Elective.

In order to be considered equivalent to a Senior Design course, the course instructor must show that the course contains application of math and science, that it includes experiments and data interpretation, that it includes design, incorporates teamwork, identifies, formulates and solves an engineering problem, includes ethical and professional responsibility, etc. and the course addresses Criteria (a) through (k) of the ABET 2000 Criterion 3 (Program Outcomes and Assessment) and its subsequent updates. These are listed here:

Engineering programs must demonstrate that their graduates have:

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate and solve engineering problems
- (f) an understanding of professional, ethical, and environmental responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

To be considered a Professional Elective, an MP course must show that students perform a majority of the above items.

Requirement: Instructors of MP courses will write a syllabus with justification of their course if they want it to be used as a Professional Elective and be evaluated by a letter grade. The Undergraduate Committee will determine from the syllabus and justification whether the course fits the requirements. Each course will be reassessed every three years. MP courses that are not approved can only be taken as Pass/No Entry courses and cannot be used to satisfy professional elective requirements for CE or EnvE majors.

In case of questions regarding the appropriateness of a course as a professional elective, you should contact the CEE Department Executive Officer in Rowley 140A, as well as your advisor.

Clarkson University  
Wallace H. Coulter School of Engineering  
Department of Civil and Environmental Engineering

Professional Elective Approval Form

This form is not needed for the following courses to be taken Professional Electives:

- a) Any ES 2xx course
- b) Any 3xx, 4xx, or 5xx course with the designator CS, AE, ES, ME, CE, CH, EE, BY, CM, IH, MA, or PH except for ES 300
- c) Maximum of two (2) courses from the School of Business above the required foundation BUS course. Professional electives from the School of Business can have the designators of AC, FN, IS, LW, MK, OM, OS, and SB. Professional electives from the School of Business need not have the (BUS) designator.
- d) Any one (1) TC course
- e) CM 241, BY 221 & 224, PHIL 341 or PHIL 370, EV 430, CS 141 or EE 261, CE 240
- f) Any CE 002, 004, 006, etc. (even numbers only)
- g) One (1) MP 3xx or 4xx course or a total of three (3) credits from the list of courses that are determined to be credit-bearing MP courses
- h) HP 300, HP 390
- i) HP 490 if the student completes the Honors program
- j) Any two (2) of MS 4xx, AS 4xx for a maximum total of six (6) credits if the student completes the ROTC program

For consideration of any other course as a Professional Elective on a case-by-case basis, both the student and advisor should agree that the course is professionally relevant, meets the student's professional career objectives, is of reasonable rigor, and does not contain a significant amount of material already in the student's program. Students must still fulfill the minimum 16.5 design credit requirement for graduation. In case of questions regarding the appropriateness of a course as a professional elective, you should contact the Department's Executive Officer.

The following course to be taken in the \_\_\_\_\_ Semester of \_\_\_\_\_ is approved  
Fall or Spring or Summer year

as a professional elective for \_\_\_\_\_  
Name of Student Student Number

Course: \_\_\_\_\_ Credits: \_\_\_\_\_  
Number Course Title

Student's Signature: \_\_\_\_\_

Advisor's Signature: \_\_\_\_\_

Department Chair or Executive Officer: \_\_\_\_\_

Please attach a justification statement, explaining the reasons why the course that is not listed as a normally acceptable professional elective is required to satisfy your specific career objectives.

### ***Design Credits from Professional Electives***

The CEE department requires that a total of 16.5 credit hours of design be taken. For the CE degree, through required courses (CE 212; CE 310; CE 320; CE 330; CE 340; CE 441 or CE 442; and CE 490 or CE 491 or CE 492) you will have accumulated 11.5 design credits. Therefore, CE majors will need to obtain the remaining 5 design credits from the professional elective courses (see special notes section). Required courses for the EnvE major supply 7.5 or 6.5 design credits depending whether CE 479 or CE 480 is taken. Therefore additional 9 or 10 design credits must be obtained from the Core Professional Courses and Professional Electives. The following is a list of courses that carry design credits.

<b>Course No.</b>	<b>Course Title</b>	<b>Design Credits</b>
CE 212	Introduction to Engineering Design	1.5
CE 310	Geotechnical Engineering I: Soil Mechanics	1
CE 320	Structural Analysis	1
CE 330	Water Resources Engineering I	1
CE 340	Introduction to Environmental Engineering	1
CE 405	Construction Planning and Management	1
CE 406	Construction Engineering	2
CE 407	Construction Estimating and Scheduling	2
CE 411	Construction Materials Engineering	2
CE 415/515	Geotechnical Engineering II: Foundations	3
CE 423	Structural Health Monitoring and Condition Assessment	1
CE 430	Water Resources Engineering II	1
CE 433	Human Exposure Analysis	2
CE 441	Reinforced Concrete Design	3
CE 442	Steel Design	3
CE 444/544	Advanced Design of Structural Concrete	3
CE 447	Reinforced Masonry and Timber Design	3
CE 448	Introduction to Architectural Engineering	2
CE 452	Advanced Mechanics of Materials	1
CE 453/553	Properties and Performance of Concrete Materials	1
CE 455/555	Structural Damage Assessment and Repair	1
CE 457/557	Environmental Degradation of Concrete Structures	1
CE 461	Transportation Systems Design	3
CE 468	Traffic Engineering	1.5
CE 478	Solid Waste Management & Landfill Design	2
CE 479	Water and Wastewater Treatment Processes	2
CE 480	Chemical Fate and Transport in the Environment	1
CE 481/581	Hazardous Waste Management Engineering	1.5
CE 482/582	Environmental Systems Analysis & Design	2
CE 486	Industrial Ecology	1
CE 490/491/492 /493	Senior Design (Structures, Transportation, Geotechnical, or Water Resources/Environmental or Building/Architectural)	3
CH 434	Air Pollution	1
IH 406	Industrial Hygiene Control Methods	2
CE 519	Advanced Foundation Engineering	3
CE 547	Reinforced Masonry and Timber Design	3
CE 582	Environmental Systems Analysis & Design	2
CE 583	Modeling Natural Aquatic Systems	1
CE 584	Chemodynamics	1
CE 586	Introduction to Industrial Ecology	1
ES 432	Risk Analysis	1.5

### ***ROTC or AFROTC Professional Electives***

Students who complete the Army or Air Force advanced ROTC program may, at their option, use the 400 level credits for a maximum of 6 credit hours of professional electives.

