Mission of the Department of Civil and Environmental Engineering

The mission of the Department of Civil and Environmental Engineering 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: Graduates will become civil (environmental) engineering professionals who apply knowledge to meet the challenges of their field.
Outcomes to Ensure Achievement of Objective:

<table>
<thead>
<tr>
<th>Civil Engineering</th>
<th>Environmental Engineering</th>
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<tbody>
<tr>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
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<td>1c) Students will have the ability to apply engineering design to produce solutions that meet specified needs for the public good.</td>
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<tr>
<td>1d) Students will have the ability to apply appropriate learning strategies and modern engineering tools, to identify, formulate and design solutions for complex engineering problems.</td>
<td></td>
</tr>
<tr>
<td>1e) Students will have basic proficiency in at least four of the recognized civil focus areas.</td>
<td>1e) Students will have basic proficiency in more than one environmental engineering focus area e.g. air, water, land or environmental health.</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

Objective 2: Graduates will become civil (environmental) engineering professionals who exhibit effective communication, teamwork, and leadership.
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: Graduates will become well-rounded citizens who utilize their education to serve the public good, 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: Graduates will become civil (environmental) engineering professionals who exhibit intellectual growth, continued innovation, and a commitment to lifelong 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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1 where the “public good” is defined through consideration of public health, safety, and welfare, as well as global, national, cultural, social, civil, and economic factors.
2 Ibid.
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
  Exclusions to Required Courses ......................................................................................................... 12
  Additional Mathematics Requirements ............................................................................................... 12
  Professional Electives .......................................................................................................................... 12
  Design Credits from Required Courses and Professional Electives .................................................. 13
  Capstone Design Experience (Senior Design) ...................................................................................... 13
  MP (Multidisciplinary Project) Courses ............................................................................................ 13
  ROTC or AFROTC Professional Electives ......................................................................................... 14
  Pass-No Entry Courses ....................................................................................................................... 14
  Professional Experience ........................................................................................................................ 14
  Curriculum Requirements ................................................................................................................... 17
    Course Evaluations ............................................................................................................................. 17
    Clarkson Common Curriculum (KA/UC) ......................................................................................... 17
    Coulter School of Engineering Requirements ............................................................................... 18
  Advisement and Coordination .............................................................................................................. 18
Minors and Professional Concentrations for CEE Majors ..................................................................... 19
  Professional Concentration in Construction Engineering Management (class of 2021 and beyond) ... 19
  Professional Concentration in Structural Engineering ..................................................................... 20
  Professional Concentration in Water Resources Engineering .......................................................... 21
  Minor in Environmental Engineering ................................................................................................. 21
  Minor in Architectural and Facilities Engineering (for Class of 2021 and beyond) ......................... 23
  How to Sign-up for a Concentration, Minor, Dual Major, Dual/Second Degree, or another Major ...... 24
Curricular Opportunities and Information for CEE Majors ................................................................ 25
  Adirondack Semester ......................................................................................................................... 25
  Double Majors ..................................................................................................................................... 25
  Dual Degree ........................................................................................................................................ 25
  Second Degree ................................................................................................................................... 26
  Undergraduate Students in Graduate Courses ................................................................................... 26
  Engineering MBA-MS 4 + 1 Program ................................................................................................. 26
Other Curricular Matters .......................................................................................................................... 27
  Student Academic Records ................................................................................................................. 27
  Changing Majors ............................................................................................................................... 27
  Non-Transfer Student, Transfer Credit .............................................................................................. 27
    Advanced Placement Credit ........................................................................................................... 27
    Cross-Registration within the Associated Colleges of the St. Lawrence Valley ......................... 27
    Off-Campus Course Permission .................................................................................................... 27
  Special Interests ................................................................................................................................. 28
  Research Experience for Undergraduates (REU) Programs ............................................................. 28
  Commencement ................................................................................................................................. 28
  Graduate School .............................................................................................................................. 28
Welcome from the Chair

I am pleased to welcome you to the Department of Civil and Environmental Engineering at Clarkson. 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](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. The National Science Foundation (NSF) currently funds Research Experiences for Undergraduates (REU) Sites at Clarkson and at other universities around the country that provide special opportunities for undergraduate students to gain experience in research that is relevant to Civil and Environmental Engineering. More information about these opportunities and how you can become involved may be found at [https://www.nsf.gov/crssprgm/reu/reu_search.jsp](https://www.nsf.gov/crssprgm/reu/reu_search.jsp).

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. 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 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, water resources, 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 2021-2022", which you can find on the internet by selecting “Undergraduate Regulations” at [https://www.clarkson.edu/student-administrative-services-sas/clarkson-regulations](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 [https://www.asce.org/career-growth/ethics/code-of-ethics](https://www.asce.org/career-growth/ethics/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 with 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 through a sign-up sheet posted outside their office door the week prior or through an online meeting scheduling tool (often using Google calendar appointments). 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 online 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 online at 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 a 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 visit the following link https://intranet.clarkson.edu/academic/school-of-engineering/fundamentals-of-engineering-examination-fe/ 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 be 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!”

The Civil Engineering curriculum is designed to provide all graduates with a theoretical foundation as well as design experience in the areas of structures, geotechnical, water resources, and environmental engineering. This foundation is typically achieved in the junior year and enables students to use the senior year to select elective courses in areas where

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3 ASCE Metropolitan Section, found at [http://www.ascemetsection.org/kids/what-is-civil-engineering](http://www.ascemetsection.org/kids/what-is-civil-engineering), accessed on 10 July 2017
their particular interests have developed. In the senior year, a capstone design course culminates the development of design skills that were 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 construction engineering management, water resources engineering, or structural engineering. Additionally, CivE students can select their professional electives to obtain a minor in environmental engineering or in architectural & facilities engineering. 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 ensure 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 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.4 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.

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. 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.

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

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4 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.
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 a 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 CivE and EnvE curricula require STAT 383-Probability & Statistics. 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 MyCU. 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.

**Capstone Design Experience (Senior Design)**

All CEE majors must complete a capstone design experience, typically during their last Spring semester in their program. The two courses typically taken are CE490 (CivE) and CE491 (EnvE), with water resources focused students taking one or the other, so long as it has the requisite water resources related content. The capstone/senior design experience is one in which students execute a multi-disciplinary project, as a team based on their previous coursework, often for actual/"real world" customers that are depending on the deliverables for the success of their endeavor. During the Fall semester, prior to the enrollment period, the CEE department will announce the particular projects that will be executed during the following Spring semester such that students can select the appropriate course and/or section of CE490/1 that they desire.

For those that, by virtue of going on co-op or other reasons, end up with an expected graduation in August or December, it is critical that you plan to take your capstone course in the Spring prior to that final semester. Students, on a case-by-case and well-justified basis, may elect to take capstone/senior design courses that are in other departments or in combination with those offered by other departments. Such alternatives must meet the full requirements of the CEE department course offerings as well as be evaluated and approved by the CEE department prior to enrollment.

**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, includes experiments and data interpretation, includes design, incorporates teamwork, identifies, formulates, and solves an engineering problem, includes ethical and professional responsibility, etc., and that 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.

**ROTC or AFROTC Professional Electives**

Students who complete the Army or Air Force advanced ROTC program may use, at their option, any two 4xx courses with the designator MS or AS for a maximum total of six (6) credit hours (must complete 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 CEE Professor Backus, a graduate of Clarkson CEE, Clarkson Army ROTC, and a retired US 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:

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.

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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.
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. 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 (meaning a typical 40 hour work week) 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). Normally this is a contiguous experience, not split into shorter duration experiences.

