Johns Hopkins University

Department of Environmental Health and Engineering

Undergraduate Programs

Updated 09/09/2024

Return to top

Contents

Academic Calendar 2024-25

FALL 2024	
August 23 –August 25	Orientation for all new undergraduates
August 26	First day of class
September 2	Labor Day – no classes
November 25 –November 29	Thanksgiving Break
December 6	Last day of classes
December 9 –December 10	Reading period
December 11 - December 19	Final exams
SPRING 2025	
January 2 - January 17	Intersession
January 21	First day of classes
April 28	Last day of classes
March 17- March 21	Spring Break
April 29 –May 2	Reading period
May 5- May 13	Final examination period
May 22	Degree conferral

Return to top

INTRODUCTION

The field of Environmental Engineering is dedicated to the study and amelioration of environmental problems. Such problems are complex and multifaceted, and successful solutions must operate within the constraints imposed by societal concerns. As a result, the discipline of Environmental Engineering is a highly interdisciplinary endeavor.

The Bachelor of Science in Environmental Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. under the General Criteria and the Program Criteria for Environmental Engineering and Similarly Named Engineering Programs. Additional information from the Whiting School of Engineering regarding our ABET Accreditation can be found here.

ABET Program Educational Objectives and Student Outcomes

Our graduates are expected to attain The BSEE Program Educational Objectives (PEOs) within a few years of graduation. The objectives may be found on the Departmental web page Program Objectives and Outcomes | Johns Hopkins | Bloomberg School of Public Health (jhu.edu) and the WSE ABET page linked above

Continuous Improvement

The Department of Environmental Health and Engineering strives to continuously improve its curriculum by using performance criteria to regularly assess its program educational objectives (what skills it expects its students to demonstrate). The environmental engineering program uses the results of each assessment to continuously improve upon its curriculum and thus ensure that it is meeting the needs of its students.

Our program was implemented for the first time during the 2002-2003 academic year and is intended to provide a strong foundation in the physical, chemical and biological sciences, as well as in mathematics, engineering science andengineering design. It is broad and flexible enough to accommodate students with a variety of interests in Environmental Engineering. This training should provide an ideal preparation for future employment in business or industry or for subsequent training at the graduate level, either in Environmental Engineering or in a field such as environmental law, public health, or medicine. Advanced training through participation in a senior design project involves synthesizing information from more than one field to solve real-world problems.

Advising

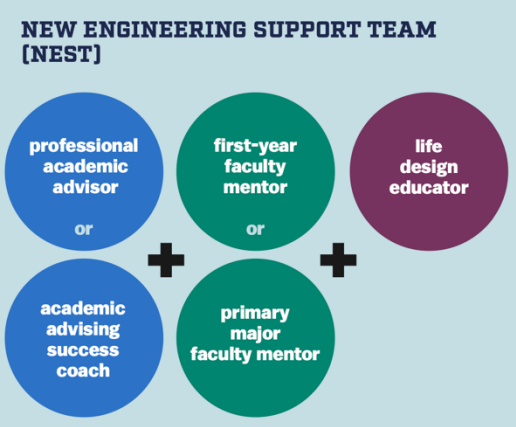
If you have questions about any of our EHE undergraduate degree programs, please contact:

Marsha Wills-Karp, Department Chair of Environmental Health and Engineering at mwkarp@jhu.edu

Sarah Preheim, Director of Undergraduate Studies at sprehei1@jhu.edu

Taylor Voelkel, Academic Program Administrator at tvoelke3@jhu.edu

Sarah Kendig, Senior Academic Advisor at skendig1@jh.edu



All undergraduate students majoring in Environmental Engineering must follow a program approved by the academic advisor associated with the Department who is appointed as the student's professional advisor or academic advising success coach. The student will also be assigned a faculty mentor from the Department, which might change after the student's first year. Additionally, the student will be assigned a life design educator, under the New Engineering Support Team (NEST) model. It is the responsibility of the student to initiate and attend regular meetings with all their assigned NEST members.

Professional Academic Advisor or Academic Advising Success Coach

Each student must meet with his/her professional academic advisor or Academic Advising Success Coach at least once a semester to:

1. plan or make changes to his/her course schedule,
2. discuss requirements for the major, and
3. discuss any problems that relate to academics or academic performance.

All Environmental Engineering Majors must fill out and obtain their professional academic advisor or academic advising success coach's signature on a checkout sheet during Advising Week. Submit ***signed*** check out sheets to the Academic Program Administrator by email prior to registering each semester.

Please see your SIS record to see your assigned professional academic advisor or academic advising success coach. Your professional academic advisor or academic advising success coach should ensure that you are fulfilling credits and selecting courses that will enhance your academic experience and ensure timely fulfillment of graduation requirements. Checkout sheets should be signed by your professional academic advisor or academic advising success coach. If you have difficulty meeting with your professional academic advisor or academic advising success coach, or feel that your advisor should be changed, please email the Academic Program Administrator.