### ***Undergraduate Students in Graduate Courses***

Enrollment in **500** and **600** level courses is encouraged for qualified students. Frequently these classes are smaller and filled with challenging material. Enrollment by a student in a 500 level course requires:

- a. A current cumulative quality point ratio of at least 3.0
- b. Permission of the student's advisor
- c. Permission of the student's department chair

Enrollment by an undergraduate student in a 600 level course requires:

- a. A current cumulative quality point ratio of at least 3.5
- b. Permission of the student's advisor
- c. Permission of the student's department chair
- d. Permission of the Dean of their School

Permission forms are available in the Departmental Office, 140 Rowley.

### ***Exceptions to Required Courses***

The Academic Standards Committee has granted the following blanket exceptions for required courses:

- a. Replace ES 223 with EE 324
- b. Replace ES 330 with CH 301
- c. Replace ES 340 with CH 271
- d. Replace ES 260 with ME 290
- e. Replace ES 100 with CS 141
- f. Replace CH 210 with CM 371
- g. Replace CE 301 with SC 301

Additionally, students who join the CE or the EnvE major after the Fall semester of their Sophomore year by transferring to Clarkson or by switching majors within Clarkson, will be allowed to substitute a 400 level CE design course instead of CE 212-Introduction to Engineering Design. The substitute course cannot be used to satisfy any other graduation requirement and it must have at least 1.5 design credits as CE 212. Also, for students who have taken an Introduction to Design course such as (ME212) prior to joining the CEE Department, such courses with appropriate design content will be accepted in place of CE 212.

### ***Pass-No Entry Courses***

In general, courses taken by CEE students to satisfy graduation requirements may not be taken on a pass-no entry basis, including MS or AS courses (Army and Air Force ROTC). Two exceptions to this rule exist:

1. A course taken above and beyond graduation requirements may be taken on a pass-no entry basis, but in all such cases the advisor should write a short statement to the effect that the course will not be allowed towards meeting graduation requirements and the student should sign it;
2. Honors Thesis (HP390/HP490) work normally is graded Pass/Fail, and up to six (6) credits earned for Honors Thesis are eligible to be counted in the CEE curriculum as Professional Electives if the student successfully defends the thesis.

## Professional Concentrations for CE Majors

By selection of a specific set of elective courses, CEE students can formally declare Minors and Professional Concentrations that provide both depth and breadth in the CEE area of choice and still meet the guidelines required by our ABET-accredited BSCE and BSEnvE programs. For the CE majors, the professional concentrations include Architectural Engineering, Construction Engineering Management, Structural Engineering and Environmental Engineering. When the appropriate courses are completed, as described below, a certificate from the Dean of the Coulter School of Engineering is awarded noting completion of the concentration. The Environmental Engineering concentration for CE majors is different than the EnvE major in that the Environmental Engineering concentration within the CE major is intended for students who plan to work as environmental specialists within an integrated civil engineering enterprise; on the other hand the EnvE major is more specialized for a career in environmental engineering process design, modeling, or research.

It should be noted that various departments in the Coulter School of Engineering and others at Clarkson offer several concentrations and academic minors. For further information on concentrations and minors outside of the CEE Department, see the Clarkson University *General Catalog*, visit the University WWWeb site, or contact the Dean of the School or the Chair of the Department offering the concentration or minor.

### ***Professional Concentration in Architectural Engineering***

A professional concentration in Architectural Engineering is available to students who are planning a career in building design, including architectural, structural, construction, foundation, and environmental aspects. The professional concentration allows students to satisfy the accreditation requirements in civil engineering while pursuing a concentration in architectural engineering.

Courses required for a concentration in architectural engineering are listed below. The total number of credits required for the concentration is 24, of which 18 credits have to be selected as professional electives.

COURSES	CREDIT	PREREQUISITE
CE448 Introduction to Architectural Engineering	3	ES220, CE212
CE445 Timber Design and CE446 Reinforced Masonry Design or CE447 Reinforced Masonry and Timber Design	3	CE441 or CE442 (Corequisite)
CE 415/515 Foundation Design	3	CE 310
CE 441 Reinforced Concrete Design	3	CE 320
CE 442 Steel Design	3	CE 320
CE 492 Senior (Building, Architectural) Design	3	CE448, CE441, CE442, CE415, CE447 (Corequisite)
Choose at least two of the following:	6	
CE 405 Construction Management		
CE408 Buildig Information Modeling and Integrated Product Delivery		
CE 411 Construction Materials		CE 320 & CE 441 (cor.)
CE 420/520 Advanced Structural Analysis		CE 320
CE 421/521 Composite Mechanics and Design		ES 222 & ES 260
CE542 Advanced Steel Design		CE442, CE420/520
CE 544 Advanced Concrete Design		CE 441 & 420/520
CE 453/553 Properties and Performance of Concrete Mat'ls		ES 260

CE 455/555 Structural Damage, Rehabilitation, and Repair	ES222
CE 457/557 Environmental Degradation of Concrete Structures	CE411/CE441/CE453
ME310 Thermodynamic System Engineering	ES340
ME411 Introduction to Heat Transfer	ES330, ES340, MA232
ME 444 Computer Aided Engineering	ES 100, MA 231
CE 438 or CE 538 Finite Element Methods	ES 222, ES 330, MA 232
CE 486/586 Intro to Industrial Ecology	CE340 or CH250
EHS406 Industrial Hygiene Control Methods	EHS309 or consent of instructor
<i>Or other course as designated by CEE Department Chair</i>	

TOTAL CREDITS FOR CONCENTRATION 24

In addition to the required number of credits, it is recommended that students in the architectural engineering concentration take relevant liberal arts courses such as DA 205 Painting and Drawing, as well as writing intensive communication (COMM) courses. Architecture related liberal arts courses such as History of World Architecture, Architecture and Culture, Idea and Image, Greek Art and Architecture, Roman Art and Architecture may also be taken by cross-registration at Potsdam College. A minimum grade point average of 2.0 is required in the courses taken for this professional concentration. At least nine of the credit hours required in the concentration must be completed at Clarkson University unless the Dean of the Coulter School of Engineering approves an exception.

### ***Professional Concentration in Construction Engineering Management***

The professional concentration in Construction Engineering Management is available to civil engineering students to focus their electives on courses pertinent courses to the field of construction engineering management. Electives used to satisfy requirements of the concentration include a set of courses that reflect the sub-disciplines of Construction Engineering as defined by the Accreditation Board of Engineering and Technology (ABET).

