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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 2019 semester, 2,300 undergraduates are enrolled in the College, of which nearly 400 are undergraduate civil engineering, construction engineering and management, and environmental engineering students. The graduate student enrollment in the department is approximately 110 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 course, students have the opportunity to learn about the engineering design process from a team of faculty across the College. 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:

https://catalog.udel.edu/content.php?catoid=11&navoid=438#engineering

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 of the major disciplines of civil engineering: structural, geotechnical, transportation, environmental, infrastructure systems, railroad, and coastal engineering. The curriculum gives students a unique 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 check sheet is a list of technical elective courses.

Name _____ Advisor _____

CIVIL ENGINEERING PROGRAM
(125 hours)

Effective for fall 2019 and subsequent classes.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 (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	CIEG 161 (3)		
Seminar in Composition	ENGL 110 (3)		
Analy. Geom. & Calc. B*	MATH 242 (4)		
Fundamentals of Physics I*	PHYS 207 (4)		
Oral Communication	COMM 212(3)		

SOPHOMORE YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Statics	CIEG 211 (3)		
Intro to Sustainability	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 Engineers	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	CIEG 301 (4)		
Fluid Mechanics	CIEG 305 (3)		
Fluid Mechanics Lab	CIEG 306 (1)		
Soil Mechanics	CIEG 320 (3)		
Soil Mechanics Lab	CIEG 323 (1)		
Environmental Engineering	CIEG 331 (3)		

JUNIOR YEAR

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

SENIOR YEAR

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

SENIOR YEAR

SPRING	**14 credits**	**Sem.**	**Grade**
Senior Design	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.

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 (9 credits)								
ENGL 410			Prof./Career Prep			Prof./Career Prep		

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

a) One course from: BISC207, BISC208, GEOG220/221, GEOL105/115, or GEOL107

Civil Engineering Curriculum Flowchart

Fall 1	Spring 1	Fall 2	Spring 2	Fall 3	Spring 3	Fall 4	Spring 4
MATH 241 Calc A	MATH 242 Calc B	MATH 243 Calc C	MATH 351 Engineering Math I	CIEG 331 Environmental Engineering	CIEG 486 Engineering Project Mgmt.	CIEG 461 Senior Design	CIEG 461 Senior Design
CHEM 103 General Chemistry	PHYS 207 General Physics I	CIEG 211 Statics	CIEG 212 Solid Mechanics	CIEG 301 Structural Analysis	Technical Elective	Technical Elective	Technical Elective
EGGG 101 Intro to Engineering	CIEG 161 Intro to Civil Eng. Design	Science elective	CIEG 213 Materials Lab	CIEG 320 Soil Mechanics	CIEG 321 Geotechnical Engineering	Technical Elective	Technical Elective
CISC 106 Computer Science	ENGL 110 Seminar in Composition	CIEG 402 Intro to Sustainability Prin. in Civil Eng.	CIEG 214 Construction Materials	CIEG 323 Soil Mechanics Lab	Breadth	Technical Elective	Breadth
Breadth	COMM 212 Oral Communication in Business	ENGL 410 Technical Writing	CIEG 315 Probability and Stats	CIEG 305 Fluid Mechanics	CIEG 351 Transportation Engineering	Breadth	Breadth
			CIEG 411 Comm. with Stakeholders in Eng.	CIEG 306 Fluid Mechanics Lab	CIEG 451 Transportation Engineering Lab		
16 credits	**17 credits**	**17 credits**	**16 credits**	**15 credits**	**16 credits**	**14 credits**	**14 credits**

General Education

Engineering

Math and Science

CIEG 461 is a year-long course requiring completion of junior year core classes

pre-requisite

co-requisite

Civil Engineering Technical Electives

Six technical elective courses in the Civil Engineering curriculum give students the opportunity to complete their education by focusing in an area of special interest. The technical electives can also be chosen to provide a more general civil engineering education. Technical electives must satisfy the following requirements:

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.

Technical electives can be chosen from the courses below not otherwise used in the major core:

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

Minor in Civil Engineering

A grade of C- or better is required in all of 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 (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 Civil Engineering undergraduate committee.

