

# Clarkson



## Clarkson University Department of Civil and Environmental Engineering Undergraduate Student Handbook Class of 2024

September 2020 Printing

## Mission of the Department of Civil and Environmental Engineering

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

### *Objectives and Outcomes to Support the Department Mission*

#### Objective 1: Civil (Environmental) engineering graduates apply knowledge to meet the challenges of a successful professional career.

Outcomes to Ensure Achievement of Objective:

Civil Engineering	Environmental Engineering
1a) Students will have the ability to identify, formulate, and solve complex engineering problems through application of the principles of mathematics (including differential equations), calculus-based physics, chemistry, geospatial representation, applied statistics, and principles of civil engineering.	1a) Students will have the ability to apply knowledge of mathematics through differential equations, probability and statistics, calculus-based physics, chemistry (including stoichiometry, equilibrium, and kinetics), earth science, biological science, and fluid mechanics, formulate material and energy balances, and analyze the fate and transport of substances in and between air, water, and soil phases
1b) Students will be experienced in, and have the ability to develop and conduct appropriate experimentation, including laboratory experimentation, to measure multiple phenomena, analyze and interpret data, and use engineering judgement to draw conclusions.	
1c) Students will have the ability to apply engineering design to produce solutions that meet specified needs for <u>the public good</u> <sup>1</sup> .	
1d) Students will have the ability to apply learning strategies and modern engineering tools, to identify, formulate and design solutions for complex engineering problems.	
1e) Students will have basic proficiency in at least four of the recognized civil focus areas.	1e) Students will have basic proficiency in more than one environmental engineering focus area e.g. air, water, land or environmental health.
1f) Students will have an ability to think creatively, consider risks, make trade-offs, and use informed judgement for the public good while functioning as an individual or on a team to solve complex engineering problems and produce engineering designs.	

#### Objective 2: Civil (Environmental) engineering graduates exhibit good communication, teamwork, and leadership skills.

Outcomes to Ensure Achievement of Objective:

- 2a) Students will have the ability to organize effective and concise engineering reports and memos for a range of audiences.
- 2b) Students will have the ability to organize and deliver engineering work in formal oral presentations to a range of audiences.
- 2c) Students will have the ability to function effectively on diverse, multi-disciplinary teams, whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives towards engineering design solutions that meet specified needs with consideration of the public good.

#### Objective 3: Civil (Environmental) engineering graduates will become well-rounded citizens who rely on their engineering education to serve society with an understanding of their professional and ethical responsibilities.

Outcomes to Ensure Achievement of Objective:

- 3a) Students will have the ability to recognize and practice ethical, professional, and environmental responsibility in engineering problem solving, evaluation, and design based upon knowledge of the humanities and exposure to, and understanding of, environmental quality as well as the NSPE Code of Ethics for Professional Engineers.
- 3b) Students will have the ability to understand the impact of engineering solutions on, and make informed judgements that consider the public good.

#### Objective 4: Civil (Environmental) engineering graduates are expected to exhibit intellectual growth, continued innovation and commitment to life-long learning.

Outcomes to Ensure Achievement of Objective:

- 4a) Students will have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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<sup>1</sup> "The public good": In the practice of engineering consideration of public health, safety, and welfare, as well as global, national, cultural, social, environmental, and economic factors.

## Table of Contents

Mission of the Department of Civil and Environmental Engineering.....	2
Objectives and Outcomes to Support the Department Mission.....	2
Table of Contents.....	3
Welcome from the Chair.....	5
Orientation to the Civil and Environmental Engineering Department at Clarkson University.....	6
Being a Student at Clarkson and the CEE Department.....	6
Self-reliance.....	6
Professionalism.....	6
Code of Ethics.....	6
Advisors and Advising.....	7
Advisor - Student Relationship.....	7
What is the Advisor's Responsibility?.....	7
What is the Student's Responsibility?.....	7
Rules, Regulations and Important Information for all CEE Students.....	8
Clarkson Catalog.....	8
University Regulations.....	8
Courses and Course Descriptions.....	8
Minors and Concentrations.....	8
Fundamentals of Engineering and Professional Engineering Exam.....	8
Student Telephone Book.....	8
Civil and Environmental Engineering Undergraduate Core Curricula.....	9
Introduction.....	9
Curricular Objectives and Requirements - Civil Engineering and Environmental Engineering Majors.....	9
Bachelor of Science in Civil Engineering Curriculum.....	9
Bachelor of Science in Environmental Engineering Curriculum.....	10
Clarkson Common Experience Curriculum (CCEC).....	11
Written and Oral Communications in the Curriculum.....	11
Exceptions to Required Courses.....	12
Additional Mathematics Requirements.....	12
Professional Electives.....	12
Design Credits from Required Courses and Professional Electives.....	13
MP (Multidisciplinary Project) Courses.....	13
ROTC or AFROTC Professional Electives.....	14
Pass-No Entry Courses.....	14
Professional Experience.....	14
Civil and Environmental Engineering Transfer Students.....	16
Curriculum Requirements.....	16
Course Evaluations.....	16
Clarkson Common Curriculum (KA/UC).....	16
Coulter School of Engineering Requirements.....	17
Advisement and Coordination.....	18
Minors and Professional Concentrations for CEE Majors.....	19
Professional Concentration in Architectural Engineering (through class of 2020 only).....	19
Professional Concentration in Construction Engineering Management (through class of 2020).....	20
Professional Concentration in Construction Engineering Management (class of 2021 and beyond).....	21
Professional Concentration in Structural Engineering.....	22
Professional Concentration in Water Resources Engineering.....	23
Minor in Environmental Engineering.....	23
Minor in Architectural and Facilities Engineering (for Class of 2021 and beyond).....	25
How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major.....	26
Curricular Opportunities and Information for CEE Majors.....	28
Adirondack Semester.....	28
Double Majors.....	28
Dual Degree.....	28
Second Degree.....	29
Undergraduate Students in Graduate Courses.....	29
Engineering MBA-MS 4 + 1 Program.....	29
Other Curricular Matters.....	30
Student Academic Records.....	30
Changing Majors.....	30
Non-Transfer Student, Transfer Credit.....	30
Advanced Placement Credit.....	30
Cross-Registration within the Associated Colleges of the St. Lawrence Valley.....	30
Off-Campus Course Permission.....	30
Special Interests.....	31
Research Experience for Undergraduates (REU) Programs.....	31

Commencement .....	31
Graduate School .....	31
Cooperative Education Program .....	31
Semester Abroad.....	32
Summer Employment (Internships).....	32
<b>CEE Department Co-Curricular and Extra-Curricular Activities .....</b>	<b>33</b>
Societies and Activities.....	33
Professional Societies in CEE .....	33
Honor Societies .....	33
CEE Department Student Awards.....	34
Civil and Environmental Engineering SPEED Teams .....	34
Construction Engineering and Management Team.....	34
Concrete Canoe Team.....	35
Clarkson University Chapter of Engineers for International Sustainability .....	35
Environmental Remediation Team.....	35
Steel Bridge Team.....	35
Timber Bridge Team.....	35
Bridges to Prosperity.....	35
Other Extracurricular Activities.....	36
Phalanx: Clarkson's Highest Honor Society .....	36
<b>Clarkson University Support Services .....</b>	<b>37</b>
English as a Second Language Test.....	37
Career and Professional Development Center .....	37
Student Administrative Services Center (SAS) .....	37
Student Support Services.....	37
Accommodative Services .....	37
The Student Health and Counseling Center (SHAC).....	38
International Student Advising.....	38
The Writing Center.....	38
<b>Appendices.....</b>	<b>39</b>
Appendices Listing .....	39
Appendix A: Faculty of the Department of Civil and Environmental Engineering .....	40
The Faculty of the Department.....	40
Research Faculty .....	45
Emeritus Faculty .....	45
Appendix B: Listing of Clarkson Internet Sites Referenced in Handbook.....	47
Appendix C: Civil Engineering Curriculum Worksheet (through Class of 2020).....	49
Appendix D: Civil Engineering Curriculum Worksheet (Class of 2021 and thereafter).....	51
Appendix E: Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter).....	53
Appendix F: Environmental Engineering Curriculum Worksheet (Class of 2021 and thereafter).....	55
Appendix G: Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter) .....	57
Appendix H: Civil Engineering Curriculum Flowchart .....	59
Appendix I: Environmental Engineering Curriculum Flowchart .....	60
Appendix J: Civil and Environmental Engineering Hosted Minors.....	61
Appendix K: Clarkson University Common Experience Requirements Checklist (CivE and EnvE) .....	63
Appendix L: Professional Elective Approval Form.....	65
Appendix M: Design Credits Course Listing.....	67

## Welcome from the Chair

I am pleased to welcome you to the Department of Civil and Environmental Engineering at Clarkson. Civil and environmental engineers will have a major role in the near future in updating our civil and environmental infrastructure.

When you read through this Handbook, I encourage you to consider the possibilities offered by the Civil Engineering (CivE) and Environmental Engineering (EnvE) curricula to undergraduate students. Our department has highly ranked graduate programs in civil and environmental engineering. They offer a variety of advanced study opportunities, 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 CivE 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 engineering, or water resources engineering. Within the Civil Engineering degree program, you may choose to specialize in four different areas and pursue a focus (through either a minor or a professional concentration) in Architectural and Facilities Engineering, Construction Engineering Management, Environmental Engineering 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 Civil and Environmental Engineering (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 that most often involve students from CEE and from other departments. Together these students work as teams (including Concrete Canoe, Steel Bridge, Timber Bridge, Construction Management, Engineers for International Sustainability) to analyze a problem and then design and build a solution just like in engineering practice. 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 internet; 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 internet. Go to the URL--  
<https://www.clarkson.edu/research-experience-undergrads-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 is 315-268-6529/6517 (on campus x6529/x6517) and my email address is [jdempsey@clarkson.edu](mailto:jdempsey@clarkson.edu). I'd be pleased to hear from you anytime.

Sincerely yours,

*John Dempsey*

John Dempsey  
Professor and Chair  
Department of Civil and Environmental Engineering

## Orientation to the Civil and Environmental Engineering Department at Clarkson University

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

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 self-reliance. However, self-reliance does not mean 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. 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 you will be asked to evaluate each course and instructor. The course evaluation will be completed on-line. Your constructive comments regarding the course and the professor are taken seriously. In addition to your evaluations, there is a regular peer review of untenured faculty in our department. The review consists of evaluations by other faculty members 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 Undergraduate Regulations 2019-2020", which you can find on the internet by selecting "Undergraduate Regulations" at <https://www.clarkson.edu/student-administrative-services-sas/clarkson->

regulations. The Code of Ethics of the American Society of Civil Engineers may be found at <http://www.asce.org/code-of-ethics/>.

### ***Advisors and Advising***

The CEE Department has assigned each student an academic advisor. The advisor is a faculty member of the CEE Department. 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 CEE Department Chair or Executive Officer. 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, please contact them ahead of time to make an appointment to enable your advisor to be better 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 typically schedule appointments with you during the designated advising period in one of two ways: 1) through a sign-up sheet posted outside their office door the week prior or through an online meeting scheduling tool (often using the Google calendar appointment sign-up tool). 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 so you can enter the course selection meetings with your choices for classes pre-selected. Advising need not only happen during the designated advising week, and it is advantageous to schedule an appointment with your advisor early in the semester to start a dialogue about your future path. 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.

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.



## Rules, Regulations and Important Information for all CEE Students

### *Clarkson Catalog*

The University Catalog is the “rule book” for your curriculum and the “contract” between you and the university in regard to what it will take to earn your degree. The Catalog that is applicable to you is the one that is in place during the academic year at the time of your entry at Clarkson as an Undergraduate student. This document is available on line at <https://www.clarkson.edu/clarkson-catalog>.

### *University Regulations*

The regulations that you are expected to follow are in a publication of the College Regulations that you received electronically upon entering the University. Additional copies may be obtained from the Dean of Students Office, Price Hall; also, the Undergraduate Regulations may be viewed on the internet <https://www.clarkson.edu/student-administrative-services-sas/clarkson-regulations>.

### *Courses and Course Descriptions*

The most current listing of courses offered at Clarkson can be found online at <https://intranet.clarkson.edu/student-life/sas/classes-schedules/>.

### *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.

A list of minors and concentrations available can be found online (<https://www.clarkson.edu/academics/undergraduate-programs>). Further information on these concentrations can be obtained from the Deans of the respective schools.

See also the section “Minors and Professional Concentrations for CEE Majors” in this handbook for how to sign up and declare minors and/or professional concentrations, especially those that relate most closely to CivE and EnvE majors.

### *Fundamentals of Engineering and Professional Engineering 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 exam is administered by computer and is offered on campus each spring (in the months of April through early May). To help you prepare for the exam, Clarkson offers weekly review sessions over the months prior to the exam (CE499 is a 0 credit hour course you can take in the Spring Semester of your senior year for this purpose). 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 normally register for the FE Exam at least 6 months in advance online through the National Council of Examiners for Engineering and Surveying (NCEES); usually registration is due in October/November for the April/May exam. If you have any further questions, please go to the following link <https://intranet.clarkson.edu/academic/school-of-engineering/fundamentals-of-engineering-examination-f-e/> and/or contact the Department Executive Officer in Rowley 140.

### *Student Telephone Book*

You will not receive a physical telephone book. On-campus telephone numbers can found online at <https://intranet.clarkson.edu/directory/>.



## Civil and Environmental Engineering Undergraduate Core Curricula

### *Introduction*

Included in this section are the CEE curricular objectives and the requirements for degree completion as well as notes related to those particular degree programs. Information concerning elective options, professional concentrations, and the Clarkson Common Experience Curriculum. Additional information about other curricular options beyond the Civil Engineering (CivE) and/or Environmental Engineering (EnvE) majors such as dual degrees, a second degree and double majors are also discussed in this section.

### *Curricular Objectives and Requirements - Civil Engineering and Environmental Engineering Majors*

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

The graduation requirements of the Civil and Environmental Engineering Department are shown, by semester, on the curriculum sheets (see the appendices). 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 CivE and EnvE programs are accredited by The Accreditation Board for Engineering and Technology (ABET). Graduation from the accredited CivE and EnvE programs enables you to take the Fundamentals of Engineering (FE) and Professional Engineering (PE) Examinations, leading to a license to practice engineering throughout the USA, which is critical for your career in Civil or Environmental Engineering.

### *Bachelor of Science in Civil Engineering Curriculum*

Civil Engineering is a field of international need. “A civil engineer is a type of engineer that designs and builds public infrastructure projects—things like airports, bridges, buildings, canals, dams, landfills, levees, pipelines, roads, sewers, subways, tunnels, and water supply systems. Civil engineers work with the general public more than any other type of engineer—and affect our daily lives in almost everything they do. Civil engineering is the oldest and most diverse field of engineering. Thousands of years ago, ancient civil engineers built pyramids in Egypt, aqueducts in the Roman Empire, and the Great Wall of China—objects that still remain standing to this very day!

Since then, civil engineering has evolved into a specialized profession so there are many different types of civil engineers: Structural engineers design structures such as buildings and bridges to withstand forces from gravity, people, equipment, wind, and earthquakes. Geotechnical engineers evaluate rock and soil conditions to design tunnels, foundations, embankments, slopes, and excavations. Transportation engineers plan and design streets, highways, railroads, airports, canals, ports, and subways. They make sure transportation facilities can handle increased volumes of vehicles and passengers in the future. Environmental engineers help protect our health and safety by purifying drinking water, treating wastewater, and designing landfills for the disposal of solid waste. Water Resource engineers are responsible for the flow of water through canals, and aqueducts. They also design dams and levees that provide hydroelectric power, flood control, and reservoirs for water supply. Construction engineers develop schedules and cost estimates to complete projects on time and within budget and inspect the quality of constructed materials. They get to create the designs of architects and engineers!”<sup>2</sup>

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

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<sup>2</sup> ASCE Metropolitan Section, found at <http://www.ascemetsection.org/kids/what-is-civil-engineering>, accessed on 10 July 2017

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 also 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 in the section of this handbook, entitled “Professional Electives”. The CivE curriculum provides for eight (8) 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 CivE curriculum sheet applicable to the class year you entered Clarkson (see the appendices). By satisfying the courses shown in the "checklist" on the CivE curriculum sheet, a student can obtain a professional concentration in architectural engineering (through class of 2020 only), construction engineering management, water resources engineering, or structural engineering. Additionally, CivE students can select their professional electives to obtain a minor in environmental engineering and architectural & facilities engineering (starting in the Fall 2020 semester). Alternatively, some students utilize their professional electives to build as diverse of an educational base as possible as preferred by many employers. 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.