COURSES	CREDIT	PRE-REQUISITE
Two of the following:		
CE 405 Construction Planning and Management	6	JR or SR
CE 406 Construction Engineering		JR or SR
CE 411 Construction Materials		CE 441 (Co-requisite)
CE 415/515 Foundations, Stability and Retaining Structures	3	CE 310
CE 441 Reinforced Concrete Design	3	CE 320
CE 442 Steel Design	3	CE 320
TWO of the following:	6	
CE 407 Construction Estimating and Scheduling		
CE 408 Buildig Information Modeling and Integrated Product Delivery		
OS 466 Negotiations and Relationship Management		OS286
OM 480 Project Management		Statistics or consent
OM 351 Quality Management & Lean Enterprise		Statistics or consent
LW 466 Law of the Workplace		LW 270 or consent
PHIL 341 Professional Ethics		
EHS 309 Introduction to Occupational Health or		
EHS 416 Principles of Toxicology and Epidemiology		EHS 309 or consent
<i>OR other course as designated by CEE Department Chair</i>		

TOTAL CREDITS FOR CONCENTRATION 21

In addition to the required courses, it is recommended that MA 383 Applied Statistics I be taken as a mathematics elective course for this concentration. A minimum grade point average of 2.0 is required in the courses taken for the concentration. At least one-fourth of the credit hours required must be completed at Clarkson University, unless the Dean of the Coulter School of Engineering approves an exception.

***Professional Concentration in Structural Engineering***

A professional concentration in Structural Engineering is available to undergraduate students who are planning a career in structural design. The professional concentration allows students to satisfy the accreditation requirements in civil engineering while pursuing a course of study in structural engineering and mechanics with the aim of developing the necessary analytical skills for the structural design of buildings, bridges, vehicle structures, etc. Students receive a Bachelor of Science degree in CE with a certificate of professional concentration in Structural Engineering.

Courses required for a concentration in structural engineering are listed below. The total number of credits required for the concentration is 21.

COURSES	CREDIT	PRE-REQUISITE
CE 420/520 Advanced Structural Analysis	3	CE 320, MA 339
CE 415/515 Foundations Design	3	CE 310
CE 441 Reinforced Concrete Design	3	CE 320
CE 442 Steel Design	3	CE 320
CE 490 or CE 492 Senior Design	3	CE 310 & CE 441 or CE 442
Choose at least two of the following:	6	
CE 401/501 Fracture Mechanics of Concrete Structures		ES 222 (corequisite)
CE 411 Construction Materials		CE 320 & CE 441 (cor.)
CE 421/521 Composite Mechanics and Design		ES 222 & ES 260
CE 438 or CE 538 Finite Element Methods		ES 222, ES 330, MA 232
CE 444/544 Advanced Concrete Design		CE 441 & 420/520
CE 453/553 Properties and Performance of Concrete Materials		ES 260
CE 455/555 Structural Damage, Rehabilitation, and Repair		ES 222
CE 457/557 Environmental Degradation of Concrete Structures		CE411/CE441/CE453
ME 444 Computer Aided Engineering		ES 100, MA 231
CE512 Fundamentals of Dynamics and Vibrations		ES 223
<i>Or other course as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>21</b>	

In addition to the required number of credits, it is recommended that students in the structural engineering concentration take MA 339 (Applied Linear Algebra) as their mathematics elective. A minimum grade point average of 2.0 is required in the courses taken for this professional concentration. At least nine of the credit hours required in the concentration must be completed at Clarkson University unless the Dean of the Coulter School of Engineering approves an exception.

***Professional Concentration in Environmental Engineering***

A professional concentration in Environmental Engineering is available to all undergraduate students. The professional concentration enables students to satisfy the accreditation requirements of their particular major while focusing their electives on pertinent courses for environmental engineering. Electives used to

satisfy requirements of the concentration include a set of science and engineering courses that reflect the sub-disciplines of Environmental Engineering as defined by the Accreditation Board of Engineering and Technology (ABET). Students receive a Bachelor of Science degree in their major with a professional concentration in Environmental Engineering.

COURSES	CREDIT	PRE-REQUISITE
CE 491 Senior Environmental Design <i>OR</i> MP 401 Environmental Remediation Design <i>OR</i> MP 444 EPA P3 Sustainable Design Competition	3	SR standing SR standing SR standing
CE 340 Introduction to Environmental Engineering <i>OR</i> CH 220 Chemical Engineering Principles II: Material Balance	3 3	ES 330 CM 132 or CM 104, MA132
BY 320 Microbiology <i>OR</i> BY 221 and BY 224 General Ecology (4 credits)	3 4	BY 214, CM 132 consent
CM 241 Organic Chemistry <i>OR</i> CM 371 Physical Chemistry <i>OR</i> CH 210 Chemical Engineering Principles I	3	CM 104 or CM 132 CM 104 or CM 132, MA 132 and PY 131 PH 132 - corequisite
TWO of the following:	6	
CE 430 Water Resources Engineering II		CE 330
CE 478 Solid Waste Management and Landfill Design		JR or SR
CE 479 Water and Wastewater Treatment Processes		CE 340
CE 480 Chemical Fate and Transport in the Environment		CE 340
CE 481/581 Hazardous Waste Management Engineering		CE 340
CE 477/577 Atmospheric Chemistry		CM 370, CM 371 or ES340
CE 580 Environmental Chemistry		consent
CE 482/582 Environmental Systems Analysis and Design		consent
CE 583 Modeling Natural Aquatic Systems		consent
CE 584 Chemodynamics		consent
CE 586 Introduction to Industrial Ecology		consent
CE 587 Contaminant Transport in Groundwater		consent
CE 589 Aspects of Freshwater Ecosystems		consent
CH 434 / ES 434 Air Pollution Control		ES 330
ES 432/532 Risk Analysis		consent
ES 436 Global Climate Change: Science, Engineering & Policy		consent
ES 464 Corrosion Engineering		CM 132
EHS 406 Industrial Hygiene Control Methods, <i>OR</i>		EHS 309, consent
EHS 416 Principles of Occupational Health <i>OR</i> other course designated by CEE Department Chair		EHS 309, consent
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>18</b>	

CE majors that are in the Environmental concentration are recommended to take ES 250 Electrical Science and ES340 Thermodynamics rather than ES 223 Rigid Body Dynamics for their ES electives. In addition to the required courses, it is recommended that STAT 383 Applied Statistics I be taken as the mathematics elective course for this professional concentration. A minimum grade point average of 2.0 is required in the courses taken for the professional concentration. At least one-fourth of the credit hours required must be

completed at Clarkson University, unless the Dean of the Coulter School of Engineering approves an exception.