For ROTC Cadets, your professional experience may include training and other experiences beyond your required evaluation camp (those camps that are required; e.g., Basic or Advanced Camp at Fort Knox, KY for Army ROTC and Field Training at Maxwell AFB, AL for Air Force ROTC). Said evaluation camps DO NOT count as professional experiences, while other activities such as CULP, CTLT, LEDx, SOAR, etc., do qualify. ROTC Cadets should ensure they consider fulfilling their Professional Experience requirement during the other summers that are not required to attend their evaluation camp in the event that they do not qualify for follow-on training after said camps.

Prior to you participating in an internship or co-op experience, it is highly advantageous to have it approved through Handshake (see below). Questions on this should be addressed directly to the CEE XO, who is the approval authority for what qualifies for the professional experience requirement, can adjudicate any exceptions or special circumstances on a case-by-case basis.

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 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 MyCU 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, submitted it for approval, and 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 MyCU 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. For more information please see the CEE Executive Officer in Rowley 140A or at 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.

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.

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.
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 Construction Engineering Management, Structural Engineering and Water Resources Engineering. When the appropriate courses are completed, as described below, a certificate from the Chair of Civil and Environmental Engineering is awarded noting completion of the concentration. The Environmental Engineering minor for CivE majors is different than the EnvE major in that the Environmental Engineering minor with 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 MyCU and follow the instructions indicated in “Concentration, Minor, Dual Major, Dual/Second Degree, or another Major”, below.

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).

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>CO/PREREQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE411 Construction Materials Engineering</td>
<td>3</td>
<td>Junior or Senior Standing</td>
</tr>
<tr>
<td>CE415/515 Foundations, Stability and Retaining Structures</td>
<td>3</td>
<td>CE310</td>
</tr>
<tr>
<td>CE441 Reinforced Concrete Design</td>
<td>3</td>
<td>CE320</td>
</tr>
<tr>
<td>CE442 Steel Design</td>
<td>3</td>
<td>CE320</td>
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Choose ONE of the following non-CE courses

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>CO/PREREQUISITE</th>
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</thead>
<tbody>
<tr>
<td>OS286 Organizational Behavior</td>
<td>3</td>
<td>SOPHOMORE or Consent of Instructor</td>
</tr>
<tr>
<td>EHS330 Safety Analysis</td>
<td>3</td>
<td>SOPHOMORE Standing at least</td>
</tr>
<tr>
<td>LW 270 Law &amp; Society 1</td>
<td>3</td>
<td>Stat282/383, or MA330, EC150 or EC350, AC203 or AC/EM205, sophomore standing or consent of instructor</td>
</tr>
<tr>
<td>FN361 Financial Management</td>
<td>3</td>
<td>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</td>
</tr>
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</table>

EM/OM380 Project Management**

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>CO/PREREQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW466 Law of the Workplace</td>
<td>3</td>
<td>STAT282 or STAT383 or MA330 or MA232 or MA330. Enrollment is limited to students in CUSB, CivE-Construction Engineering Management Concentration, Software Engineering or consent of the instructor</td>
</tr>
<tr>
<td>EM/OM451 Quality Management &amp; Lean Enterprise</td>
<td>3</td>
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</tbody>
</table>

COMM217/417 Speaking

** 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.

Completion of ONE of the following TRACKS by completing at least two courses in the track:

** Construction/Infrastructure Track:

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>CO/PREREQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE302 Surveying, Geodetic Control, and Engineering Measurements</td>
<td>3</td>
<td>MA131</td>
</tr>
<tr>
<td>CE304 Introduction to Estimating and Scheduling</td>
<td>3</td>
<td>JR or SR</td>
</tr>
<tr>
<td>CE315 Geology for Engineers</td>
<td>3</td>
<td>CM 131 and PH 131 Corequisite: CM 132</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>PREREQUISITE</th>
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</thead>
<tbody>
<tr>
<td>CE420/520 Computational Methods of Structural Analysis</td>
<td>3</td>
<td>CE320 with minimum grade of C</td>
</tr>
<tr>
<td>CE415/515 Foundations, Stability and Retaining Structures</td>
<td>3</td>
<td>CE310</td>
</tr>
<tr>
<td>CE441 Reinforced Concrete Design</td>
<td>3</td>
<td>CE320 (co-requisite)</td>
</tr>
<tr>
<td>CE442 Steel Design</td>
<td>3</td>
<td>CE320</td>
</tr>
<tr>
<td>CE490 Senior Design</td>
<td>3</td>
<td>CE310 &amp; CE441 or CE442</td>
</tr>
<tr>
<td>Choose at least TWO of the following courses:</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>CE408 BIM &amp; IPD</td>
<td>3</td>
<td>CEE Junior or Senior Standing</td>
</tr>
<tr>
<td>CE411 Construction Materials Engineering</td>
<td>3</td>
<td>Junior or Senior Standing</td>
</tr>
<tr>
<td>CE421/521 Composite Mechanics and Design</td>
<td>3</td>
<td>ES222 &amp; ES260</td>
</tr>
<tr>
<td>CE538 Finite Element Methods</td>
<td>3</td>
<td>ES222, ES330, MA 232</td>
</tr>
<tr>
<td>CE453/553 Properties &amp; Performance of Concrete Materials</td>
<td>3</td>
<td>ES260</td>
</tr>
<tr>
<td>CE555 Structural Damage Assessment, Repair, and Streqh.</td>
<td>3</td>
<td>ES222</td>
</tr>
<tr>
<td>CE448 Introduction to Architectural Engineering</td>
<td>3</td>
<td>ES220 and CE212, or consent of instructor.</td>
</tr>
<tr>
<td>CE512 Structural Dynamics</td>
<td>3</td>
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</table>

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.

<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>PREREQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE430 Water Resources Engineering II</td>
<td>3</td>
<td>CE330</td>
</tr>
<tr>
<td>CE470 Stream Riparian System and Fluvial Morphology</td>
<td>3</td>
<td>CE330 or CE340; or permission of the instructor.</td>
</tr>
<tr>
<td>CE479 Water and Wastewater Treatment Processes</td>
<td>3</td>
<td>ES330, CE340, or consent of the instructor.</td>
</tr>
<tr>
<td>CE490/1 Senior Design with a Water Resources focus</td>
<td>3</td>
<td>SR, Corequisites: CE310, and either CE441 or CE442 (or consent of the instructor)</td>
</tr>
</tbody>
</table>

Choose at least TWO of the following courses:

- CE315 Geology for Engineers                                            | 3      | CM 131 and PH 131 Corequisite: CM 132 |
- 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                                |
- CE482/582 Environmental Systems Analysis & Design                     | 3      | CE340 or CE579 or equivalent course, EC350, or consent of the instructor. |

Choose at least ONE of the following courses:

- BY/EV330 Great Lakes Water Protection                                 | 3      | Sophomore standing at least BY222 or CM132 or consent of the instructor. Corequisite: BY 432 |
- BY431 Limnology                                                       |
- ES436 Global Climate Change: Science, Engineering & Policy           |
- COMM428 Environmental Communication                                  |
- EV305 Sustainability & the Environment                                |
- POL/SOC470 Environmental Policy                                      |