### ***Bachelor of Science in Environmental Engineering Curriculum***

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.

The core professional courses assure that all students are proficient in the core areas of environmental engineering. The EnvE curriculum also provides for six (6) 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. Courses acceptable as professional electives are listed in the section “Professional Electives”. At least three of these professional electives must be selected from engineering topics to satisfy accreditation requirements. Students who anticipate working as environmental engineers within an integrated civil and environmental engineering enterprise are recommended to take both ES222-Strength of Materials and CE310-Geotechnical Engineering I, which are essential for the design of landfills as well as a more quantitative understanding of groundwater and soil interactions.

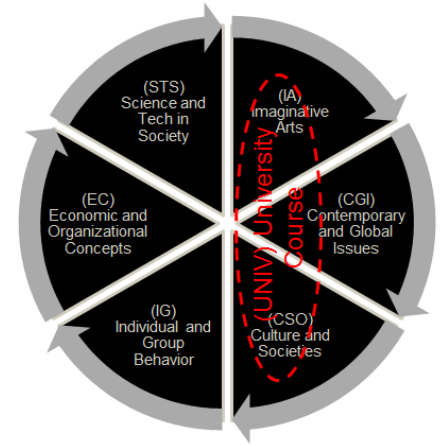
The core professional courses, thesis option, and the CivE and EnvE double major option are given at the bottom of the EnvE curriculum sheet applicable to the class year you entered Clarkson (see the appendices). CivE and EnvE double majors must meet the core requirements of both the EnvE and CivE curricula, regardless of the listing provided in the

“options” area on either curriculum sheet; tracking for double majors will be done on the provided double major curriculum sheet provided in the appendices. Suggested professional electives that meet varied career objectives are shown following the EnvE curriculum sheet applicable to the class year you entered Clarkson (see appendices). 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.

### ***Clarkson Common Experience Curriculum (CCEC)***

Each student must complete 6 courses (18 hours) in the required knowledge areas (KA). The 6 courses include UNIV 190 Clarkson Seminar and EC350 Economic Principles and Engineering Economics. University courses (UC) are interdisciplinary and cover at least two knowledge areas. The 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 <https://intranet.clarkson.edu/academic/common-experience/ce-knowledge-area-communication-point-and-technology-courses/> under “Comprehensive List”, “Master List of Knowledge Area, Communication, and Technology Courses.”

In addition to UNIV 190 Clarkson Seminar, students are required to take at least five courses that have Knowledge Area designators. At least one of these five courses must be a University course that has two Knowledge Area designators. At least four of the six Knowledge Areas must be covered.

Finally, students must take a Technology Course that addresses the theme of “technology serving humanity.” These courses are indicated by the TECH designator. This TECH designation is NOT the same as a course designated as STS. Most students accomplish this through ES110 Engineering & Society (on occasion transfer students may need to take a different course if they are not given credit for ES110 in their transfer evaluation).

Neither EC150 Microeconomics nor EC151 Macroeconomics should be taken as a KA elective by CivE or EnvE majors as it duplicates most of the material covered in EC350 Economic Principles/Engineering Economics.<sup>3</sup> Students who have transfer credit for EC150, or a similar introductory course that may be designated as EC2 (by virtue of transferring into CivE or EnvE or from another institution), may satisfy the EC350 graduation requirement by taking EC200 that rounds out their education in Economics Principles and the Engineering Economics portion of EC350 (typically 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 or by email at [cee@clarkson.edu](mailto:cee@clarkson.edu).

### ***Written and Oral Communications in the Curriculum***

The CEE faculty believes that your education is not complete without proper instruction in communication. Many of the Civil and Environmental Engineering courses integrate writing extensively as a part of the teaching processes rather than just allow it to be 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.

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.

<sup>3</sup> CEE students who take EC151 as a Knowledge Area elective, still need to take the full EC350 to satisfy their graduation requirements, and as a result are encouraged to NOT take EC151 as a Knowledge Area elective.

Currently CE212, CE310, CE320, CE330, CE380, and the Senior Design Courses each possess at least one communication point (C1). Additional communication points may be obtained from the KA and UC electives to complete the minimum six communication points before graduation. Students are required to write laboratory reports in each of CE310, CE320, CE330, and CE380 where the student's ability to communicate ideas and concepts clearly is assessed. The best reports are evaluated by the Undergraduate Committee for consideration for the CEE Writing Award that is presented annually at the University Recognition Day. Use of the Writing Center, located in Bertrand H. Snell Hall 139, is strongly encouraged to improve written communications prior to submission.

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

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

- a. Replace ES223 with EE324
- b. Replace ES340 with CH271
- c. Replace ES100 with CS141
- d. Replace CH210 with CM371
- e. Replace CE301 with SC301
- f. Replace CH220 with CE380 (and vice versa)
- g. Replace CE301 with SC301
- h. Replace CM241 with CM221
- i. Replace CH480 with CH220

Those participating in the Adirondack Semester during their Sophomore year (see also Curricular Opportunities and Information for CEE Majors below), will be able to use EV314 Integrated Design Project in place of CE212, noting that this only carries one credit of design, meaning that students will have to account for this in their taking of professional electives so as to accumulate the required 16.5 design credits needed to complete their degrees. Additionally, students in the following categories will be allowed to substitute a 400 level CE design course instead of CE212-Introduction to Engineering Design (see also Civil and Environmental Engineering Transfer Students below):

- who join the CivE or the EnvE major after the Fall semester of their Sophomore year by transferring to Clarkson,
- who join the CivE or the EnvE major by switching majors within Clarkson, or
- who for some other reason advance past the sophomore year without taking CE212 (an exception approved by their advisor and the department chair),

The substitute course cannot be used to satisfy any other graduation requirement and it must have at least 1.5 design credits as does CE212. Also, for students who have taken an different/alternative 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 CE212.

### ***Additional Mathematics Requirements***

The EnvE curriculum requires specifically STAT 383-Probability & Statistics, as does the CivE curriculum for the class of 2021 and beyond. Additional mathematics courses can be used as professional electives provided they have sufficient rigor as to require MA 132 (Calculus II) or MA 231 (Calculus III) or MA 232 (Differential Equations) as a prerequisite. See below for more on professional electives.

**Note: SB 284 Statistics or STAT 282-General Statistics may not be selected to satisfy either the additional mathematics requirement or a Professional Elective.**

### ***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 the 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" (in the appendices) 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 that are acceptable to be Professional Electives:

- (a) Any ES 2xx course.
- (b) Any three (3) credit (or greater) 3xx, 4xx, or 5xx course with the designator held within the Coulter School of Engineering, the Institute for a Sustainable Environment, the Honors Program (so long as the student completes the honors program), and/or the Departments of Mathematics, Physics, Biology, Chemistry, and Computer Science in the School of Arts and Sciences.
- (c) Select lower division courses from the above departments as indicated in this list or as indicated by the Department Chair: CM221, CM241 & 242, BY222 & BY224, BY240, EE261, CS141, MA200, MA211, MA215.
- (d) Any course that is distinctly named as required, without option, in either the Bachelor of Science in Civil or Environmental Engineering, as well as any similarly named course (optional or required) in any minor or professional concentration hosted in the CEE department.
- (e) A maximum of any three (3), three (3) credit hour (or greater) courses from the Reh School of Business.
- (f) Any one, three (3) credit (or greater) COMM course with communication points (C1 or C2).
- (g) Any one, three (3) credit (or greater), 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) Any two 4xx courses from one of the ROTC programs, for a maximum total of six (6) credit hours, if the student completes the ROTC program.
- (i) Any 4xx or higher Political Science Course.
- (j) Any ES or CE transfer course as designated during the transfer evaluation process.

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

### ***Design Credits from Required Courses and Professional Electives***

The CEE department requires that a total of 16.5 credit hours of design be taken through the CivE or EnvE curricula. For the CivE degree, through required courses (CE212; CE310; CE320; CE330; CE340; CE441 or CE442; and CE490 or CE491) you will have accumulated 11.5 design credits. Therefore, CivE 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 design credits. Therefore, an additional 9 design credits must be obtained from the Core Professional Courses and Professional Electives. A list of courses that carry design credits is provided in the appendices.

### ***MP (Multidisciplinary Project) Courses***

In order for a MP course to be considered for a Professional Elective, it should have the same rigor and course content as CE490 or CE491. 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/Capstone 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 the applicable ABET criteria as contained in CE490 or CE491. Those wishing to consider taking an alternate senior/capstone course should coordinate this with the Department Executive Officer who can provide the needed information about the ABET criteria.

To be considered a Professional Elective, an MP course must show that students perform a majority of the CivE or EnvE program ABET requirements. For this reason, students should request that the MP course instructor 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. This process will be facilitated by the Department Executive Officer. 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 CivE or EnvE majors.

In case of questions regarding the appropriateness of a course as a professional elective, you should contact your advisor, or, alternatively, the CEE Department Executive Officer in Rowley 140A or by email at [cee@clarkson.edu](mailto:cee@clarkson.edu).

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

Students who complete the Army or Air Force advanced ROTC program may, at their option, any two 4xx courses with the designator MS or AS for a maximum total of six (6) credit hours if the student completes the ROTC program. Participants in Army or Air Force ROTC Programs may wish to discuss how best to coordinate their studies with their military requirements with Professor Backus, a graduate of Clarkson CEE, Clarkson Army ROTC, and a retired Army Lieutenant Colonel.

### ***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). Three 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 applied 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.
3. Those students taking the pass-no entry option during the Spring 2020 semester as a result of the university policy in reaction to the sudden change to online learning during the COVID-19 pandemic.

### ***Professional Experience***

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. ES 499 Professional Experience for Engineering Majors, a 0 credit pass/no entry course is used to matriculate the Professional Experience requirement. Students will typically enroll in ES499 during the junior or senior years. There are three ways you may complete this requirement<sup>4</sup>:

1. Execute a research endeavor with a faculty member that spans at least a semester or a summer,
2. Execute an internship or co-op experience, or
3. Be a leader of a SPEED Team.

Leadership in a SPEED team means that you are an officer or captain of the SPEED team, not merely a member of the team. Research experiences may span more than a summer or semester, however, for it to count towards this requirement, it cannot also be taken as part of a course (e.g. CE495/496, ES443/444, HP390/490, etc.) simultaneously. Thus, for at least one summer/semester, research has to be conducted without course credit to count as your professional experience.

Internship and Co-op experiences must provide a professional experience that relates to the practice of engineering. What the specifics of the experiences that are permitted vary widely and generally seek to advance, in a practical and professional manner, your studies in your major. Certain activities, such as jobs in retail sales or in food service, do not meet this intent. Internship and Co-op experiences should generally be paid or unpaid full-time efforts lasting at least 8 to 12 weeks in duration (note, in New York State, engineering related internships are required by law to be paid positions).

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<sup>4</sup> Please note that for some concentrations or minors, this list is narrowed to one or two choices, please check with the program director or your advisor to ensure you know those requirements

Prior to you participating in an internship or coop experience, it is highly advantageous to have it approved through handshake (see below) prior to executing that experience.

The Career Development Center provides help and guidance for finding appropriate co-ops and internships. Often times it is prior to summer that this becomes most critical. Regardless of the choice made, you must document this experience as part of the following process and “pass” ES499.

### Step 1 – Handshake

The reporting of professional experience is done on online through Handshake. The steps you must follow are below.

- a. Log into Handshake (<http://clarkson.joinhandshake.com>).
- b. You can log on using your single sign-on information, that you would use for Peoplesoft or Moodle for example.
- c. Click "Career Center" in the top right corner, then "Experiences."
- d. Then on that page, still in the top right corner, select "Request an Experience."
- e. It will bring you to a form that you will need to fill out completely.
- f. Your adviser will receive the form to approve afterwards.

After submitting, you will receive an email confirming your submission and outlining the next steps.

**Co-op Students Only:** Your paperwork should include an Academic Plan form (located under the Career Center, Resources section, located at the bottom center of the page), which is completed through a meeting with your advisor. If you do not have all of this right away, you can always fill out as much information as possible, "save as draft", and then complete the paperwork at a later date. Your academic plan should be completed either prior to your going on co-op or, at the latest, just as you start your semester on co-op.

In regard to acceptance letters for internship or co-op experiences, an email is sufficient for this part of the requirement. Also, your internship or co-op experience should in some manner relate to the practice of Civil or Environmental Engineering. If you have questions about if that is the case, please contact your advisor or the Department office to ensure your experience will be acceptable.

### Step 2 – ES499 Enrollment

Once you have completed the above and submitted it for approval, as well as have completed your experience, you must enroll in ES499, section 2. To do this you will need to fill out the add/drop form on PeopleSoft SAS forms to have ES499 added to your transcript. Make sure you pick Section 2 when you add the course. At the end of the semester, the Department Executive Officer will validate you have completed the requirement and give you a pass for this course.

Failure to complete ES499 will prevent you from graduating, so make sure you get it completed well before your final semester.



## Civil and Environmental Engineering Transfer Students

### *Curriculum Requirements*

Transfer students must fulfill the same requirements as any other student in the Civil or Environmental Engineering programs. That said, there are some unique factors that are involved for students that may have begun their collegiate work at another institution. This section is intended to address those unique characteristics and may often supersede other information contained elsewhere in this handbook.

### Course Evaluations

Each transfer student to the University will receive a unique evaluation of their prior coursework at the post-secondary level. The Department Executive Officer or a senior faculty member in the CivE or the EnvE program that has strong familiarity with the program curricula, as well as knowledge about the numerous community college and other schools that typically feed into Clarkson, will conduct these evaluations. Because each evaluation is unique, there are often differences between individual evaluations, even if they originate from the same source program.

Critical to evaluations for either the CivE or the EnvE curriculum, is that the science and engineering science courses taken at the junior college level (or that are desired to be transferred in), must be calculus based. This is because Clarkson's degrees are accredited by ABET as Engineering programs (as opposed to Engineering Technology programs), requiring calculus based science and engineering courses. Thus, those seeking to transfer into either program are highly advised to ensure they are in a calculus based science curriculum.

### Clarkson Common Curriculum (KA/UC)

#### *KA/UC Course Options*

Typically, transfer students have fulfilled many, if not all, of their Knowledge Area/University course requirements. Credit, if at all possible, will be provided for UNIV190, The Clarkson Seminar, based upon coursework at the feeder institution. In the event that this is not the case, transfer students that hold the academic rank of Sophomore or higher will be allowed to take another University (UNIV) designated course of their choosing in lieu of UNIV190 and SHOULD NOT be enrolled in UNIV190 under any circumstances. Transfer students should work with their advisor or the Department Executive Officer in Rowley 140A in order to determine the right way to fulfill any remaining Knowledge Area/University course requirements.

#### *Economics Requirement*

Transfer students that come into the CivE or EnvE curriculum are encouraged to delay taking any Economics courses until they matriculate to Clarkson University. Clarkson's EC350 Economics Principles and the Engineering Economics course is a combination of what is typically executed in three separate courses at other institutions:

- Microeconomics
- Macroeconomics
- Engineering Economics

This course fulfills completely the ABET requirements for the study of Economics in an Engineering curriculum. Because one cannot receive credit for taking the same material twice, taking a portion of this course previously will require you to complete the rest of the course materials as an additional course during some semester at Clarkson, typically as an oversubscription. Thus, transfer students are encouraged to NOT take an Economics course until they reach Clarkson.