First-Year and Primary Major Faculty Mentors

Faculty from within the Department of Environmental Health and Engineering will be assigned as the student's first-year and/or primary major faculty mentor to aid students in developing their engineering identity. Faculty mentors can provide academic guidance related to learning opportunities, reflection regarding academic progress and professional growth, an opportunity for students to practice the skills needed to develop a relationship with a mentor, and to be a supportive engineering role model. Students should meet with their faculty mentors at least twice per semester to develop a relationship, although meeting more often (e.g. once per month) is encouraged.

Return to top

Advising Week

Advising Week Logistics

Mandatory advising meetings take place during Advising Week, which is the week before Spring and Fall registration begins, in order to choose classes for the upcoming semester. Please contact your professional academic adviser or academic advising success coach to schedule a meeting during advising week. How to prepare for your advising meetings:

1. Schedule a meeting with your adviser during advising week.
2. Fill out a checkout sheet with the courses you have already taken and the courses that you hope to take in the upcoming semester. (Note: In order to graduate, you must have one of these on record for each semester that you are a student in EHE.)
3. Meet with your adviser to 1) confirm your courses and 2) obtain a signature on your checkout sheet.
4. Email your checkout sheet to the Academic Program Administrator.
5. Juniors must fill out a Junior Checkout sheet which is a list (signed by your adviser) of all courses you intend to take to graduate. If you change courses then you must submit a new, up-to-date, signed checkout sheet to the Department.

Best Practices During Advising Week:

- Contact your academic adviser prior to advising week– don't wait until advising week begins!
- Plan your schedule using the advising manual and list of courses for the semester. Please don't expect your adviser to plan your schedule for you. We are here to approve your courses, but you must come to the meeting prepared.
- Have a list of specific questions.
- Remember to turn in your checkout sheet to the department before advising week ends.

Note that undergraduate advising week is the week BEFORE undergraduate registration week. Please schedule an appointment with your advisor to ensure you are able to review your progress and course selection plans prior to the undergraduate registration week. For more information on how to register, important announcements, and deadlines please visit the Registrar's Office.

Responsible Conduct of Research Course

Any undergraduate student, from any school, receiving payment from the Whiting School of Engineering to conduct research must complete Responsible Conduct of Research training.

Undergraduate students who must complete Responsible Conduct of Research training will not receive a diploma until course completion is verified.

Please visit the WSE Advising Office website for details.

General Regulations for the Environmental Engineering Major

All undergraduate students majoring in Environmental Engineering must follow a program approved by a the professional academic advisor or academic advising success coach who is appointed as the student's advisor.

Course and Grade Regulations

The Department of Environmental Health and Engineering requires that:

University allows one S/U course each semester outside the student's major (regulations can be found in the JHU catalog). However, all courses used to fulfill undergraduate requirements, with the exceptions of the First Year Seminars, must be taken for a letter grade.

Course and Grade Regulations during COVID-19 pandemic:

- *Due to the global COVID-19 pandemic, final grades for all undergraduate students in Spring 2020 semester-long and second-half semester courses were reported as Satisfactory/Unsatisfactory. Final grades for courses completed in the first half of Spring 2020 were unaffected.*
- *Due to the global COVID-19 pandemic, the default final grades in Fall 2020 courses for all undergraduate students were Satisfactory/Unsatisfactory (S/U). Students had the option to change to a letter grade in any course, unless it was offered Satisfactory/Unsatisfactory only (S/U).*

Grades of C- or better must be obtained in all required Engineering, Mathematics, and Science courses (i.e., grades of D+ or lower will not be accepted). This applies to the required focus area electives and Engineering Microeconomics. No more than ten D credits may be counted toward graduation requirements.

No more than 12 credits completed prior to matriculation or in summer sessions at other accredited colleges oruniversities may be accepted. Transfer students are not subject to this restriction. They must:

1. obtain credit for courses they wish to transfer during their first year at Hopkins, and
2. also require a minimum of two years residence for a Hopkins degree.

Advanced Placement

The Whiting School's Office of Academic Affairs decides what AP credits can be counted toward an engineering degree. Please visit JHU Catalogue's section on undergraduate policies if you have questions about your AP credits.

AP credits may not count towards Humanities and Sciences or replace Statistics courses.

CHEMISTRY: A score of four or five on the AP Chemistry exam exempts a student from taking the Intro Chemistry I and II sequence (030.101, 030.102). In that case, Chemistry Lab is waived. Students with AP Chemistry are encouraged to enroll in 030.103 Applied Chemical Equilibrium and Reactivity with Lab to ensure a solid foundation in college level chemistry.

PHYSICS: A score of four or five on Physics C (parts one and two) exempts a student from the Physics I and II sequence (171.101, 171.102), and the corresponding Physics Labs (173.111, 173.112) are waived. Five Physics credits are required, whether from AP credit or JHU courses work, and any additional Physics credits, whether from Physics II or AP credit, can be used as Environmental Engineering Electives. For additional information about AP credits, please consult your Engineering 101 Program Planning Guide provided by the Whiting School of Engineering.