Or other course as designated by CEE Department Chair

TOTAL CREDITS FOR CONCENTRATION: 21

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:
<table>
<thead>
<tr>
<th>COURSES</th>
<th>CREDIT</th>
<th>PREREQUISITE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core required courses (2):</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Complete ONE of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE340 Introduction to Environmental Engineering</td>
<td>3</td>
<td>CM132 or CM104, MA232 (co-req)</td>
</tr>
<tr>
<td>CE380 Fundamentals of Environmental Engineering</td>
<td>3</td>
<td>CH210 or instructor consent</td>
</tr>
<tr>
<td>CH220 Materials Balances</td>
<td>3</td>
<td>CM132, MA132, PH131, CH210 or CM371 (Co-req)</td>
</tr>
<tr>
<td>Complete ONE of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capstone Design with specific environmental focus (e.g., CE490/1/2, MP401, AE451, CH420, EE412, EM456, ME446)</td>
<td>3</td>
<td>Senior standing in degree program or instructor consent</td>
</tr>
<tr>
<td>Environmentally-related research (e.g., CE495, CE496, ES443/4/5/6/7)</td>
<td>3</td>
<td>Instructor consent</td>
</tr>
<tr>
<td>Complete ONE of these chemical principle courses:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CH210 Chemical Engineering Principles</td>
<td>3</td>
<td>CM104 or CM132, MA132</td>
</tr>
<tr>
<td>CH221 Spectroscopy</td>
<td>3</td>
<td>CM104 or CM132</td>
</tr>
<tr>
<td>CM241 Organic Chemistry I</td>
<td>3</td>
<td>CM104 or CM132</td>
</tr>
<tr>
<td>CM371 Physical Chemistry I</td>
<td>3</td>
<td>CM104 or CM132, MA132, PH132</td>
</tr>
<tr>
<td>Complete ONE of these biological principles courses:</td>
<td>3-5</td>
<td></td>
</tr>
<tr>
<td>BY214 Genetics</td>
<td>3</td>
<td>BY160 or instructor consent</td>
</tr>
<tr>
<td>BY222 Ecology &amp; BY224 Ecology Laboratory</td>
<td>3/2</td>
<td>BY140 (note: BY222 andBY224 are co-reqs.)</td>
</tr>
<tr>
<td>BY320 Microbiology</td>
<td>3</td>
<td>Waived for ENVE students</td>
</tr>
<tr>
<td>BY330/EV330 Great Lakes Water Protection</td>
<td>3</td>
<td>Sophomore standing</td>
</tr>
<tr>
<td>Complete TWO of the following courses*:</td>
<td>6-8</td>
<td></td>
</tr>
<tr>
<td><strong>Note: at least ONE course must be a core professional elective</strong></td>
<td>6-8</td>
<td></td>
</tr>
<tr>
<td>Core Professional Electives (minimum ONE required):</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ES432 Risk Analysis</td>
<td>3</td>
<td>CM131 or CM103</td>
</tr>
<tr>
<td>CE479 Water and Wastewater Treatment Processes</td>
<td>3</td>
<td>CE340, ES330 or instructor consent</td>
</tr>
<tr>
<td>CE481 Hazardous Waste Management Engineering</td>
<td>3</td>
<td>CE340 (co-req)</td>
</tr>
<tr>
<td>CE482 Environmental Systems Analysis and Design</td>
<td>3</td>
<td>CE340 or CE479, EC350, or instr. consent</td>
</tr>
<tr>
<td>CE486 Industrial Ecology</td>
<td>3</td>
<td>CE340, CH220, ES330, ES340, CH301, CH271 or consent of the instructor</td>
</tr>
<tr>
<td>Other Professional Electives:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BY314 Bioinformatics</td>
<td>3</td>
<td>BY160 and BY214</td>
</tr>
<tr>
<td>BY328 Conservation Biology</td>
<td>3</td>
<td>BY222 or instructor consent</td>
</tr>
<tr>
<td>BY412 Molecular Biology Laboratory</td>
<td>3</td>
<td>BY214 or instructor consent</td>
</tr>
<tr>
<td>BY425 Biological Systems &amp; Environmental Change</td>
<td>3</td>
<td>BY222</td>
</tr>
<tr>
<td>BY431 Limnology &amp; BY432 Limnology Laboratory</td>
<td>3/2</td>
<td>BY222 or CM132 or instructor consent (note: BY431 and BY432 are co-reqs.)</td>
</tr>
<tr>
<td>BY486 Molecular Biotechnology</td>
<td>3</td>
<td>BY160 and BY214</td>
</tr>
<tr>
<td>CE430 Water Resources Engineering II</td>
<td>3</td>
<td>CE330</td>
</tr>
<tr>
<td>CE434 Sustainable Development Engineering</td>
<td>3</td>
<td>CE340 or consent of the instructor</td>
</tr>
<tr>
<td>CE435 Groundwater Hydrology &amp; Geochemistry</td>
<td>3</td>
<td>CM132, MA132, CE340</td>
</tr>
<tr>
<td>CE477 Atmospheric Chemistry</td>
<td>3</td>
<td>CM370 or CM371 or ES340</td>
</tr>
<tr>
<td>CE478 Solid Waste Management and Landfill Design</td>
<td>3</td>
<td>Junior or senior standing</td>
</tr>
<tr>
<td>CH434/ES434 Air Pollution Control</td>
<td>3</td>
<td>CM131 or CM103 &amp; junior standing</td>
</tr>
<tr>
<td>ES436 Global Climate Change: Science, Engineering &amp; Policy</td>
<td>3</td>
<td>Quantitative and modeling skills (MATLAB, Excel) are required, statistics is recommended</td>
</tr>
<tr>
<td>EHS406 Industrial Hygiene Control Methods, OR</td>
<td>3</td>
<td>EHS309 or instructor consent</td>
</tr>
<tr>
<td>EHS416 Principles of Occupational Health</td>
<td>3</td>
<td>EHS309 or instructor consent</td>
</tr>
<tr>
<td>EV314 Adirondack Integrated Research Project</td>
<td>3</td>
<td>Instructor consent</td>
</tr>
</tbody>
</table>

**TOTAL CREDITS FOR THE MINOR** 18-22

* 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):

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

Credit Hours: 12

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

- CE304 (Introduction to Scheduling and Estimating) - Construction
- CE404 (Applications in 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
- 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 to 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**

MyCU is used to declare a minor or professional concentration. Extensive tutorials and documentation on using myCU for these tasks and many others can be found at [https://intranet.clarkson.edu/student-life/sas/peoplesoft-info/](https://intranet.clarkson.edu/student-life/sas/peoplesoft-info/). Students also can contact the CEE department at cee@clarkson.edu for additional help.
Curricular Opportunities and Information for CEE Majors

Adirondack Semester

Offered in 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:

<table>
<thead>
<tr>
<th>ADK Semester Course</th>
<th>Civil Engineering</th>
<th>Environmental Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE301 GIS</td>
<td>CE301 Requirement</td>
<td>CE301 Requirement</td>
</tr>
<tr>
<td>EV/BY312 ADK Ecology &amp; Env. Science</td>
<td>Prof. Elective, C-1</td>
<td>Prof. Elective or Earth Science Elective, TECH</td>
</tr>
<tr>
<td>EV322 ADK Sense of Place</td>
<td>Prof. Elective or KA/UC: UNIV/CSO/IA, C-1</td>
<td>Prof. Elective or KA/UC: UNIV/CSO/IA, C-1</td>
</tr>
<tr>
<td>EV314 Integrated Research Project</td>
<td>ADK as Soph.: CE212 ADK as Jr./Sr.: Prof. Elective Either case, 1 credit of design, 2 comm. point</td>
<td>ADK as Soph.: CE212 ADK as Jr./Sr.: Prof. Elective Either case, 1 credit of design, 2 comm. point</td>
</tr>
</tbody>
</table>

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 Appendices) 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
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.

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 MyCU. 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 MyCU 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/](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](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.
CxEE 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.

