DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

UNDERGRADUATE PROGRAM
CLASS OF 2026

University of Delaware
August 2022

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Introduction

Welcome to the University of Delaware! The Department of Civil and Environmental Engineering is one of seven departments in the College of Engineering. In the fall 2022 semester, over 2600 undergraduates are enrolled in the College, of which approximately 400 are undergraduate civil engineering, construction engineering and management, and environmental engineering students. The graduate student enrollment in the department is approximately 115 students.

Common First Semester in Engineering

The College of Engineering has a common first semester. One of these classes is EGGG101, Introduction to Engineering. In this first-year experience course, students collaborate with peers to apply the engineering design process to solve open-ended product and process-based design challenges. EGGG101 addresses "grand challenges" in engineering. At the end of first semester, students will have the opportunity to request a change of major into a different engineering major. Admission to another College of Engineering major is contingent on meeting the academic requirements and space available in the major**.**

Undergraduate Degree Programs

The Department of Civil and Environmental Engineering offers three undergraduate degree programs in civil engineering, construction engineering and management, and in environmental engineering, as well as four minors.

The undergraduate programs prepare graduates for entry-level positions. After four years of work experience, students can qualify for a license to practice by passing a Principles and Practice of Engineering (PE) examination administered by a state board. Students take the introductory Fundamental of Engineering (FE) exam, which is a pre-requisite for the PE, during senior year. In Delaware, the PE license is administered by the Delaware Association of Professional Engineers (DAPE). Information about the exam can be found at www.dape.org or www.ncees.org.

Civil Engineering Bachelor's Degree Program

The Bachelor of Civil Engineering (BCE) degree at the University of Delaware offers training in all the major disciplines of civil engineering: structural, geotechnical, transportation, environmental, infrastructure systems, railroad, and coastal engineering. The curriculum gives students an opportunity to acquaint themselves with the various disciplines within the profession. Civil engineering students may select technical electives in one field or take a variety of courses to explore several areas of civil engineering.

A complete description of the undergraduate curriculum is in the Undergraduate Catalog. The check sheet and diagram shown on the next two pages list the recommended courses for each semester and help students keep track of progress toward graduation. Progress can also be tracked in UDSIS using the degree audit tool.

Following the diagram is a list of technical elective courses.

Name _____ Advisor _____

CIVIL ENGINEERING PROGRAM
(125 hours)

The required courses are normally taught in fall or spring semesters as indicated below.
Each student is responsible for tracking future changes in this schedule.

FIRST YEAR

FALL	**16 credits**	**Sem.**	**Grade**
General Chemistry*	CHEM 103 /133 (4)		
Computer Science	CISC 106 (3)		
Intro. to Engineering	EGGG 101 (2)		
Analy. Geom. & Calc. A*	MATH 241 (4)		
Breadth Requirement	(3)		

FIRST YEAR

SPRING	**17 credits**	**Sem.**	**Grade**
Intro to Civil Eng. Design (H)	CIEG 161 (3)		
Seminar in Composition	ENGL 110 (3)		
Analy. Geom. & Calc. B*	MATH 242 (4)		
Fundamentals of Physics I*	PHYS 207/227 (4)		
Public Spking/Prof Present.	COMM 212(3)		

SOPHOMORE YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Statics (H)	CIEG 211 (3)		
Intro to Sustainability (H)	CIEG 402 (3)		
Analy. Geom. & Calc. C	MATH 243 (4)		
Science with lab elective **(a)**	(4)		
Tech. Writing/Breadth Req.	ENGL 410 (3)		

SOPHOMORE YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Solid Mechanics	CIEG 212 (3)		
CE Materials Lab	CIEG 213 (1)		
Prob. & Stats. for Eng (H)	CIEG 315 (3)		
Engineering Math I	MATH 351 (3)		
Construction Materials	CIEG 214 (3)		
Comm. with Stakeholders	CIEG 411 (3)		

JUNIOR YEAR

FALL	**15 credits**	**Sem.**	**Grade**
Structural Analysis/Design (H)	CIEG 301 (4)		
Fluid Mechanics (H)	CIEG 305 (3)		
Fluid Mechanics Lab	CIEG 306 (1)		
Soil Mech and Fndation Eng.	CIEG 320 (3)		
Soil Mech/Fndation Eng Lab	CIEG 323 (1)		
Environmental Engineering	CIEG 331 (3)		

JUNIOR YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Geotechnical Engineering	CIEG 321 (3)		
Transportation Engineering	CIEG 351 (3)		
Transportation Eng. Lab	CIEG 451 (1)		
Eng. Project Mgmt (H)	CIEG 486 (3)		
Breadth Requirement	(3)		
Technical Elective	(3)		

SENIOR YEAR

FALL	**14 credits**	**Sem.**	**Grade**
Senior Design (H)	CIEG 461 (2)		
Breadth Requirement	(3)		
Technical Elective	(3)		
Technical Elective	(3)		
Technical Elective	(3)		

SENIOR YEAR

SPRING	**14 credits**	**Sem.**	**Grade**
Senior Design (H)	CIEG 461 (2)		
Technical Elective	(3)		
Technical Elective	(3)		
Breadth Requirement	(3)		
Breadth Requirement	(3)		

*Grade of C- or higher for degree requirement or as pre-requisite for other courses.
(H) Department of Civil and Environmental engineering offers an honors section of this course.

All breadth requirements (18 credit hours) and ENGL110 require a C- or better. The three University breadths must be taken from separate departments. See UD Academic Catalog for more information.