Summary: AP credit for Physics C (parts one and two) are 8 credits total, whereas the required Physics I with lab course at JHU is 5 credits. 5 of the 8 AP credits can be applied towards the Physics requirement and three additional AP credits count as free Environmental Engineering Elective credits. If students only receive 4 credits from their AP exam (part one or part two), they will need to take at least one more Physics credit, whether the Lab (e.g. 173.111) or Physics II (171.102), with any additional credits applying towards free EEE credits.

Return to top

BIOLOGY: A score of five on AP Biology exams can be counted towards the student's free electives, but students should additionally take either the required Environmental Biology and Ecology (EBE) course, or an upper-level biology or ecology course to gain knowledge about Environmental Biology and Ecology beyond what is taught in AP Biology. Note that the content of the EBE course could overlap with the content from the AP Biology course.

ENVIRONMENTAL ENGINEERING MAJOR CURRICULUM

Overview

The mission of our undergraduate program is to provide students with a broadly based yet rigorous education in the fundamental subjects central to the field, in a milieu that fosters the development of a spirit of intellectual inquiry and the problem-solving skills required to address the open-ended issues characteristic of the real world.

Our B.S. program provides a strong foundation in the physical, chemical, and biological sciences, as well as in mathematics, engineering science, and engineering design. It is broad and flexible enough to accommodate students with a variety of interests in environmental engineering and management. This training should provide ideal preparation for future employment in business or industry or for subsequent training at the graduate level, either in environmental engineering/science or in a field such as environmental law, public health, or medicine.

Graduation Requirements

With the assistance of their professional academic advisor or academic advising success coach and in consultation with their first-year or primary major faculty mentor, each student will plan a curriculum suited to his or her ultimate career goals. The program also encourages individual study and research through Customized Academic Learning (CAL).

Environmental Engineering Curriculum

In addition to meeting the University requirements described above, the Environmental Engineering curriculum requires the following courses, grouped by categories as described below. A minimum of 125 credits is required for graduation in the Environmental Engineering major.

First Year Seminar (2-3 credits)

All first-year students must take either a design-based or a discussion-based First Year Seminar. Students are encouraged to sign up for the sections taught by EHE instructors but are welcome to take any FYS course. The FYS should be taken in the first semester of their freshman year, but in rare cases could be taken in the second semester.

Mathematics (M) with a Focus on Applications (20 credits)

Required Courses:

- AS.110.108 Calculus I (Physical Sciences and Engineering)
- AS.110.109 Calculus II (Physical Sciences and Engineering)
- AS.110.202 Calculus III (Physical Sciences and Engineering) or AS.110.211 Honors Multivariable Calculus
- EN.553.291 Linear Algebra and Differential Equations or AS.110.201 Linear Algebra and AS.110.302 Differential Equations with Applications

- An advanced course (300 level or higher) in probability and statistics (the Department of Applied Mathematics and Statistics offers several suitable courses, such as 553.311)

Basic Science (BS) (16 credits)

Required Courses:

- AS.171.101 General Physics for Physical Science Majors I or AS.171.107 General Physics for Physical Sciences Majors (AL)
- AS.173.111 General Physics Laboratory I
- AS.030.101 Introductory Chemistry I and AS.030.105 Introductory Chemistry Lab I
- AS.030.102 Introductory Chemistry II and AS.030.106 Introductory Chemistry Lab II[1]
- EN.570.201 Environmental Biology and Ecology[2]

Optional Courses that could also count towards the free Environmental Engineering Electives:

- AS.171.102 General Physics for Physical Science Majors II or AS.171.108 General Physics for Physical Sciences Majors (AL)
- AS.173.112 General Physics Laboratory II

Premedical students should also take additional chemistry courses as electives, such as:

- AS.030.205 Introductory Organic Chemistry I
- AS.030.206 Introductory Organic Chemistry II
- AS.030.225 Organic Chemistry Laboratory

[1]Note that students who have AP credit for Chem I must take AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab rather than AS.030.102 Introductory Chemistry II and AS.030.106 Introductory Chemistry Lab II

[2] This course is highly recommended but can be substituted for any Biology or Ecology course on a case-by-case basis.
Note: Premedical students could substitute one of the following for EN.570.201:

- AS.020.305 Biochemistry and AS.020.315 Biochemistry Project Lab
- AS.020.306 Cell Biology and AS.020.316 Cell Biology Lab

Humanities and Social Sciences (HS) (18 credits)

A minimum of six courses totaling 18 credits in Humanities or Social Sciences (catalog code H or S). Please note that Elementary Language courses, which do not carry an area designator, can be used to satisfy the Distribution requirements for engineering students. The six courses must include:

1. one advisor-approved course that specifically develops writing skills (e.g., a how to write class),
2. 570.334 Engineering Microeconomics, and
3. four additional H&S courses with at least two at the 300 level or higher. EN.570.406 can be taken as part of these requirements.