Students, however, who do opt to transfer into the CivE or EnvE after taking what transfers in as EC150, EC151, or a similar introductory course (that may be designated as EC 2) may satisfy the EC350 graduation requirement by taking EC200 that rounds out their education in Economics Principles and the Engineering Economics portion of EC350

(typically the last one-third of the semester). EC200 is a one (1) credit course.<sup>5</sup> For more information please see the CEE Executive Officer in Rowley 140A or at [cee@clarkson.edu](mailto:cee@clarkson.edu).

## Coulter School of Engineering Requirements

### *ES100 – Introduction to the Engineering Use of the Computer*

Often students transferring into the CivE or EnvE programs at Clarkson will have taken a course in the use of computers for the purpose of engineering or science. So long as that course provides some level of computer programming (regardless of programming language), that course will be accepted as a replacement for ES100, which is a 2 credit hour course at Clarkson (even if the incoming course is 3 credit hours, only 2 credit hours will be granted). That said, Clarkson currently uses MATLAB as the programming language for ES100. To that end, transfer students are responsible for self-educating in the use of MATLAB (tutorials are available through the Clarkson University learning management system, Moodle, using self-registration) for use in further coursework at Clarkson. If students have not had a course that includes computer programming, then they will be required to take ES100 and should do so as soon as possible after arriving at Clarkson.

### *ES110 – Engineering and Society*

This curriculum requirement in the Coulter School of Engineering is:

- an exploration of the role of the engineer in society,
- an exploration of the differing kinds of engineering disciplines and sub-disciplines,
- an exploration of the ethical standards that engineers are expected to uphold,
- how both science and technology shape society and/or how society can shape science and technology,
- and an introduction to engineering design broadly.

For this reason, this course fulfills both Knowledge Area course requirements and fulfills the common curriculum TECH requirement (meaning a study of technologies impact on society). This course is intended to be taken exclusively in the Freshman year and, therefore, is not appropriate for transfer students. Thus, transfer students that hold the academic rank of Sophomore or higher will be allowed to take another course in lieu of ES110 and generally SHOULD NOT be enrolled in ES110. Courses to be taken in lieu of ES110 must meet the following requirements (at a minimum):

- Have a TECH designation if not provided elsewhere in the curriculum (ES260 also provides this designation, thus students gaining credit for that course need not meet this requirement),
- Provide for a Knowledge Area designation of STS, to indicate it provides a study of science and technology, including their relationship to society, unless a student has already met the common curriculum Knowledge area/University course requirement otherwise,
- Provides one communication point, unless the student has already met the communication points requirements otherwise.

Some recommended courses for this purpose include:

- ES238
- BR200

### *Professional Experience*

As indicated elsewhere in this handbook, as part of the CivE and EnvE curriculum you must have a professional experience. That experience can precede your enrollment at Clarkson, but must have occurred while you were a fulltime post-secondary student and relate to the practice of Civil or Environmental Engineering. Follow the instructions for recording your professional experience as indicated in that section of this handbook, but ensure you indicate this occurred while enrolled at your former institution.

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<sup>5</sup> CEE students who take EC151 as a Knowledge Area elective, still need to take the full EC350 to satisfy their graduation requirements, and as a result are encouraged to NOT take EC151 as a Knowledge Area elective.

### ***Advisement and Coordination***

Every student in the CEE Department receives a faculty advisor, this is no different for transfer students. Incoming transfer students will normally be assigned to the CEE Executive Officer (XO) and/or a senior faculty member (who is aligned with the cohort for graduation of the incoming transfer student), accounting for their unique course sequence requirements. Transfer students should plan to meet with their advisor before classes start as part of orientation activities.

## Minors and Professional Concentrations for CEE Majors

By selection of a specific set of elective courses, CEE students can formally declare 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 CivE 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 Chair of the Civil and Environmental Engineering is awarded noting completion of the concentration. The Environmental Engineering concentration for CivE majors is different than the EnvE major in that the Environmental Engineering concentration within the CivE 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 internet site, or contact the Dean of the School or the Chair of the Department offering the concentration or minor.

**To declare a minor or professional concentration, go to PeopleSoft and follow the instructions indicated in “Concentration, Minor, Dual Major, Dual/Second Degree, or another Major”, below.**

### *Professional Concentration in Architectural Engineering (through class of 2020 only)*

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. This concentration is no longer available to the class of 2021 and after. Those in those class years should enroll in the Architectural & Facilities Engineering Minor (see below).

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

**\*\*Unlike the other concentrations, the Architectural Concentration does not get noted on your transcript, but you will receive a certificate when you complete your degree.**

COURSES	CREDIT	PREREQUISITE
CE448 Introduction to Architectural Engineering	3	ES220, CE212
CE415/515 Foundations, Stability and Retaining Structures	3	CE310
CE441 Reinforced Concrete Design	3	CE320
CE442 Steel Design	3	CE320
CE492 Senior (Building, Architectural) Design	3	CE448, CE441, CE442, CE415, CE445 or CE446 or co-requisite
<b><i>Choose at least THREE of the following courses:</i></b>	<b>9</b>	
CE305 Construction Management	3	JR or SR
CE408 Building Information Modeling & Integrated Proj. Deliv.	3	JR. or SR
CE411 Construction Materials Engineering	3	CE320 & CE441 (cor.)
CE409 Fundamentals of Building Systems	3	JR or SR
CE410 Sustainable Infrastructure and Building	3	JR or SR
CE420/520 Advanced Structural Analysis	3	CE320
CE421/521 Composite Mechanics and Design	3	ES222 & ES260
CE444/544 Advanced Concrete Design	3	CE441 & 420/520
CE453/553 Properties & Performance of Concrete Materials	3	ES260
CE455/555 Structural Damage Assessment, Repair, and Strgh.	3	ES222
CE457/557 Environ. Degradation of Concrete Structures	3	CE411/CE441/CE453
ME310 Thermodynamic System Engineering	3	ES340
ME411 Introduction to Heat Transfer	3	ES330, ES340, MA232
CE486/586 Intro to Industrial Ecology	3	CE340 or CH250
EHS406 Industrial Hygiene Control Methods	3	EHS309 or consent of instructor
<i>Or other course as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>24</b>	

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 Associate Dean of the Coulter School of Engineering approves an exception.

***Professional Concentration in Construction Engineering Management (through class of 2020)***

The professional concentration in Construction Engineering Management is available to civil engineering students to focus their electives on 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).

<b>COURSES</b>	<b>CREDIT</b>	<b>PREREQUISITE</b>
CE411 Construction Materials Engineering	3	CE441
CE415/515 Foundations, Stability and Retaining Structures	3	CE310
CE441 Reinforced Concrete Design	3	CE320
CE442 Steel Design	3	CE320
<b><i>Choose at least TWO of the following courses:</i></b>	<b>6</b>	
CE305 Construction Management	3	JR or SR
CE406 Construction Engineering	3	JR or SR
CE407 Introduction to Construction Estimating and Scheduling	3	JR or SR
CE408 Building Information Modeling & Integrated Proj. Deliv.	3	JR or SR
CE409 Fundamentals Of Building Systems	3	JR or SR
CE410/510 Sustainable Infrastructure & Building	3	JR or SR
CE445 Timber Design	3	CE441 or CE442
CE446 Reinforced Masonry Design	3	CE441 or CE442
CE453/553 Properties & Performance of Concrete Materials	3	ES260
CE461 Transportation Systems Design	3	JR
<b><i>Choose at least TWO of the following non-CE courses:</i></b>	<b>6</b>	
COMM417 Business & Professional Speaking	3	
OS466 Negotiations and Relationship Management	3	OS286 & JR
EM/OM480 Project Management	3	
EM/OM 351 Quality Management & Lean Enterprise	3	
LW270 Law & Society I	3	SOPHOMORE standing at least
LW466 Law of the Workplace	3	LW270 or consent of instructor
FN361 Financial Management	3	Stat282/383, or MA330, EC150 or EC350, AC203 or AC/EM205, sophomore standing or consent of instructor
EHS330 Safety Analysis	3	
<i>Or other course as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>24</b>	

In addition to the required courses, as part of the professional experience requirement, students must execute the internship option, unless prior approval is granted by the Director of CEM. A minimum grade point average of 2.0 is required in the courses taken for the concentration (with at least 25% of the credit hours taken at Clarkson University unless approved by the Dean).

***Professional Concentration in Construction Engineering Management (class of 2021 and beyond)***

The professional concentration in Construction Engineering Management is available to civil engineering students to focus their electives on 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).

<b>COURSES</b>	<b>CREDIT</b>	<b>CO/PREREQUISITE</b>
CE411 Construction Materials Engineering	3	CE441
CE415/515 Foundations, Stability and Retaining Structures	3	CE310
CE441 Reinforced Concrete Design	3	CE320
CE442 Steel Design	3	CE320
<b><i>Choose ONE of the following non-CE courses</i></b>	<b>3</b>	
OS286 Organizational Behavior	3	SOPHOMORE or Consent of Instructor
EHS330 Safety Analysis	3	
LW 270 Law & Society 1	3	SOPHOMORE Standing at least
FN361 Financial Management	3	Stat282/383, or MA330, EC150 or EC350, AC203 or AC/EM205, sophomore standing or consent of instructor
EM/OM380 Project Management**	3	STAT282, STAT383, or MA232 or MA330. Enrollment is limited to students in CUSB, CivE-Construction Engineering Management Concentration, Software Engineering or consent of the instructor.
LW466 Law of the Workplace	3	LW270 or Consent of Instructor
EM/OM451 Quality Management & Lean Enterprise	3	STAT282 or STAT383 or MA330 or consent of instructor
COMM217/417 Speaking	3	
** Must have declared the CEM concentration to gain entrance into this course. EM/OM380 is the preferred course in this group. Students are encouraged to take additional courses from this group using their KA/UC electives and to acquire required communication credits		
<b><i>Completion of ONE of the following TRACKS by completing at least two courses in the track:</i></b>	<b>6</b>	
Construction/Infrastructure Track:		
CE315 Geology for Engineers	3	CM 131 and PH 131 Corequisite: CM 132
CE406 Construction Engineering	3	JR or SR
CE453/553 Properties & Performance of Concrete Materials	3	ES260
CE407 Introduction to Construction Estimating and Scheduling	3	JR or SR
CE408 Building Information Modeling & Integrated Proj. Deliv.	3	JR or SR
CE410/510 Sustainable Infrastructure and Building	3	JR or SR
Architectural Engineering/Building Construction Track:		
CE409 Fundamentals of Building Systems	3	JR or SR
CE448 Introduction to Architectural Engineering	3	ES220 and CE212, or consent of instructor.
CE407 Introduction to Construction Estimating and Scheduling	3	JR or SR
CE408 Building Information Modeling & Integrated Proj. Deliv.	3	JR or SR
CE410/510 Sustainable Infrastructure and Building	3	JR or SR
<i>Or other course(s) as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>21</b>	

### ***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 CivE 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.

<b>COURSES</b>	<b>CREDIT</b>	<b>PREREQUISITE</b>
CE420/520 Computational Methods of Structural Analysis	3	CE320 with minimum grade of C
CE415/515 Foundations, Stability and Retaining Structures	3	CE310
CE441 Reinforced Concrete Design	3	CE320 (co-requisite)
CE442 Steel Design	3	CE320
CE490 or CE492 Senior Design	3	CE310 & CE441 or CE442
<b><i>Choose at least TWO of the following courses:</i></b>	<b>6</b>	
CE408 BIM & IPD	3	CEE Junior or Senior Standing
CE411 Construction Materials Engineering	3	CE320 & CE441 (cor.)
CE421/521 Composite Mechanics and Design	3	ES222 & ES260
CE538 Finite Element Methods	3	ES222, ES330, MA 232
CE444/544 Advanced Concrete Design	3	CE441 & 420/520
CE453/553 Properties & Performance of Concrete Materials	3	ES260
CE455/555 Structural Damage Assessment, Repair, and Strgh.	3	ES222
CE457/557 Environ. Degradation of Concrete Structures	3	CE411/CE441/CE453
ME444 Computer Aided Engineering	3	ES100, MA231
CE512 Structural Dynamics	3	
<i>Or other course as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>21</b>	

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 Water Resources Engineering***

A professional concentration in Water Resource Engineering is available to undergraduate students who are planning a career in hydraulics, open channel flow, water treatment, or hydrology. The professional concentration allows students to satisfy the accreditation requirements in civil engineering while pursuing a course of study in water resources engineering. Students receive a Bachelor of Science degree in CivE with a certificate of professional concentration in Water Resources Engineering.

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

<b>COURSES</b>	<b>CREDIT</b>	<b>PREREQUISITE</b>
CE430 Water Resources Engineering II	3	CE330
CE470 Stream Riparian System and Fluvial Morphology	3	CE330 or CE340; or permission of the instructor.
CE479 Water and Wastewater Treatment Processes	3	ES330, CE340, or consent of the instructor.
CE490/1 Senior Design with a Water Resources focus	3	SR, Corequisites: CE310, and either CE441 or CE442 (or consent of the instructor)
<b>Choose at least TWO of the following courses:</b>	<b>6</b>	
CE315 Geology for Engineers	3	CM 131 and PH 131 Corequisite: CM 132
CE340 Introduction to Environmental Engineering	3	MA131 and CM104 or CM132. Corequisite: MA232.
CE380 Fundamentals of Environmental Engineering	3	CH210 or consent of instructor
CE434 Sustainable Development Engineering	3	CE340 or consent of the instructor.
CE435 Groundwater Hydrology & Geochemistry	3	CM132 (or CM104/106), and MA131, and (or EV/BY280)
CE478 Solid Waste Management & Landfill Design	3	JR or SR
CE481/581 Hazardous Waste Management	3	CE340 or Corequisite: CE340.
CE482/582 Environmental Systems Analysis & Design	3	CE340 or CE579 or equivalent course, EC350, or consent of the instructor.
<b>Choose at least ONE of the following courses:</b>	<b>3</b>	
BY/EV330 Great Lakes Water Protection		Sophomore standing at least
BY431 Limnology		BY222 or CM132 or consent of the instructor. Corequisite: BY 432
ES436 Global Climate Change: Science, Engineering & Policy		
COMM428 Environmental Communication		
EV305 Sustainability & the Environment		
POL/SOC470 Environmental Policy		
<i>Or other course as designated by CEE Department Chair</i>		
<b>TOTAL CREDITS FOR CONCENTRATION</b>	<b>21</b>	

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.

### ***Minor in Environmental Engineering***

A Minor in Environmental Engineering is available to all Clarkson undergraduate students. The Environmental Engineering Minor 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 Minor 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 Minor in Environmental Engineering.