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

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. Contact 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:

<table>
<thead>
<tr>
<th>Organization Name</th>
<th>Faculty Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi Epsilon (Civil / Env. Eng.)</td>
<td>Professor Tyler Smith</td>
</tr>
<tr>
<td>Tau Chi Alpha (Env. Eng.)</td>
<td>Professor Stefan Grimberg</td>
</tr>
<tr>
<td>Tau Beta Pi (All Engineering)</td>
<td>Professor Sitaraman Krishnan</td>
</tr>
<tr>
<td>Phi Kappa Phi (All Engineering)</td>
<td>Professor Richard McCluskey</td>
</tr>
<tr>
<td>Phalanx (All Majors)</td>
<td>Professor Erik Backus</td>
</tr>
</tbody>
</table>
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 Student Success 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) and 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.

Accessability Services

Accessability Services is located in 1003 Price Hall. 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 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.
# Appendices

## Appendices Listing

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Faculty of the Department of Civil and Environmental Engineering</td>
</tr>
<tr>
<td>B</td>
<td>Listing of Internet/Intranet Sites Referenced in this Handbook</td>
</tr>
<tr>
<td>C</td>
<td>Civil Engineering Curriculum Worksheet (Class of 2021 and thereafter)</td>
</tr>
<tr>
<td>D</td>
<td>Civil Engineering Curriculum Worksheet (Class of 2025 and thereafter)</td>
</tr>
<tr>
<td>E</td>
<td>Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)</td>
</tr>
<tr>
<td>F</td>
<td>Environmental Engineering Curriculum Worksheet (Class of 2025 and thereafter)</td>
</tr>
<tr>
<td>G</td>
<td>Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2020 and thereafter)</td>
</tr>
<tr>
<td>H</td>
<td>Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2025 and thereafter)</td>
</tr>
<tr>
<td>I</td>
<td>Civil Engineering Curriculum Flowchart</td>
</tr>
<tr>
<td>J</td>
<td>Environmental Engineering Curriculum Flowchart</td>
</tr>
<tr>
<td>K</td>
<td>Civil and Environmental Hosted Minors Tracking Sheet</td>
</tr>
<tr>
<td>L</td>
<td>Clarkson University Common Experience Requirements Checklist (CivE and EnvE)</td>
</tr>
<tr>
<td>M</td>
<td>Professional Elective Approval Form</td>
</tr>
<tr>
<td>N</td>
<td>Design Credits Course Listing</td>
</tr>
</tbody>
</table>
Appendix A: Faculty of the Department of Civil and Environmental Engineering

**Erik Backus**
Professor of Practice  
Director, Construction Engineering Management Program  
132 Rowley, 268-6522  
MS Civil Engineering, University of Missouri – Rolla, 2004  
Registered Professional Engineer, Missouri  
**Teaches:**  
CE212 – Introduction to Engineering Design  
CE404 – Applications in Scheduling and Estimating  
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  
CE452/552 Advanced Strength of Materials  
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, 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.

Allen Gontz
Professor
126 Rowley, 268-7716
PhD Earth Sciences, University of Maine, 2005

Teaches:
CE315 – Geology for Engineers

Research:
Quaternary Systems; Earth Processes; Landscape Change; Climate Change; Sea Level Change; Lacustrine, Palustrine & Estuarine Systems; Shallow Earth Geophysics; Geoarchaeology; Geomorphology.
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.

William Olsen
Professor of Practice
102 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:

Xianda Shen
Assistant Professor
108 Rowley, 268-6606
PhD Civil Engineering, Georgia Institute of Technology, 2019
Teaches:
ES220 – Statics
CE415/515 – Foundations, Stability, and Retaining Structures
Research:
Multi-scale geomechanical modeling, Thermo-Hydro-Chemo-Mechanical (THCM) couplings in porous and fractured media, and the application of data-driven methods to geotechnical engineering.
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.

Siwen Wang
Assistant Professor
130 Rowley, 268-4446
PhD Environmental Science and Engineering, Caltech, 2020
Teaches:
CE479/579 – Water and Wastewater Treatment Design
Research:
Treatment of waterborne pathogens, including bacteria, viruses, parasites, antibiotic resistance genes; Development of point-of-use pathogen detection techniques for environmental applications.

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 and Executive Officer
140A Rowley, 268-7741/1261
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:
ES 220 – Statics
CE310 – Geotechnical Engineering I: Soil Mechanics
CE415/515 – 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:
Research Faculty

**Kerop Janoyan**  
Research Professor  
104 Rowley, 268-6529  
PhD Civil Engineering, University of California, Los Angeles, 2001  
**Research:**  
Sensing of Structural and Geotechnical Phenomena, Structural Health Monitoring.

**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:**  

**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; CO₂ Transport in Water.

Thomas Young  
Professor Emeritus  
PhD Limnology, Michigan State University, 1977  
Research:  
Environmental Engineering Systems.
Appendix B: Listing of Clarkson Internet/Intranet Sites Referenced in Handbook

<table>
<thead>
<tr>
<th>Campus Resource</th>
<th>Universal Resource Locator (URL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarkson University Home Page</td>
<td><a href="http://www.clarkson.edu">http://www.clarkson.edu</a></td>
</tr>
<tr>
<td>Clarkson University Internal (Intranet) Site</td>
<td><a href="https://intranet.clarkson.edu">https://intranet.clarkson.edu</a></td>
</tr>
<tr>
<td>Clarkson University Interactive Campus Map</td>
<td><a href="https://clarkson.university-tour.com/map.php">https://clarkson.university-tour.com/map.php</a></td>
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<tr>
<td>Dept. of Civil &amp; Environmental Engineering</td>
<td><a href="https://www.clarkson.edu/academics/engineering/civil-environmental-engineering">https://www.clarkson.edu/academics/engineering/civil-environmental-engineering</a></td>
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<td>Undergraduate research experiences and opportunities at Clarkson</td>
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<td>Student Support Services Center</td>
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<td>Course Registrar</td>
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<td>Commonly Used Forms</td>
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## Appendix C: Civil Engineering Curriculum Worksheet (Classes of 2021-2024)

<table>
<thead>
<tr>
<th>Faculty Advisor</th>
<th>Student Name</th>
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</tr>
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<tbody>
<tr>
<td>FRESHMAN – FALL</td>
<td></td>
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<tr>
<td>CM131 General Chem. I (4 cr)</td>
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<td>PH131 Fund. Physics I (4 cr)</td>
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<tr>
<td>UNIV190 Clarkson Sem.</td>
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<tr>
<td>MA131 Calculus I</td>
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<tr>
<td>FY/PE100 First Year Seminar (0 cr)</td>
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<tr>
<td>CE212 Intro. Eng. Des.</td>
<td>1.5</td>
<td>ES222 Strength of Materials</td>
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<tr>
<td>ES220 Statics</td>
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<td>CE305 Construction Planning and Mgmt. (S)</td>
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<tr>
<td>Elective - KA or UC</td>
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<td>ES330 Fluid Mechanics</td>
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<tr>
<td>MA231 Calculus III</td>
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<td>MA232 Differential Equations</td>
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<tr>
<td>CE301 Geospatial Analysis &amp; Appl.</td>
<td></td>
<td>ES Elective (ES223 RBD recom.) (S)</td>
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<tr>
<td>JUNIOR AND SENIOR YEARS</td>
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<td>CE310 Geotechnical Engineering I (S) (3 cr)</td>
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<td>ES elective (ES260 Materials Science recommended)</td>
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<td>ES340 Intro. Environmental Eng. (S)</td>
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<td>ES Elective (ES250 Elect. Sci. or ES340 Thomas recom.)</td>
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<td>University Course (UC Elective)</td>
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<tr>
<td>CE320 Structural Analysis (F) (3 cr)</td>
<td>1 (C1)</td>
<td>CE441 Reinforced Concrete Design (S) OR CE442 Steel Design (F)</td>
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<td>CE330 Water Resources I (F&amp;S) (3 cr)</td>
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<td>Senior Design (CE490 Str., Trans., Geo.-Constr.) OR CE491 Water Resources-Environmental OR CE492 Building Construction (S)</td>
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<tr>
<td>STAT383 Probability &amp; Statistics</td>
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<td>EC350 Econ. Principles / Engineering Economics</td>
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<tr>
<td>ES499 (Prof. Experience) (0cr)</td>
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<td>See also page 2.</td>
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1 Courses are 3 credits unless otherwise noted.
2 A Total of 16.5 Design Credits are Required.
3 Depending on Mathematics placement; may adj. to ES110 in 1st Sem., PH131 in 2nd Sem. w/ KA Course, & PH132 in 3rd Sem.
4 Recommended for Fall semester immediately before grad. but before senior design; Transfers w/ EC150/151 cred. take EC200
5 Or other course designated by CEE Department Chair. For UNIV190, Transfers use other KA/UNIV Course.
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:

<table>
<thead>
<tr>
<th>Course Number/Name</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
<th>Course Name/Number</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
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### Appendix D: Civil Engineering Curriculum Worksheet (Class of 2025 and thereafter)

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<th>Faculty Advisor</th>
<th>Student Name</th>
<th>Student Number</th>
<th>Class Year</th>
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<tr>
<td><strong>FRESHMAN – FALL</strong></td>
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<tr>
<td>CM131 General Chem. I (4 cr)</td>
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<tr>
<td>PH131 Fund. Physics I (4 cr)</td>
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<tr>
<td>UNIV190 Clarkson Sem.</td>
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<tr>
<td>MA131 Calculus I</td>
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<tr>
<td>FY/PE100 First Year Seminar (0 cr)</td>
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<td><strong>SOPHOMORE – FALL</strong></td>
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<tr>
<td>CE212 Intro. Eng. Des.</td>
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<tr>
<td>ES220 Statics</td>
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<tr>
<td>Elective - KA or UC³</td>
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<tr>
<td>MA231 Calculus III</td>
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<tr>
<td>CE301 Geospatial Analysis &amp; Appl.</td>
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<tr>
<td><strong>JUNIOR AND SENIOR YEARS</strong></td>
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<tr>
<td>Elective - KA or UC³</td>
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<tr>
<td>ES Elective (ES260 Materials Science recommended)</td>
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<tr>
<td>ES Elective (ES250 Elect. Sci. or ES340 Therm. recom.)</td>
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<tr>
<td>CE320 Structural Analysis (F) (3 cr)</td>
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<td>Science Elective (Any BY Course, CE315, or per CEE Dept. list)</td>
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<td>CE330 Water Resources I (F&amp;S) (3 cr)</td>
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<tr>
<td>EC350 Econ. Principles / Engineering Economics²</td>
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<tr>
<td>STAT333 Probability &amp; Statistics</td>
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<tr>
<td>ES499 (Prof. Experience) (0cr)</td>
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<td>Optional: CE499 (FE Exam Rev) (0cr)</td>
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<td><strong>OTHER COURSES (Do not count towards degree requirements)</strong></td>
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<td>See also page 2.</td>
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</table>

¹ Courses are 3 credits unless otherwise noted.

² A Total of 16.5 Design Credits are required.

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

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

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

⁶ 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.


⁸ Not often offered, students should consider other options in planning their electives.

Effective for 2021-2022
Civil Engineering Curriculum notes

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

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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:

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<tr>
<th>Course Number/Name</th>
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<th>Semester</th>
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**Appendix E: Environmental Engineering Curriculum Worksheet (Classes of 2021-2024)**

<table>
<thead>
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<th>Faculty Advisor</th>
<th>Student Name</th>
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<th>Class Year</th>
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<tr>
<td><strong>FRESHMAN – FALL</strong></td>
<td><strong>FRESHMAN – SPRING</strong></td>
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<tr>
<td>CM131 General Chem. I (4 cr)</td>
<td>CM132 General Chem. II (4 cr)</td>
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<tr>
<td>PH131 Fund. Physics I (4 cr)</td>
<td>PH132 Fund. Physics II (4 cr)</td>
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<tr>
<td>UNIV190 Clarkson Sem.</td>
<td>ES110 Engr. &amp; Society (TECH)</td>
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<tr>
<td>MA131 Calculus I</td>
<td>MA132 Calculus II</td>
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<tr>
<td>FY/PE100 First Year Seminar (0 cr)</td>
<td>ES100 Intro Computer (2 cr)</td>
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<td><strong>SOPHOMORE – FALL</strong></td>
<td><strong>SOPHOMORE - SPRING</strong></td>
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<tr>
<td>CE212 Intro. Eng. Des.</td>
<td>CE340 Intro to Environmental Engr. (S)</td>
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<tr>
<td>ES220 Statics</td>
<td>CE380 Fund. of Environmental Engr. (S)</td>
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<td>Elective - KA or UC</td>
<td>ES330 Fluid Mechanics</td>
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<td>MA232 Differential Equations</td>
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<td>CH210 Molecular Properties</td>
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<td>JUNIOR AND SENIOR YEARS</td>
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<td>Elective - KA or UC</td>
<td>BY320 Microbiology (S)</td>
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<td>☐ CM241 Organic Chemistry (F) OR</td>
<td>☐ CM221 Spectroscopy (F)</td>
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<tr>
<td>Earth Science Elective</td>
<td>EC350 Econ. Principles / Engineering Economics</td>
<td>EC</td>
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<tr>
<td>CE301 Geospatial Analysis &amp; Appl.</td>
<td>STAT383 Probability &amp; Statistics</td>
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<tr>
<td>CE330 Water Resources I (F&amp;S)</td>
<td>ES340 Thermodynamics I</td>
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<tr>
<td>1 (C1)</td>
<td>Senior Design CE-491 (Water Resources/Environmental) (S) OR Approved Alternate</td>
<td>3 (C1)</td>
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<tr>
<td>CE479 Water &amp; Wastewater Treat. (F)</td>
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<td>3 (C1)</td>
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<td>☑ Checklist to monitor progress towards Professional Concentration(s)</td>
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<td>Core Professional Courses</td>
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<td>Thesis Option</td>
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<td>OTHER COURSES (Do not count towards degree requirements)</td>
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</table>

1 Courses are 3 credits unless otherwise noted.
2 A Total of 16.5 Design Credits are required.
3 Depending on Mathematics placement; may adj. to ES110 in 1st Sem., PH131 in 2nd Sem. w/ KA Course, & PH132 in 3rd Sem.
4 Recommended for Fall semester immediately before grad. but before senior design; Transfers w/ EC150/151 cred. take EC200
5 Or other course designated by CEE Department Chair. For UNIV190: Transfers use other KA/UNIV Course.
6 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).