Please note that the writing course will fulfill one of the two writing intensive courses required by the university (W courses). Note also that most medical schools require a year of English literature and/or composition.

Return to top

Required courses:

- EN.570.334 Engineering Microeconomics

Elective examples from EHE:

- EN.570.406 Environmental History

Writing course examples:

- AS.220.105 Introduction to Fiction & Poetry I or AS.220.106 Introduction to Fiction & Poetry II
- EN.661.110 Professional Writing and Communication

General Engineering (GE) (16 credits)

Required courses:

- EN.570.108 Introduction to Environmental Engineering and Design
- EN.570.351 Introduction to Fluid Mechanics
- EN.560.201 Statics & Mechanics of Materials and EN.560.211 Statics & Mechanics of Materials Lab
- EN.500.113 Gateway Computing: Python or EN.500.114 Gateway Computing: Matlab
- EN.510.312 Thermodynamics/Materials

Design Experience and Engineering Laboratory (D) (9 credits)

Required courses:

- EN.570.305 Environmental Engineering Systems Design
- EN.570.419 Environmental Engineering Design I
- EN.570.421 Environmental Engineering Design II

The Design and Synthesis sequence 570.419-570.421 is a five-credit project course (2 credits fall semester, 3 credits spring semester) and involves a comprehensive study of the engineering design process from problem definition to final design. The course involves team projects that include written and oral presentations. Students will form small teams that will work with local companies or government agencies in executing the project. Prerequisite: senior standing in Environmental Engineering.

Environmental Engineering Requirements (EER) (20 credits)

Required courses:

- EN.570.100 A Survey of Environmental Health and Engineering: Ask the Lorax
- EN.570.239 Environmental Engineering Chemistry – Current and Emerging Topics
- EN.570.303 Environmental Engineering Principles and Applications
- EN.570.304 Environmental Engineering and Science Laboratory
- EN.570.350 Environmental Hazards and Health Risks
- EN.570.353 Hydrology

Return to top

- EN.570.420 Air Pollution

Environmental Engineering Focus Area Electives (EEFA) (at least 6 credits from within a single focus area)

Focus Areas within the Environmental Engineering Major

Students must select among five different focus areas:

- Environmental Management and Economics
- Environmental Engineering and Science
- Land Air and Water Resources
- Environmental Health Engineering
- Energy Systems Analysis

Students need to take at least 2 Environmental Engineering Focus Area Electives (6 credits) within one of the following focus areas from the lists provided below as a requirement. Exceptions to this will only be made in rare circumstances.

Environmental Management and Economics

- EN.570.416 Data Analytics in Environmental Health and Engineering
- EN.570.422 Resilience of Ecological Systems
- EN.570.423 Environmental Impacts of Climate Change
- EN.570.454 Geostatistics: Understanding Spatial Data
- EN.570.490 Solid Waste Engineering and Management
- EN.570.491 Hazardous Waste Engineering and Management
- EN.570.497 Decision and Risk Analysis
- EN.570.607 Energy Systems Planning and Policy

Environmental Engineering and Science

- EN.570.320 Case Studies in Climate Change
- EN.570.411 Engineering Microbiology
- EN.570.423 Environmental Impacts of Climate Change
- EN.570.429 Methods in Microbial Community Analysis
- EN.570.441 Environmental Inorganic Chemistry
- EN.570.442 Environmental Organic Chemistry
- EN.570.443 Aquatic and Biofluid Chemistry
- EN.570.445 Physical and Chemical Processes I
- EN.570.446 Biological Process of Wastewater Treatment (recommended course background: EN.570.411)
- EN.570.448 Physical and Chemical Processes II
- EN.570.451 Environmental Dispersion and Transport
- EN.570.490 Solid Waste Engineering and Management
- EN.570.491 Hazardous Waste Engineering and Management
- EN.570.456 Environmental Electrochemistry

Land, Air, and Water Resources

- EN.570.320 Case Studies in Climate Change
- EN.570.349 Water quality of rivers, lakes, and estuaries
- EN.570.421 Landscape Hydrology Watershed Analysis
- EN.570.423 Environmental Impacts of Climate Change

Return to top

- EN.570.426 Groundwater, Porous Media, and Hydrogeology
- EN.570.443 Aquatic and Biofluid Chemistry
- EN.570.451 Environmental Dispersion and Transport
- EN.570.454 Geostatistics: Understanding Spatial Data
- AS.270.618 Remote Sensing of the Environment

Environmental Health Engineering

PH courses offered on the Bloomberg School of Public Health campus during 8-week terms. 600-level courses require permission of instructor. Please note, WSE students receive 2/3rds semester credits for SPH term courses, e.g., students earn 2.7 credits for a 4 credit SPH course. To avoid issues arising from fractional credits during graduation audit, we round the credit conversion to integer values – courses with 3 term credits are counted as 2 semester credits and courses with 4 or 5 term credits are counted as 3 semester credits.

