



#### Welcome to Course 1

Our core mission is to educate, inside and outside the classroom.

MIT CEE equips you with the fundamental skills to succeed as an engineer in today's complex world through our general engineering ABET accredited undergraduate program. Grounded in science and engineering, we understand the world, invent and lead with creative design. We pursue big engineering through innovations which may begin locally, but scale broadly and quickly to impact people everywhere.

Our general engineering ABET accredited undergraduate degree consists of 1) General Institute Requirements (GIRs), 2) General Department Requirements (GDRs), 3) one of three Cores (each with 54-60 units), 4) Elective Subjects with Engineering Content (48-60 units), and 5) Unrestricted Electives (48-54 units).

# **1-ENG Degree Structure** + unrestricted electives 1 2 1 2 1 2 1 2 1 2 1 2 2 3 1 2 2 3 1 2 3 1 2 3 3 1 2 3 4 2 3 1 2 3 4 2 3 1 2 3 4 2 4 2 5 2 6 3 6 5 5 5 6 5 5 5 6 5 5 5 5 2 5 2 5 3 5 3 5 3 6 5

General Department Requirements (GDRs) Differential Equations (18.03, 12 units), Computation (1.000, 12 units), Intro Design (1.101, 6 units), Probability (1.010A, 6 units), Data Analysis (1.073/1.074, 6 units), Capstone (1.013, 12 units)

**General Institute Requirements (GIRs)** 

### General Department Requirements (GDRs): 54

1.000 Computer Programming & Numerical Methods for Engineering Applications, 12, REST; 18.03

1.010A Probability: Concepts & Applications, 6; Calculus II (GIR)

1.101 Introduction to Civil & Environmental Engineering Design, 6

1.073 Introduction to Environmental Data Analysis, 6; or

1.074 Multivariate Data Analysis, 6; 1.01018.03 Differential Equations, 12, REST; Calculus II (GIR)1.013 Senior Civil & Environmental Engineering Design,12, CI-M; permission of instructor

#### Core subjects: 54-60

Students are required to select one area of core coursework from the following three areas: environment, mechanics and materials, and systems.

#### **Elective Subjects with Engineering Content: 48-60**

Students are required to take Restricted Electives selected from subjects offered within or outside CEE to form a coherent program of study under supervision by CEE faculty.

#### **Unrestricted Electives: 48-54**

To help you plan for your undergraduate career, you will select a core and work with your faculty advisor on determining a set of electives and restricted electives. The dynamic structure of the undergraduate degree program allows students to follow a set path of suggested subjects or to design a set of subjects, that combined tailor their individual educational experience. Check out more information on the cores in the following pages.

Minors in CEE Offered in:

- Civil and Environmental Systems
- Civil Engineering
- Environmental Engineering Science

https://cee.mit.edu/education/undergraduate/ undergraduate-minors/

#### mini-UROP [1.097, 6 units]

Our mini-UROP program takes place over IAP and is designed to offer freshmen a taste of the research conducted in CEE. Students will work closely with either a grad student or postdoc on a research project and have an in-depth experience in the lab over three weeks. At the end of the three weeks, mini-UROP participants present their research in "lightning" presentations to an audience of their peers and CEE community members. Many mini-UROPs have the opportunity to develop into full term UROPs in the spring. Projects range from designing a city on Mars to creating durable, eco-friendly concrete using recycled materials.

Learn more about the mini-UROP and additional UROP resources here: https://cee.mit.edu/urop/



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**CEE Internship Program** Interested in advancing your career? CEE is here to help! We will utilize alumni connections and help you take advantage of various institute and departmental resources to ensure you secure an internship that is best suited for you. Reach out to your advisor or the Academic Programs Office at cee-apo@mit.edu to setup a time to meet!



#### TREX

Traveling Research Environmental Experiences (TREX) is a three-credit field research course offered during Independent Activities Period by the Department of Civil and Environmental Engineering to students majoring in Civil or Environmental Engineering. TREX (Course 1.091) provides CEE undergraduates with the opportunity to gain hands-on fieldwork and research experience in a global context. Past expeditions have generated enormous enthusiasm for learning about earth systems and determining how these systems can be managed in a sustainable way.

#### **ONE-MA<sup>3</sup>**

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.

# Major in 1, Minor in 6 Major in 1, Minor in 4



CEE has developed a series of major + minor degree tracks that brings together cores within the CEE major (Course 1-ENG) with

- Computer Science Minor (Course 6)
- Or a Design Minor (Course 4)

Connecting the course 1-ENG degree with one of the robust minors gives CEE students a leading edge.

#### **Smart Infrastructure**

**1-ENG Core + Course 6 Computer Science Minor** A proliferation of data and networked systems are creating more efficient and sustainable alternatives for infrastructure and transportation systems. The smart infrastructure joint major + minor degree track prepares students with the skills and understanding to be leaders and developers of the future.