Creative Arts & Humanities	**Sem.**	**Grade**	History & Cultural Change	**Sem.**	**Grade**	Social & Behavioral Sciences	**Sem.**	**Grade**
Add'l Breadth Requirement (18 credits)								
ENGL 410			Prof./Career Prep			Prof./Career Prep		

_____ two upper-level (300 and higher) courses _____ Multicultural Requirement

a) One course from: BISC 207, BISC 208, GEOG 220/221, GEOL 105/115, or GEOL 107

Civil Engineering Technical Electives

Technical electives include upper-level courses in engineering, mathematics, computer science, and the sciences. Graduate-level courses may also be taken as technical electives. The following is a list of suggested technical electives for different aspects of civil engineering. Some of the courses may not be offered a particular year. A current list is available in the department office and department website. Some courses offered in other departments may also be approved as technical electives. Students should meet with their advisor before selecting courses. This list is not exhaustive.

1. Technical electives will include courses from engineering, mathematics, and the sciences, or by the approval of the Civil Engineering undergraduate committee.
2. All technical electives must be 300-level or higher, or by approval of the Civil Engineering undergraduate committee.
3. Four out of six technical electives must be 400-level or higher CIEG courses.
4. Four out of six technical electives must be taken at UD.

Courses that satisfy the technical elective requirements are listed below. Students may choose courses from one or more categories.

BISC 300-699
BMEG 300-699
CHEG 300-699
CHEM 300-699
CIEG 300-699
CISC 300-699
CPEG 300-699
ELEG 300-699
GEOG 372
GEOL 300-699
MAST 300-699
MATH 300-699
MEEG 300-699
MSEG 300-699
PHYS 300-699
PLSC 421
PLSC 430
STAT 300-699
UNIV 401-402

Civil Infrastructure Systems

CIEG 318	Introduction to Railroads
CIEG 414	Railroad Geotechnical Engineering
CIEG 417	Introduction to Railroad Safety and Derailment Engineering
CIEG 452	Transportation Facilities Design
CIEG 453	Roadway Geometric Design
CIEG 454	Urban Transportation Planning
CIEG 457	Contemporary Topics in Transportation
CIEG 458	Pavement Analysis and Design
CIEG 459	Optimization in Design and Construction

CIEG 462 Transportation Sustainability
CIEG 463 Traffic Engineering and Modeling
CIEG 641 Risk Analysis
CIEG 646 Convex Optimization
CIEG 647 Network Optimization
GEOG 372 Introduction to GIS
LARC 222 Introduction to Surveying
LARC 343 Site Engineering
LARC 431 Urban Hydrology and Drainage Design

Structural Engineering

CIEG 311 Dynamics
CIEG 401 Introduction to the Finite Element Method
CIEG 403 Sustainability Applications in Infrastructure
CIEG 404 Prestressed Concrete Design
CIEG 406 Reinforced Concrete Design
CIEG 407 Building Structure Design
CIEG 412 Structural Steel Design
CIEG 413 Advanced Structural Analysis
CIEG 421 Foundation Engineering
CIEG 423 Advanced Reinforced Concrete
CIEG 492 International Construction
CIEG 495 Temporary Structures Design
CIEG 496 Building Systems Engineering and Design
CIEG 608 Highway Bridge Engineering
CIEG 611 Structural Dynamics Design
CIEG 612 Advanced Mechanics of Materials

Geotechnical Engineering

CIEG 401 Introduction to the Finite Element Method
CIEG 421 Foundation Engineering
CIEG 422 Earth Structures Engineering
CIEG 424 Earth Retaining Structures
CIEG 425 Unsaturated Soil Mechanics
CIEG 427 Deep Foundations
CIEG 428 Ground Improvement Methods
CIEG 605 Intermediate Topics in Finite Element Analysis
CIEG 626 Soil Behavior

Environmental Engineering

CIEG 433 Hazardous Waste Management
CIEG 436 Processing, Recycling, Management of Solid Wastes
CIEG 440 Water Resources Engineering
CIEG 445 Industrial Ecology
CIEG 465 Global Sustainable Engineering
CIEG 498 Groundwater Flow and Contaminant Transport
or
GEOL 428 Hydrogeology
GEOL 421 Environmental and Applied Geology
LARC 442 Stormwater Management for Sustainable Development

PLSC 421	Nonpoint Source Pollution
PLSC 430	Urban Ecology

Transportation Engineering

CIEG 318	Introduction to Railroads
CIEG 417	Introduction to Railroad Safety and Derailment Engineering
CIEG 418	Railroad Engineering
CIEG 452	Transportation Facilities Design
CIEG 453	Roadway Geometric Design
CIEG 454	Urban Transportation Planning
CIEG 457	Contemporary Topics in Transportation
CIEG 458	Pavement Analysis and Design
CIEG 459	Optimization in Design and Construction
CIEG 463	Traffic Engineering and Modeling

Coastal Engineering

CIEG 405	Advanced Fluid Mechanics
CIEG 440	Water Resources Engineering
CIEG 471	Introduction to Coastal Engineering
CIEG 639	Ocean Fluid Dynamics
CIEG 675	Matlab for Engineering Analysis
CIEG 679	Sediment Transport Mechanics
CIEG 680	Coastal Processes
GEOL 411	Fluvial Geomorphology
GEOL 434	Geology of Coasts
MAST 402	Physical Oceanography
MAST 455	Geophysical Fluid Dynamics

Construction Engineering and Management Bachelor's Degree Program

The Bachelor of Construction Engineering and Management (BCEM) program focuses on implementing the engineering solutions designed by the sub-disciplines of civil engineering: structural, environmental, geotechnical, and materials and transportation engineering.

The goal of construction engineering and management is to deliver a physical facility in a safe manner within time and budget constraints. As the industry evolves and progresses, this goal becomes increasingly difficult. The construction enterprise itself becomes complex and technically demanding under increasing economic, time, and quality constraints.