A total of 18-22 credits are required for this minor, depending on the specific courses taken. A student must complete the course requirements as follows:

COURSES	CREDIT	PREREQUISITE
<b>Core required courses (2):</b>	<b>6</b>	
<i>Complete ONE of:</i>		
CE340 Introduction to Environmental Engineering	3	CM132 or CM104, MA232 (co-req)
CE380 Fundamentals of Environmental Engineering	3	CH210 or instructor consent
CH220 Materials Balances	3	CM132, MA132, PH131, CH210 or CM371 (Co-req)
<i>Complete ONE of:</i>		
Capstone Design with specific environmental focus (e.g., CE490/1/2. MP401, AE451, CH420, EE412, EM456, ME446)	3	Senior standing in degree program or instructor consent
Environmentally-related research (e.g., CE495, CE496, ES443/4/5/6/7)	3	Instructor consent
<b>Complete ONE of these chemical principle courses:</b>	<b>3</b>	
CH210 Chemical Engineering Principles	3	CM104 or CM132, MA132, PH131
CH221 Spectroscopy	3	CM104 or CM132
CM241 Organic Chemistry I	3	CM104 or CM132
CM371 Physical Chemistry I	3	CM104 or CM132, MA132, PH132 (co-req)
<b>Complete ONE of these biological principles courses:</b>	<b>3-5</b>	
BY214 Genetics	3	BY160 or instructor consent
BY222 Ecology & BY224 Ecology Laboratory	3/2	BY140 (note: BY222 and BY224 are co-reqs.)
BY320 Microbiology	3	Waived for ENVE students
BY330/EV330 Great Lakes Water Protection	3	Sophomore standing
<b>Complete TWO of the following courses*:</b>	<b>6-8</b>	
<i>Note: at least ONE course must be a core professional elective</i>		
<i>Core Professional Electives (minimum ONE required):</i>		
ES432 Risk Analysis	3	CM131 or CM103
CE479 Water and Wastewater Treatment Processes	3	CE340, ES330 or instructor consent
CE481 Hazardous Waste Management Engineering	3	CE340 (co-req)
CE482 Environmental Systems Analysis and Design	3	CE340 or CE479, EC350, or instr. consent
CE486 Industrial Ecology	3	CE340, CH220, ES330, ES340, CH301, CH271 or consent of the instructor
<i>Other Professional Electives:</i>		
BY314 Bioinformatics	3	BY160 and BY214
BY328 Conservation Biology	3	BY222 or instructor consent
BY412 Molecular Biology Laboratory	3	BY214 or instructor consent
BY425 Biological Systems & Environmental Change	3	BY222
BY431 Limnology & BY432 Limnology Laboratory	3/2	BY222 or CM132 or instructor consent ( <b>note:</b> BY431 and BY432 are co-reqs.)
BY486 Molecular Biotechnology	3	BY160 and BY214 or instructor consent
CE430 Water Resources Engineering II	3	CE330
CE434 Sustainable Development Engineering	3	CE340 or consent of the instructor
CE435 Groundwater Hydrology & Geochemistry	3	CM132, MA132, CE340
CE477 Atmospheric Chemistry	3	CM370 or CM371 or ES340
CE478 Solid Waste Management and Landfill Design	3	Junior or senior standing
CH434/ES434 Air Pollution Control	3	CM131 or CM103 & junior standing
ES436 Global Climate Change: Science, Engineering & Policy	3	Quantitative and modeling skills (MATLAB, Excel) are required, statistics is recommended
EHS406 Industrial Hygiene Control Methods, OR	3	EHS309 or instructor consent
EHS416 Principles of Occupational Health	3	EHS309 or instructor consent
EV314 Adirondack Integrated Research Project	3	Instructor consent
<b>TOTAL CREDITS FOR THE MINOR</b>	<b>18-22</b>	

\* Substitutions made upon approval of the department chair

A minimum grade-point average of 2.0 is required in the courses taken for the minor. At least one quarter of the total credit hours required must be completed at Clarkson, unless the Dean of the Coulter School of Engineering approves the exception.

***Minor in Architectural and Facilities Engineering (for Class of 2021 and beyond)***

The following describes the requirements for a Minor in Architectural and Facilities Engineering.

In order to gain the specific domain knowledge in the area of Architectural and Facilities Engineering, students must complete the following four (4) core technical courses (substitutions may be granted with the approval of the CEE Department Chair):

Courses	Rational
CE305 (Construction Planning and Management); Pre-req: Soph/Jr/Sr Status; offered Spring Semesters	Providing domain knowledge in the area of Construction Management
CE408 (Building Information Modeling/Integrated Project Delivery); Pre-req: Jr/Sr Status; offered All Semesters	Providing domain knowledge in integrated systems and technical coordination/design documentation
CE409 (Fundamentals of Building Systems), Pre-req: Jr/Sr Status; offered Spring Semesters	Providing domain knowledge in passive design, mechanical, electrical, plumbing systems in buildings/facilities
CE448 (Introduction to Architectural Engineering); Pre-Req: ES220 & CE212, or consent; offered Fall Semesters	Providing domain knowledge background in architecture

Credit Hours: 12

Additionally, in order to further explore in further depth the various areas of Architectural and Facilities Engineering; students must take two (2) more courses within the following list of courses (or others as designated and/or approved by the CEE Department Chair or designee):

- CE407 (Introduction to Scheduling and Estimating) - Construction
- CE410/510 (Sustainable Infrastructure and Building) - Sustainability
- CE411 (Construction Materials Engineering) – Construction/Materials
- CE415/515 (Foundations and Retaining Structures) - Building Structural Design
- CE441 (Reinforced Concrete Design) or CE442 (Steel Design) – Building Structural Design
- ME310 (Thermodynamic Systems Engineering) – Thermal Design
- ME411 (Introduction to Heat Transfer) – Thermal Flow
- ME444 (Computer Aided Engineering) – Design Documentation
- EE221 (Linear Circuits) – Electrical Engineering
- EE331 (Energy Conversion) – Electro-Mechanical Engineering
- EE333 (Power System Engineering) – Power Engineering
- EE/ME450 (Control Systems) – Building Automation
- EHS330 – Safety Analysis – Environment, Health, and Safety Assessment – Safety/IEQ
- ES238 (Introduction to Energy Systems) - Energy
- EV305 (Sustainability and the Environment) - Sustainability

Credit Hours: 6

Further, in order to execute the necessary data processing and analytics involved within the field of Architectural and Facilities Engineering, students are required take as their last math course (beyond Calculus 1, 2, and 3 and Differential Equations) one (1) of the following courses:

- DS241 (Introduction to Data Science),
- MA330 (Advanced Engineering Math),
- STAT383 (Probability and Statistics), or
- STAT389 (Probability and Statistics with Multivariate Analysis).

Next, in order to have the needed cultural, management and other related skills for operating in the field of Architectural and Facilities Engineering, students are required to take the following:

- A course in art history, architectural history, art appreciation, applied art, or related study (as a knowledge area/university course).
- One (1) of the following courses: EM/OM380 (Project Management), FN361 (Financial Management), OS286 (Organizational Behavior 1), and LW270 (Law and Society 1). Two of these can be taken as Clarkson Common Curriculum, Knowledge Area courses (OS286 carries IG and EM/OM380 carries EC).

Finally, in order to round out the minor, the senior design/capstone experience (CE490/491, ME446, EE412, EM456, or equivalent) must have an Architectural and/or Facilities focus). Students are encouraged to seek out multi-disciplinary/inter-disciplinary capstone options (inclusive of courses related to Clarkson Ignite President’s Challenge) for this purpose.

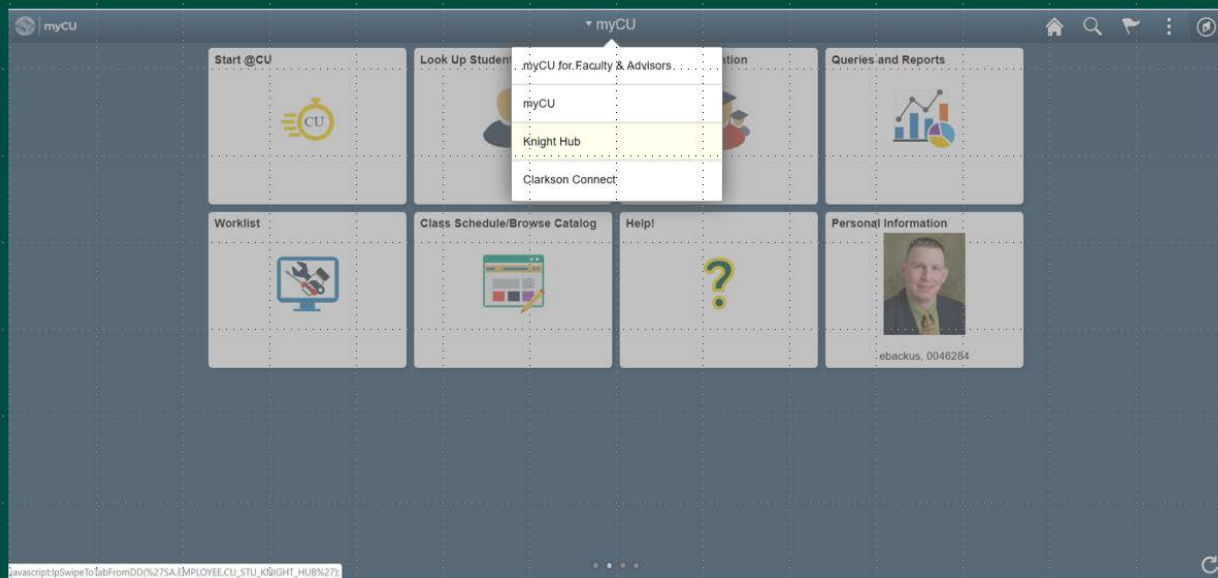
The minor requires a student to take eighteen (18) credit hours of coursework that will fit within the free, professional, or other electives for their respective engineering curriculum. The required Math elective choice indicated would fulfill the already established requirement within every ABET accredited degree program. The required nine (9) credit hours in management and cultural awareness can be easily facilitated through careful selection of Clarkson Common Curriculum, Knowledge Area courses.

***How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major***

To declare a minor or professional concentration (with the exception of the Architectural Engineering Concentration), go to PeopleSoft and follow the instructions below. If this does not work, contact the CEE department at [cee@clarkson.edu](mailto:cee@clarkson.edu) for help. The following is a graphic walk-through of the online PeopleSoft form:



# Select Knight Hub from the top of the screen



# Select Forms for Students



Then go to the applicable form listed on the left of that page:

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• Undergraduate Change of Major Form</li><li>• Undergraduate Concentration Declaration Form</li><li>• Undergraduate Double Major Form</li></ul> | <ul style="list-style-type: none"><li>• Undergraduate Minor Declaration Form</li><li>• Undergraduate Second Degree Form</li></ul> |
|---|---|

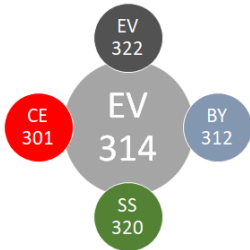
## Curricular Opportunities and Information for CEE Majors

### *Adirondack Semester*

Offered variably in both spring and fall semesters, a small group of up to 12 students will be in session with a diverse group of Clarkson faculty with specific interests, experience and scholarly work directly related to the Adirondack Park. The mission of the Adirondack Semester is to deliver a dynamic blend of traditional and experiential education in an intimate and community-based learning environment. Students strive to answer broad questions concerning the relationship of social, economic and environmental impacts of the Adirondack Park. Students are absorbed in interdisciplinary courses in the natural and social sciences and emerge with critical thinking and collaborative skills that prepare them to analyze complex problems and provide solutions related to environmental, social, and economic sustainability.

Faculty from Chemistry, Biology, Environmental Science, Engineering, Political Science, Philosophy, Literature and Business use the Adirondack base and professional network to provide students a direct experience with the people and agencies that shape policy, conduct business, and lobby at local and state levels. Students are engaged in conversations in the classroom with their peers, professors and guest lecturers, in the community with local citizens, and while conducting scientific research in the field.

The semester consists of five 3-credit courses providing the student with fifteen 300 level credits. One semester typically offers 2 University courses, 4 varied Knowledge Areas, 4 Communication Points, and 1 Design Credit for Civil and Environmental Engineering students. Presently the semester includes the following courses, which relate to the Civil and Environmental Engineering Curriculums in the corresponding ways:



ADK Semester Course	Civil Engineering	Environmental Engineering
CE301 GIS	CE301 Requirement	CE301 Requirement
EV/BY312 ADK Ecology & Env. Science	Prof. Elective, C-1	Prof. Elective or Earth Science Elective, C-1
EV322 ADK Sense of Place	KA/UC: UNIV/CSO/IA, C-1	KA/UC: UNIV/CSO/IA, C-1
EV/SS320 Social and Political Issues in the ADK	KA/UC: UNIV/EC/CSO, C-1	KA/UC: UNIV/EC/CSO, C-1
EV314 Integrated Research Project	ADK as Soph.: CE212 ADK as Jr./Sr.: Prof. Elective Either case, 1 credit of design, 1 comm. point	ADK as Soph.: CE212 ADK as Jr./Sr.: Prof. Elective Either case, 1 credit of design, 1 comm. point

For more information on course contents and registering for the Adirondack Semester, visit the website at <https://www.clarkson.edu/adirondack-semester>.

### *Double Majors*

You may decide to pursue two majors while at Clarkson. For example, by selecting a very strict set of courses and taking two extra classes you can satisfy the requirements of both CivE and EnvE majors within 126 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, that is found on myCU, using the procedure indicated above, under “How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major”, must be completed to establish your double major. A double major degree requires completion of all requirements for both programs (as indicated in their respective curriculum sheets (see the Appendicies) prior to graduation. In general, the double major option is **NOT** recommended, as it renders the required curriculum very rigid and does not allow the student flexibility in course selection.

### *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 found on myCU, using the procedure indicated above under “How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major”.

### ***Second Degree***

Some students may desire obtaining two degrees in fields of study that are not similar or aligned to one another. For example a degree in Civil Engineering and a degree in History. This is possible at Clarkson through the pursuit of a Second Degree. A second degree means that you could receive two degrees, most likely, 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 use the form that is found on myCU, using the procedure indicated above under “How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major”.

### ***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 all of the following:

- 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 all of the following:

- 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 CEE Departmental Office, 140 Rowley or [cee@clarkson.edu](mailto:cee@clarkson.edu).

### ***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.



## **Other Curricular Matters**

### ***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 applying to change your major on Peoplesoft. Alternately signing an "Undergraduate Change of Major" form prepared by that Department, along with the approval of the Executive Officer of the Department to which the student is requesting admittance. You are encouraged to apply to change your major on Peoplesoft after communicating with the Faculty of your new major. There is no need to notify the Department you are leaving as they will be informed by SAS, but it is always good courtesy to do so. 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. The form for changing your major is found on myCU, using the procedure indicated above, under "How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major".

### ***Non-Transfer Student, Transfer Credit***

Transfer credit from another college or university or by AP exam credits is handled by Student Administrative Services (SAS) Center, Graham Hall. Questions regarding transfer credits earned before enrolling at Clarkson should be directed to the CEE Executive Officer. 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 (SAS) Center, please see the information at this link for more information: <https://www.clarkson.edu/student-administrative-services-sas/ap-credit-transfer-information-new-students>.

### **Cross-Registration within the Associated Colleges of the St. Lawrence Valley**

Clarkson is a member of the Associated Colleges of the St. Lawrence Valley. As such, Clarkson has joined with SUNY Potsdam, St. Lawrence University, and SUNY Canton in a program allowing a student to take up to two courses per year at the other institutions of the Associated Colleges. Clarkson students typically use this opportunity to take language, art, education, or music courses not offered here. The Cross Registration Form for this program is available at the Student Administrative Services (SAS). This form can be found on the SAS intranet forms page at this link: <https://intranet.clarkson.edu/student-life/sas/forms/>.

### **Off-Campus Course Permission**

After enrolling at Clarkson, students may desire to take classes at another institution other than through the Associated Colleges to fulfill course requirements at Clarkson. While there are limitations on the quantity of courses that may be taken this way, this is perfectly acceptable, so long as the course is approved for transfer into Clarkson and you receive a "C" or better in the course taken elsewhere. Students seeking to take courses away from Clarkson while still matriculated, should visit the CEE Office and obtain information about the "Off Campus Course Permission Form". Before taking a course at another university, the Off-Campus Course Work Permission form must be completed. This involves signatures by the student, the course department chair, and the major advisor/department chair/program director (and in rare occasions, the Dean of Engineering may be required to sign). Failure to get prior approval through this process may

prevent the course from transferring into Clarkson and/or prevent it from meeting curricular requirements. It is highly advantageous that students obtain off-campus PRIOR to taking courses elsewhere, for those reasons.

### ***Special Interests***

Undergraduate students may participate in research projects with department faculty members, earning academic credit (CE495 or CE496) 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 scheduled class activities. Both undergraduate research and directed study feature valuable one-on-one interactions with faculty members.

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

Currently a program funded by the National Science Foundation provides 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 <http://internal.clarkson.edu/reu/>.