All students must complete three of the following courses:

CIEG 222	Introduction to Surveying
CIEG 301	Structural Analysis
CIEG 302	Structural Design
CIEG 311	Dynamics
CIEG 315	Probability and Statistics for Engineers
CIEG 318	Introduction to Railroads
CIEG 320	Soil Mechanics
CIEG 321	Geotechnical Engineering
CIEG 322	CAD Applications in Civil & Environmental Engineering
CIEG 331	Environmental Engineering
CIEG 343	Site 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 407	Building Design
CIEG 410	Experimental Mechanics of Composites
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 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 429	Concrete Design
CIEG 431	Urban Hydrology and Drainage Design
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 464	Building Information 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

Course suggestions for students interested in the following topical areas:

- Earth sciences: CIEG 323 and CIEG 321
- Environment: CIEG 331 and CIEG 436
- Urban topics: CIEG 331 and CIEG 351
- Structures: CIEG 301 and CIEG 302
- 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 and Renewable Energy Systems
ELEG 491	Ethics/Impacts of Engineering
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
GEOG 422	Resources, Development and the Environment
GEOG 434	Plan Sustainable Communities & Regions
MEEG 435	Wind Power Engineering
PHIL 448	Environmental Economics
POSC 311	Politics of Developing Nations
POSC 350	Politics and the Environment
SOCI 471	Disasters, Vulnerability & Development

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

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.

CONSTRUCTION ENGINEERING AND MANAGEMENT PROGRAM (126 hours)

Effective for fall 2019 and subsequent classes.
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 (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)		
General Physics I*	PHYS 207 (4)		
Breadth Req. (CEM list)	(3)		

SOPHOMORE YEAR

FALL	**16 credits**	**Sem.**	**Grade**
Statics	CIEG 211 (3)		
Introduction to Surveying	CIEG 222 (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)		
Enviro., Health, and Safety	CIEG 292 (3)		
Oral Communication	COMM 212(3)		
Math Course **(b)**	(3)		

JUNIOR YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Construct. Est./Cost Control	CIEG 391 (3)		
Struct. Analysis and Design	CIEG 396 (4)		
Soils and Foundations	CIEG 397 (4)		
Constr. Means and Methods	CIEG 393 (3)		
Breadth Req. (CEM list)	(3)		

JUNIOR YEAR

SPRING	**16 credits**	**Sem.**	**Grade**
Survey of Accounting*	ACCT 200 (4)		
Construction Plan/Sched.	CIEG 392 (3)		
Construction Law and Reg.	CIEG 394 (3)		
Optim. in Design/Const.	CIEG 459 (3)		
Breadth Req. (CEM list)	(3)		

SENIOR YEAR

FALL	**15 credits**	**Sem.**	**Grade**
Engineering Project Mgmt.	CIEG 486 (3)		
Fluids, Hydraulics, Wtr. Res.	CIEG 398 (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)		
Free Elective	(3)		
Breadth Req. (CEM list)	(3)		

*Grade of C- or higher for degree requirement or as pre-requisite for other courses.