There is a rapidly growing need for engineers prepared for the challenges of construction management in the future. This need is recognized by industry, has been addressed by professional society and accrediting bodies, and validated through market studies. The Department of Civil and Environmental Engineering, with strong encouragement of industry and alumni, launched the bachelor's program in Construction Engineering and Management in 2017. The program requires 126 credit hours and is structured following ABET-accreditation guidelines thereby giving a path to professional licensure. Other distinctive features include:

- mandatory practical experience through a required 26-week guided co-op
- required completion of UD Certificate of Business Essentials or an optional minor through the UD Alfred Lerner College of Business and Economics
- optional international experience through technical electives
- numerous opportunities for professional society involvement

Students complete prescribed breadth courses as part of the curriculum. One breadth course is discretionary and is chosen by the student, who should ensure that the breadth requirements and multicultural requirement of the University are satisfied.

A complete description of the undergraduate curriculum is in the Undergraduate Catalog. The check sheet and diagram shown on the next two pages list the recommended courses for each semester and help students keep track of progress toward graduation. Progress can also be tracked in UDSIS using the degree audit tool.

Name _____ Advisor _____

CONSTRUCTION ENGINEERING AND MANAGEMENT PROGRAM (126 hours)
The required courses are normally taught in fall or spring semesters as indicated below.
Each student is responsible for tracking future changes in this schedule.

FIRST YEAR

FALL	**16 credits**	**Sem.**	**Grade**
General Chemistry*	CHEM 103/133 (4)		
Computer Science	CISC 106 (3)		
Intro. to Engineering	EGGG 101 (2)		
Analy. Geom. & Calc. A*	MATH 241 (4)		
Breadth Req. (CEM list)	(3)		

FIRST YEAR

SPRING	**17 credits**	**Sem.**	**Grade**
Introduction to CEM	CIEG 191 (3)		
Seminar in Composition	ENGL 110 (3)		
Analy. Geom. & Calc. B*	MATH 242 (4)		
Fundamentals of Physics I*	PHYS 207/227 (4)		
Breadth Req. (CEM list)	(3)		

SOPHOMORE YEAR

FALL	**16 credits**	**Sem.**	**Grade**
Statics (H)	CIEG 211 (3)		
Enviro., Health, and Safety (H)	CIEG 292 (3)		
CAD and BIM in Construct.	CIEG 291 (3)		
Prob. & Stats. for Engineers	CIEG 315 (3)		
Science/Math Elective **(a)**	(4)		

SOPHOMORE YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Solid Mechanics	CIEG 212 (3)		
Civil Eng. Materials Lab	CIEG 213 (1)		
Construction Materials*	CIEG 214 (3)		
Introduction to Surveying	CIEG 222 (3)		
Public Spking/Prof Present.	COMM 212(3)		
Math Course **(b)**	(3)		

JUNIOR YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Construct. Est./Cost Cntrl (H)	CIEG 391 (3)		
Struct. Analysis/Design (H)	CIEG 301 (4)		
Soils Mech and Fndation Eng	CIEG 320 (3)		
Soils Mech/Fndation Eng Lab	CIEG 323 (1)		
Fluid Mechanics (H)	CIEG 305 (3)		
Breadth Req. (CEM list)	(3)		

JUNIOR YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Survey of Accounting*	ACCT 200 (4)		
Construction Plan/Sched. (H)	CIEG 392 (3)		
Construction Law/Reg. (H)	CIEG 394 (3)		
Engineering Proj. Mgmt. (H)	CIEG 486 (3)		
Breadth Req. (CEM list)	(3)		

SENIOR YEAR

FALL	**15 credits**	**Sem.**	**Grade**
Optim. in Design/Const.	CIEG 459 (3)		
Constr. Means/Methods (H)	CIEG 393 (3)		
Co-op in Civil/Enviro Eng.	CIEG 481 (3)		
Technical Elective **(c)**	(3)		
Breadth Req. (CEM list)	(3)		

SENIOR YEAR

SPRING	**13 credits**	**Sem.**	**Grade**
Senior Design	CIEG 491 (4)		
Technical Elective **(c)**	(3)		
General Elective	(3)		
Breadth Req. (CEM list)	(3)		

*Grade of C- or higher for degree requirement or as pre-requisite for other courses.
(H) Department of Civil and Environmental engineering offers an honors section of this course.

All breadth requirements (18 credit hours) and ENGL110 require a C- or better. See Undergraduate Catalog for more information.

Creative Arts & Humanities	**Sem.**	**Grade**	History & Cultural Change	**Sem.**	**Grade**	Social & Behavioral Sciences	**Sem.**	**Grade**
						ECON 100		
Add'l Breadth Req.			Add'l Breadth Req.			Add'l Breadth Req.		
ENGL 410			BUAD 100			FINC 200		

_____ two upper-level (300 and higher) courses _____ Multicultural Requirement

a) one course from: BISC 207, BISC 208, GEOL 105/115, GEOL 107, GEOG152, MATH 243, PHYS 208, PLSC 204/205
b) MATH 349 (Elementary Linear Algebra) or MATH 351 (Engineering Math I). 351 requires MATH 243.
c) two courses from: CIEG 343, CIEG 402, CIEG 492, CIEG 493, CIEG 494, CIEG 495, CIEG496, or other approved elective

Environmental Engineering Bachelor's Degree Program

The Bachelor of Environmental Engineering (BENE) program educates students in the causes, control, and prevention of environmental contamination so that they may analyze those processes and improve the quality of the earth's atmospheric, water, and land resources.

The core curriculum includes important aspects of thermodynamics and ecology, as well as courses on treating water and wastewater, controlling air pollution, and managing solid wastes. Laboratory coursework emphasizes the current methods for pollutant analysis and treatment. Through these courses, students develop an understanding of the fate of environmental contaminants; an ability to apply methods of modeling and simulation to environmental processes; and the ability to assess risk and estimate cost. The program emphasizes teaching students to apply knowledge to the conception, analysis, and design of solutions to real-world environmental problems. Students develop the ability to implement technology-based solutions through design, construction, and operation. Graduates will be competent in basic environmental engineering laboratory skills and will have received training in oral and written communications.