Effective for 2017-2018

See also page 2.
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
- 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 450 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

**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

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:

<table>
<thead>
<tr>
<th>Course Number/Name</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
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Page 50 of 68
### Appendix F: Environmental Engineering Curriculum Worksheet (Class of 2025 and thereafter)

<table>
<thead>
<tr>
<th>Faculty Advisor</th>
<th>Student Name</th>
<th>Student Number</th>
<th>Class Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRESHMAN – FALL</strong></td>
<td>ID/Des. Credit</td>
<td>Semester</td>
<td>Grade</td>
</tr>
<tr>
<td>CM131 General Chem. I (4 cr)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH131 Fund. Physics I (4 cr)&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>UNIV190 Clarkson Sem.&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>MA131 Calculus I</td>
<td></td>
<td></td>
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<tr>
<td>FY/PE100 First Year Seminar (0 cr)</td>
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<td></td>
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</tr>
<tr>
<td><strong>SOPHOMORE – FALL</strong></td>
<td>ID/Des. Credit</td>
<td>Semester</td>
<td>Grade</td>
</tr>
<tr>
<td>CE212 Intro. Eng. Des.</td>
<td>1.5&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>ES220 Statics</td>
<td></td>
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<tr>
<td>Elective - KA or UC&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>MA231 Calculus III</td>
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<tr>
<td>CH210 Molecular Properties</td>
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<tr>
<td><strong>JUNIOR AND SENIOR YEARS</strong></td>
<td></td>
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<tr>
<td>Elective - KA or UC&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>☐ CM241 Organic Chemistry (F) OR ☐ CM241 Spectroscopy (F)</td>
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<tr>
<td>☐ Earth Science Elective&lt;sup&gt;4&lt;/sup&gt;</td>
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<tr>
<td>CE301 Geospatial Analysis &amp; Appl.</td>
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<tr>
<td>CE330 Water Resources I (F&amp;S)</td>
<td>1 (C1)</td>
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<tr>
<td>CE479 Water &amp; Wastewater Treat. (F)</td>
<td>3 (C1)</td>
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</tr>
<tr>
<td>☑ Checklist to monitor progress towards Professional Concentration(s)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Core Prof. Course</th>
<th>Core Professional Courses</th>
<th>Thesis Option</th>
<th>Double Major Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Prof. Course</td>
<td>Core Professional Courses must include three of these courses:&lt;sup&gt;5&lt;/sup&gt;</td>
<td>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.</td>
<td>If a student desires a double major in both Civil and Environmental Engineering, the use of the Double Major sheet is required. Of note, students who double major will be required to complete 123 credit hours meaning at least one semester of 18 credit hours of work. Further, the curriculum only has available narrowly defined selected elective options, leaving nearly no flexibility within an 8 semester classwork effort.</td>
</tr>
<tr>
<td>☐ CE 482/582 Systems (2) ☐ CE 486 Ind Ecology (1) ☐ ES 432 Risk Analys (1.5) ☐ CE 481 Haz Waste (2.5)</td>
<td></td>
<td>☐ CE 495 ☐ CE 496</td>
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</tr>
</tbody>
</table>

**OTHER COURSES (Do not count towards degree requirements)**

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> Eligible Earth Science elective courses are CE315 Geology for Engineers, ES436 Global Climate Change: Science, Engineering and Policy, CE477 Atmospheric Chemistry.
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 451 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
- CM 421 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/346 Principles of Toxicology and Epidemiology
- OM 331 Operations & Supply Chain Management
- SB 361 Supply Chain Environmental Management
- *Recommended Electives

*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:**

<table>
<thead>
<tr>
<th>Course Number/Name</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
<th>Course Number/Name</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
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</table>
## Appendix G: Double Major Civil and Environmental Engineering Curriculum Worksheet (Classes of 2021-2024)

<table>
<thead>
<tr>
<th>Faculty Advisor</th>
<th>Student Name</th>
<th>Student Number</th>
<th>Class Year</th>
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</table>

### FRESHMAN - FALL
- CM131 General Chem. I (4 cr)
- PH131 Fund. Physics I (4 cr)
- UNIV190 Clarkson Sem.
- MA131 Calculus I
- FY/PE100 First Year Seminar (0 cr)

### FRESHMAN - SPRING
- CM132 General Chem. II (4 cr)
- PH132 Fund. Physics II (4 cr)
- ES110 Engineering & Society (TECH)
- MA132 Calculus II
- ES100 Intro Computer (2 cr)

### SOPHOMORE - FALL
- CE 212 Intro. Eng. Des. (F) 1.5
- ES220 Statics
- CHE10 Molecular Properties
- MA231 Calculus III
- Elective – KA

### SOPHOMORE - SPRING
- CE340 Intro to Environmental Engr 1
- CE380 Fundamentals of Environmental Engr 1
- ES222 Strength of Materials
- MA232 Differential Equations
- Elective – KA

### JUNIOR/SENIOR YEAR
- ES330 Fluid Mechanics (F Junior Yr)
- ES260 Material Science (F&S)
- ES340 Thermodynamics I (F&S)
- ES Elective (ES 223 or ES 250) (F&S)
- □ CM241 Organic Chemistry (F) OR □ CM221 Spectroscopy (F)
- BY320 Microbiology (S)
- STAT383 Probability and Statistics (F&S)

### Environmental Engineering Core Professional Courses
- CE320 Structural Analysis (F Junior Yr) 1 (C1)
- CE441 Reinforced Concrete Design (S Senior yr) OR CE442 Steel Design (F Senior Yr) 3
- CE330 Water Resources I (F&S) 1 (C1)
- CE479 Water &Wastewater Treatment (F) 3 (C1)
- □ Senior Design CE-491 (Water Resources/Environmental) (S) OR Approved Alternate 3 (C1)

### Environmental Engineering Core Professional Courses
- Core Professional Courses must include three of these courses:
  - □ CE482/582 Environmental Systems (2)
  - □ CE486 Industrial Ecology (1)
  - □ ES432 Risk Analysis (1.5)
  - □ CE481 Hazardous Waste Engineering (2.5)

### EnvE Core Professional Course
- CE301 Geospatial Analysis & Appl. (F&S)

### EnvE Core Professional Course
- CE305 Construction Planning and Management (S) 1

### CE310 Geotechnical Engineering I (S) 1 (C1)

---

1. All courses are 3 credits unless otherwise noted
2. A total of 16.5 design credits are required
3. Environmental Engineering Core Professional Courses must include three of these courses: CE 482/582 Systems (2); CE 486 Ind Ecology (1); ES 432 Risk Analys (1.5); CE 481 Hazard Waste (2.5)
4. 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)
### Appendix II: Double Major Civil and Environmental Engineering Curriculum Worksheet (Class of 2025 and thereafter)

<table>
<thead>
<tr>
<th>Faculty Advisor</th>
<th>Student Name</th>
<th>Student Number</th>
<th>Class Year</th>
</tr>
</thead>
</table>

#### FRESHMAN - FALL
- CM131 General Chem. I (4 cr)  
- PH131 Fund. Physics I (4 cr)  
- UNIV190 Clarkson Sem.  
- MA131 Calculus I  
- FY/PE100 First Year Seminar (0 cr)

<table>
<thead>
<tr>
<th>Design Credit</th>
<th>Semester</th>
<th>Grade</th>
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</table>

#### FRESHMAN - SPRING
- CM132 General Chem. II (4 cr)  
- PH132 Fund. Physics II (4 cr)  
- ES110 Engineering & Society (TECH)  
- MA132 Calculus II  
- ES100 Intro Computer (2 cr)

<table>
<thead>
<tr>
<th>Design Credit</th>
<th>Semester</th>
<th>Grade</th>
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#### SOPHOMORE - FALL
- CE 212 Intro. Eng. Des. (F)  
- ES220 Statics  
- CH210 Molecular Properties  
- MA231 Calculus III  
- Elective – KA

<table>
<thead>
<tr>
<th>Design Credit</th>
<th>Semester</th>
<th>Grade</th>
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#### SOPHOMORE - SPRING
- CE340 Intro to Environmental Engr  
- CE380 Fundamentals of Environmental Engr  
- ES222 Strength of Materials  
- MA232 Differential Equations  
- Elective – KA