- PH.182.613 Exposure Assessment Techniques for Health Risk Management
- PH.182.614 Industrial Hygiene Laboratory
- PH.182.615 Airborne Particles
- PH.182.622 Ventilation and Hazard Controls

Energy Systems Analysis

- EN.520.370 Introduction to Renewable Energy Engineering
- EN.560.449 Energy Systems
- EN.570.497 Decision and Risk Analysis
- EN.570.607 Energy Systems Planning and Policy

Environmental Engineering or General Elective Courses (additional credits to 125)

Additional credits of environmental engineering or general elective courses will be needed to meet the minimum Environmental Engineering credit requirement (125 credits), which may be taken from any of the focus areas listed above, additional course listed below, or other courses outside the department. We encourage students to take courses from the lists provided below to prepare themselves for careers and advanced study in environmental engineering.

Other Relevant Suggested Courses (does not count towards 6 focus area elective credits)

- EN.553.413 Applied Statistics and Data Analysis
- EN.553.433 Monte Carlo Methods
- AS.270.323 Ocean Biogeochemical Cycles
- AS.270.325 Introductory Oceanography
- AS.270.641 Present and Future Climate
- AS.270.679 Atmospheric Science
- AS.271.402 Water, Energy and Food Nexus
- PH.140.615 Statistics for Laboratory Scientist I
- PH.182.626 Water and Sanitation in Low-Income Communities
- PH.182.637 Noise and Other Physical Agents in the Environment
- PH.182.640 Food and Water-borne Diseases

Return to top

- PH.182.638 Environmental and Health Concerns in Water Use and Reuse
- PH.187.610 Public Health Toxicology
- PH.317.600 Intro to Risk Sciences and Public Health
- PH.188.680 Fundamentals of Occupational Health
- PH.317.605 Methods in Quantitative Risk Assessment
- EN.570.415 Current Trends in Environmental Microbiology

Return to top

Sample Program of Study

This program is based on the assumption that students have not previously completed AP courses in calculus, physics, chemistry, etc.

First Year			
FIRST SEMESTER	**CREDITS**	**SECOND SEMESTER**	**CREDITS**
AS.110.108 Calculus I (M)	4	AS.110.109 Calculus II (M)	4
AS.030.101 Introductory Chemistry I (BS)	3	AS.030.102 Introductory Chemistry II (BS)	3
AS.030.105 Introductory Chemistry Lab I (BS)	1	AS.030.106 Introductory Chemistry Lab II (BS)	1
EN.570.108 Introduction to Environmental Engineering and Design (GE)	3	AS.171.101 General Physics: Physical Science Major I (BS)	4
First-Year Seminar	2-3	AS.173.111 General Physics Lab I (BS)	1
EN.570.100	1	EN.500.113 Gateway Computing: Python or EN.500.114 Gateway Computing: Matlab (GE)	3
Total	**14-15**	**Total**	**16**

Second Year			
FIRST SEMESTER	**CREDITS**	**SECOND SEMESTER**	**CREDITS**
H&S Elective 1	3	AS.110.202 Calculus III (M)	4
H&S Elective 2	3	EN.510.312 Thermodynamics/Materials (GE)	3
EN.553.291 Linear Algebra and Differential Equations (M)	4	EN.570.201 Environmental Biology and Ecology (BS)	3
EN.560.201 Statics & Mechanics of Materials (GE)	3	EN.570.334 Engineering Microeconomics (HS)	3
EN.560.211 Statics & Mechanics of Materials Lab (GE)	1	H&S Elective 3	3
EN.570.239 Environmental Engineering Chemistry – Current and Emerging Topics (EER)	3		
Total	**17**	**Total**	**16**

Return to top

Third Year			
FIRST SEMESTER	**CREDITS**	**SECOND SEMESTER**	**CREDITS**
EN.570.303 Environmental Engineering Principles and Applications (EER)	3	EN.570.420 Air Pollution (EER)	3
EN.570.305 Environmental Engineering Systems Design (D)	4	EN.570.304 Environmental Engineering and Science Laboratory (EER)	4
EN.570.351 Introduction to Fluid Mechanics (GE)	3	EN.570.353 Hydrology (EER)	3
EN.553.310 or 311 Probability/Statistics (M)	4	Environmental Engineering or Free Elective	3
H&S Elective 4	3	H&S Elective 5	3
Total	**17**	**Total**	**16**

Fourth Year			
FIRST SEMESTER	**CREDITS**	**SECOND SEMESTER**	**CREDITS**
EN.570.350 Environmental Hazards and Health Risks (EER)	3	EN.570.421 Environmental Engineering Design II (D)	3
Environmental Engineering Focus Area Elective 1 (EEFA)	3	Environmental Engineering Focus Area Elective 2 (EEFA)	3
EN.570.419 Environmental Engineering Design I (D)	2		3
Environmental Engineering or Free Elective	3	Environmental Engineering or Free Elective	3
H&S Elective 6	3	Environmental Engineering or Free Elective	3
Total	**14**	**Total**	**15**

Total Credits 125

First Year Seminar (FYS) unique requirements = 2-3; Math (M) = 20 credits; Humanities and Social Sciences (HS) = 18 credits; Basic Science (BS) = 16 credits; General Engineering (GE) = 16 credits; Environmental Engineering Requirement (EER) = 19 credits; Environmental Engineering Focus Area Courses (EEFA) = 6 credits; Environmental Engineering or other free Electives = 18-19 credits; Design (D) = 9 credits.