Students take four technical electives, allowing them to obtain greater depth within their area of interest to broaden their training through additional upper-level courses in engineering, science, and mathematics.

A complete description of the undergraduate curriculum is in the Undergraduate Catalog. The check sheet and diagram shown on the next two pages list the recommended courses for each semester and help students keep track of progress toward graduation. Progress can also be tracked in UDSIS using the degree audit tool.

Following the check sheet is a list of technical elective courses.

Name _____ Advisor _____

ENVIRONMENTAL ENGINEERING PROGRAM
(126 hours)
The required courses are normally taught in fall or spring semesters as indicated below.
Each student is responsible for tracking future changes in this schedule.

FIRST YEAR

FALL	**16 credits**	**Sem.**	**Grade**
General Chemistry*	CHEM 103/133 (4)		
Computer Science	CISC 106 (3)		
Intro. to Engineering	EGGG 101 (2)		
Analy. Geom. & Calc. A*	MATH 241 (4)		
Breadth Requirement	(3)		

FIRST YEAR

SPRING	**17 credits**	**Sem.**	**Grade**
General Chemistry*	CHEM 104/134 (4)		
Intro to Enviro. Eng.*	CIEG 133 (3)		
Seminar in Composition*	ENGL 110 (3)		
Analy. Geom. & Calc. B*	MATH 242 (4)		
Breadth Requirement	(3)		

SOPHOMORE YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Statics (H)	CIEG 211 (3)		
Enviro. Eng. Processes*	CIEG 233 (3)		
Analy. Geom. & Calc. C*	MATH 243 (4)		
Fundamentals of Physics I*	PHYS 207/227 (4)		
Breadth Requirement	(3)		

SOPHOMORE YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Introductory Biology I	BISC 207 (4)		
Prob. & Stats. for Eng (H)	CIEG 315 (3)		
Engineering Math I	MATH 351 (3)		
Thermo. for Enviro Eng.	CIEG 333 (3)		
Computer Elective **(a)**	(3)		

JUNIOR YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Fluid Mechanics (H)	CIEG 305 (3)		
Fluid Mechanics Lab	CIEG 306 (1)		
Microbiology of Eng. Systems	CIEG 444 (4)		
Organic Chemistry I	CHEM 321 (3)		
Water Resources Eng.	CIEG 440 (3)		
Breadth Requirement	(3)		

JUNIOR YEAR

SPRING	**15 credits**	**Sem.**	**Grade**
Tech. Writing/Breadth Req.	ENGL 410 (3)		
PRM of Solid Waste	CIEG 436 (3)		
Water and WW Quality	CIEG 437 (3)		
Water and Wastewater Eng.	CIEG 438 (3)		
Technical Elective	(3)		

SENIOR YEAR

FALL	**14 credits**	**Sem.**	**Grade**
Senior Design (H)	CIEG 461 (2)		
Enviro. Eng. Lab	CIEG 337 (3)		
Surface Water Course **(b)**	(3)		
Technical Elective	(3)		
Breadth Requirement	(3)		

SENIOR YEAR

SPRING	**14 credits**	**Sem.**	**Grade**
Senior Design (H)	CIEG 461 (2)		
Air Pollution Course **(c)**	(3)		
Groundwater Course **(d)**	(3)		
Technical Elective	(3)		
Technical Elective	(3)		

*Grade of C- or higher for degree requirement or as pre-requisite for other courses.
(H) Department of Civil and Environmental engineering offers an honors section of this course.

All breadth requirements (18 credit hours) require a C- or better. The three University breadths must be taken from separate departments. See UD Academic Catalog for more information.

Creative Arts & Humanities	**Sem.**	**Grade**	History & Cultural Change	**Sem.**	**Grade**	Social & Behavioral Sciences	**Sem.**	**Grade**
Add'l Breadth Requirements (9 credits)								
ENGL 410			Prof./Career Prep					

_____ two upper-level (300 and higher) courses _____ Multicultural Requirement

a) APEC 480, GEOG 372, CIEG3 22, or LARC 150;
b) CIEG 430 or CIEG 468
c) CIEG 415 (spring) or CIEG 434 (fall);
d) CIEG 498 or GEOL 428

Environmental Engineering Technical Electives

Courses that satisfy the technical elective requirements are listed below. Students may choose courses from one or more categories.

BISC 641	Microbial Ecology
CHEG 332	Chemical Engineering Kinetics
CHEG 342	Heat and Mass Transfer
CHEG 622	Chemicals, Risk and the Environment
CHEM 443	Physical Chemistry I
CHEM 444	Physical Chemistry II
CHEM 527	Introductory Biochemistry
CIEG 300-699	
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
GEOG 405	Computing for Environmental Research
GEOG 432	Environmental Hydrology
GEOG 455	Certification Systems for Sustainable Development
GEOG 473	Select Technical Topics
GEOL 421	Environmental and Applied Geology
LARC 343	Site Engineering
LARC 431	Urban Hydrology and Drainage Design
LARC 442	Stormwater Management for Sustainable Development
MAST 382	Introduction to Ocean Science
PLSC 405	Environmental Forensics and Society
PLSC 419	Soil Microbiology
PLSC 421	Nonpoint Source Pollution
PLSC 439	Plant-Contaminant Interactions
PLSC 603	Soil Physics
PLSC 608	Environmental Soil Chemistry
UAPP 411	Regional Watershed Management
UNIV 401-402	Senior Thesis

Environmental Treatment Processes

CHEG 332	Chemical Engineering Kinetics
CHEG 342	Heat and Mass Transfer
CIEG 632	Chemical Aspects of Environmental Engineering
CIEG 634	Physical Aspects of Environmental Engineering
CIEG 636	Biological Aspects of Environmental Engineering