### ***Commencement***

Any student who is within six (6) credit hours of meeting the BSCE or BSEnvE 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.

### ***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 Rowley 140. Within that handbook, you will find detailed information on the following advanced degree programs:

- Master of Science in Civil and Environmental Engineering
- Doctor of Philosophy in Civil and Environmental Engineering

CEE also offers a non-thesis Master of Science in Civil and Environmental Engineering. Assistantships are not available for this degree but the degree can be completed in twelve (12) to eighteen (18) months for full-time students.

Note that if you take additional credits at the 500 or 600 levels beyond the undergraduate degree requirements, so long as they are all taken at Clarkson, an unlimited number of credits can be transferred upon admission to the graduate degree program.

### ***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: <https://www.clarkson.edu/career>.

### ***Semester Abroad***

Let Clarkson be your launching point for a life-changing global experience. We have formal study abroad exchange agreements with numerous colleges and universities in multiple countries. Spend a full academic year or semester living and learning in a stimulating and challenging new environment. Wherever you go, you will return to Clarkson with an enlightened new perspective on yourself and your world. Clarkson makes it easy to study abroad and still earn credit toward graduation. We encourage you to start your study abroad research early. Visit the Career Center and let us help you find the programs that best match your interests and career goals. Further information can be found at the following link: <https://www.clarkson.edu/international-center/study>.

### ***Summer Employment (Internships)***

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.

## CEE Department Co-Curricular and Extra-Curricular Activities

### *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, 127 Student Center or contact the presidents of the organizations (found through Knightlife: <https://knightlife.clarkson.edu>).

### 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.

Organization Name	Faculty Advisor
Clarkson Construction Club/Associated General Contractors (AGC)/CEM Program Activities	Professor Erik Backus
American Society of Civil Eng. (ASCE)	Professor Steve Wojtkiewicz
New York Water Environment Assoc. (NYWEA)	Professor Stefan Grimberg
Engineers for International Sustainability (formerly Engineers Without Borders; EWB)	Professor Shane Rogers
Society of Women Engineers (SWE)	Professor Jan DeWaters
Bridges to Prosperity/Timber Bridge	Professor Erik Backus

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 Knightlife) 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.

### 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:

Organization Name	Faculty Advisor
Chi Epsilon (Civil Eng.)	Professor Tyler Smith
Tau Chi Alpha (Env. Eng.)	Professor Stefan Grimberg
Tau Beta Pi (All Engineering)	Professor Sitaraman Krishnan
Phi Kappa Phi (All Engineering)	Professor Richard McCluskey
Phalanx (All Majors)	Professor Erik Backus

### ***CEE Department 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.

Keith M. Russ Civil and Environmental Engineering Achievement Awards – Presented annually to two juniors exhibiting outstanding academic performance, with additional consideration for services to the CEE department; the University and/or the community. Selected by the Department Chair based on recommendations from the faculty. The awards are equal in recognition and are not intended as “first” and “second” place awards, although awards may be of equal or different dollar amounts.

The Ackermann Awards – Presented annually to one sophomore and one junior who have demonstrated the greatest academic improvement (improved cumulative GPA) between the prior fall semester and the semester in which the students will be selected as awardees. In exceptional cases, deviation from this rule is permitted with a majority vote by the CEE Undergraduate Committee.

### ***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, took regional top honors in the Design-Build division and second place Pre-Construction division in 2018 and placed second nationally in the Design-Build/IPD division in 2019. 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.

### Clarkson University Chapter of Engineers for International Sustainability

Formerly known as Engineers Without Borders-USA (EWB-USA), this is a nonprofit organization aimed at improving the lives of people in need globally through community-based projects that meet their expressed needs. Projects are variable, and often include technology development in the areas of water, wastewater, and energy infrastructure. Although engineering-focused in name, EIS projects are quite complex, requiring strong input from a wide variety of disciplines including engineering, chemical and biological sciences, business/entrepreneurship, public health sciences and the social sciences. All Clarkson students are welcome to participate in the Clarkson University Chapter of EIS.

### 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 with great success. 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, DC. 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 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 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, 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 wood are welcome to participate.

### Bridges to Prosperity

Bridges to Prosperity provides isolated communities with access to essential health care, education and economic opportunities by building footbridges over impassable rivers. We build to:

- Innovate: We develop and share engineering solutions that are safe, replicable, and locally viable.
- Educate: We provide educational programs that teach footbridge construction to reach the greatest number of people in need.

- Inspire: We provide opportunities for leadership development and personal growth through international collaboration.

We measure our success by the long lasting impact our training and bridge projects have on the reduction of rural poverty due to isolation.

### ***Other Extracurricular Activities***

CEE students are encouraged to take part in the broad range of extracurricular opportunities across the Clarkson community. CEE students are often found among the leaders of the Clarkson University Student Association (CUSA), and Clarkson Union Board (CUB), the Integrator and many other campus organizations. Many CEE students partake in intercollegiate sports as well as intermural and club activities. We find that our involved students are our best performing students.

In addition, Potsdam offers many other 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.

### **Phalanx: Clarkson's Highest Honor Society**

Phalanx is Clarkson's highest honor society recognizing those that not only are stellar academically, but have stepped out in service to others and leadership in the community. Its purpose is to recognize the achievements and promote the interests of students, faculty, staff and other Clarkson Community members in extracurricular activities, scholarship, and athletics at Clarkson. Phalanx gives out two kinds of awards each year for individuals, commendable service and commendable leadership, as well as distinguished service for organizations. Membership in Phalanx is exceptionally limited and is derived from those recognized with the commendable leadership award annually.

## **Clarkson University Support 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 internet sites referenced in this Handbook.

### ***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.

### ***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 (see above under other curricular matters). 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.

### ***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 the Director of Accommodative Services at 268-7643. The web page for Accommodative Services is given in the tabulation at the end of this Handbook.



### ***The Student Health and Counseling Center (SHAC)***

The SHAC provides medical care and mental wellness services to serve the students and help them achieve the healthiest version of themselves. For appointments or further information on this service call 268-6633.

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

International student advising is available at the International Center located in the Educational Resources Center (ERC). 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 268-3943.

### ***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 in Bertrand H. Snell Hall and can be contacted at 268-4439 or [wcenter@clarkson.edu](mailto:wcenter@clarkson.edu).

## Appendices

### *Appendices Listing*

Appendix	Contents
A	Faculty of the Department of Civil and Environmental Engineering
B	Listing of Internet Sites Referenced in this Handbook
C	Civil Engineering Curriculum Worksheet (through Class of 2020)
D	Civil Engineering Curriculum Worksheet (Class of 2021 and thereafter)
E	Environmental Engineering Curriculum Worksheet (through Class of 2019)
F	Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)
G	Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)
H	Civil Engineering Curriculum Flowchart
I	Environmental Engineering Curriculum Flowchart
J	Civil and Environmental Hosted Minors Tracking Sheet
K	Clarkson University Common Experience Requirements Checklist (CivE and EnvE)
L	Professional Elective Approval Form
M	Design Credits Course Listing

## *Appendix A: Faculty of the Department of Civil and Environmental Engineering*

### The Faculty of the Department

#### **Erik Backus**

Professor of Practice and Executive Officer  
Director, Construction Engineering Management Program  
140A Rowley 268-6522  
MS Civil Engineering, University of Missouri – Rolla, 2004  
Registered Professional Engineer, Missouri

#### **Teaches:**

CE212 – Introduction to Engineering Design  
CE406 – Construction Engineering  
CE409 – Fundamentals of Building Design  
CE410/510 – Sustainable Infrastructure & Building  
CE441 – Reinforced Concrete Design  
CE448 – Intro to Architectural Engineering  
CE490/1 – Senior/Capstone Design

#### **Research:**

Sustainable Construction; Force Protection Engineering/Infrastructure Resiliency; Integrated Project Delivery/Project Leadership; Energy/Alternative Energy Metrics/Management; and Alternate Transportation Impacts/Planning

#### **Abul Baki**

Assistant Professor  
226 Rowley 268-4156  
PhD Water Resources Engineering, University of Alberta, 2013

#### **Teaches:**

ES330 – Fluid Mechanics  
CE572 – Shallow Water Hydrodynamics  
CE573 – Ecohydraulics

#### **Research:**

Flow Characteristics in Streams; Environmental Hydraulics for Sustainability; Sustainable and Resilient Water Infrastructure; Sustainable Hydropower Development; Unmanned Aerial Vehicles and GIS Techniques in Water Resources Modeling

#### **Behzad Behnia**

Assistant Professor  
106 Rowley 268-6533  
PhD Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, 2013

#### **Teaches:**

ES100 – Introduction to Engineering Use of the Computer  
ES220 – Statics  
CE461 – Transportation Systems Design  
CE463 – Railroad Engineering

#### **Research:**

Smart & Sustainable Transportation Infrastructure; Characterization of Infrastructure Materials; Pavement/Railroad Engineering; Nondestructive Testing and Evaluation (NDT&E); Experimental and Computational Mechanics

### **John Dempsey**

Professor and Department Chair  
140B Rowley 268-6517  
PhD Engineering, University of Auckland, 1979

#### **Teaches:**

ES 220 – Statics  
CE501 – Fracture Mechanics of Concrete Structures  
CE551 – Theory of Elasticity  
CE554 – Continuum Mechanics  
CE633 – Plasticity

#### **Research:**

Fracture of Quasi-Brittle Geomaterials and Batteries; Ice Mechanics and Ice Engineering; Scale Effects; Elasticity; and Contact Mechanics

### **Pedro Fernández-Cabán**

Assistant Professor  
232 Rowley 268-5502  
PhD Civil and Environmental Engineering, University of Florida, 2017

#### **Teaches:**

CE420 – Computational Methods of Structural Analysis  
CE441 – Reinforced Concrete Design  
CE442 – Steel Design

#### **Research:**

Cyber-Physical Modeling of Infrastructure Systems; Performance-Based Structural Design and Optimization

### **Andrea Ferro**

Professor  
206 Rowley 268-7649  
PhD Civil and Environmental Engineering, Stanford University, 2002  
Registered Professional Engineer, Massachusetts

#### **Teaches:**

ES330 – Fluid Mechanics  
CE/EV/BY313 – Biogeochemical Earth Systems  
CE340 – Introduction to Environmental Engineering  
CE433/ES533 – Human Exposure Analysis  
CE434/534 – Sustainable Development Engineering  
CE477/577 - Atmospheric Chemistry  
CE491 – Senior Design – Water Resources/Environmental  
EV432/532 – Risk Analysis

#### **Research:**

Indoor Air Quality; Fate and Transport of Pollutants in the Built Environment; Resuspension of Particulate Matter; Human Exposure to Pollutants; and Exposure versus Health Effect Relationships for Airborne Particulate Matter

### **Stefan Grimberg**

Professor  
204 Rowley Lab 268-6490  
PhD Environmental Sciences and Engineering, University of North Carolina, Chapel Hill, 1995  
Registered Professional Engineer, Vermont

#### **Teaches:**

ES330 – Fluid Mechanics  
CE482/582 - Environmental Systems Analysis  
CE491 - Senior Design  
CE682 - Environmental Biological Processes

**Research:**

Biological Waste Treatment; Anaerobic Digestion of High Strength Wastes.

**Thomas Holsen**

Professor

CAMP Annex (CARES) 206 268-3851

PhD University of California, Berkeley, 1988

**Teaches:**

CE380 – Fundamentals of Environmental Engineering

CE480 – Chemical Fate and Transport in the Environment

CE491 – Senior Design

CE584 – Chemodynamics

**Research:**

Fate and Transport of Contaminants in the Environment.

**Ian Knack**

Assistant Professor

130 Rowley 268-4446

PhD Civil and Environmental Engineering, Clarkson University, 2011

**Teaches:**

ES220 – Statics

ES330 – Fluid Mechanics

CE330 – Water Resources I

CE470/570 – Stream Dynamics and Riparian Systems

CE491 – Senior Design – Water Resources

**Research:**

River Ice Processes: Fluvial Morphology in Rivers subject to Freezing, River Ice Breakup Dynamics, Interaction of Suspended Sediment and Frazil Ice, Effect of Surface Ice on Channel Stability, and Fish Habitat and Ecology; Stream Dynamics and Riparian Systems Processes: Channel Stability Analysis, Woody Debris Jams, Effect on In-Stream Structures on Channel Stability and Flood Potential, Thermal Effects on Bank Stability, and Stream Water Quality Modeling.

**William Olsen**

Professor of Practice

271 Rowley 268-3878

BA Geography, State University of New York at Buffalo, 2000

**Teaches:**

CE301 – Geographic Information Systems

CE408 – Building Information Modeling and Integrated Project Delivery

**Sulapha Peethamparan**

Professor

236 Rowley 268-4435

PhD Civil Engineering, Purdue University, 2007

**Teaches:**

CE453/553 – Properties and Performance of Concrete Materials

CE630 – Advanced Concrete Materials

CE631 – Cement Chemistry

ES260 – Materials Science

**Research:**

Sustainable Cement Based Materials – Cement free binder (alkali activated) Concretes; Waste or Recycled Materials in Concrete; and Bio Cement.

**Shane Rogers**

Associate Professor

212 Rowley 268-6501  
PhD Environmental Engineering, Iowa State University, 2004

**Teaches:**

ES240 – Sustainable Water Resources Management  
CE340 – Introduction to Environmental Engineering  
CE479/579 – Water and Wastewater Engineering  
CE491 – Senior Design – Environmental  
CE686 – Environmental Engineering Design

**Research:**

Sustainable Water Resources Management and Biotechnologies for Soils, Water, and Residuals Treatment, including Genome-Enabled Molecular Technologies for Investigating Soils, Air, and Water Quality.

**Tyler Smith**

Associate Professor  
230 Rowley 268-2243  
PhD Ecology & Environmental Sciences, Montana State University, 2012

**Teaches:**

ES100 – Introduction to Engineering Use of the Computer  
CE330 – Water Resources Engineering I  
CE430 – Water Resources Engineering II  
CE491 – Senior Design/Water Resources  
CE569 – Watershed Analysis

**Research:**

Quantitative Analysis of Hydrological & Environmental Data & Processes; Study of Uncertainties Arising from Data & Errors & Imperfect Model Structures; Rainfall Runoff Model Calibration; Bayesian Statistical Inference in Modeling Natural Systems; and Risk Analysis in Water Resources Planning and Hydrology.

**Spencer Thew**

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

**Teaches:**

CE305 – Construction Planning and Management  
CE411 – Construction Materials Engineering

**Robert Thomas**

Assistant Professor  
228 Rowley 268-6546  
PhD Civil and Environmental Engineering, Clarkson University, 2016

**Teaches:**

ES222 – Strength of Materials  
CE212 – Introduction to Engineering Design  
CE441 – Reinforced Concrete Design  
CE549 – Experimental Methods in Structural Engineering

**Research:**

Sustainability of Concrete; Alternative Binders for Concrete; Reclaimed Aggregates for Concrete; Advanced Engineered Cementitious Composites; High Strain Rate Properties of Cementitious Composites (Seismic, Impact, Blast); Physical Modeling of Diffusion Processes in Cementitious Composites; Full-Scale Performance of Reinforced Concrete Structures; and Performance-Based Specifications for Concrete.

