

CIVIL AND ENVIRONMENTAL ENGINEERING

COURSE 1

DEPARTMENT CONTACT:

Course 1 Academic Program Office - cee-apo@mit.edu
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DESCRIPTION

Civil and environmental engineers' intellectual focuses are discovery and innovation in order to better understand the world, as well as to invent and lead with creative design to sustain both life and society in ever-changing environments. They focus on five strategic areas: ecological systems, resources, structure and design, urban systems, and global systems. Civil engineers design the structures we live and work in, the roads and bridges we drive on, the clean water we drink, and wastewater treatment systems we use. Environmental engineers use engineering and ecological principles to protect and enhance the natural environment.

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1-ENG Civil and Environmental Engineering *Includes tracks in Environment, Mechanics and Materials, and Systems Engineering*

INTRODUCTORY CLASSES

- 1.000 **Introduction to Computer Programming and Numerical Methods for Engineering Applications**
Presents the fundamentals of computing and computer programming (procedural and object-oriented programming) in an engineering context. Introduces logical operations, floating-point arithmetic, data structures, induction, iteration, and recursion. Computational methods for interpolation, regression, root finding, sorting, searching, and the solution of linear systems of equations and ordinary differential equations. Control of sensors and visualization of scientific data. Draws examples from engineering and scientific applications. Students use the MATLAB programming environment to complete weekly assignments.
- 1.101 **Introduction to Civil and Environmental Engineering Design I**
Introduces the creative design process in the context of civil and environmental engineering. Fosters active learning through open-ended, student-driven projects in which teams apply the design process to a design/planning problem. In labs, students design and build a working model or an experiment that addresses a specific engineering aspect of their project.
- 1.102 **Introduction to Civil and Environmental Engineering Design II**
Project-oriented subject focused on the principles and practice of engineering design. Emphasis on construction and deployment of designs, plus performance testing used to determine if designs behave

as expected. Includes a major team project involving use and application of sensors, as well as environmentally-friendly, and energy-effective or energy-producing designs. Develops practical, teamwork and communication skills. Satisfies 6 units of Institute Laboratory credit. Enrollment limited; preference to Course 1 majors and minors.

1.106 **Environmental Fluid Transport Processes and Hydrology Laboratory**
Fundamentals of mass transport and flow measurement in environmental systems. Topics include analysis of measurement uncertainty, diffusion, dispersion, air-water exchange, dissolution, and porous media flow. Develops communication skills through the writing and revision of formal lab reports and short oral presentations. Satisfies 6 units of Institute Laboratory credit. Enrollment limited; preference to 1-ENG majors.

1.107 **Environmental Chemistry Laboratory**
Laboratory and field techniques in environmental engineering and its application to the understanding of natural and engineered ecosystems. Exercises involve data collection and analysis covering a range of topics, spanning all major domains of the environment (air, water, soils, and sediments), and using a number of modern environmental analytical techniques. Instruction and practice in written and oral communication provided. Concludes with a student-designed final project, which is written up in the form of a scientific manuscript. Satisfies 6 units of Institute Laboratory credit. Enrollment limited; preference to 1-ENG.

EXPERIENTIAL LEARNING

mini-UROP

The mini-UROP is a 6-unit subject over IAP (1.097) in which first-year students are paired with a CEE graduate student or postdoc mentor for an inside look at the exciting researching taking place in the department. This is a great opportunity to learn more about CEE!

ONE-MA³

A summer fieldwork program on materials in art, archeology, and architecture (ONE-MA3) that gives undergraduate students an unforgettable hands-on research experience in Italy. While in Italy, students are immersed in an in-depth, real-world analysis of ancient infrastructures and materials as a prerequisite for a fall subject, 1.057 Heritage Science and Technology. The subject extends the summer experience into a discussion of theory and practice.

Course 1 Internship Program

Course 1 utilizes alumni connections to help you take advantage of various institute and departmental resources to ensure you secure an internship that is best suited for you.

COURSE 1 FRIENDLY UROP AREAS

MIT Energy Initiative (EI)

Environmental Solutions Initiative (ESI)

Inst for Data, Systems, Society (IDSS)

Lab for Info & Decision Systems (LIDS)

Supply Chain Management (SCM)

COURSE 1 STUDENT GROUPS

The Civil and Environmental Engineering Students Association (CEESA)

SKILLS

- Familiarity with engineering fundamentals
- Design innovative and sustainable structures
- Design and optimize urban systems
- Collect and analyze complex data

POSSIBLE FUTURE POSITIONS

- **Environmental engineer:** Use engineering and ecological principles to protect and enhance the natural environment and its resources.
- **Energy engineer:** Designs and evaluates projects and programs to reduce energy costs or improve energy efficiency during the design, building, or remodeling stages of construction.
- **Structural engineer:** Analyzes and designs structures such as stadiums, arenas, office buildings, and bridges to ensure they safely and satisfactorily perform their purpose.

CAREER INDUSTRY EXAMPLES

Aerospace and Defense	Construction	Government
Chemicals and Materials	Consulting	Transportation
Computer Software	Energy and Utilities	

SAMPLE EMPLOYERS

Accenture	Crusoe Energy Systems	Radia, Inc.
Amyris	FM Global	Ramboll-Environ
Bloom Energy Corp.	General Motors	Pioneer Natural Resources
Booz Allen & Hamilton	Keolis America Inc.	PA Consulting