<table>
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<tr>
<th>Design Credit</th>
<th>Semester</th>
<th>Grade</th>
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#### JUNIOR/SENIOR YEAR
- ES330 Fluid Mechanics (F Junior Yr)  
- ES260 Material Science (F&S)  
- ES340 Thermodynamics I (F&S)  
- ES Elective (ES 225 or ES 250) (F&S)  
- CM241 Organic Chemistry (F) OR CM221 Spectroscopy (F)  
- BY320 Microbiology (S)  
- STAT383 Probability and Statistics (F&S)  
- EC350 Econ. Principles & Engineering Economics (F&S)  
- Elective – KA/UC  
- Environmental Engineering Core Professional Courses

<table>
<thead>
<tr>
<th>Design Credit</th>
<th>Semester</th>
<th>Grade</th>
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#### Environmental Engineering Core Professional Courses
- Core Professional Courses must include three of these courses:
  - CE482/582 Environmental Systems (2)  
  - CE486 Industrial Ecology (1)  
  - ES432 Risk Analysis (1.5)  
  - CE481 Hazardous Waste Engineering (2.5)

<table>
<thead>
<tr>
<th>Design Credit</th>
<th>Semester</th>
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#### OTHER COURSES (Do not count toward degree requirements)

<table>
<thead>
<tr>
<th>Design Credit</th>
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#### NOTE: A Civil and Environmental Double Major must complete 123 credit hours. In the absence of appropriate transfer or AP credit, this will require at least one 18 credit hour semester to graduate within 8 semesters of coursework.

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1. All courses are 3 credits unless otherwise noted  
2. A total of 16.5 design credits are required  
3. Environmental Engineering Core Professional Courses must include three of these courses: CE 482/582 Systems (2); CE 486 Ind Ecology (1); ES 432 Risk Anal (1.5); CE 481 Haz Waste (2.5)  
4. One of the following: CE315 Geology for Engineers (1); ES436 Global Climate Change: Science, Engineering and Policy (odd springs), CE477 Atmospheric Chemistry (even springs)
<table>
<thead>
<tr>
<th>Course Number/Name</th>
<th>ID/Des. Cred.</th>
<th>Semester</th>
<th>Grade</th>
<th>Course Name/Number</th>
<th>ID/Des. Cred.</th>
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</table>
### Appendix J: Environmental Engineering Curriculum Flowchart

#### Department of Civil and Environmental Engineering

**Environmental Engineering Curriculum Flow-Chart**

<table>
<thead>
<tr>
<th>Semesters</th>
<th>Math</th>
<th>Basic/Applied Science</th>
<th>Engineering Science</th>
<th>Civil/Environmental Engineering</th>
<th>Humanities/KA/Business</th>
<th>Other/Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>MA131 Calculus 1</td>
<td>MA132 Calculus 2</td>
<td>MA131 Physics 1 (4)</td>
<td>CH210 Molec. Properties</td>
<td>ES100 Intro to Comp.</td>
<td>UN190 Clarkson Sm. Co-Calculus</td>
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<tr>
<td>1 (F)</td>
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<td>2 (S)</td>
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<tr>
<td>Sophomore</td>
<td>MA221 Calculus 3</td>
<td>MA221 Diff. Equations</td>
<td>MA132 Physics 2 (4)</td>
<td>CH210 Molec. Properties</td>
<td>ES110 Engr. &amp; Society</td>
<td>KA/UC Elective</td>
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<tr>
<td>3 (F)</td>
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<td>4 (S)</td>
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<tr>
<td>Junior</td>
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<tr>
<td>5 (F)</td>
<td>ST4383 App. Stats</td>
<td>MA221 or MA222</td>
<td>MA211 or MA221</td>
<td>ES110 Statics</td>
<td>CE330 Water Res. 1</td>
<td>CE212 Intro to Engr. Des.</td>
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<td>6 (S)</td>
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**Notes:**
- All Courses are 3 credit hours, unless indicated in parentheses.
- Solid Line Connection - Pre-Requisite
- Dashed Line Connection - Co-Requisite
- KA/UC indicates Knowledge Area and Univ. Courses in compliance with the Clarkson Common Curriculum
- 1 Students may take either CM241 Organic Chemistry or CM221 Spectroscopy
Appendix K: Civil and Environmental Engineering Hosted Minors

Civil and Environmental Engineering Hosted Minors Tracking Sheet

- Minor in Environmental Engineering

Complete the following requirements:

- Complete ONE of the following:
  - CE340 Intro. to Env. Engineering
  - CE380 Fund. of Env. Engineering, OR
  - CH220 Materials Balances.

- Complete ONE of the following:
  - BY214 Genetics
  - BY222 Ecology w/ BY224 Ecology Lab.
  - BY320 Microbiology, OR
  - BY/EV330 Great Lakes Water Protection

- Complete ONE of the following:
  - CH210 Chem. Engr. Principles
  - CH/CM221 Spectroscopy
  - CM241 Organic Chemistry 1, OR
  - CM371 Physical Chemistry 1.

- Complete ONE of the following:
  - BY314 Bioinformatics
  - BY328 Conservation Biology
  - BY412 Molecular Biology Laboratory
  - BY425 Biological Systems & Environmental Change

- Complete ONE of the following:
  - 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

- Complete ONE of the following:
  - 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

- Complete ONE of the following:
  - CE305 Constr. Planning and Mgmt.
  - CE408 Building Info. Mod./IPD
  - CE409 Fund. of Bldg. Sys.
  - CE448 Intro. to Arch Engr.

- Complete ONE of the following:
  - DS214 Introduction to Data Science
  - MA330 Advanced Engineering Math
  - STAT383 Probability and Statistics
  - STAT389 Probability and Statistics w/ Multivariate Analysis

- Complete ONE of the following:
  - EM/OM380 Project Management
  - FN361 Financial Management
  - OS286 Organizational Behavior 1, OR
  - LW270 Law and Society 1

- Complete ONE of the following:
  - CH490/491, ME446, EE412, EM456, or equivalent, with an Architectural and/or Facilities focus (inc. MP courses)

- Complete TWO of the following:
  - CE407 Intro. to Sch. and Est.
  - CE470/510 Sustainable Infra. & Bldg.
  - CE411 Constr. Mat. Engineering
  - CE415/515 Found. & Ret. Struct.
  - CE441 Rein. Concrete Design
  - CE442 Steel Design
  - ME310 Thermo. Sys. Engineering
  - ME411 Introduction to Heat Transfer
  - ME444 Computer Aided Engineering
  - EE21 Linear Circuits
  - EE331 Energy Conversion
  - EE333 Power Systems Engineering
  - EE/ME450 Control Systems
  - EH530 – Safety Analysis – Envr., Health, and Safety Assessment
  - ES238 Intro. to Energy Systems
  - EV305 Sustainability and the Envir.

Student Name  Student Number  Exp. Graduation Year

- Minor in Architectural and Facilities Engineering

Complete the following required courses:

- CE305 Constr. Planning and Mgmt.
- CE408 Building Info. Mod./IPD
- CE409 Fund. of Bldg. Sys.
- CE448 Intro. to Arch Engr.

- Complete ONE of the following:
  - DS214 Introduction to Data Science
  - MA330 Advanced Engineering Math
  - STAT383 Probability and Statistics
  - STAT389 Probability and Statistics w/ Multivariate Analysis

- Complete ONE of the following:
  - EM/OM380 Project Management
  - FN361 Financial Management
  - OS286 Organizational Behavior 1, OR
  - LW270 Law and Society 1

- Complete ONE of the following:
  - CH490/491, ME446, EE412, EM456, or equivalent, with an Architectural and/or Facilities focus (inc. MP courses)

- Complete TWO of the following:
  - CE407 Intro. to Sch. and Est.
  - CE470/510 Sustainable Infra. & Bldg.
  - CE411 Constr. Mat. Engineering
  - CE415/515 Found. & Ret. Struct.
  - CE441 Rein. Concrete Design
  - CE442 Steel Design
  - ME310 Thermo. Sys. Engineering
  - ME411 Introduction to Heat Transfer
  - ME444 Computer Aided Engineering
  - EE21 Linear Circuits
  - EE331 Energy Conversion
  - EE333 Power Systems Engineering
  - EE/ME450 Control Systems
  - EH530 – Safety Analysis – Envr., Health, and Safety Assessment
  - ES238 Intro. to Energy Systems
  - EV305 Sustainability and the Envir.