**Brooks Washburn, AIA**

Adjunct Associate Professor  
212 Rowley 268-6529

Masters in Architecture II, Harvard Graduate School of Design, 1979

**Teaches:**

CE448 – Introduction to Architectural Engineering

**Steven Wojtkiewicz**

Professor

240A Rowley 268-1261

PhD, Aeronautical and Astronautical Engineering/Computational Science and Engineering, University of Illinois at Urbana-Champaign, 2000

**Teaches:**

ES100 – Introduction to Engineering Use of the Computer

ES222 – Strength of Materials

CE320 – Structural Analysis

CE420/520 – Computational Methods of Structural Analysis

CE512 – Structural Dynamics

CE612 – Uncertainty Quantification and Optimization in Computational Mechanics

**Research:**

Uncertainty Quantification; Structural Dynamics; Structural Control and Health Monitoring; Computational Mechanics

**Weiming Wu**

Professor

128 Rowley 268-6550

Ph.D., Wuhan University of Hydraulic and Electric Engineering, China, 1991

**Teaches:**

CE571 – Computational River Dynamics

CE573 – Sediment Transport

ES330 – Fluid Mechanics

**Research:**

Fundamentals of Sediment Transport; Hydro- and Morphodynamics in River, Estuarine, and Coastal Waters; Free Surface Flow and Sediment Transport Modeling; Dam/Levee Breach and Flood Modeling; Surge and Wave Attenuation by Vegetation; Interaction between Surface and Subsurface Flows; Water Quality and Aquatic Ecosystem/Ecotoxicology Modeling

**Suguang Xiao**

Assistant Professor

234 Rowley 268-2341

PhD, Civil and Environmental Engineering, Lehigh University, 2017

**Teaches:**

CE310 – Geotechnical Engineering I: Soil Mechanics

CE415 – Foundations, Stability, and Retaining Structures

**Research:**

Energy Geotechnics; Soil-Structure Interaction

**Yang Yang**

Assistant Professor

208 Rowley 268-3861

PhD School of Environment, Tsinghua University, 2014

**Teaches:**

CE340 – Introduction to Environmental Engineering

CE380 – Fundamentals of Environmental Engineering

CE580 – Environmental Chemistry

CE681 – Environmental Physio-Chemical Processes

**Research:**

Synthesis and Characterization of Advanced Electro-Active Materials; Advance Oxidation/Reduction Techniques for

Emerging Contaminant Removal and Value-Added Chemical Production; Development and Commercialization of Decentralized Water Treatment Techniques for WASH (Water, Sanitation and Hygiene) Applications.

#### Research Faculty

##### **Hung Tao Shen**

Distinguished Research Professor  
108 Rowley 268-6606  
PhD Mechanics & Hydraulics, University of Iowa, 1974

##### **Research:**

River and sea ice processes; Transport of pollutants in surface waters; Mathematical modeling of surface water hydraulics.

#### Emeritus Faculty

##### **Norbert Ackermann**

Professor Emeritus  
PhD Civil Engineering, Carnegie Mellon University, 1959

##### **Research:**

Mechanics of Granular Flow; Ice Mechanics and Hydraulics.

##### **Gordon Batson**

Professor Emeritus  
PhD Civil Engineering, Carnegie Mellon University, 1962  
Registered Professional Engineer, New York State

##### **Research:**

Structural Design; Properties of Fiber Reinforced Concrete and Remote Sensing.

##### **James Edzwald**

Distinguished Professor of Water Engineering  
PhD Environmental Science and Engineering, University of North Carolina, Chapel Hill, 1972

##### **Research:**

Physical-Chemical Treatment Processes; Water Supply and Drinking Water Research; Water Chemistry; Water Quality and Pollution.

##### **Feng-Bor Lin**

Professor Emeritus  
PhD Civil Engineering, Carnegie Mellon University, 1975

##### **Research:**

Transportation Systems analysis; Traffic Signal Controls; Traffic Engineering; Traffic Safety.

##### **Levon Minnetyan**

Professor Emeritus  
PhD Structural Mechanics, Duke University, 1974  
Registered Professional Engineer, New York State

##### **Research:**

Progressive Fracture of Composite Structures.

##### **Hayley Shen**

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

##### **Research:**

Transport and Flow of Granular Materials; Sea Ice Dynamics and Ice-Wave Interactions.

##### **Poojitha Yapa**



Professor Emeritus

PhD Fluid Mechanics & Thermal Science, Clarkson University, 1983

**Research:**

Oil and Gas Spills; Deep Water Blowout Modeling; Hydrothermal Vents; Transport and Fate of Contaminants in Rivers and Groundwater; CO<sub>2</sub> Transport in Water.

**Thomas Young**

Professor Emeritus

PhD Limnology, Michigan State University, 1977

**Research:**

Environmental Engineering Systems.

**Appendix B: Listing of Clarkson Internet Sites Referenced in Handbook**

Listing of Clarkson Internet Sites Referenced in Handbook

Campus Resource	Universal Resource Locator (URL)
Clarkson University Home Page	<a href="http://www.clarkson.edu">http://www.clarkson.edu</a>
Clarkson University Internal (Intranet) Site	<a href="https://intranet.clarkson.edu">https://intranet.clarkson.edu</a>
Clarkson University Interactive Campus Map	<a href="https://clarkson.university-tour.com/map.php">https://clarkson.university-tour.com/map.php</a>
Dept. of Civil & Environmental Engineering	<a href="https://www.clarkson.edu/academics/engineering/civil-environmental-engineering">https://www.clarkson.edu/academics/engineering/civil-environmental-engineering</a>
Undergraduate research experiences and opportunities at Clarkson	<a href="https://www.clarkson.edu/research-experience-undergrads-reu">https://www.clarkson.edu/research-experience-undergrads-reu</a>
Student Administrative Services Center	<a href="https://www.clarkson.edu/student-administrative-services-sas">https://www.clarkson.edu/student-administrative-services-sas</a>
Student Support Services Center	<a href="https://www.clarkson.edu/student-success-diversity-and-inclusion/student-support-services">https://www.clarkson.edu/student-success-diversity-and-inclusion/student-support-services</a>
Accessibility Services	<a href="https://www.clarkson.edu/accessability-services">https://www.clarkson.edu/accessability-services</a>
Course Registrar	<a href="https://www.clarkson.edu/student-administrative-services-sas">https://www.clarkson.edu/student-administrative-services-sas</a>
Student Phone Directory	<a href="https://intranet.clarkson.edu/directory/student-directory/">https://intranet.clarkson.edu/directory/student-directory/</a>
Commonly Used Forms	<a href="https://intranet.clarkson.edu/student-life/sas/forms/">https://intranet.clarkson.edu/student-life/sas/forms/</a> <a href="https://intranet.clarkson.edu/student-life/sas/financial-aid-forms/">https://intranet.clarkson.edu/student-life/sas/financial-aid-forms/</a>

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**Appendix C: Civil Engineering Curriculum Worksheet (through Class of 2020)**

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 (4 cr)					PH 132 Fund. Physics II (4 cr)				
UNIV 190 Clarkson Seminar					ES110 Engineering & Society				
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				
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 & Ap. (F&S)					EC350 Econ. Principles / Engineering Economics				
CE 320 Structural Analysis (F)		1			ES elective *				
CE 330 Water Resources I (F&S)		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		
Mathematics Elective (STAT 383 Recommended <sup>4</sup> )					<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"/> CE415 or CE515 <input type="checkbox"/> CE441 <input type="checkbox"/> CE442 <input type="checkbox"/> CE448 <input type="checkbox"/> CE492  <input type="checkbox"/> <input type="checkbox"/> <b>Three of the following:</b> <sup>3</sup> CE405, CE408, CE411, CE420 or CE520, CE421 or CE521, CE445, CE446, CE538, CE542, CE544, CE453 or CE553, CE455 or CE555, CE457 or CE557, CE486 or CE586, EHS406, ME310, ME411, ME444	<input type="checkbox"/> CE411 <input type="checkbox"/> CE415/515 <input type="checkbox"/> CE441 <input type="checkbox"/> CE442 <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> CE405, CE406, CE407, CE408, CE409, CE410, CE445, CE446, CE453, CE461, CE510, CE553 <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>4</sup> OS466, FN361 EM/OM351 EM/OM380 ESH330 LW270, LW466 COMM417	<input type="checkbox"/> CE340 or CH220 <input type="checkbox"/> CE491, MP401 or MP444 <input type="checkbox"/> CM241 or CM371 or CH 210 <input type="checkbox"/> BY240, BY320, or BY222 and BY224 (4 cr)  <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>3</sup> BY531, BY532, CE430, CE435, CE477, CE478, CE479, CE480, CE481, CE482, CE486, CE577, CE580, CE581, CE582, CE584, CE586, CH434, ES432, ES434, ES436, ES464, ES532, EHS406 or EHS416	<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> CE 408, CE411, CE421 or CE521, CE544, ME444, CE438 or CE538, CE401 or CE501, CE445, CE446, 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									
ES499 (Prof. Experience) (0cr)									

<sup>2</sup> 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 are required.

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

<sup>4</sup> STAT 383 Probability and Statistics will be required effective Class of 2020

Approved for 2015-2016

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**Appendix D: Civil Engineering Curriculum Worksheet (Class of 2021 and thereafter)**

Faculty Advisor		Student Name		Student Number		Class Year	
<b>FRESHMAN – FALL</b>				<b>FRESHMAN – SPRING</b>			
CM131 General Chem. I (4 cr)	ID/Des. Credit <sup>2</sup>	Semester	Grade	CM132 General Chem. II (4 cr)	ID/Des. Credit <sup>2</sup>	Semester	Grade
PH131 Fund. Physics I (4 cr) <sup>3</sup>				PH132 Fund. Physics II (4 cr) <sup>3</sup>			
UNIV190 Clarkson Sem. <sup>5</sup>				ES110 Engr. & Society (TECH)	STS (C1) <sup>7</sup>		
MA131 Calculus I				MA132 Calculus II			
FY/PE100 First Year Seminar (0 cr)				ES100 Intro Computer (2 cr)			
<b>SOPHOMORE – FALL</b>				<b>SOPHOMORE - SPRING</b>			
CE212 Intro. Eng. Des.	1.5/			ES222 Strength of Materials			
ES220 Statics				CE305 Construction Planning and Mgmt. (S)	1		
Elective - KA or UC <sup>3</sup>				ES330 Fluid Mechanics			
MA231 Calculus III				MA232 Differential Equations			
CE301 Geospatial Analysis & Appl.				ES Elective <sup>7</sup> (ES223 RBD recom.) (S)			
<b>JUNIOR AND SENIOR YEARS</b>							
Elective - KA or UC <sup>3</sup>				CE310 Geotechnical Engineering I (S) (3 cr)	1 (C1)		
ES elective <sup>7</sup> (ES260 Materials Science recommended)				CE340 Intro. Environmental Eng. (S)	1		
ES Elective <sup>7</sup> (ES250 Elect. Sci. or ES340 Thermo. recom.)				University Course (UC) Elective			
CE320 Structural Analysis (F) (3 cr)	1 (C1)			CE441 Reinforced Concrete Design (S) <b>OR</b> CE442 Steel Design (F)	3		
CE330 Water Resources I (F&S) (3 cr)	1 (C1)			Senior Design (CE490 Str., Trans., Geo./Constr.) <b>OR</b> CE491 Water Resources/Environmental <b>OR</b> CE492 Building/Construction) (S)	3 (C1)		
STAT383 Probability & Statistics				<input checked="" type="checkbox"/> <b>Checklist to monitor progress towards Professional Concentration(s)</b>			
EC350 Econ. Principles / Engineering Economics <sup>4</sup>	EC			Construction Engineering Management	Structural Engineering	Water Resources Engineering	
Professional Elective:				<input type="checkbox"/> CE411 (F) <input type="checkbox"/> CE415 or CE515 (F) <input type="checkbox"/> CE441 (S) <input type="checkbox"/> CE442 (F)	<input type="checkbox"/> CE420 or CE520 <input type="checkbox"/> CE415 or CE515 (F) <input type="checkbox"/> CE441 (S) <input type="checkbox"/> CE442 (F) <input type="checkbox"/> CE490 or CE492	<input type="checkbox"/> CE430 <input type="checkbox"/> CE470 <input type="checkbox"/> CE479 <input type="checkbox"/> CE490/1/2 Senior Design with Water Resources focus	
Professional Elective:				<input type="checkbox"/> <b>One of the following:</b> <sup>6</sup> OS286 (IG), FN361, EM/OM380 (EC), EM/OM451, EHS330, LW270, LW466, COMM217/417 (C2)	<input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>5</sup> CE408, CE411, CE521, CE544, CE438 or CE538, CE401 or CE501, CE445, CE448, CE455 or CE555, CE453 or CE553, CE449, CE512	<input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>5</sup> CE315, CE340, CE380, CE434, CE435, CE478, CE481, CE482	
Professional Elective:				<b>AND</b> completion of at least one of these Tracks		<input type="checkbox"/> <b>One of the following:</b> <sup>5</sup> BY/EV330, BY431, ES436, COMM428, EV305, POL/SOC470	
Professional Elective:				<i>Construction/Infrastructure Track:</i> <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>5</sup> CE315, CE406, CE453/553, CE407, CE408, CE410/510, and/or CE461			
Professional Elective:				<i>Architectural Engineering &amp; Building Construction Track:</i> <input type="checkbox"/> <input type="checkbox"/> <b>Two of the following:</b> <sup>5</sup> CE409, CE448, CE407, CE408, and/or CE410/510			
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
ES499 (Prof. Experience) (0cr)							
<b>OTHER COURSES (Do not count towards degree requirements)</b>							
See also page 2.							

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

<sup>2</sup> A Total of 16.5 Design Credits are required.

<sup>3</sup> Depending on Mathematics placement; may adj. to ES110 in 1<sup>st</sup> Sem., PH131 in 2<sup>nd</sup> Sem. w/ KA Course, & PH132 in 3<sup>rd</sup> Sem.

<sup>4</sup> Recommended for Fall semester immediately before grad. but before senior design; Transfers w/ EC150/151 cred. take EC200

<sup>5</sup> Or other course designated by CEE Department Chair. For UNIV190: Transfers use other KA/UNIV Course.

<sup>6</sup> EM/OM380 is the preferred course in this group; students are encouraged to take more than one in this group using their KA/UC electives.

<sup>7</sup> Eligible ES elective courses are ES223 Rigid Body Dynamics, ES260 Materials Science, ES340 Thermodynamics, and ES250 Electrical Science.

Effective for 2018-2019

## Civil Engineering Curriculum notes

Most important courses in the second year are Statics, Calculus III, Strength of Materials, Fluid Mechanics, and Differential Equations.

Environmental Engineering Minor is available to Civil Engineering majors.

Alternative Schedules of the Civil Engineering curriculum (based on Mathematics evaluation/placement):

If PH 131 is not taken in the Fall semester of the first year, ES 110 is enrolled in instead, PH 131 is delayed to the Spring semester of the first year and PH 132 is delayed to the Fall semester of the second year replacing CE 301 that would move to a later semester.

Third and fourth year courses are designated at large and are not assigned to a particular Fall and Spring semester.

When planning individual schedules, the order of courses according to prerequisites must be taken into account

Water Resources Concentration electives with Knowledge Area and Communication Credits

CE434 STS C1, CE479 C1, CE481 C1, BY/EV330 CGI/STS C1, ES436 CGI/STS, EV340 CGI C1, COMM428 CGI/STS, EV305 C1, PHIL370 STS C1, POL374 CGI/STS C1, POL375 CGI, POL/SOC470 STS C1.

Transfer Students: The following courses are waived for Transfer Students: UNIV190, FY/PE100, ES110. With the exception of FY/PE100, if transfer credit is not awarded for these courses, students must take equivalent courses that meet the Knowledge Area and TECH requirements.