Environmental Science

BISC 641	Microbial Ecology
CHEM 443	Physical Chemistry I
CHEM 444	Physical Chemistry II
CHEM 527	Introductory Biochemistry
CIEG 615	Meteorologic Processes in Air Pollution
GEOL 421	Environmental and Applied Geology
MAST 382	Introduction to Ocean Sciences
PLSC 405	Environmental Forensics and Society
PLSC 419	Soil Microbiology
PLSC 421	Nonpoint Source Pollution

PLSC 438	Fate/Transport Soil Contaminants
PLSC 439	Plant-Contaminant Interactions
PLSC 603	Soil Physics
PLSC 608	Environmental Soil Chemistry

Environmental Transport and Modeling

GEOG 432	Environmental Hydrology
LARC 431	Urban Hydrology and Drainage Design
LARC 442	Stormwater Management for Sustainable Development
PLSC 421	Nonpoint Source Pollution

Facility Design

CIEG 301	Structural Analysis and Design
CIEG 311	Dynamics
CIEG 320	Soil Mechanics
CIEG 321	Geotechnical Engineering
CIEG 471	Introduction to Coastal Engineering
CIEG 486	Engineering Project Management
GEOG 473	Select Technical Topics
LARC 343	Site Engineering

Environmental Management and Policy

CHEG 622	Chemicals, Risk and the Environment
CIEG 402	Introduction to Sustainability Principles in Civil Engineering
CIEG 433	Hazardous Waste Management
CIEG 445	Industrial Ecology
CIEG 465	Global Sustainable Engineering
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
GEOG 405	Computing for Environmental Research
GEOG 455	Certification Systems for Sustainable Development
LARC 442	Stormwater Management for Sustainable Development
UAPP 411	Regional Watershed Management

4 + 1 Degree Programs

Well-qualified civil and environmental engineering majors may apply to the 4+1 program which culminates in the student earning a Bachelor of Civil Engineering (BCE) degree or a Bachelor of Environmental Engineering (BENE) degree, and a Master of Civil Engineering (MCE) degree within five years. The program is limited to University of Delaware undergraduates pursuing the BCE or BENE degree with a minimum grade point average of 3.25 at the time of application. Students must complete at least 90 credits toward the undergraduate degree before they can be enrolled in the program. Only full-time students at the time of application are eligible.

Additionally, the College of Engineering and the College of Business and Economics offer a joint five-year program that leads to a bachelor's degree in an engineering major and a Master of Business Administration degree from the College of Business and Economics. Discuss this program with the Assistant Dean for more information:
https://lerner.udel.edu/programs/accelerated-degree-programs/engineering-mba/

Academic Minors

Minor in Civil Engineering

A grade of C- or better is required in all the courses completed for the minor. Before beginning the civil engineering courses, the student must meet the required mathematics, physics, and other pre-requisites for each course. Required courses:

CIEG 211 - Statics (3cr.)
CIEG 212 - Solid Mechanics (3cr.)
CIEG 305 - Fluid Mechanics (3cr.)
CIEG 320 - Soil Mechanics and Foundation Engineering (3cr.)

Nine additional credits (three courses) in civil engineering from the approved minor course list must be taken of which at least six credits must be at the 300-level or higher. CIEG 331 and CIEG 438 cannot both be used toward the minor. CIEG 367 and CIEG 467 can only be used toward the minor if approved by the undergraduate committee.

All students must complete three of the following courses:

CIEG 301	Structural Analysis and Design
CIEG 311	Dynamics
CIEG 315	Probability and Statistics for Engineers
CIEG 318	Introduction to Railroads
CIEG 321	Geotechnical Engineering
CIEG 331	Environmental Engineering
CIEG 351	Transportation Engineering
CIEG 401	Introduction to the Finite Element Method
CIEG 402	Introduction to Sustainability Principles in Civil Engineering
CIEG 403	Sustainability Applications in Infrastructure
CIEG 404	Prestressed Concrete Design
CIEG 405	Advanced Fluid Mechanics
CIEG 406	Reinforced Concrete Design
CIEG 407	Building Design
CIEG 412	Structural Steel Design
CIEG 413	Advanced Structural Analysis
CIEG 414	Railroad Geotechnical Engineering
CIEG 417	Introduction to Railroad Safety and Derailment Engineering
CIEG 418	Railroad Engineering
CIEG 419	Concrete Materials
CIEG 421	Foundation Engineering
CIEG 422	Earth Structures Engineering
CIEG 423	Advanced Reinforced Concrete Design
CIEG 424	Earth Retaining Structures
CIEG 425	Unsaturated Soil Mechanics
CIEG 427	Deep Foundations
CIEG 428	Ground Improvement Methods
CIEG 436	Processing, Recycling, Management of Solid Wastes
CIEG 438	Water and Wastewater Engineering
CIEG 440	Water Resources Engineering
CIEG 442	Stormwater Management for Sustainable Development
CIEG 452	Transportation Facilities Design

CIEG 453 Roadway Geometric Design
CIEG 454 Urban Transportation Planning
CIEG 457 Contemporary Topics in Transportation
CIEG 458 Pavement Analysis and Design
CIEG 459 Optimization in Design and Construction
CIEG 462 Transportation Sustainability
CIEG 463 Traffic Engineering and Modeling
CIEG 465 Global Sustainable Engineering
CIEG 471 Introduction to Coastal Engineering
CIEG 486 Engineering Project Management

CIEG 367 with prior approval of undergraduate committee
CIEG 467 with prior approval of undergraduate committee
LARC 222 Introduction to Surveying
LARC 343 Site Design
LARC 431 Urban Hydrology and Drainage Design
LARC 442 Stormwater Management for Sustainable Development
MSEG 410 Experimental Mechanics of Composites

Course suggestions for students interested in the following topical areas:

- Earth sciences: CIEG 321 and CIEG 427
- Environment: CIEG 331 and CIEG 436
- Urban topics: CIEG 331 and CIEG 351
- Structures: CIEG 301 and CIEG 404
- Coastal: CIEG 440 and CIEG 471
- Transportation: CIEG351 and CIEG 452
- Railroads: CIEG 318 and CIEG 418

Minor in Sustainable Infrastructure

The objective of this minor is to provide the basic knowledge and skills required in balancing civil infrastructure development with environmental and societal impacts, so that sustainability can be methodically defined and attained. Students will learn the principles of sustainability and the fundamental tools needed to assess sustainability; be able to evaluate the impact of proposed infrastructure development on limited natural resources; recognize and assess the political, economic, environmental, and social impacts of infrastructure development; and develop the insight needed to find solutions that minimize the effect of infrastructure development on the local community and across global boundaries.

To receive a minor in Sustainable Infrastructure, the student must successfully complete a minimum of 15 credits as described below with a minimum grade of C- in each course.

All students must complete the following core course:
CIEG 402 Introduction to Sustainability Principles in Civil Engineering

All students must complete one of the following core courses:
CIEG 403 Sustainability Applications in Infrastructure
CIEG 465 Global Sustainable Engineering

All students must complete three of the following sustainability-related breadth courses:
APEC 343 Environmental Economics

BUAD 429 Sustainability and Green Business
ECON 311 Economics of Developing Countries
ELEG 415 Electric Power Systems
ELEG 491 Ethics/Impacts of Engineering
ENEP 402 Electricity Policy and Planning
ENEP 410 Political Economy of the Environment
ENTR 157 Venturing for Good
ENTR 420 Social Entrepreneurship
ENTR 489 Eco-Entrepreneurship Practicum
GEOG 422 Resources, Development and the Environment
LEAD 400 Leadership for the Common Good
MEEG 435 Wind Power Engineering
PHIL 448 Environmental Economics
POSC 350 Politics and the Environment
POSC 491 Politics of Developing Nations
SOCI 471 Disasters, Vulnerability & Development
UAPP 406 Plan Sustainable Communities & Regions
UAPP 411 Regional Watershed Management
UAPP 421 Contemporary Issues in a Global Society

Several courses included as electives in the minor may require completion of pre-requisite courses for students in some majors.

Minor in Environmental Engineering

A minor in environmental engineering may be earned by a student in any University bachelor's degree program through the successful completion of a minimum of 18 credits as described below. Before beginning the environmental engineering courses, the student must meet the required mathematics, physics, and other pre-requisites for each course. A grade of C- or better is required in all the courses completed for the minor.

One chemistry course is required:
CHEM 104/134* General Chemistry
*Can be replaced with CHEM 112

Two environmental engineering courses are required:
CIEG 233* Environmental Engineering Processes
CIEG305** Fluid Mechanics (lab optional)
*Can be replaced with CIEG 331
**Can be replaced with MEEG 331 or CHEG 341

An additional three courses in environmental engineering must be taken from the following:
CIEG 430 Water Quality Modeling
CIEG 433 Hazardous Waste Management
CIEG 434 Air Pollution Control
CIEG 436 Processing, Recycling, Management of Solid Wastes
CIEG 438* Water and Wastewater Engineering
CIEG 440 Water Resources Engineering
CIEG 498 Groundwater Flow and Contaminant Transport
*Will not count if CIEG 331 is taken in place of CIEG 233

Minor in Environmental Sustainability

The objective of this minor is to provide basic knowledge and skills required in balancing technological development and environmental impacts, so that sustainability can be methodically defined and attained. Students will have the opportunity to assess sustainability using tools such as lifecycle analysis, risk assessment, and the triple bottom line of economic, environmental, and societal effects; recognize and specify engineering solutions to resource, pollution, and sanitation problems that are in harmony with local cultures; relate environmental issues to local political, societal, and economic factors to provide a proper context for sustainable solutions; and evaluate and compare appropriate technologies and other sustainable solutions across global boundaries.

To receive a minor in environmental sustainability, students must complete a total of 15 credits in accordance with the requirements specified below. Before beginning these courses, the student must meet the required course pre-requisites. A minimum grace of C- must be achieved in each course qualifying for the minor.

Recommend pre-requisite:
The student is advised to have completed an introductory course in mass and energy balances such as CHEG 112, CIEG 233, or MEEG 331.

Core courses:

CIEG 445	Industrial Ecology
CIEG 465	Global Sustainable Engineering

One of the following pollution control technology courses:

CIEG 433	Hazardous Waste Management
CIEG 436	Processing, Recycling, Management of Solid Wastes
CIEG 438	Water and Wastewater Engineering

Two of the following sustainability-related breadth courses:

APEC 343	Environmental Economics
BUAD 429	Sustainability and Green Business
ECON 311	Economics of Developing Countries
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
ENTR 489	Eco-Entrepreneurship Practicum
GEOG 320	Water and Society
GEOG 422	Resources, Development and the Environment
MAST 676	Environmental Economics
PHIL 448	Environmental Ethics
POSC 350	Politics and the Environment
POSC 491	Politics of Developing Nations
SOCI 471	Disasters, Vulnerability & Development
UAPP 406	Plan Sustainable Communities & Regions
UAPP 411	Regional Watershed Management