#### Network Systems and Computation

**1-ENG Core + Course 6 Computer Science Minor** Design and manage large scale complex systems that can be applied to a number of domains, including supply chain and logistics; infrastructure sensing and control; and societal networks, among others. The network systems and computation joint major + minor degree track prepares students with the modeling and decisionmaking principles required to develop and maintain successful systems.



#### **Environmental Modeling and Analytics** 1-ENG Core + Course 6 Computer Science Minor

Understand and model both small and large-scale ecosystems and the environment using analytical and numerical analysis. The environmental modeling analytics joint major + minor degree track prepares students with skills needed to tackle environmental challenges and to engineer solutions to major problems.

Learn more about majoring in Course 1 and minoring in Course 6 here: https://cee.mit.edu/major-in-1-minorin-6/

#### Sustainable Design

1-ENG Core + Course 4 Design Minor

Understand and design both small and large scale mechanical structures using classical analyses and computational tools. The sustainable design joint major + minor develops and understanding and skills that enables students to be leading structural designers of the future.

## Mechanics and Materials

Civil engineering is critically important today as our communities strain to sustain limited natural resources, accommodate growth, and replace worn, declining infrastructure.

Pursue our Civil Engineering track to create innovative design built on strong fundamentals for the sustainability of existing structures, and for sustainable designs of new structures and systems.

#### **Required Subjects**

- 1.035 Mechanics of Materials, 12 units
- 1.036 Structural Mechanics & Design, 12 units
- 1.050 Solid Mechanics, 12 units
- 1.056 Introduction to Structural Design, 12 units
- 1.060 Fluid Mechanics, 12 units
- 1.102 Introduction to Civil & Environmental Engineering Design II, 6 units



#### **CEE** Students in the Mechanics and Materials Core Pursue Careers Dedicated to:

Leading Large Scale Projects Infrastructure Engineering Geomechanical Engineering Structural Engineering and Design Consulting Engineering Sustainable Materials and Structures







Learn more about the mechanics and materials core here: https://cee.mit.edu/education/undergraduate/ undergraduate-degrees/

# **Systems** Engineering

Leverage the power of big data and advanced decisionmaking tools to improve our cities, services, and communities. Select the Systems Engineering track to use mathematical methods in network science, optimization and control theory, and data analytics for addressing the problems of growing demand and limited resources in today's urban systems.

Systems Engineering teaches students to design, analyze, optimize, and implement solutions that improve the safety and efficiency of complex urban systems such as transportation, supply chains, energy, water, and other societal networks. Such an education prepares students for a range of career opportunities in technology, engineering, consulting, and management.

In addition to taking core CEE Systems subjects, students take classes in computing, machine learning, robotics, and decision sciences.

#### **CEE Students in the Systems Engineering Core Pursue Careers Dedicated to:**

Supply Chains and Logistics Transportation Engineering Data Science and Analytics Autonomous Robotics Service Optimization Engineering Consulting Government or Corporate Research and Development

Learn more about the Systems Engineering core here: https://cee.mit.edu/education/undergraduate/ undergraduate-degrees/

# **Environment**



Help conserve and extend the planet's natural resources to improve the lives of people everywhere. Choose the Environmental Engineering Science track, which combines academic rigor with real-world applications, to understand and protect our land, water, air, and health.

Find innovative ways to keep our air clean, water and food abundant, societies resilient to climate change, and lives safe, enhanced and extended.

In addition to taking core environmental engineering classes, students take classes in biology, chemistry, physics, fieldwork, and data analysis, all geared toward better understanding the natural and human-influenced environment.

Combine scientific inquiry and engineering principles to explore today's most pressing environmental issues, and to aid people on all scales, from the local to the global.

#### **Required Subjects**

- 1.020 Engineering Sustainability: Analysis and Design, 12 units
- Introduction to Network Models, 12 units 1.022
- 1.041 Transportation: Foundations & Methods, 12 units
- 1.075 Water Resource Systems, 12 units
- 1.102 Introduction to Civil & Environmental Engineering Design II, 6 units





#### **Required Subjects**

1.018	Fundamentals of Ecology, 12 units
1.060	Fluid Mechanics, 12 units
1.061A	Transport Processes in the Environment
	I, 6 units
1.070A	Introduction to Hydrology & Water Resources I,
	6 units
1.080	Environmental Chemistry, 12 units
1.091	Traveling Research Environmental eXperience
	(TREX): Fieldwork, 3 units
1.106	Environmental Fluid Transport Processes &
	Hydrology Laboratory, 6 units
1.107	Environmental Chemistry Laboratory, 6 units

#### **CEE Students in the Environmental Engineering Science Core Pursue Careers Dedicated to:**

Stormwater Management Air Quality Engineering Water Resources Engineering Conservation and Environmental Protection Sustainable Development Environmental Consulting

Learn more about the Environmental Engineering Science core here: https://cee.mit.edu/education/ undergraduate/undergraduate-degrees/