Additional Courses that have been transferred into Clarkson University or do not count towards a BS in Civil Engineering or BS in Environmental Engineering:

OTHER COURSES (Do not count towards degree requirements)							
Course Number/Name	ID/Des. Cred.	Semester	Grade	Course Name/Number	ID/Des. Cred.	Semester	Grade

**Appendix E: Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)**

Faculty Advisor		Student Name			Student Number			Class Year				
<b>FRESHMAN - FALL</b>				Design Credit <sup>1</sup>	Semester	Grade	<b>FRESHMAN - SPRING</b>					
CM 131 General Chem. I (4 cr)							CM 132 General Chem. II (4 cr)					
PH 131 Fund. Physics I (4 cr)							PH 132 Fund. Physics II (4 cr)					
UNIV 190 Clarkson Seminar CMP 120							ES110 Engineering & Society					
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)				1	
ES 220 Statics							CE 380 Fundamentals of Environmental Engrg (S)				1	
CH210 Molecular Properties							ES 330 Fluid Mechanics					
MA 231 Calculus III							MA 232 Differential Equations					
Elective – KA or UC							Elective – KA or UC					
<b>JUNIOR AND SENIOR YEARS</b>												
Elective – KA or UC							BY 320 Microbiology (S)					
CM 241 Organic Chemistry (F) <i>OR</i> CM 221 Spectroscopy (F)							EC 350 Econ. Principles & Engineering Economics					
Earth Science Elective <sup>3</sup>							ES 340 Thermodynamics I					
CE 301 Geospatial Analysis & Appl.							STAT 383 Probability and Statistics					
CE 330 Water Resources I (F&S)				1			CE 491 Sr. Design (Envir./ Wat. Res) (S)				3	
CE 479 Water & Wastewater Treatment (F)				3			<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 482/582 Systems (2) <input type="checkbox"/> CE 486 Ind Ecology (1) <input type="checkbox"/> ES 432 Risk Anal (1.5) <input type="checkbox"/> CE 481 Haz Waste (2.5)  () = 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 <input type="checkbox"/> CE 442 Steel Design (3)	
Core Professional Course												
Core Professional Course												
Professional Elective												
Professional Elective												
Professional Elective												
Professional Elective												
Professional Elective												
Professional Elective												
ES499 (Prof. Experience) (0 cr.)												

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

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

<sup>3</sup> One of: CE435/535 Groundwater Hydrology and Geochemistry; CE315 Geology for Engineers (1), ES436 Global Climate Change: Science, Engineering and Policy (odd springs), CE477 Atmospheric Chemistry (even springs)



ENVIRONMENTAL ENGINEERING CURRICULUM SHEET NOTES:

**SUGGESTED KNOWLEDGE AREA OR SOC/HUM ELECTIVES**

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EC 360 Environmental Economics	EV 342 (PHIL 370) Environmental Ethics
SOC 330 Health, Wealth, Inequality, and the Environment	EV 480 (PHIL 480) Environmental Philosophy Seminar
POL 470 (SOC 470) Environmental Policy	COMM 428 Public Debate and the Environment

**SUGGESTED PROFESSIONAL ELECTIVES**

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BY 222/224 Ecology + Lab	CM 221 Spectroscopy
BY 328 Conservation Biology	CM 460 Biochemistry I
BY 431 Limnology	*ES 222 Strength of Materials
*CE 310 Geotechnical Engineering I	ES 405 Design of Exp. and Analysis of Data
CE 430 Water Resources Engineering II	ES 436 Global Climate Change: Science, Engineering & Policy
CE 477 Atmospheric Chemistry	ES 464 Corrosion Engineering
CE 478 Solid Waste Management and Landfill Design	EV 430 Environmental Law
CE 433/ES533 Human Exposure Analysis	EHS 309 Industrial Hygiene
CH 434 Air Pollution Control	EHS 406 Industrial Hygiene Control Methods
CH 351 Mass Transfer & Stage-Wise operations	EHS/BY 416 Principles of Toxicology and Epidemiology
CH 465 Biochemical Engineering	OM 331 Operations & Supply Chain Management.
CM 406 Treatment of Experimental Data	SB 361 Supply Chain Environmental Management
CM 430 Colloids and Interfaces	

\* Recommended Electives

**Appendix F: Environmental Engineering Curriculum Worksheet (Class of 2021 and thereafter)**

Faculty Advisor		Student Name		Student Number		Class Year	
<b>FRESHMAN – FALL</b>				<b>FRESHMAN – SPRING</b>			
CM131 General Chem. I (4 cr)	ID/Des. Credit <sup>2</sup>	Semester	Grade	CM132 General Chem. II (4 cr)	ID/Des. Credit <sup>2</sup>	Semester	Grade
PH131 Fund. Physics I (4 cr) <sup>3</sup>				PH132 Fund. Physics II (4 cr) <sup>3</sup>			
UNIV190 Clarkson Sem. <sup>5</sup>				ES110 Engr. & Society (TECH)	STS (C1) <sup>7</sup>		
MA131 Calculus I				MA132 Calculus II			
FY/PE100 First Year Seminar (0 cr)				ES100 Intro Computer (2 cr)			
<b>SOPHOMORE – FALL</b>				<b>SOPHOMORE - SPRING</b>			
CE212 Intro. Eng. Des.	1.5/ <sup>2</sup>			CE340 Intro to Environmental Engr. (S)	1		
ES220 Statics				CE380 Fund. of Environmental Engr. (S)	1		
Elective - KA or UC <sup>3</sup>				ES330 Fluid Mechanics			
MA231 Calculus III				MA232 Differential Equations			
CH210 Molecular Properties				Elective - KA or UC <sup>3</sup>			
<b>JUNIOR AND SENIOR YEARS</b>							
Elective - KA or UC <sup>3</sup>				BY320 Microbiology (S)			
<input type="checkbox"/> CM241 Organic Chemistry (F) <b>OR</b> <input type="checkbox"/> CM221 Spectroscopy (F)				EC350 Econ. Principles / Engineering Economics <sup>4</sup>	EC		
Earth Science Elective <sup>6</sup>				STAT383 Probability & Statistics			
CE301 Geospatial Analysis & Appl.				ES340 Thermodynamics I			
CE330 Water Resources I (F&S)	1 (C1)			Senior Design CE491 (Water Resources/ Environmental) (S) OR Approved Alternate	3 (C1)		
CE479 Water & Wastewater Treat. (F)	3 (C1)			<input checked="" type="checkbox"/> <b>Checklist to monitor progress towards Professional Concentration(s)</b>			
Core Prof. Course				Core Professional Courses	Thesis Option	Double Major Option	
Core Prof. Course				Core Professional Courses must include three of these courses <sup>2</sup> : <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 (2.5)	Students are encouraged 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 (see also the Civil Engineering Curriculum or Double Major sheet which is authoritative):  <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 305 Const. Planning & Mgmt.(1) <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 Prof. Course							
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
Professional Elective:							
ES499 (Prof. Experience) (0cr)							
<b>OTHER COURSES (Do not count towards degree requirements)</b>							
See also page 2.							

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

Effective for 2017-2018

<sup>2</sup> A Total of 16.5 Design Credits are required.

<sup>3</sup> Depending on Mathematics placement; may adj. to ES110 in 1<sup>st</sup> Sem., PH131 in 2<sup>nd</sup> Sem. w/ KA Course, & PH132 in 3<sup>rd</sup> Sem.

<sup>4</sup> Recommended for Fall semester immediately before grad. but before senior design; Transfers w/ EC150/151 cred. take EC200

<sup>5</sup> Or other course designated by CEE Department Chair. For UNIV190: Transfers use other KA/UNIV Course.

<sup>6</sup> Eligible Earth Science elective courses are CE435/535 Groundwater Hydrology & Geochemistry; CE315 Geology for Engineers, ES436 Global Climate Change: Science, Engineering and Policy, CE477 Atmospheric Chemistry, CE310 Geotechnical Engineering I: Soil Mechanics (note ES222 required).

## Environmental Engineering Curriculum notes:

### SUGGESTED KNOWLEDGE AREA OR SOC/HUM ELECTIVES

EC 360 Environmental Economics  
 SOC 330 Health, Wealth, Inequality, and the Environment  
 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 Engineering  
 CM 406 Treatment of Experimental Data  
 CM 430 Colloids and Interfaces  
 \* Recommended Electives  
 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 Engineering  
 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

Transfer Students: The following courses are waived for Transfer Students: UNIV190, FY/PE100, ES110. With the exception of FY/PE100, if transfer credit is not awarded for these courses, students must take equivalent courses that meet the Knowledge Area and TECH requirements.

Additional Courses that have been transferred into Clarkson University or do not count towards a BS in Civil Engineering or BS in Environmental Engineering:

OTHER COURSES (Do not count towards degree requirements)							
Course Number/Name	ID/Des. Cred.	Semester	Grade	Course Name/Number	ID/Des. Cred.	Semester	Grade

**Appendix G: Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)**

Faculty Advisor		Student Name		Student Number		Class Year	
<b>FRESHMAN - FALL</b>				<b>FRESHMAN - SPRING</b>			
	Design Credit <sup>2</sup>	Semester	Grade		Design Credit <sup>2</sup>	Semester	Grade
CM131 General Chem. I (4 cr)				CM132 General Chem. II (4 cr)			
PH131 Fund. Physics I (4 cr)				PH132 Fund. Physics II (4 cr)			
UNIV190 Clarkson Sem.				ES110 Engineering & Society (TECH)	STS (C-1)		
MA131 Calculus I				MA132 Calculus II			
FY/PE100 First Year Seminar (0 cr)				ES100 Intro Computer (2 cr)			
<b>SOPHOMORE - FALL</b>				<b>SOPHOMORE - SPRING</b>			
CE 212 Intro. Eng. Des. (F)	1.5/			CE340 Intro to Environmental Engr	1		
ES220 Statics				CE380 Fundamentals of Environmental Engr	1		
CH210 Molecular Properties				ES222 Strength of Materials			
MA231 Calculus III				MA232 Differential Equations			
Elective – KA				Elective – KA			
<b>JUNIOR/SENIOR YEAR</b>							
ES330 Fluid Mechanics ( F Junior Yr)				CE320 Structural Analysis (F Junior Yr)	1 (C1)		
ES260 Material Science (F&S)				CE441 Reinforced Concrete Design (S Senior yr) OR CE442 Steel Design (F Senior Yr)	3		
ES340 Thermodynamics I (F&S)				CE330 Water Resources I (F&S)	1 (C1)		
ES Elective (ES 223 or ES 250) (F&S)				CE479 Water &Wastewater Treatment (F)	3 (C1)		
<input type="checkbox"/> CM241 Organic Chemistry (F) OR <input type="checkbox"/> CM221 Spectroscopy (F)				Senior Design CE491 (Water Resources/ Environmental) (S) OR Approved Alternate	3 (C1)		
BY320 Microbiology (S)				<b>Environmental Engineering Core Professional Courses</b>			
STAT383 Probability and Statistics (F&S)				Core Professional Courses must include three of these courses <sup>5</sup> :			
EC350 Econ. Principles & Engineering Economics (F&S)				<input type="checkbox"/> CE482/582 Environmental Systems (2) <input type="checkbox"/> CE486 Industrial Ecology (1) <input type="checkbox"/> ES432 Risk Analysis (1.5) <input type="checkbox"/> CE481 Hazardous Waste Engineering (2.5)			
Elective – KA/UC							
EnvE Core Professional Course <sup>3</sup>							
EnvE Core Professional Course <sup>3</sup>							
EnvE Core Professional Course <sup>3</sup>							
CE301 Geospatial Analysis & Appl. (F&S)							
CE305 Construction Planning and Management (S)	1						
CE310 Geotechnical Engineering I (S) <sup>4</sup>	1 (C1)						

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

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

<sup>3</sup> Environmental Engineering Core Professional Courses must include three of these courses: CE 482/582 Systems (2); CE 486 Ind Ecology (1); ES 432 Risk Anals (1.5) ; CE 481 Haz Waste (2.5)

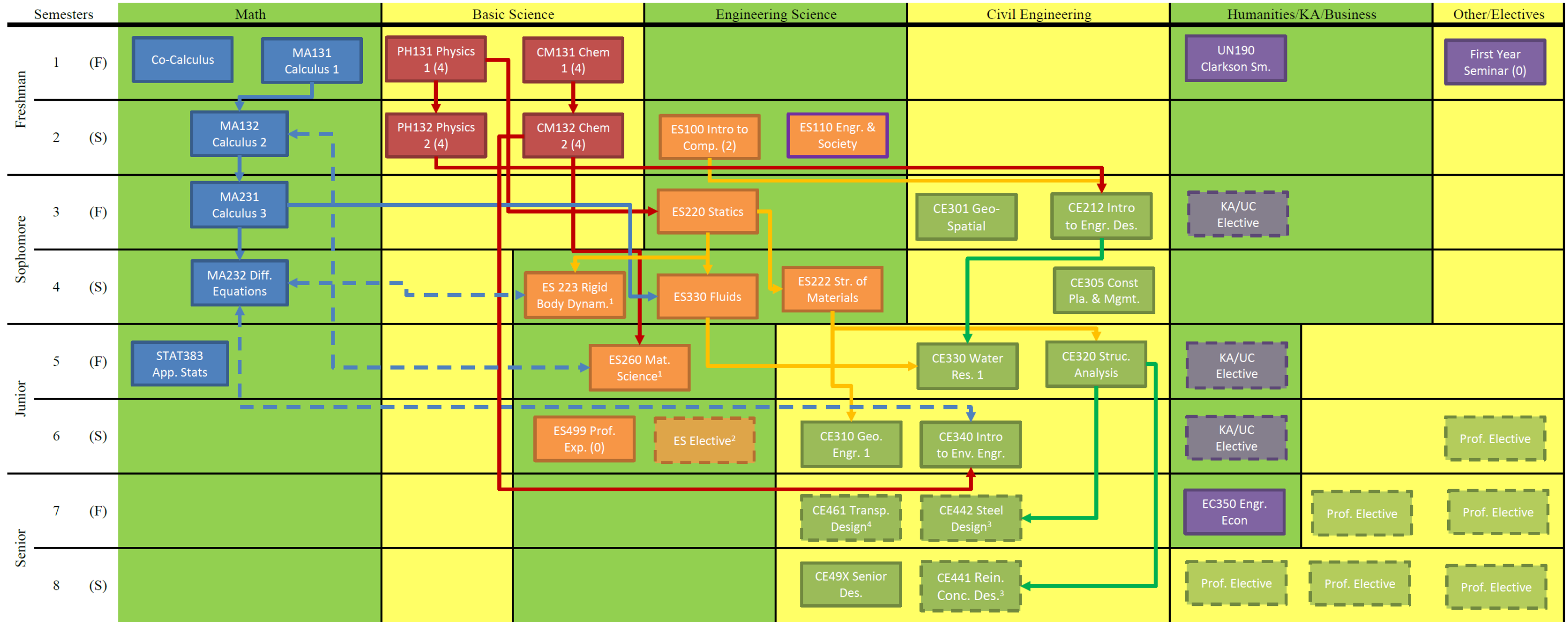
<sup>4</sup> One of the following: CE435/535 Groundwater Hydrology and Geochemistry; CE315 Geology for Engineers (1), ES436 Global Climate Change: Science, Engineering and Policy (odd springs), CE477 Atmospheric Chemistry (even springs), CE310 Geotechnical Engineering I: Soil Mechanics (note that ES222 is a pre-requisite for this course)      ce

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Department of Civil and Environmental Engineering

Civil Engineering Curriculum Flow-Chart



Notes:

All Courses are 3 credit hours, unless indicated in parentheses  
 Assumes Fall Semester Start  
 KA/UC indicates Knowledge Area and Univ. Courses, in compliance with the Clarkson Common Curriculum

Solid Line Connection - Pre-Requisite  
 Dashed Line Connection - Co-Requisite

<sup>1</sup> Other ES course options may be considered, consent of advisor and chair

<sup>2</sup> One of the following: ES250 Electric Circuits or ES340 Thermodynamics

<sup>3</sup> One of these two courses (CE441 or CE442) must be taken, other taken as a prof. elec. or other course