## **Other Options in the CE and EnvE Curricula**

You are not limited to only one degree or one specific area of study. You may decide to obtain dual degrees, a double major, or a second degree. Clarkson also has an Engineering MBA-MS 4+1 program.

### ***Dual Degree***

Dual degrees are two different bachelor's degrees; for instance, a Civil Engineering Degree and an Environmental Engineering degree or a Civil Engineering Degree and a Mechanical Engineering Degree. To do this you must complete at least 150 credit hours with at least 30 credit hours unique to each program. To obtain a dual degree you must complete a form which can be obtained from the Department secretaries, 140 Rowley, or from the Student Administrative Services Center, Cubley-Reynolds Ross-Brooks center core. A copy of this form is shown in Appendix B.

### ***Second Degree***

A second degree means that you could receive two degrees at TWO different commencements. To do this, you need at least 150 credit hours with at least 30 credit hours unique to each program. Also, at least 12 credit hours (6 of which are upper level courses) toward the second degree must be completed in residence after the awarding of the first degree. To obtain a second degree you have to be readmitted to Clarkson through the Student Administrative Services Center, Cubley-Reynolds Ross-Brooks center core.

### ***Double Majors***

You may decide to pursue two majors while at Clarkson. For example, by selecting a very strict set of courses you can satisfy the requirements of both CE and EnvE or both CE and ME majors within the 120 credits of coursework. Your advisor should be able to direct you to a source that can tell you the courses needed to complete the second major. The Undergraduate Double Major Degree Form (Appendix C) must be completed to establish your double major. A double major degree requires completion of all requirements for both programs prior to graduation. In general, the double major option is not usually recommended because it renders the required curriculum very rigid and does not allow the student much flexibility in course selections.

### ***Engineering MBA-MS 4 + 1 Program***

The Schools of Business and Engineering have an option which allows a freshman undergraduate engineer who wants an MBA or Master of Science in Management Systems to plan required courses so that the graduate degree can be completed at Clarkson in one year beyond the baccalaureate.

Students in this option will be in a dual major (engineering and either MBA or MS). They will be classified as engineering students with engineering advisors. Their admission to the MBA/MS program is conditional until they meet traditional School of Management admission requirements (GMAT's, etc.). Interested students should contact the Director of Graduate Business Programs, 329 Bertrand H. Snell Hall.

## **Student Academic Records**

Your academic record is kept by your assigned advisor and also by the CEE Department office, located in 140 Rowley. This record will be used to determine if you have met Clarkson's graduation requirements. Take an interest in this record and make sure that it is up-to-date. You are entitled to a copy of this record at any time you wish.

## **Changing Majors**

You may decide to change majors. This is accomplished by notifying the Department you wish to enter and signing an "Undergraduate Change of Major" form (Appendix D) prepared by that Department, along with the approval of the Chair of the Department to which the student is requesting admittance. There is no need to notify the Department you are leaving as they will be informed by SAS. In order to be admitted to a program in the CEE department from another major a student must be in good standing. Students who are not in good standing may be offered advice by the CEE faculty with regard to their academic curricula until they achieve good standing and become eligible to join a CEE program.

## **Special Interests**

Undergraduate students may participate in research projects with department faculty members, earning academic credit (CE 495 or CE 496) during the school year. In the summers, research projects are available at Clarkson or other universities. These usually pay a small stipend.

In a directed-study course, a student learns a subject by reading materials under the guidance of a faculty member, without lectures or other class activities. Both undergraduate research and directed study feature valuable one-on-one interactions with faculty members.

## **Transfer Credit**

Transfer credit from another college or university is also dealt with through the Student Administrative Services (SAS) Center, Graham Hall. Note well: before taking a course at another university, the Off-Campus Course Work Permission form (Appendix E) must be completed. This involves signatures by the student, the course department chair, the major advisor/department chair/program director and the Dean of Engineering.

Transfer students should be sure that the University SAS Office receives their final transcript(s) as soon as possible during their first semester on campus.

## ***Advanced Placement Credit***

With appropriate testing it is possible to receive Advanced Placement (AP) Credit for courses taken prior to attending University. It is best to do this as soon as possible in your freshman year or even prior to arriving on campus for your first freshman semester. A minimum AP exam grade of 4 is usually required. Requests to have AP credits accepted must be initiated at the Student Administrative Services Center.

## ***Cross-Registration***

Clarkson has joined with Potsdam State, St. Lawrence University, and Canton Tech in a program allowing a student to take up to two courses per year at the other institutions of Associated Colleges. Clarkson students typically use this opportunity to take language, art, education, or music courses not offered here. The Cross Registration Form is available at the Student Administration Services.

## **Writing Across the Curriculum**

The CEE faculty believes that your education is not complete without proper instruction in communication. The CEE department has chosen a comprehensive approach whereby the majority of the required CEE courses are included in the program. The intention is to integrate writing so extensively that it becomes a part of the teaching processes rather than just another associated topic to be learned. We firmly believe this approach will be the most beneficial in the long run and will provide a unique edge to your marketability.

Currently CE 212, CE 320, CE 340, CE480, CE490, CE491, CE492, and CE493 each possess one communication point (C1) . Additional communication points must be obtained from the KA and UC electives to complete at least six communication points before graduation. Juniors are required to write laboratory reports in each of CE 310, CE 320, CE 330, CE 340. The reports are graded by faculty regarding the student's ability to communicate ideas and concepts clearly. The best papers are evaluated by the Undergraduate Committee for possible nomination to the CEE Writing Award that is presented every year at the University Recognition Day. If a writing assignment is unsatisfactory, then it should be resubmitted and regraded by the faculty member in charge of the course until a satisfactory grade is achieved. A visit to the Writing Center, located in Bertrand H. Snell Hall 139, is strongly encouraged prior to any re-submission.

### **English as a Second Language Test**

All non-native English speaking undergraduates are required to take the English as a Second Language (ESL) Placement Test. Depending on the results, the student must take up to two semesters of ESL. A student who is at the intermediate level must pass both the intermediate and advanced ESL courses (ESL 250 and ESL 350). Contact the Liberal Arts Center for further information.

### **Professional Engineering Exam (PE Exam)**

Professional registration is very important step for many who wish to pursue a career in the field of Civil and Environmental Engineering. To obtain registration as a Professional Engineer (PE), you must successfully complete a two-part examination procedure. The first part, called the Fundamentals of Engineering (FE) Examination, typically is taken in the Spring of the senior year. The second part, called the Professional Engineering (PE) Exam, is taken after completing at least four years of work experience satisfactory to the State Licensing Board.