Approved as of 2016-2017

Approved as of 2020-2021
Appendix L: Clarkson University Common Experience Requirements Checklist (CivE and EnvE)

<table>
<thead>
<tr>
<th>Faculty Advisor</th>
<th>Student Name</th>
<th>Student Number</th>
<th>Class Year</th>
</tr>
</thead>
</table>

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/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
  - □ MA132 Calculus II
  - □ MA231 Calculus III
  - □ 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
  - □ CM132 General Chemistry II
  - □ PH131 Physics I
  - □ 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, I4, 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
    - I4
    - IG
    - STS
  - □ UNIV Course: ____________ KA(1): ________ KA(2): ________
  - □ 4 additional Knowledge Area Courses (must check at least four boxes below)
    - □ EC350 Econ. Principles / Engineering Economies (or for Transfers, CEC150 or 151 and EC200) KA(1): ________ KA(2): ________
    - □ Course: ___________________________ KA(1): ________ KA(2): ________
    - □ Course: ___________________________ KA(1): ________ KA(2): ________
    - □ Course: ___________________________ KA(1): ________ KA(2): ________
    - □ Course: ___________________________ KA(1): ________ KA(2): ________
- **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.: ____________
  - □ At Least 2 Communication Points from CE courses at the 300 or 400 Level (must check at least 2 below)
    - □ CE490/1 Comm. Pts.: ____________ Comm. Pts.: ____________
  - □ Other Courses with Communication Points
  - □ ≥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/Dean or designee
Appendix M: Professional Elective Approval Form

Clarkson University
Wallace H. Coulter School of Engineering
Department of Civil and 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: ____________
**Appendix N: 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:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Design Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE212</td>
<td>Introduction to Engineering Design</td>
<td>1.5</td>
</tr>
<tr>
<td>CE302</td>
<td>Surveying, Geodetic Control, and Engineering Measurements</td>
<td>1</td>
</tr>
<tr>
<td>CE304</td>
<td>Introduction to Scheduling and Estimating</td>
<td>1</td>
</tr>
<tr>
<td>CE305</td>
<td>Construction Planning and Management</td>
<td>1</td>
</tr>
<tr>
<td>CE310</td>
<td>Geotechnical Engineering I: Soil Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>CE320</td>
<td>Structural Analysis</td>
<td>1</td>
</tr>
<tr>
<td>CE330</td>
<td>Water Resources Engineering I</td>
<td>1</td>
</tr>
<tr>
<td>CE340</td>
<td>Introduction to Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE380</td>
<td>Fundamentals of Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE404</td>
<td>Applications in Scheduling and Estimating</td>
<td>2</td>
</tr>
<tr>
<td>CE406</td>
<td>Infrastructure Construction</td>
<td>2</td>
</tr>
<tr>
<td>CE408</td>
<td>Building Information Modeling and Integrated Project Delivery</td>
<td>2</td>
</tr>
<tr>
<td>CE409</td>
<td>Fundamentals of Building Systems</td>
<td>2</td>
</tr>
<tr>
<td>CE410</td>
<td>Sustainable Infrastructure &amp; Building</td>
<td>3</td>
</tr>
<tr>
<td>CE411</td>
<td>Construction Materials Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE415/515</td>
<td>Foundations, Stability, and Retaining Structures</td>
<td>3</td>
</tr>
<tr>
<td>CE421/521</td>
<td>Composite Mechanics and Design</td>
<td>1</td>
</tr>
<tr>
<td>CE423</td>
<td>Structural Health Monitoring and Condition Assessment</td>
<td>1</td>
</tr>
<tr>
<td>CE430</td>
<td>Water Resources Engineering II</td>
<td>1</td>
</tr>
<tr>
<td>CE433</td>
<td>Human Exposure Analysis</td>
<td>2</td>
</tr>
<tr>
<td>CE434</td>
<td>Sustainable Development Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE435/EV435</td>
<td>Groundwater Hydrology &amp; Geochemistry</td>
<td>1</td>
</tr>
<tr>
<td>CE441</td>
<td>Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CE442</td>
<td>Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CE445</td>
<td>Timber Design</td>
<td>3</td>
</tr>
<tr>
<td>CE446</td>
<td>Reinforced Masonry Design</td>
<td>3</td>
</tr>
<tr>
<td>CE546</td>
<td>Advanced Reinforced Masonry Design</td>
<td>3</td>
</tr>
<tr>
<td>CE448</td>
<td>Introduction to Architectural Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE452/552</td>
<td>Advanced Mechanics of Materials</td>
<td>1</td>
</tr>
<tr>
<td>CE453/553</td>
<td>Properties and Performance of Concrete Materials</td>
<td>1</td>
</tr>
<tr>
<td>CE455/555</td>
<td>Structural Damage Assessment, Repair and Strengthening</td>
<td>1</td>
</tr>
<tr>
<td>CE461</td>
<td>Transportation Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>CE463</td>
<td>Railroad Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE468</td>
<td>Traffic Engineering</td>
<td>1.5</td>
</tr>
<tr>
<td>CE478</td>
<td>Solid Waste Management &amp; Landfill Design</td>
<td>2</td>
</tr>
<tr>
<td>CE479/579</td>
<td>Water and Wastewater Treatment Processes</td>
<td>3</td>
</tr>
<tr>
<td>CE481/581</td>
<td>Hazardous Waste Management Engineering</td>
<td>2.5</td>
</tr>
<tr>
<td>CE482/582</td>
<td>Environmental Systems Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>CE486/586</td>
<td>Industrial Ecology</td>
<td>1</td>
</tr>
<tr>
<td>CE490/491</td>
<td>Senior Design (Structures, Transportation, Geotechnical, Construction, and Facilities/Architectural or Water Resources/Environmental)</td>
<td>3</td>
</tr>
<tr>
<td>CE508</td>
<td>BIM for Construction Prefabrication</td>
<td>2</td>
</tr>
<tr>
<td>CE519</td>
<td>Advanced Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CE541</td>
<td>Bridge Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE544</td>
<td>Advanced Design of Structural Concrete</td>
<td>3</td>
</tr>
<tr>
<td>CE546</td>
<td>Advanced Reinforced Masonry Design</td>
<td>3</td>
</tr>
<tr>
<td>CE583</td>
<td>Modeling Natural Aquatic Systems</td>
<td>1</td>
</tr>
<tr>
<td>CE584</td>
<td>Chemodynamics</td>
<td>1</td>
</tr>
<tr>
<td>CH434</td>
<td>Air Pollution Control</td>
<td>1</td>
</tr>
<tr>
<td>EE/ES438</td>
<td>Alternate Energy Systems</td>
<td>1</td>
</tr>
<tr>
<td>EHS406</td>
<td>Industrial Hygiene Control Methods</td>
<td>2</td>
</tr>
<tr>
<td>ES240</td>
<td>Our Water Future: Sustainable Water Resources Management</td>
<td>1</td>
</tr>
<tr>
<td>ES432</td>
<td>Risk Analysis</td>
<td>1.5</td>
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<tr>
<td>EV314</td>
<td>Adirondack Integrated Research Project</td>
<td>1</td>
</tr>
<tr>
<td>EV390</td>
<td>Sustainability Project Experience</td>
<td>3</td>
</tr>
</tbody>
</table>