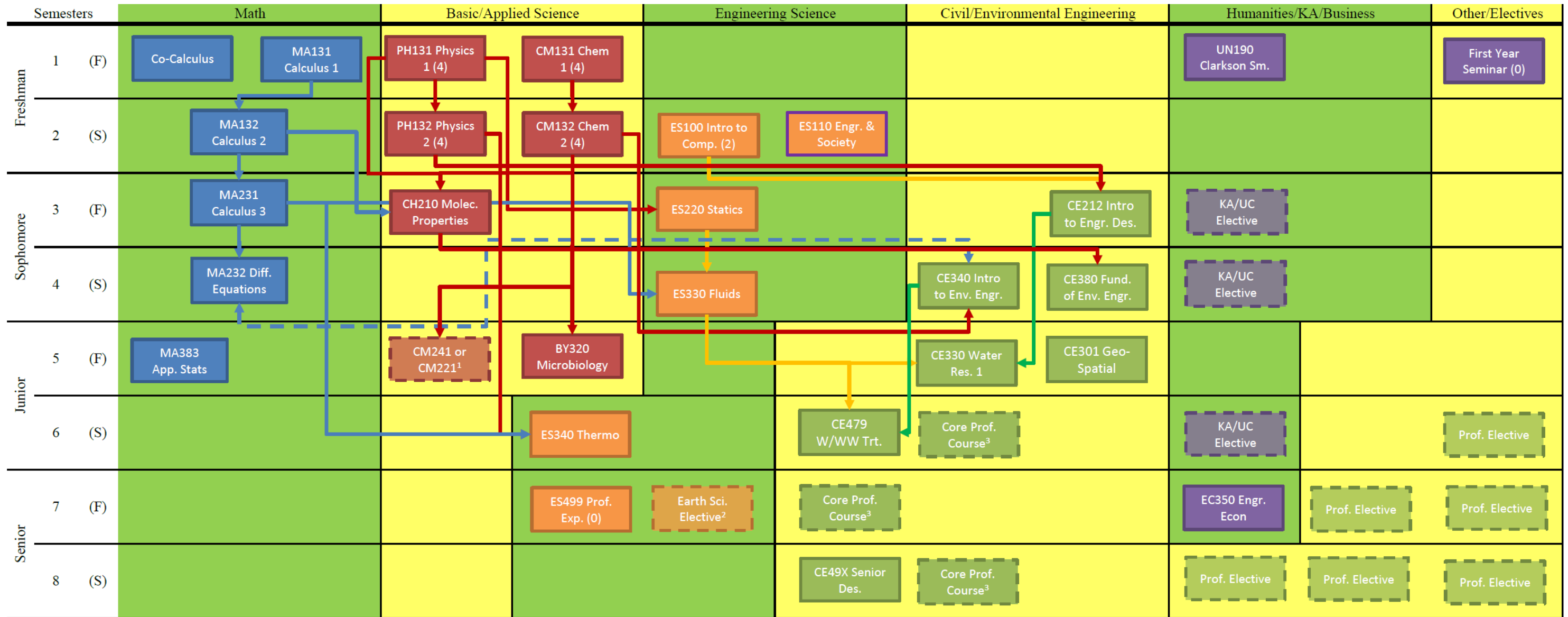
<sup>4</sup> This course is required for Class of 2020, others may take this as a prof. elec. or another course in its place





# Department of Civil and Environmental Engineering

## Environmental Engineering Curriculum Flow-Chart



Notes:

All Courses are 3 credit hours, unless indicated in parentheses  
Assumes Fall Semester Start

KA/UC indicates Knowledge Area and Univ. Courses, in compliance with the Clarkson Common Curriculum

Solid Line Connection - Pre-Requisite  
Dashed Line Connection - Co-Requisite

<sup>1</sup> Students may take either CM241 Organic Chemistry or CM221 Spectroscopy

<sup>2</sup> One of the following: CE310 Geotech 1: Soils, CE315 Geo. For Engr., CE435/535 GrndWater Hydro. & Geochem., ES436 Glob. Clim. Change: Sci., Engr. & Pol., CE477 Atm. Chem.

<sup>3</sup> Three of the following: CE482/582 Environ. Sys., CE486 Ind. Ecology, ES432 Risk Anal., or CE481/581 Haz. Waste Mgmt.

**Appendix J: Civil and Environmental Engineering Hosted Minors**

**Civil and Environmental Engineering Hosted Minors Tracking Sheet**

Minor in Environmental Engineering

Complete the following requirements:

<input type="checkbox"/> Complete ONE of the following: CE340 Intro. to Env. Engineering, CE380 Fund. of Env. Engineering, OR CH220 Materials Balances. Took:	<input type="checkbox"/> Complete ONE of the following: BY214 Genetics, BY222 Ecology w/ BY224 Ecology Lab, BY320 Microbiology, OR BY/EV330 Great Lakes Water Protection Took:
<input type="checkbox"/> Complete ONE of the following: CH210 Chem. Engr. Principles, CH/CM221 Spectroscopy, CM241 Organic Chemistry 1, OR CM371 Physical Chemistry 1. Took:	<input type="checkbox"/> Complete ONE of the following: ES432 Risk Analysis, CE479 Water and Wastewater Treat., CE481 Haz. Waste Mgmt. Engr., OR CE482 Env. Systems Analysis and Des. Took:
<input type="checkbox"/> Complete ONE of the following: BY314 Bioinformatics, BY328 Conservation Biology, BY412 Molecular Biology Laboratory, BY425 Biological Systems & Environmental Change,  BY431 Limnology & BY432 Limnology Laboratory, BY486 Molecular Biotechnology, CE430 Water Resources Engineering II, CE434 Sustainable Development Engineering, CE435 Groundwater Hydrology & Geochemistry, CE477 Atmospheric Chemistry, CE478 Solid Waste Management and Landfill Design, Took:	<input type="checkbox"/> Complete ONE of the following: Capstone Design w/ Env. Focus (CE490/1, MP401, AE451, CH420, EE412, EM456, ME446), OR Env. Related Research for 3 CH (CE495/6, ES443/4/5/6) Took:  CH434/ES434 Air Pollution Control, ES436 Global Climate Change: Science, Engineering & Policy, EHS406 Industrial Hygiene Control Methods, EHS416 Principles of Occupational Health, OR EV314 Adirondack Integrated Research Project Took:

Approved as of 2016-2017

Student Name

Student Number

Exp. Graduation Year

Minor in Architectural and Facilities Engineering

Complete the following requirements:

Complete the following required courses: <input type="checkbox"/> CE305 Constr. Planning and Mgmt. <input type="checkbox"/> CE408 Building Info. Mod./IPD <input type="checkbox"/> CE409 Fund. of Bldg. Sys. <input type="checkbox"/> CE448 Intro. to Arch Engr. Took:	<input type="checkbox"/> Complete TWO of the following: CE407 Intro. to Sch. and Est. CE410/510 Sustainable Infra. & Bldg. CE411 Constr. Mat. Engineering CE415/515 Found. & Ret. Struct. CE441 Reinf. Concrete Design CE442 Steel Design ME310 Thermo. Sys. Engineering ME411 Introduction to Heat Transfer ME444 Computer Aided Engineering EE221 Linear Circuits EE331 Energy Conversion EE333 Power System Engineering EE/ME450 Control Systems EHS330 – Safety Analysis – Envir., Health, and Safety Assessment ES238 Intro. to Energy Systems EV305 Sustainability and the Envir. Took:
<input type="checkbox"/> Complete ONE of the following: DS241 Introduction to Data Science MA330 Advanced Engineering Math STAT383 Probability and Statistics STAT389 Probability and Statistics w/ Multivariate Analysis Took:	
<input type="checkbox"/> Complete ONE of the following: EM/OM380 Project Management, FN361 Financial Management, OS286 Organizational Behavior 1, OR LW270 Law and Society 1 Took:	
<input type="checkbox"/> Complete ONE of the following: A 3 CH course in art history, architectural history, art appreciation, applied art, or related study (as a knowledge area/university course). Clarkson DA110 Drawing, OR SUNY Potsdam ARTH310, ARTH311, ARTH352, & ARTH356 (through the Assoc. Schools of the St. Law. Valley) comply with this requirement. Took:	<input type="checkbox"/> Complete ONE of the following: CE490/491, ME446, EE412, EM456, or equivalent, with an Architectural and/or Facilities focus (inc. MP courses) Took:

Approved as of 2020-2021



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**Appendix K: Clarkson University Common Experience Requirements Checklist (CivE and EnvE)**

Faculty Advisor	Student Name	Student Number	Class Year
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**All items must be checked off prior to graduation for all CivE and EnvE students. Deviations from the checklist must be approved by the Academic Advisor, Department Chair/XO and Dean of Engineering.**

- FY100, First-Year Seminar.** *Required only for first-year students (exception may be provided for transfer students).*
- UNIV190, The Clarkson Seminar.** *Depending on initial abilities and background, students may also be required to enroll in a course that provides writing instruction and support for UNIV190. Students for whom English is a second language must also meet the ESL/EAP requirement. For transfer students this may be a designated humanities or other KA/UC course if not given specific credit for UNIV190.*
- Mathematics Courses and Statistics.** *Students must take at least 2 mathematics courses and have a significant learning experience in statistics and/or probability.*
  - MA131 Calculus I**     **MA231 Calculus III**
  - MA132 Calculus II**                                         **MA232 Differential Equations**
  - STAT383 Probability and Statistics**
- Science Courses.** *Students must take at least 2 science courses, at least one of which must have a lab.*
  - CM131 General Chemistry I**                             **PH131 Physics I**
  - CM132 General Chemistry II**                         **PH132 Physics II**

**Technology Course.** *Students must take a Technology Course that addresses the theme of technology serving humanity. These courses are indicated by the TECH designator. Normally this is fulfilled by ES110; transfers can select another course if there was not an equivalent transfer course designated.*

**Technology Course:** \_\_\_\_\_

**Knowledge Areas and University Courses.** *Students must take at least five (5) courses that have Knowledge Area designators, covering at least 4 of the 6 Knowledge Areas (CSO, CGI, IA, STS, EC, and IG). Additionally, at least one (1) of these five (5) courses must be a University Course that has at least two Knowledge Area designators. Note that certain majors, professional concentrations and minors have recommended or required KA/UC courses.*

- 4 of 6 Knowledge Areas\* (check four or more):**  
 CGI     CSO     EC     IA     IG     STS

**UNIV Course:** \_\_\_\_\_ **KA(1):** \_\_\_\_\_ **KA(2):** \_\_\_\_\_

**4 additional Knowledge Area Courses (must check at least four boxes below)**

<input type="checkbox"/> <b>EC350</b>	Econ. Principles / Engineering Economics (or for Transfers, CEC150 or 151 and EC200)	<b>KA(1):</b>	EC	<b>KA(2):</b>	
<input type="checkbox"/> <b>Course:</b>		<b>KA(1):</b>		<b>KA(2):</b>	
<input type="checkbox"/> <b>Course:</b>		<b>KA(1):</b>		<b>KA(2):</b>	
<input type="checkbox"/> <b>Course:</b>		<b>KA(1):</b>		<b>KA(2):</b>	
<input type="checkbox"/> <b>Course:</b>		<b>KA(1):</b>		<b>KA(2):</b>	

**Communication Points (minimum of 6).** *In addition to UNIV190, students must select coursework with a total of at least 6 communication points; at least two points must come from within CE courses at the 300 or 400 level.*

**CE212** Comm. Pts.:   1  

**At Least 2 Communication Points from CE courses at the 300 or 400 Level (must check at least 2 below)**

- CE310** Comm. Pts.:   1                               **CE320** Comm. Pts.:   1
- CE330** Comm. Pts.:   1                               **CE380** Comm. Pts.:   1
- CE470** Comm. Pts.:   1                               **CE479** Comm. Pts.:   1
- CE481** Comm. Pts.:   1                               **CE490/1** Comm. Pts.:   1

**Other Courses with Communication Points**

**Course:** \_\_\_\_\_ Comm. Pts.: \_\_\_\_\_     **Course:** \_\_\_\_\_ Comm. Pts.: \_\_\_\_\_  
 **Course:** \_\_\_\_\_ Comm. Pts.: \_\_\_\_\_     **Course:** \_\_\_\_\_ Comm. Pts.: \_\_\_\_\_

**≥16.5 Design Credits.** *Sum of design credits of all courses on the student's curriculum sheet must be ≥ 16.5. The CEE Undergraduate Handbook has an Appendix that lists design credits from required courses and professional electives.*

**ES499: Professional Experience for Engineering Majors.** *All students must participate in a project-based Professional Experience following the first-year, related to the student's professional goals. See the CEE Undergraduate handbook for more information on applicable experiences and the process of approval for this requirement.*

- Pre-Approval Worksheet Complete (Handshake)\***                            *Date of Approval:* \_\_\_\_\_
- Post-Experience Self-Assessment Complete (Handshake)\***                    *Date of Approval:* \_\_\_\_\_

\* At least 4 of the 6 Knowledge Area Designators must be covered; † Requires approval of the CEE Chair/XO or designee cee

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*Appendix L: Professional Elective Approval Form*

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



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CIVIL & ENVIRONMENTAL ENGINEERING

Professional Elective Approval Form

This form is NOT required for those courses already approved as annotated in this handbook. Submission of form for the purpose of approving an already approved course will result in its rejection.

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.

All requests for approval MUST be accompanied by 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.

Name of Student: \_\_\_\_\_ Student Number: \_\_\_\_\_

Course Requested for approval:

Course number: \_\_\_\_\_ Course Title: \_\_\_\_\_ Credit Hours: \_\_\_\_\_

Semester Course is to be taken: \_\_\_\_\_

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Advisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Department Chair/XO Approval: \_\_\_\_\_ Date: \_\_\_\_\_

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### Appendix M: Design Credits Course Listing

The CEE department requires that a total of 16.5 credit hours of design be taken through the CivE or EnvE curricula. The following is a list of courses that carry design credits:

Course No.	Course Title	Design Credits
CE212	Introduction to Engineering Design	1.5
CE305	Construction Planning and Management	1
CE310	Geotechnical Engineering I: Soil Mechanics	1
CE320	Structural Analysis	1
CE330	Water Resources Engineering I	1
CE340	Introduction to Environmental Engineering	1
CE380	Fundamentals of Environmental Engineering	1
CE406	Construction Engineering	2
CE407	Introduction to Construction Estimating and Scheduling	2
CE408	Building Information Modeling and Integrated Project Delivery	2
CE409	Fundamentals of Building Systems	2
CE410	Sustainable Infrastructure & Building	3
CE411	Construction Materials Engineering	2
CE415/515	Foundations, Stability, and Retaining Structures	3
CE421/521	Composite Mechanics and Design	1
CE423	Structural Health Monitoring and Condition Assessment	1
CE430	Water Resources Engineering II	1
CE433	Human Exposure Analysis	2
CE434	Sustainable Development Engineering	2
CE435/EV435	Groundwater Hydrology & Geochemistry	1
CE441	Reinforced Concrete Design	3
CE442	Steel Design	3
CE445	Timber Design	3
CE446	Reinforced Masonry Design	3
CE546	Advanced Reinforced Masonry Design	3
CE448	Introduction to Architectural Engineering	2
CE452/552	Advanced Mechanics of Materials	1
CE453/553	Properties and Performance of Concrete Materials	1
CE455/555	Structural Damage Assessment, Repair and Strengthening	1
CE461	Transportation Systems Design	3
CE463	Railroad Engineering	2
CE468	Traffic Engineering	1.5
CE478	Solid Waste Management & Landfill Design	2
CE479/579	Water and Wastewater Treatment Processes	3
CE481/581	Hazardous Waste Management Engineering	2.5
CE482/582	Environmental Systems Analysis & Design	2
CE486/586	Industrial Ecology	1
CE490/491	Senior Design (Structures, Transportation, Geotechnical, or Water Resources/Environmental or Building/Architectural)	3
CE519	Advanced Foundation Design	3
CE544	Advanced Design of Structural Concrete	3
CE546	Advanced Reinforced Masonry Design	3
CE583	Modeling Natural Aquatic Systems	1
CE584	Chemodynamics	1
CH434	Air Pollution Control	1
EE/ES438	Alternate Energy Systems	1
EHS406	Industrial Hygiene Control Methods	2
ES240	Our Water Future: Sustainable Water Resources Management	1
ES432	Risk Analysis	1.5
EV314	Adirondack Integrated Research Project	1
EV390	Sustainability Project Experience	3

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