Department Faculty

Name	Office	Title	Ph.D.	Areas of Expertise
Daniel Cha	346A DuPont Hall	Professor	University of California, Berkeley	Biochemistry, Environmental and Water Resources, Sustainability, Water
Michael Chajes	358A DuPont Hall	Professor and Dean of Honors College	University of California, Davis	Bridges for the Future, Infrastructure, Sustainability, Structural
Yu-Ping Chin	474 ISE Lab	Professor	University of Michigan	Biochemistry, Coastal and Ocean, Environmental and Water Resources, Sustainability, Water
Pei Chiu	468 ISE Lab	Professor	Stanford University	Environmental and Water Resources, Sustainability, Water
Rachel Davidson	360B DuPont Hall	Professor and Associate Dean for Academic Affairs	Stanford University	Disasters, Infrastructure, Infrastructure Systems, Risk Assessment, Structural
Dominic DiToro	356A DuPont Hall	Edward C. Davis Professor and Director for the Center of	Princeton University	Coastal and Ocean, Environmental and Water Resources, Risk Assessment

Shangjia Dong	344B DuPont Hall	Assistant Professor	Oregon State University	Disasters, Infrastructure Systems
Ardeshir Faghri	360C DuPont Hall	Professor	University of Virginia	Infrastructure Systems, Sustainability, Transportation
John Gillespie, Jr.	201C Composite Center	Donald C. Phillips Professor	University of Delaware	Bridges for the Future, Materials, Structural, Sustainability
Monique Head	360H DuPont Hall	Associate Chair and Associate Professor	Georgia Institute of Technology	Bridges for the Future, Disasters, Infrastructure, Structural, Sustainability
Tianjian Hsu	205 Ocean Eng. Lab	Professor and Director of the Center for Applied Coastal Research	Cornell University	Coastal & Ocean
Yao Hu	217A Pearson Hall	Assistant Professor	University of Illinois at Urbana-Champaign	Big Data, Environmental and Water Resources, Sustainability, Water
Chin-Pao Huang	352A DuPont Hall	Donald C. Phillips and Francis Alison Professor	Harvard University	Environmental and Water Resources, Sustainability, Water
Paul Imhoff	344A DuPont Hall	Professor	Princeton University	Environmental and Water Resources, Sustainability, Water
Allen Jayne	307 DuPont	Assistant Professor	University of Delaware	Structural
Victor Kaliakin	360F DuPont Hall	Professor	University of California, Davis	Geotechnical
James Kirby	201 Ocean Eng. Lab	Edward C. Davis Professor	University of Delaware	Coastal & Ocean, Disasters
Nobuhisa Kobayashi	207 Ocean Eng. Lab	Professor	Massachusetts Institute of Technology	Coastal & Ocean, Disasters
Earl “Rusty” Lee	355 DuPont Hall	Associate Professor	Rensselaer Polytechnic Institute	Disasters, Infrastructure, Infrastructure Systems, Transportation
Haritha Malladi	360A DuPont Hall	Assistant Professor and Director of First-Year Engineering	North Carolina State University	Infrastructure, Materials, Sustainability, Transportation

Julia Maresca	204B Delaware Biotech. Institute	Associate Professor	Penn State University	Biochemistry, Environmental and Water Resources, Water
Jennifer McConnell	358B DuPont Hall	Bentley Systems Early Career Professor	West Virginia University	Big Data, Bridges for the Future, Infrastructure, Materials, Structural, Sustainability
Christopher Meehan	358A DuPont Hall	Professor	Virginia Tech University	Big Data, Bridges for the Future, Disasters, Geotechnical, Infrastructure, Risk Assessment, Sustainability
Holly Michael	101A Penny Hall	Professor and Unidel Fraser Russell Career Development Chair in Environmental Geological Sciences	Massachusetts Institute of Technology	Coastal and Ocean, Environmental and Water Resources, Water
Ri Na	342B DuPont Hall	Assistant Professor	University of Nebraska—Lincoln	Construction, Infrastructure, Sustainability
Mark Nejad	352B DuPont Hall	Assistant Professor	Wayne State University	Disasters, Infrastructure Systems, Sustainability Transportation
Jack Puleo	301 DuPont Hall	Professor and Chair	University of Florida	Coastal & Ocean, Disasters, Sustainability
Jennie Saxe	343A DuPont Hall	Assistant Professor	University of Delaware	Environmental and Water Resources
Harry “Tripp” Shenton	360E DuPont Hall	Professor and Associate Dean for Undergraduate Information	Johns Hopkins University	Bridges for the Future, Structural
Mohsin Siddiqui	342C DuPont Hall	Assistant Professor	University of Texas at Austin	Construction, Infrastructure Systems
Jovan Tatar	356B DuPont Hall	Assistant Professor	University of Florida	Bridges for the Future, Infrastructure, Materials, Structural, Sustainability
Allan Zarembski	343B DuPont Hall	Professor of Practice	Princeton University	Big Data, Infrastructure, Infrastructure Systems, Transportation

Administrative and Support Staff

Name	Position	Office	Phone	Email
Christine Murray	Staff Assistant	301 DuPont Hall	302-831-2442	camurray@udel.edu
Nicole Murphy	Assistant to the Chair	301A DuPont Hall	302-831-3017	nbmurphy@udel.edu
Sarah Palmer*	Undergraduate Academic Advisor	301 DuPont Hall	302-831-0438	sbpalmer@udel.edu
Jacquee Lukawski	Graduate Academic Advisor	301 DuPont Hall	302-831-6570	jacquee@udel.edu
Gary Wenczel	Structural and Geotechnical Lab Manager	281 DuPont Hall	302-831-6936	wenczel@udel.edu
Yu-Han Yu	Environmental Lab Manager	143A DuPont Hall	302-831-4457	yuhanyu@udel.edu

* primary contact for all undergraduate concerns

Advisement

Students are assigned to a faculty advisor upon arrival on campus. Students in civil engineering and environmental engineering will normally have the same faculty advisor for the entire time they are enrolled in the undergraduate program in the Department of Civil or Environmental Engineering. Students in construction engineering and management will change advisors each year. It is suggested that students meet with their advisor once each semester.

There is a two-week advising period every semester, just prior to the time when students will be registering for courses for the following semester. Students will register for appointments with their faculty advisor using the Blue Hen Success Collaborative. The University will assign students a registration appointment, after which they may enroll in courses.