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

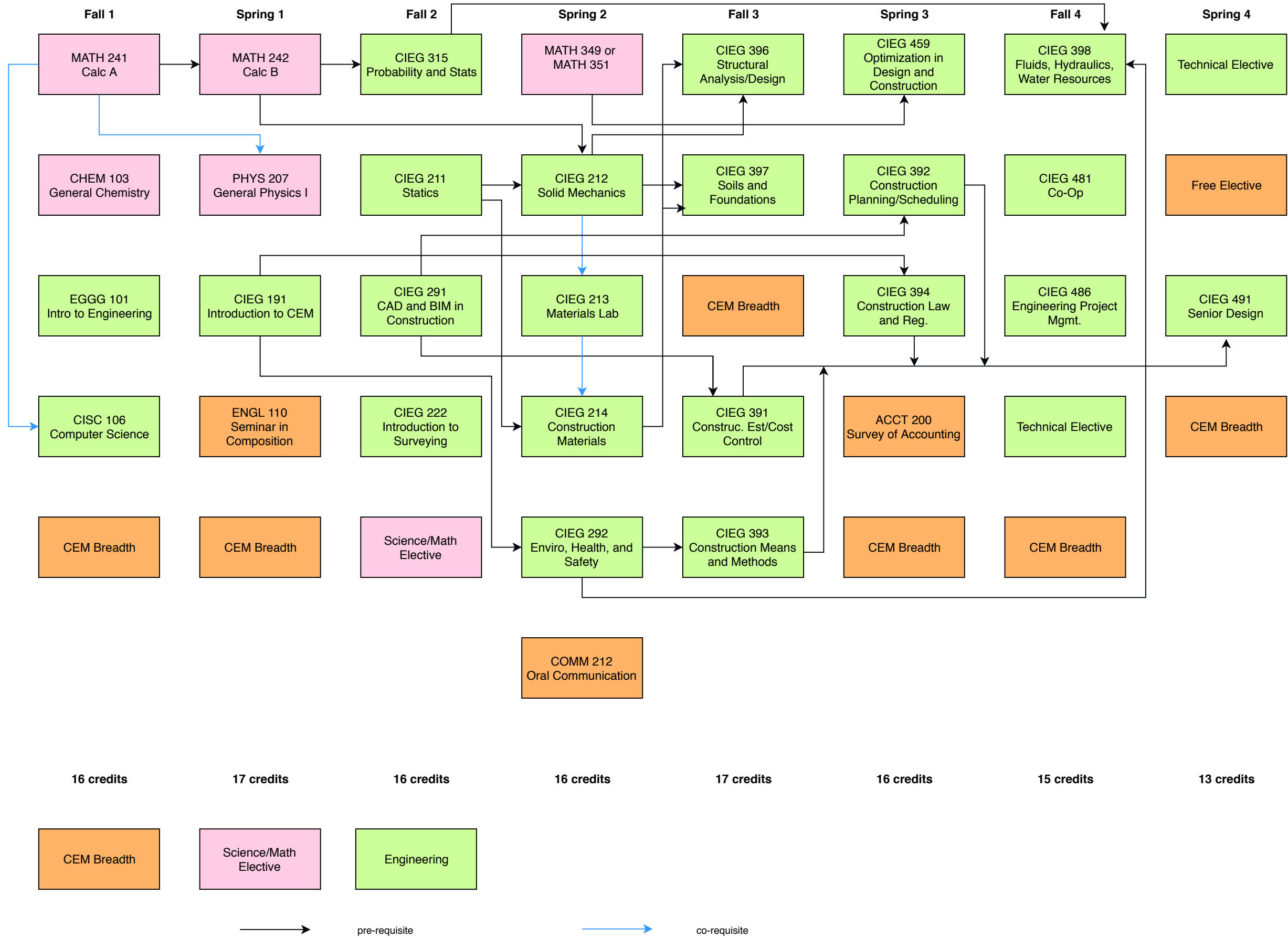
Creative Arts & Humanities (upper-level)	**Sem.**	**Grade**	History & Cultural Change	**Sem.**	**Grade**	Social & Behavioral Sciences	**Sem.**	**Grade**
			PLSC 170			ECON 100		
Add'l Breadth Req.			Add'l Breadth Req.			Add'l Breadth Req.		
ENGL 410			BUAD 100			FINC 200		

_____ two upper-level (300 and higher) courses

_____ Multicultural Requirement

a) one course from: BISC207, GEOL105/115, GEOL107, GEOG152, MATH243, PHYS208, PLSC204/205
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

Construction Engineering and Management
Curricular Flowchart



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)

Effective for fall 2019 class. 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 (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 (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	CIEG 211 (3)		
Enviro. Eng. Processes*	CIEG 233 (3)		
Analy. Geom. & Calc. C*	MATH 243 (4)		
General Physics I*	PHYS 207 (4)		
Breadth Requirement	(3)		

SOPHOMORE YEAR

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

JUNIOR YEAR

FALL	**17 credits**	**Sem.**	**Grade**
Fluid Mechanics	CIEG 305 (3)		
Fluid Mechanics Lab	CIEG 306 (1)		
Microbio. 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**
Water and WW Quality	CIEG 437 (3)		
Tech. Writing/Breadth Req.	ENGL 410 (3)		
Technical Elective	(3)		
Breadth Requirement	(3)		
Water and Wastewater	CIEG 438 (3)		

SENIOR YEAR

FALL	**14 credits**	**Sem.**	**Grade**
PRM of Solid Waste	CIEG 436 (3)		
Senior Design	CIEG 461 (2)		
Envio. Eng. Lab.	CIEG 337 (3)		
Surface Water Course **(b)**	(3)		
Technical elective	(3)		

SENIOR YEAR

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

*Grade of C- or higher for degree requirement or as pre-requisite for other courses.