The FE is offered on campus each spring, and to help you prepare for the exam, Clarkson offers weekly review sessions over the two months prior to the exam. Notification for the review sessions will appear early each spring semester. You must be within 20 credit hours of completing your graduation requirements before you will be permitted to attempt the exam. You must register for the FE Exam at least 6 months in advance; usually registration is due in October for the Spring exam. If you have any further questions, contact the secretary of the Associate Dean of Engineering for Academic Affairs, Room 102 CAMP Building.

### **Graduate School**

Many of you should consider graduate school, particularly if you find you would like to become more focused within the broad spectrum of civil and environmental engineering. You should continually seek information regarding this topic. Your advisor can be of great help in discussing graduate school options, as can be a professor from whom you have taken a class and who you know shares professional interests with you. An additional source of information that can be of help to you is the *CEE Graduate Handbook*, which the department publishes annually and is available in Room 140 Rowley. In it you will find detailed information on the following advanced degree programs:

- Master of Engineering in Civil Engineering
- Master of Engineering/Master in Business (ME/MBA)
- Master of Science in Civil Engineering
- Doctor of Philosophy in Civil and Environmental Engineering

## **Career and Professional Development Center**

There are many things that you can do to plan your career. The best place to start is to decide on your interests. Build a career on the aspects of engineering that you enjoy. Talking to your advisor is a good way to see what is out in the work world. Many advisors have held industrial or government positions before entering teaching. Another way to learn about Civil and Environmental Engineering professional practice is through the activities of student chapters of the three professional societies (AGC, ASCE, NYWEA). You should also make contact with the staff of the Career and Professional Development Center, and find out what they can do for you.

Clarkson offers two additional special programs that also can broaden your college experiences. Both the Cooperative Education and Semester Abroad programs require a student to be off campus for at least one semester. Participation in either of these programs requires that you thoroughly research curriculum requirements so that you can ensure that you will have all the necessary prerequisites and courses for graduation.

### ***Cooperative Education Program***

The Cooperative Education Program (Co-op Program) is a good way to get practical experience by working for a company for one semester. To find out more about this program contact the Career and Professional Development Center.

### ***Semester Abroad***

Some students, usually in their junior year, complete a semester abroad. Clarkson has an exchange program with Lulea University, Sweden; City University, London, England, Queens University, Kingston, Ontario; University of Ottawa, Ottawa, Ontario; Monash University, Clayton, Victoria; University of Newcastle, Callaghan, New South Wales. To find out more details contact the Career Development Center in the ERC. The total number of credits transferred to Clarkson will not exceed 15. Prior to departure, an Off-Campus Course Work Permission form must be completed and approved for each course. Good Standing status is a requirement.

### ***Summer Employment***

Each fall, the Career and Professional Development Center holds evening sessions to help students prepare for a summer job-search. In the spring semester, some summer job interviews can be scheduled through the Career Development Center. The Center is always willing to assist with resume preparation. It is very beneficial for an engineering major to have meaningful summer work experience, especially in the summer between the junior and senior years.

### ***Research Experience for Undergraduates (REU) Programs***

Currently two programs funded by the National Science Foundation provide special opportunities for CEE undergraduate students from Clarkson and other universities to gain experience in research that is relevant to Civil and Environmental Engineering. See page 33 for the associated web pages.

## **Societies and Activities**

There are a number of professional and honor societies on campus that relate to the fields of Civil and Environmental Engineering. These societies may give further information about what types of jobs are available and what kind of work is presently being done in the field. To learn more about these organizations check the Student Activities Office, 2nd Floor Cheel Center or call the presidents of the organizations (their numbers are located in the Student Telephone Book).

## ***Professional Societies in CEE***

The student chapters of the several professional societies of interest to Civil and Environmental Engineers (named below) are active at sponsoring and participating in a variety of events during the year, including Open House, Parent's Weekend, field trips, and hosting a number of guest speakers.

<u>Organization Name</u>	<u>Faculty Advisor</u>
Associated General Contractors	Professor Spencer Thew
American Society of Civil Engineers	Professor Levon Minnetyan
New York Water Environment Association	Professor Christopher Bellona
Engineers Without Borders	Professor Shane Rogers
Society of Women Engineers	Professor Andrea Ferro

In addition to on-campus activities, students have opportunities to participate in regional and national student conferences as well as leadership seminars. Various types of scholarships, awards, and loans are available through the local chapters of these societies. Several student competitions are announced on a regular basis and students are always encouraged to participate in these competitions. Call the presidents (see student telephone book) or the faculty advisors of the student chapters to get more information about these activities. During the past several years, the ASCE student chapter has participated in regional steel bridge, timber bridge, construction management and concrete canoe design competitions. In addition, several members of ASCE and NYWEA have competed in an annual national environmental remediation competition.

## ***Honor Societies***

In addition to the professional societies described above, several academic honor societies also have chapters at Clarkson. Their primary purposes include recognizing and encouraging continued outstanding scholarly achievement and to provide a forum for related professional development activities. The honor societies likely to be of most interest to Civil and Environmental Engineering majors would include:

<u>Organization Name</u>	<u>Faculty Advisor</u>
Chi Epsilon (Civil Engineering)	Professor Kerop Janoyan
Tau Beta Pi (All Engineering)	Professor Hayley Shen
Phi Kappa Phi (All Disciplines)	Professor Richard McCluskey

## ***Student Awards***

The Civil and Environmental Engineering Department honors several deserving students each year with the following awards:

The Charles Martin Clark Memorial Prize -- Established in 1946 by Mr. Clark's associates on the Board of Water Supply of the City of New York, the Charles Martin Clark Memorial Prize is awarded annually to a senior civil engineering student of outstanding scholarship and character, possessing qualifications required for a successful professional career.

Arthur L. Straub Memorial Award -- Established in 1976, the Arthur L. Straub Memorial Award is presented annually to a senior civil engineering student who possesses the qualities of professional maturity and scholastic ability, and also is involved in extracurricular activities. The Straub Award is given to honor Arthur L. Straub, a Professor of Civil and Environmental Engineering at Clarkson from 1956 to 1976.

Civil and Environmental Engineering Award for Writing – Established in 1998 by the Faculty of the department. The recipient is a Civil and Environmental Engineering major who has exhibited superior performance in their writing assignments and reports.