Note that Environmental Engineering Focus Area (EEFA) do not strictly need to be taken in the semesters indicated in the sample program of study – this is only for illustration. Students may take courses in any semester that the courses are offered, as long as they meet the relevant prerequisites.

Return to top

Double Majors and Minors

Information for Environmental Engineering Majors

Environmental Engineering majors may elect to double-major or to complete a minor from any department in the School of Engineering or the School of Arts and Sciences that offers one. Students wishing to pursue a double major should inform the Whiting School's Office of Academic Advising. It is the student's responsibility to ensure that all appropriate requirements are met (it is recommended that a faculty advisor from each major be asked to sign off on the student's planned academic program). Students wishing to pursue a minor should confer with the department through which the minor is offered to ascertain the exact requirements.

The minor in Entrepreneurship and Management focuses on business and management from a multidisciplinary viewpoint and is designed to provide Hopkins engineering students with the knowledge and skills to become leaders in technology companies. Students interested in the Entrepreneurship and Management minor should contact the Center for Leadership Education (https://engineering.jhu.edu/cle/ or cle@jhu.edu) for more information. More traditional subspecialty minors are available through the departments of Civil Engineering, Computer Science, and Applied Mathematics and Statistics.

The Minor in Environmental Engineering

Environmental engineers play particularly pivotal roles as professionals who bridge the gap between understanding complex scientific concepts and helping to formulate public policies that affect the environment. Environmental engineering has become an important aspect of engineering practice in most engineering fields, and the discipline spans the professional spectrum from the private sector through governmental agencies to academia. An undergraduate minor in environmental engineering allows engineering students to pursue an interest in this field and to incorporate aspects of environmental engineering into careers in other engineering disciplines.

Students in any undergraduate major in the GWC Whiting School of Engineering are eligible for admission to the environmental engineering minor program. Students will work with an advisor in the Department of Environmental Health and Engineering (EHE) to develop a program that meets the requirements for the minor and is consistent with the educational requirements of their major field of engineering study. Students in undergraduate majors other than engineering can enroll in the Environmental Science minor, also offered by the Department of Environmental Health and Engineering.

Requirements of the Minor Program consist of:

- a set of "core" science and mathematics courses, already common to the civil and chemical engineering majors,
- four required courses (total of 10 credits) in environmental engineering, and
- two elective courses, one of which is taken at the freshman or sophomore level and the other of which is taken at the junior or senior level.

EE MINOR Core Courses

Advanced placement credits and/or equivalent courses in other schools or departments are acceptable, subject to advisor approval.

- AS.110.108 Calculus I
- AS.110.109 Calculus II
- AS.110.202 Calculus III or AS.110.211 Honors Multivariable Calculus

- EN.553.291 Linear Algebra and Differential Equations or AS.110.302 Differential Equations with Applications
- AS.030.101 Introductory Chemistry I
- AS.030.102 Introductory Chemistry II
- AS.030.105 Introductory Chemistry Lab I
- AS.030.106 Introductory Chemistry Lab II
- AS.171.101 General Physics: Physical Science Major I or AS.171.107 General Physics for Physical Sciences Majors (AL)
- AS.173.111 General Physics Lab I

EE MINOR CURRICULUM (a total of 18 credits is required)

Required Courses:

- EN.570.303 Environmental Engineering Principles and Applications
- EN.570.304 Environmental Engineering Laboratory
- EN.570.30 Environmental Engineering Systems Design

EE MINOR Elective Courses (total of 9 credits).

One course from each of two groups is required, plus one additional course (3 total required minor electives). Double counting of these courses with specified required courses in the student's major is not allowed. Substitution for one required course may be possible under special circumstances, with the explicit approval of the environmental engineering minor advisor. Additional course electives are possible but require the approval of the environmental engineering minor advisor.