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

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

_____ two upper-level (300 and higher) courses

_____ Multicultural Requirement

a) APEC480, GEOG372, CIEG322, or PLSC150;
b) CIEG430 or CIEG468
c) CIEG498 or GEOL428
d) CIEG415 or CIEG434

Environmental Engineering

Fall 1	Spring 1	Fall 2	Spring 2	Fall 3	Spring 3	Fall 4	Spring 4
MATH 241 Calc A	MATH 242 Calc B	MATH 243 Calc C	MATH 351 Engineering Math I	CIEG 305 Fluid Mechanics	Technical Elective	CIEG 436 PRM of Solid Waste	Air Pollution Course
EGGG 101 Intro to Engineering	CIEG 133 Intro to Environmental Engineering	CIEG 233 Environmental Eng. Processes	CIEG 333 Thermo for Environmental Eng.	CIEG 306 Fluid Mechanics Lab	CIEG 438 Water and Wastewater Engineering	CIEG 337 Environmental Engineering Lab	Groundwater Course
CHEM 103 General Chemistry	CHEM 104 General Chemistry	PHYS 207 General Physics I	BISC 207 Introductory Biology I	CIEG 444 Microbiology of Eng. Systems	CIEG 437 Water and Wastewater Quality	CIEG 461 Senior Design	CIEG 461 Senior Design
CISC 106 Computer Science	ENGL 110 Seminar in Composition	CIEG 211 Statics	CIEG 315 Probability and Stats	CHEM 321 Organic Chem I	Breadth	Technical Elective	Technical Elective
Breadth	Breadth	Breadth	Computer Elective	CIEG 440 Water Resources Engineering	ENGL 410 Technical Writing	Surface Water Course	Technical Elective
				Breadth			
16 credits	**17 credits**	**17 credits**	**16 credits**	**17 credits**	**15 credits**	**14 credits**	**14 credits**

General Education

Engineering

Math and Science

CIEG 461 requires enrollment in 2 of the following 3 courses: CIEG 337, CIEG 438, CIEG 440

pre-requisite

co-requisite

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 212	Solid Mechanics
CIEG 214	Construction Materials
CIEG 301	Structural Analysis
CIEG 302	Structural Design
CIEG 311	Dynamics
CIEG 320	Soil Mechanics
CIEG 321	Geotechnical Engineering
CIEG 402	Introduction to Sustainability Principles in Civil Engineering
CIEG 431	Urban Hydrology and Drainage Design
CIEG 433	Hazardous Waste Management
CIEG 442	Stormwater Management for Sustainable Development
CIEG 445	Industrial Ecology
CIEG 465	Global Sustainable Engineering
CIEG 471	Introduction to Coastal Engineering
CIEG 486	Engineering Project Management
CIEG 615	Meteorologic Processes in Air Pollution
CIEG 632	Chemical Aspects of Environmental Engineering
CIEG 634	Physical Aspects of Environmental Engineering
CIEG 636	Biological Aspects of Environmental Engineering
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
GEOG 432	Environmental Hydrology
GEOL 421	Environmental and Applied Geology
GEOL 428	Hydrogeology
LARC 343	Site Engineering
MSEG 302	Materials Science for Engineers
PLSC 419	Soil Microbiology
PLSC 421	Nonpoint Source Pollution
PLSC 438	Fate/Transport Soil Contaminants
PLSC 603	Soil Physics
PLSC 608	Environmental Soil Chemistry
UAPP 411	Regional Watershed Management

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
PLSC 419	Soil Microbiology
PLSC 421	Nonpoint Source Pollution
PLSC 438	Fate/Transport Soil Contaminants
PLSC 603	Soil Physics
PLSC 608	Environmental Soil Chemistry

Environmental Transport and Modeling

CIEG 431	Urban Hydrology and Drainage Design
CIEG 442	Stormwater Management for Sustainable Development
GEOG 432	Environmental Hydrology
GEOL 428	Hydrogeology
PLSC 421	Nonpoint Source Pollution

Facility Design

CIEG 212	Solid Mechanics
CIEG 214	Construction Materials
CIEG 301	Structural Analysis
CIEG 302	Structural Design
CIEG 311	Dynamics
CIEG 320	Soil Mechanics
CIEG 321	Geotechnical Engineering
CIEG 471	Introduction to Coastal Engineering
CIEG 486	Engineering Project Management
LARC 343	Site Engineering
MSEG 302	Materials Science for Engineers

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 442	Stormwater Management for Sustainable Development
CIEG 445	Industrial Ecology
CIEG 465	Global Sustainable Engineering
ENEP 410	Environmental Sustainability: Economic and Policy Analysis
GEOL 428	Hydrogeology
UAPP 411	Regional Watershed Management

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 of the courses completed for the minor.