A professional Undergraduate Academic Advisor is available to meet with students as well.

Advisors for the Class of 2026

Student Group	**Name**	**Office**	**Email**
Construction Eng. and Mgmt.	Prof. M. Siddiqui	352A DuPont Hall	mohsin@udel.edu
Environmental Eng. Students A-R	Prof. J. Maresca	204B DBI	jmaresca@ude.edu
Environmental Eng. Students S-Z	Prof. P. Chiu	468 ISE	pei@udel.edu
Civil Eng. Students A-K	Prof. J. Tatar	356B DuPont	jtatar@udel.edu
Civil Eng. Students L-N	Prof. A. Jayne	307 DuPont	ajayne@udel.edu
Civil Eng. Students O-Z	Prof. N. Kobayashi	207 Ocean Eng Lab	nk@udel.edu
Civil Eng. Honors Students	Prof. J. Puleo	301 DuPont	jpuleo@ude.edu
Env. Eng. Honors Students	Prof. D. Cha	346A DuPont Hall	cha@udel.edu

Student Organizations

There are hundreds of clubs and organizations on campus. Student organizations in the College of Engineering are listed at https://www.engr.udel.edu/academic-affairs/student-organizations/. Below are organizations with specific relevance to students in the Department of Civil and Environmental Engineering.

Organization	Faculty Advisor	Email
American Society of Civil Engineers (ASCE)	Prof. Allen Jayne	ajayne@udel.edu
Institute of Transportation Engineers (ITE)	Prof. Rusty Lee	elee@udel.edu
Chi Epsilon Civil Engineering Honor Society		
Environmental Engineering Student Association	Prof. Daniel Cha	cha@udel.edu
Engineers Without Borders (EWB)	Prof. Jennie Saxe	jpsaxe@udel.edu
American Society of Highway Engineers (ASHE)	Matheu Carter	matheu@udel.edu
Society of Hispanic Professional Engineers (SHPE)	Prof. Raul Lobo	lobo@udel.edu
National Society of Black Engineers (NSBE)	Prof. Sheldon Hewlett	shewlett@udel.edu
Society of Women Engineers (SWE)	Prof. Catherine Fromen	cfromen@udel.edu
American Concrete Institute (ACI)	Prof. Jovan Tatar	jtatar@udel.edu
American Institute of Steel Construction (AISC)	Prof. Allen Jayne	ajayne@udel.edu
Construction Engineers of America (CEA)	Prof Ri Na	nari@udel.edu

Department Mentoring Program

Students are encouraged to participate in the Department's Mentoring Program https://ce.udel.edu/academics/undergraduate/mentoring-program, which has a two-pronged approach: 1) peer-to-peer (P2P), where first-year and transfer students are paired with returning students; and 2) student-to-industry professional (S2I), matching an undergraduate engineering student with an engineering industry professional.

Engineering industry professionals are volunteers who have indicated an interest in being a mentor to an undergraduate engineering student and providing career advice and support as students navigate college and planning for their future as engineers. Participation at any level is voluntary; various events, activities and workshops are geared towards professional development and creating opportunities for meaningful exchanges among the program participants. Email sbpalmer@udel.edu if you are interested in participating.

Computing Facilities

The University maintains general access computing sites throughout the campus. The site list is available at http://www.it.udel.edu/computingsites.

Engineering Computer Laboratories

The College maintains computing sites specifically for engineering students. Students can use 046 Colburn Lab, 010 Spencer Lab, and 101-D Pearson Hall when they are not in use for teaching. Computer lounges are located in Spencer Lab as well. For more information, see https://www.engr.udel.edu/it/ecalc/.

Personal Computers

The College of Engineering has no specific requirements regarding brand, operating system (i.e., Windows vs. Macintosh), or configuration. Please refer to http://sites.udel.edu/computing-purchases/personal-specs/ for recommended specifications when purchasing a new computer or laptop. Students in all programs will benefit

from using a laptop computer (vs. a desktop), due to an emphasis on in-class and group technology-based projects.

- One of the unique features of Apple computers is that they can be set up to run both Mac and Windows operating systems and software. For some students, this flexibility is very helpful.
- AppsAnywhere is a web-based App Store that allows one to access software licensed for student use by the College of Engineering, on university-owned and personally-owned computers running Windows. AppsAnywhere is easy to use and enables students to launch software titles with a single click via a new on-demand streaming technology. It is possible to use AppsAnywhere on a Mac, but you will need to run Windows on a Mac (via virtual machine or Boot Camp). https://catalog.udel.edu/content.php?catoid=11&navoid=438#engineering.

Computer-Aided Design (CAD) Software

Computer-Aided Design, otherwise known as CAD, is commonly used today in engineering practice. Years ago engineers would hand off their preliminary designs and sketches to CAD operators or technicians for them to produce a professional drawing. Today, however, having proficiency in CAD as an engineer is as critical as using a word processor, email, or spreadsheet: CAD is simply another tool in the modern engineer's toolbox. Engineering students need to develop a certain level of competency in using CAD programs while they are in school. Students who have CAD experience may be more marketable for internships, summer jobs, co-ops, and full-time employment.

There are two major CAD programs in use today in the civil and environmental engineering professions – Bentley Systems Inc. "MicroStation" and Autodesk's "AutoCAD." Neither is an industry standard, but MicroStation tends to be used more in the transportation and civil/site development fields (the "horizontal" fields) and AutoCAD tends to be used more in the structural/building fields (the "vertical" fields). The platform choice: however, is often dictated by the client, and therefore, consulting firms will frequently use both programs.

Civil engineering majors will be introduced to MicroStation in CIEG161, Introduction to Civil Engineering Design. Construction Engineering and Management students will be introduced to CAD software in CIEG291, CAD and Building Information Modeling in Construction.