## **Civil and Environmental Engineering SPEED Teams**

Clarkson University established the SPEED program (Student Projects for Engineering Experience and Design) during the late 1990's to facilitate student access to project-based, team learning experiences as a way of enhancing their ability to tackle "real-world", open-ended problems. Many of the SPEED project opportunities stem from national engineering design competitions that require students to conceptualize, design, build and test the products of their combined skills and ingenuity. Most of the projects are multidisciplinary in nature, and require contributions by students from various academic disciplines including, engineering, business, science, and liberal arts. In many respects, the team actions faithfully mimic conditions in the professional working environment – the very place students plan to find themselves upon graduation. In other words, the SPEED projects teach that to complete a project successfully, individual students must learn to work and communicate effectively with peers with varying experience, interests and skill levels, and be able to appreciate and make use of the contributions of engineers, scientists, managers, accountants, marketing strategists and many others.

### ***Construction Engineering and Management Team***

Sponsored nationally by the Associated Schools of Construction and the Associations of General Contractors, the Construction Engineering and Management Team provides students interested in construction management with an excellent opportunity to learn the ins and outs of the popular fields of Commercial Construction and Heavy Civil Construction while preparing for a competition in the Northeastern US. Clarkson's rookie team won first place in the 1999 Region One Construction Management Competition. Activities of the CEM Team include preparing a schedule, a bid, and a proposal for a construction project; successfully "selling" the project by presenting it orally and in writing to a panel of judges; learning about the construction industry; and having a great time in the process!

### ***Concrete Canoe Team***

Clarkson students have participated in the Concrete Canoe competition since the early 1980's. Sponsored by the American Society of Civil Engineers (ASCE) and Master Builders Corporation, the competition involves a design paper and an oral presentation before a panel of judges as well as the canoe race, itself. All students interested in taking on the challenge of designing, building and rowing a concrete canoe are welcome to participate.

### ***Environmental Remediation Team***

Sponsored by the Waste-Management Education and Research Consortium (WERC), the Environmental Remediation Team's competition involves designing treatment processes to remediate actual hazardous and/or radioactive waste sites. Clarkson students from engineering, science, business and management have participated in the national WERC competition for over 15 years and with great success. During the 2009 competition, for example Clarkson's team won first place for their task and brought home the Intel Award for the Most Innovative Design. Highly motivated juniors and seniors in engineering, science and business are encouraged to apply to become a part of Clarkson University's Remediation Engineers (CURE). Over the past two years the team has participated in the US EPA sponsored P3 (People, Planet and Prosperity) competition held annually in Washington D.C. Student teams winning at the initial level will receive follow up funding to demonstrate the developed process at a larger scale.

### ***Steel Bridge Team***

The American Institute of Steel Construction and the American Society of Civil Engineers sponsor the national Steel Bridge competition annually. The goal of the Steel Bridge Team is to design and build a steel bridge that is light, easy to construct, able to withstand heavy loads, aesthetically pleasing, and at least

long enough to bridge a specified span. Although of primary interest to CEE students, all Clarkson students interested in the challenge of designing and building a bridge of steel members are welcome to participate with the team.

### ***Timber Bridge Team***

The US Forest Service, the Forest Products society, and the American Society of Civil Engineers sponsor the Timber Bridge competition annually to promote interest in the use of wood as a competitive bridge construction material and to develop an appreciation for the engineering capabilities of wood. The students who comprise the Timber Bridge Team take on the challenge of designing, building, and load-testing a timber bridge that must meet exacting specifications with respect to span, width, depth, height, and length and composition of individual members. Although of primary interest to CEE students, all Clarkson students interested in the challenge of designing and building a bridge of wooden members are welcome to participate.

### ***PCI Big Beam Team***

Precast/Prestressed Concrete Institute sponsors the competition. Team members design a full size concrete beam. The beam is fabricated by Jefferson Concrete of Watertown, NY, and shipped to Clarkson. The team members then test the beam to failure in the structures laboratory under prescribed conditions and rate of loading. To win the competition the tested strength must be the closest to the design strength. In 2007 Clarkson's PCI Big Beam team placed sixth nationally and received a \$1,000 award from PCI.

## **Clarkson Services**

Clarkson has many services, such as Student Support Services, Counseling Services, Accommodative Services, etc., to help you whether your needs are related to academic or personal issues. For information that is more detailed and broader in scope than that given here, pick up a copy of the Academic Support Center Pamphlet from the Center, which is located on the second floor of Price Hall. For on-campus web access to services in general, you can use the World Wide Web. At the end of the faculty listing you will find a table that provides a list of all WWWeb sites referenced in this *Handbook*.

### ***Student Administrative Services Center (SAS)***

The Student Administrative Services Center (SAS) combines the activities of the Bursar, Registrar, and Financial Assistance offices and is located in the central area of Graham Hall on the hill campus. This office is created to fulfill most administrative needs of students and can be contacted at 268-6451. The web address for SAS is given in the tabulation at the end of this *Handbook*.

### ***Student Support Services***

Student Support Services is located in the Educational Resources Center (ERC) offers services related to educational development, tutoring, student support and accommodations for people with disabilities. Seminars are offered on topics such as time management, stress control, study strategies, and reading improvement etc. For appointments or further information on this service call 268-2209. The web address for Student Support Services is given in the tabulation at the end of this *Handbook*.

### ***Accommodative Services***

Accommodative Services is located in the Student Development Center (ERC). This is the initial point of contact for most students and staff members seeking accommodations or services related to a disabling condition. Services can include short-term arrangement for students who have become temporarily disabled also. For further information call Sheila McCarthy at 268-7643. The web page for Accommodative Services is given in the tabulation at the end of this *Handbook*.

### ***The Counseling Center***

The Counseling Center (ERC) offers personal counseling. Issues that are addressed include understanding

your personality, relationships, stress control, alcohol and drug awareness, dealing with shyness, depression and many other personal concerns. For appointments or further information on this service call 268-2327.

### ***International Student Advising***

International student advising is available in Price Hall, 2nd floor (Thomas entrance). The service includes orientation and special advising concerning such topics as: visa status requirements, and work regulations, for example. For further information on this service or appointments call 268-7970.

### ***The Student Health Center***

This facility is located in the Hamlin-Powers building. It provides out-patient services, emergency care, health screening, and health counseling and education. For further information, see the Clarkson Catalog or call 268-6633.

### ***Extracurricular Activities***

Potsdam offers many extracurricular activities. The Associated Colleges of the St. Lawrence Valley publishes a calendar of "Special Events" every month. This and other local publications list lectures, concerts, seminars, club meetings, professional societies, sports, movies, etc. that are going on in the area.