One chemistry course is required:

CHEM 104* 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
GEOG 320	Water and Society
GEOG 422	Resources, Development and the Environment
MAST 676	Environmental Economics
PHIL 448	Environmental Ethics
POSC 311	Politics of Developing Nations
POSC 350	Politics and the Environment
SOCI 471	Disasters, Vulnerability & Development

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 degree in Civil Engineering (BCE) or a Bachelor degree in Environmental Engineering (BENE), 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:
http://graduate.lerner.udel.edu/mba-programs/mba-41-options/engineering

Civil and Environmental Engineering Faculty

Name	Office	Title	Ph.D.	Areas of Expertise
Busby Attoh-Okine	354 DuPont Hall	Professor	University of Kansas	Civil Infrastructure Systems, Developing World, Sustainable Transportation &
Daniel Cha	346A DuPont Hall	Professor	University of California, Berkeley	Developing World, Environmental & Water Resources, Waste Management, Recycling, and Remediation, Water Needs
Michael Chajes	358A DuPont Hall	Professor	University of California, Davis	Bridges for the Future, Structural
Yu-Ping Chin	474 Harker Lab	Professor	University of Michigan	Climate Change/Adaptation, Environmental & Water Resources, Water Needs
Pei Chiu	468 Harker Lab	Professor	Stanford University	Climate Change/Adaptation, Waste Management, Recycling, and Remediation, Water Needs
Rachel Davidson	360B DuPont Hall	Associate Dean and Professor	Stanford University	Civil Infrastructure Systems, Developing World, Disaster Resiliency, Structural
Dominic DiToro	356A DuPont Hall	Edward C. Davis Professor	Princeton University	Environmental & Water Resources, Sustainable Materials, Water Needs
Ardeshir Faghri	360C DuPont Hall	Professor	University of Virginia	Civil Infrastructure Systems, Developing World, Sustainable Transportation & Infrastructure Systems, Transportation
John Gillespie, Jr.	201C Composite Center	Donald C. Phillips Professor	University of Delaware	Civil Infrastructure Systems, Structural, Sustainable Materials

Monique Head	360H DuPont Hall	Associate Professor	Georgia Institute of Technology	Civil Infrastructure Systems, Structural
Tianjian Hsu	205 Ocean Eng. Lab	Professor	Cornell University	Climate Change/Adaptation, Coastal & Ocean, Disaster Resiliency
Chin-Pao Huang	352A DuPont Hall	Donald C. Phillips Professor	Harvard University	Climate Change/Adaptation, Environmental & Water Resources, Sustainable Materials, Waste Management, Recycling, and Remediation, Water Needs
Paul Imhoff	344A DuPont Hall	Professor	Princeton University	Climate Change/Adaptation, Environmental & Water Resources, Sustainable Materials, Waste Management, Recycling, and Remediation
Allen Jayne	307 DuPont	Assistant Professor	University of Delaware	Developing World, Structural, Sustainable Materials
Victor Kaliakin	360F DuPont Hall	Professor	University of California, Davis	Geotechnical, Sustainable Geotechnical Systems, Sustainable Materials
James Kirby	201 Ocean Eng. Lab	Edward C. Davis Professor	University of Delaware	Climate Change/Adaptation, Coastal & Ocean, Disaster Resiliency
Nobuhisa Kobayashi	207 Ocean Eng. Lab	Professor	Massachusetts Institute of Technology	Climate Change/Adaptation, Coastal & Ocean, Disaster Resiliency
Earl “Rusty” Lee	308 DuPont Hall	Assistant Professor	Rensselaer Polytechnic Institute	Civil Infrastructure Systems, Climate Change/Adaptation, Disaster Resiliency, Transportation
Kalehiwot Manahiloh	360G DuPont Hall	Assistant Professor	Washington State University	Developing World, Geotechnical, Sustainable Geotechnical Systems, Sustainable Transportation & Infrastructure Systems
Julia Maresca	344B DuPont Hall	Assistant Professor	Penn State University	Environmental & Water Resources, Sustainable Materials, Water Needs
Jennifer McConnell	358B DuPont Hall	Associate Professor	West Virginia University	Bridges for the Future, Disaster Resiliency, Structural, Sustainable Materials