Group A

Select one introductory course at the freshman and sophomore levels of the following:

- AS.020.151 General Biology I
- AS.270.220 The Dynamic Earth: An Introduction to Geology
- EN.570.108 Introduction to Environmental Engineering and Design
- EN.570.201 Environmental Biology and Ecology
- EN.570.239 Environmental Engineering Chemistry- Current and Emerging Topics
- EN.570.350 Environmental Hazards and Health Risks

Group B

Select one of the following:

- AS.030.204 Chemical Structure and Bonding w/Lab
- AS.030.205 Introductory Organic Chemistry I
- AS.030.301 Physical Chemistry I
- AS.270.369 Geochem Earth/Environment
- EN.540.301 Kinetic Processes
- EN.540.303 Transport Phenomena I
- EN.570.353 Hydrology
- EN.570.411 Engineering Microbiology

- EN.570.442 Environmental Organic Chemistry
- EN.570.443 Aquatic and Biofluid Chemistry
- EN.570.445 Physical and Chemical Processes I
- EN.570.490 Solid Waste Engineering and Management
- EN.570.491 Hazardous Waste Engineering and Management

The Minor in Engineering for Sustainable Development

Engineers will be increasingly called upon to help devise solutions to the tremendous problems of poverty, inequality, and social and environmental dislocation that afflict major parts of the globe in the 21st century. Working as an engineer in this context involves negotiating highly complex social, economic, and political realities and dealing with a wide range of institutions and actors, including national and local governments, multilateral lenders such as the World Bank, diverse non-governmental organizations (NGOs), and local communities. It also increasingly involves working in interdisciplinary teams with social scientists, public health and medical workers, humanitarian aid workers, bankers, politicians, and the like. “Sustainable” development implies a development path that is socially equitable, culturally sensitive, and environmentally appropriate over a multi-generational time frame.

The minor in Engineering for Sustainable Development exposes engineering students to some of the key issues related to development, methods of information-gathering in diverse and difficult settings, and working effectively with non-engineers on complex problems. The minor is open to undergraduates in any of the engineering disciplines in the Whiting School of Engineering. Students in Arts & Sciences may also pursue the minor with the permission of the program director.

Program Requirements

The minor encompasses seven courses. The core course is EN.570.110 Introduction to Engineering for Sustainable Development. Six additional courses will be selected in a program devised in consultation with the minor advisor.

Core Course

- EN.570.110 Introduction to Engineering for Sustainable Development

Of the Six Additional Courses:

- Three must be grouped around a specific theme, region or within a specific discipline. Themes might include, for example, public health, environment, or economic development. Regions include Africa, Latin America, or Asia. Disciplinary concentrations might be in Anthropology, Economics, Geography, History, Political Science, Public Health, or Sociology.
- Three of the courses must be at the 300-level or above.
- One of the courses must cover methods for gathering and evaluating information in a development context.

Examples include:

- AS.280.345 Public Health Biostatistics
- AS.280.350 Fundamentals of Epidemiology
- AS.230.202 Research Methods for the Social Sciences

All courses must be completed with a grade of C- or better to qualify for the minor. At least two semesters of foreign language study are strongly recommended but not required. Students who participate in a Study Abroad program for a semester can, with the minor adviser’s consent, use this experience to count in place of one of the required courses.

The value of this program will be enhanced by some form of hands-on experiential project, whether at a field site in a

developing country, in support of fieldworkers in other divisions of the university or in distressed communities in Baltimore. This experience is not required for the minor. It might take one of the following forms:

Field work

Providing technical support to "clients" at Hopkins (for example, at the School of Public Health) who are engaged in field projects in developing countries. This might involve, for example, developing dedicated software for data management, devising robust and easy-to-use test kits for environmental toxins or medical conditions, or facilitating interactive analysis and project planning between researchers in Baltimore and the field personnel.

Participating in programs being developed by the JHU Center for Social Concern, with its growing service-learning component. This would allow students to work on projects in Baltimore which offers an ample field for identifying and responding to social and environmental problems.

The Minor in Environmental Sciences

The environmental sciences minor has been developed to encourage and facilitate studies in environmental sciences by students completing degrees in the other science and engineering disciplines. The environmental sciences (ES) minor requires:

1. completion of a set of courses in the core sciences,
2. two introductory courses dealing with the environment, and
3. three or more upper-level environmental sciences courses, as described.

Core Sciences (ES Minor)

Because of the interdisciplinary nature of environmental science, it is important that professionals from various areas of expertise acquire a common language and set of core concepts to make discussion and cooperation possible.

The following courses represent the minimum set of requirements:

Mathematics (12 credits)

- AS.110.108 Calculus I
- AS.110.109 Calculus II
- At least one of these four courses:
    - AS.110.201 Linear Algebra
    - AS.110.202 Calculus III
    - AS.110.302 Differential Equations with Applications
    - EN.550.291 Linear Algebra and Differential Equations

Biology (3 credits)

- One course, such as AS.020.151 General Biology

Physics (5 credits)

- AS.171.101 Physics I or AS.171.17 General Physics for Physical Science Majors
- AS.173.111 General Physics Lab I

Chemistry (12 credits)

- AS.030.101 Intro Chemistry I
- AS.030.102 Intro Chemistry II
- AS.030.205 Intro Organic Chemistry
- AS.030.105 Intro Chemistry Lab
- AS.030.106 Intro Chemistry Lab