### ***The Writing Center***

Clarkson's Writing Center tutors can help you produce more effective written work. Writing tutors are available to help you improve your memos, lab reports, design projects, other course assignments and even personal writing. The Writing Center is located on the Main Floor of the Bertrand H. Snell Hall.

## **Special Notes**

### ***Clarkson Catalog***

You should have received a copy of the General Catalog (Clarkson Catalog) upon entering Clarkson, but if you did not, you may obtain one from the Publications Office on the first floor of Snell Hall or the Student Administrative Services Center, Cubley Reynolds Ross-Brooks center core. It is also available on line at <http://www.clarkson.edu/catalog/>

### ***University Regulations***

The regulations that you are expected to follow are in a publication of the College Regulations that you received upon entering the University. Additional copies may be obtained from the Dean of Students Office, Cheel Campus Center, Room 201C; also, the Regulations may be viewed on the WWWeb at <http://www.clarkson.edu/studentaffairs/regulations>.

### ***Courses and Course Descriptions***

The most current listing of courses offered at Clarkson is available via the Clarkson computer network. To access the Course Register, point your WWWeb browser <http://www.clarkson.edu/sas>

### ***Student Telephone Book***

Your telephone book will be distributed to you each fall in your campus mail box. Off-campus students may obtain a copy from the Student Senate Office, second floor Cheel Center. The web address that can be used to look up students is in the tabulation at the end of this *Handbook*.

### ***Minors and Concentrations***

Minors and Concentrations - Students may register across schools to obtain a minor or concentration, and in general, should expect to do so. Interested students should consult with their academic advisors

regarding requirements. Listed below are the minors and concentrations that can be obtained through the School of Business, School of Liberal Arts, School of Science and Pre-Professional Programs. Further information on these concentrations can be obtained from the Dean of the School of Business, Dean of the School of Liberal Arts, or the Director of the School of Science.

**School of Business**

Business Administration  
Quality Based Project Management

**School of Liberal Arts**

American Studies  
Digitally Mediated Communication  
History  
International and Cross-Cultural Perspectives  
Literature and the Arts  
Political Science  
Professional Communications  
Social Issues and Public Policy  
Social Science

**Pre-Professional Programs**

Pre-Health Sciences  
Pre-Law  
Pre-Medicine  
Pre-Physical Therapy  
Pre-Veterinary

**School of Science**

Biology  
Chemistry  
Cognitive Neuroscience  
Mathematics  
Physics  
Psychology  
Statistics

**Interdisciplinary**

Environmental Policy  
Environmental Science  
Environmental Occupational Health

## **Commencement**

Any student who is within six (6) credit hours of meeting the BSCE or EnvE degree requirements may participate in Commencement. Students who require more than six (6) credit hours to complete their BS degree will not be allowed to participate in Commencement and they will be required to complete their remaining credit hour requirements on-campus. The written approval of the CEE Department Chair must be obtained by a student who has completed all but six hours for graduation in order to complete them off campus.

## Faculty of the Department of Civil and Environmental Engineering

### **Norbert Ackermann**

Professor Emeritus  
126 Rowley 268-6550  
PhD Civil Engineering, Carnegie Mellon University, 1959

#### **Teaches:**

CE 570 - Advanced Hydrology  
CE 330 – Water Resources Engineering I  
CE 430 – Water Resources Engineering II  
ES 330 - Fluid Mechanics  
ES 220 - Statics

**Research:** Mechanics of granular flow; ice mechanics and hydraulics

### **Gordon Batson**

Professor Emeritus  
105 Snell (down town) 268-6520  
PhD Civil Engineering, Carnegie Mellon University, 1962  
Registered Professional Engineer, New York State

#### **Teaches:**

CE 447 – Reinforced masonry and Timber Design

**Research:** Structural design, properties of fiber reinforced concrete and remote sensing

### **Christopher Bellona**

Assistant Professor  
208 Rowley 268-3844  
PhD Colorado School of Mines, 2007

#### **Teaches:**

CE481/581 - Hazardous Waste Management Engineering  
CE580 - Environmental Chemistry  
CE584 - Chemodynamics

**Research:** Membrane processes for water and wastewater treatment

### **James Bonner**

Professor and Director of Center for the Environment  
102 Rowley 268-3856  
PhD Civil and Environmental Engineering, Clarkson University, 1983

**Research:** Coastal environmental hazard assessment and remediation

### **John Dempsey**

Professor  
240B Rowley 268-6517  
PhD Engineering, University of Auckland, 1978  
Registered Professional Engineer, New York State

#### **Teaches:**

CE 401/501 - Fracture Mechanics of Concrete Structures  
CE 551 - Theory of Elasticity  
CE 601 - Fracture Mechanics of Quasi-Brittle Materials  
ES 100 - Introduction to Engineering Use of the Computer  
ES 501 - Mechanics of Fracture

**Research:** Fracture of structural and geomaterials, fracture of ice, ice mechanics, scale effects, elasticity, contact mechanics

**James Edzwald**

Visiting Professor

271 Rowley

PhD Environmental Science and Engineering, University of North Carolina, Chapel Hill

**Teaches:**

CE580 – Environmental Chemistry

**Andrea Ferro**

Associate Professor

206 Rowley 268-7649

PhD Civil and Environmental Engineering, Stanford University, 2002

**Teaches:**

CE 477/577 - Atmospheric Chemistry

CE 340 – Environmental Engineering I

**Research:** Indoor air pollution

**Stefan Grimberg**

Associate Professor and Chair

212 Rowley Lab 268-6490

PhD Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, 1995

**Teaches:**

CE212 – Introduction to Engineering Design

CE 481/581 - Hazardous Waste Management Engineering

CE482/582 Environmental Systems Analysis

CE 491 - Senior Design

CE 682 - Environmental Biological Processes

**Research:** Biological waste treatment, surfactants

**Thomas Holsen**

Professor

208 Rowley Lab 268-3851

PhD University of California, Berkeley, 1988

**Teaches:**

CE 580 - Environmental Engineering Chemistry

CE 584 - Chemodynamics

CE 681 - Physical Chemical Processes

**Research:** Air quality, trace organic compounds in the environment

**Kerop Janoyan**

Associate Professor and Executive Officer

128 Rowley 268-6506

PhD Civil Engineering, University of California, Los Angeles, 2001

Registered Professional Engineer, California

**Teaches:**

CE 415/515 - Foundations, Stability & Retaining Structures

CE 490 - Senior Design

CE 519 – Advanced Foundation Design

**Research:** Soil-foundation-superstructure interaction, design methods, large-scale laboratory and field testing

**Feng-Bor Lin**

Professor

228 Rowley 268-6546

PhD Civil Engineering, Carnegie Mellon University, 1974

**Teaches:**

CE 461 - Transportation Systems Design

CE 468 - Traffic Engineering

CE 490 - Senior Design

ES 220 - Statics

**Research:** Transportation systems analysis; traffic signal controls; traffic engineering; traffic safety

**Yongming Liu**

Assistant Professor  
234 Rowley 268-2341  
PhD Structural Engineering, Vanderbilt University, 2006

**Teaches:**

CE 320 – Structural Analysis  
CE 522 – Structural Durability

**Research:** Stochastic fatigue damage modeling and multidisciplinary reliability

**Levon Minnetyan**

Professor  
226 Rowley 268-7741  
PhD Structural Mechanics, Duke University, 1974  
Registered Professional Engineer, New York State

**Teaches:**

CE 441 – Reinforced Concrete Design  
CE 442 – Steel Design  
CE 490 – Senior Design  
CE 538 – Finite Element Analysis

**Research:** Progressive fracture of composite structures

**Narayanan Neithalath**

Visiting Associate Professor  
PhD Civil Engineering, Purdue University, 2004

**Teaches:**

CE 553 – Properties and Performance of Concrete Materials  
ES 260 – Materials Science and Engineering I

**Research:** Concrete materials and microstructure

**Susan Powers**

Professor and Associate Director of the Institute for a Sustainable Environment  
102 Rowley 268-6542  
PhD Environmental Engineering, University of Michigan, 1992

**Teaches:**

CE212 – Introduction to Engineering Design  
CE 481 - Hazardous Waste Management Engineering  
CE 586 - Introduction to Industrial Ecology  
CE 681 - Environmental Physico-Chemical Processes

**Research:** Environmental physical-chemical processes, groundwater contaminant transport, pollution prevention

**Randy Pray**

Adjunct Instructor  
212 Rowley 268-6529

**Teaches:**

CE 407 – Construction Estimating and Scheduling

**Sulapha Peethamparan**

Assistant Professor  
236 Rowley 268-4435  
PhD Civil Engineering, Purdue University, 2007

**Teaches:**

CE320 – Structural Analysis  
CE 553 – Properties and Performance of Concrete Materials

**Research:** Concrete materials and geotechnical stabilization

**Shane Rogers**

Assistant Professor  
230 Rowley 268-6501  
PhD Environmental Engineering, Iowa State University, 2004

**Teaches:**

CE 340 – Introduction to Environmental Engineering  
CE 479 – Water and Wastewater Engineering

**Research:** Application of molecular microbial technologies to solve water quality challenges

**Hayley Shen**

Professor  
132 Rowley 268-6614  
PhD Fluid Mechanics & Thermal Science, Clarkson University, 1982  
PhD Applied Mathematics, University of Iowa, 1976

**Teaches:**

CE 554/ME 554 - Continuum Mechanics  
ES 330 - Fluid Mechanics

**Research:** Transport and flow of granular materials; two-phase flow, polar ocean physics

**Hung Tao Shen**

Professor and Associate Dean for Graduate Studies  
140B Rowley 268-6606  
PhD Mechanics & Hydraulics, University of Iowa, 1974

**Teaches:**

CE 572 – Shallow Water Hydrodynamics  
CE 576 - Hydraulic Engineering in Cold Regions

**Research:** Ice engineering, river hydraulics, transport processes in rivers and lakes

**Spencer Thew**

Adjunct Associate Professor  
136 Rowley 268-6507  
MS Civil Engineering, Clarkson University, 1972  
Registered Professional Engineer, New York State, Virginia, Vermont and New Hampshire  
Registered Land Surveyor, New York State

**Teaches:**

CE 405 - Construction Planning and Management  
CE 406 - Construction Engineering  
CE 411 - Construction Materials Engineering

**Brooks Washburn, AIA**

Adjunct Associate Professor  
212 Rowley 268-6529  
Master in Architecture II, Harvard Graduate School of Design, 1979

**Teaches:**

CE 448 – Introduction to Architectural Engineering

**Lifeng Wang**

Assistant Professor  
126 Rowley 268-1261  
PhD Engineering Mechanics, Tsinghua University, 2006

**Teaches:**

ES260 Materials Science Engineering

**Research:** Mechanical behaviors of polymer fibers, thin films, microframes/microtrusses, and composites; nanomechanics of biological materials and bio-inspired materials; mechanics of carbon nanotubes, graphite, and carbon nanotube composites.

**Poojitha Yapa**

Professor

130 Rowley 268-7980

PhD Fluid Mechanics & Thermal Science, Clarkson University, 1983

**Teaches:**

CE 301 – Geospatial Science and Applications

CE 572 – Shallow Water Hydrodynamics

CE 574 - Hydrodynamic Dispersion

ES 330 - Fluid Mechanics

**Research:** Oil and gas spills; Deepwater blowout modeling; Transport and fate of contaminants in rivers and groundwater; ice engineering

***Listing of Clarkson WWWeb Sites Referenced in Handbook***

---

<b>Campus Resource</b>	<b>Universal Resource Locator</b>
Clarkson University Home Page	<a href="http://www.clarkson.edu">http://www.clarkson.edu</a>
Clarkson University Campus Map	<a href="http://www.clarkson.edu/campusmap">http://www.clarkson.edu/campusmap</a>
Department of Civil and Environmental Engineering	<a href="http://www.clarkson.edu/cee">http://www.clarkson.edu/cee</a>
Undergraduate research experiences and opportunities at Clarkson	<a href="http://www.clarkson.edu/reu">http://www.clarkson.edu/reu</a>
Student Administrative Services Center	<a href="http://www.clarkson.edu/sas">http://www.clarkson.edu/sas</a>
Student Support Services Center	<a href="http://www.clarkson.edu/studentaffairs">http://www.clarkson.edu/studentaffairs</a>
Accommodative Services	<a href="http://www.clarkson.edu/oas">http://www.clarkson.edu/oas</a>
Course Register	<a href="http://www.clarkson.edu/sas/">http://www.clarkson.edu/sas/</a>
Student Phone Directory	<a href="http://www.clarkson.edu/directories/studentdir">http://www.clarkson.edu/directories/studentdir</a>

---