Environmental Sciences:

Students must take two introductory courses dealing with the environment and three or more of the upper-level environmental science courses on the following lists, for a total of 15 credits:

Introductory Courses (6 credits)

Select two of the following:

- EN.570.110 Introduction to Engineering for Sustainable Development
- EN.570.201 Environmental Biology and Ecology
- EN.570.239 Environmental Engineering Chemistry – Current and Emerging Topics
- AS.270.110 Freshman Seminar: Sustainable and Non-Sustainable Resources
- AS.270.220 The Dynamic Earth: An Introduction to Geology
- AS.270.221 The Dynamic Earth Lab

Upper-Level Courses (9 credits)

Select three of the following:

- EN.570.303 Environmental Engineering Principles and Applications
- EN.570.350 Environmental Hazards and Health Risks
- EN.570.353 Hydrology
- EN.570.411 Environmental Microbiology
- EN.570.441 Environmental Inorganic Chemistry
- EN.570.442 Environmental Organic Chemistry
- EN.570.443 Aquatic and Biofluids Chemistry
- EN.570.445 Physical and Chemical Processes I
- EN.570.491 Hazardous Waste Engineering and Management
- EN.575.706 Biological Processes for Water and Wastewater Treatment
- AS.270.302 Aqueous Geochemistry
- AS.270.350 Sedimentary Geology
- AS.270.311 Geochem Earth/Environment

Pairing a Major with the Environmental Sciences Minor

Many of the most creative and productive advances in environmental sciences in recent years have come from scientists trained in traditional disciplines (biology, chemistry, geology, physics, and engineering) who have devoted themselves to the study of environmental problems. Completion of the degree requirements of a traditional discipline

provides depth and rigor that, when supplemented with additional academic training in environmental science, can be applied to professional work in a variety of environmental subjects, as the following examples show:

Biological Processes: Response of ecosystems to change, microbial degradation of pollutants, biogeochemical cycling of greenhouse gases.

Illustrative majors: Biology, Biomedical Engineering, Biophysics, Biochemical Engineering.

Physical Processes: Erosion of hillslopes, rivers, and coastlines; sediment production, transport, and fate; groundwater, movement of contaminant plumes; oceanography; atmospheric physics; aerosol formation; global warming.

Illustrative majors: Civil Engineering, Chemical and Biomolecular Engineering, Mechanical Engineering, Physics, Earth and Planetary Sciences.

Environmental Chemistry: Environmental fate of pollutants, water and waste water treatment, geochemistry, atmospheric chemistry, ozone depletion, acid rain.

Illustrative majors: Chemistry, Chemical and Biomolecular Engineering, Earth and Planetary Sciences, Materials Science and Engineering.

Environmental Systems: Environmental modeling, risk assessment, environmental systems design, pollution control strategies.

Illustrative majors: Civil Engineering, Applied Mathematics and Statistics.

The Concurrent 5-year Bachelor's/Master's Program

The Department of Environmental Health and Engineering offers a five-year Bachelor of Science in Engineering/Master of Science in Engineering (BSE/MSE) program.

To apply for admission, students must submit an online application. Students are required to present a statement of purpose, three letters of recommendation and college transcripts. GRE scores and the application fee are waived. Upon acceptance into the program, students will be asked to develop an outline of their proposed academic program with their adviser. Students should contact their faculty adviser with questions or if they would like to consider applying to the program.

Please note: If you are currently a Hopkins student applying for the BSE/MSE program, EHE will pay for your application fee. You should apply using the standard application. Select the Combined BSE/MSE or the Combined option within the application to waive the following:

- the $75.00 fee
- GRE score requirement
- TOEFL score requirement (if you are a non-US citizen)

- ***A note about double counting for BSE/MSE students.*** Students can double count two classes (up to 8 credits total) towards their MS degree, so long as they fulfill the BS degree requirements (GE, Math, Basic Science, HS, Design, EER, and EEEs) and are 400-level or higher

BSE/MSE students who take a required course in their undergrad program but do not use it towards program-required graduation credits may count that course towards their 30-credit program requirement. In order to take advantage of this exception, students must:

- Take courses at the 600-level
- Work with their advisers to confirm that the courses are required for their master's program, and
- Submit a copy of their Junior checkout sheet demonstrating that they did not previously use the master's level course to fulfill undergraduate graduation credit requirements.

Preparing to Graduate

Fundamentals of Engineering (FE) Exam

The FE examination in Maryland can be taken up to six months before graduation. These are offered twice a year, in October and April. Application deadlines are approximately six months before the exam date.

Senior Exit Interview

Senior Exit Interviews are conducted annually by a combination of an online survey and an anonymous, in-person interview.

Graduation

Juniors! To find information about your graduation application deadline please visit the Registrar's Graduation page. The application for graduation is located online in SIS self-service. To access it, log into your account and navigate to "Program of Study" under "Registration." In the last column on the right, there is a link "Apply to Graduate."