Sue McNeil	301B DuPont Hall	Chair and Professor	Carnegie Mellon University	Civil Infrastructure Systems, Climate Change/Adaptation, Disaster Resiliency, Sustainable Transportation & Infrastructure Systems, Transportation
Chris Meehan	355B DuPont Hall	Bentley Systems Professor	Virginia Tech University	Disaster Resiliency, Geotechnical, Sustainable Geotechnical Systems
Holly Michael	101A Penny Hall	Associate Professor	Massachusetts Institute of Technology	Climate Change/Adaptation, Coastal & Ocean, Developing World, Environmental & Water Resources, Water Needs
Paramita Mondal	360A DuPont Hall	Associate Professor	Northwestern University	Sustainable Materials
Ri Na	342B DuPont Hall	Assistant Professor	University of Nebraska—Lincoln	Sustainable buildings and infrastructures, BIM
Mark Nejad	352 DuPont Hall	Assistant Professor	Wayne State University	Civil Infrastructure Systems, Climate Change/Adaptation, Transportation
Jack Puleo	203 Ocean Eng. Lab	Associate Chair and Professor	University of Florida	Climate Change/Adaptation, Coastal & Ocean, Disaster Resiliency
Jennie Perey Saxe	343A DuPont Hall	Assistant Professor	University of Delaware	Environmental & Water Resources
Harry “Tripp” Shenton	360E DuPont Hall	Professor	Johns Hopkins University	Bridges for the Future, Structural, Sustainable Materials
Fengyan Shi	204 Ocean Eng. Lab	Associate Professor	Ocean University of Qingdao	Coastal & Ocean, Water Needs
Mohsin Siddiqui	342C DuPont Hall	Assistant Professor	University of Texas at Austin	Structural
Edgar Small	360D DuPont Hall	Associate Professor	State University of New York at Buffalo	Civil Infrastructure Systems, Structural, Sustainable Transportation & Infrastructure Systems
Jovan Tatar	356B DuPont Hall	Assistant Professor	University of Florida	Civil Infrastructure Systems, Structural, Sustainable Transportation & Infrastructure Systems
Allan Zarembski	343B DuPont Hall	Professor of Practice	Princeton University	Civil Infrastructure Systems, Sustainable Transportation & 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
Michael Davidson	Senior Electronics Specialist	147 DuPont Hall	302-831-6814	michaeld@udel.edu
Karen Greco	Assistant to the Chair	301A DuPont Hall	302-831-3017	kgreco@udel.edu
Sarah Palmer*	Undergraduate Academic Advisor	301 DuPont Hall	302-831-0438	sbpalmer@udel.edu
Christine Reoli	Graduate Academic Advisor	301 DuPont Hall	302-831-6570	creoli@udel.edu
Gary Wenczel	Structures 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 2023

Student Group	**Name**	**Office**	**Email**
Construction Eng. and Mgmt.	Prof. E. Small	360D DuPont Hall	esmall@udel.edu
Environmental Eng.	Prof. D. DiToro	356A DuPont Hall	dditoro@udel.edu
Civil Eng. Students A – F	Prof. C. Meehan	355 DuPont Hall	cmeehan@udel.edu
Civil Eng. Students G – N	Prof. J. McConnell	358B DuPont Hall	righman@udel.edu
Civil Eng. Students O – Z	Prof. V. Kaliakin	360F DuPont Hall	kaliakin@udel.edu
Civil Eng. Honors Students	Prof. J. Puleo	203 Coastal Eng. Lab	jpuleo@udel.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	Prof. Kalehiwot Manahiloh	knega@udel.edu
Environmental Engineering Student Association	Prof. Daniel Cha	cha@udel.edu
Engineers Without Borders (EWB)	Kimberly Bothi	kbothi@udel.edu
American Society of Highway Engineers (ASHE)	Matheu Carter	matheu@udel.edu
National Society of Black Engineers (NSBE)	Marianne Johnson	mtj@udel.edu
Society of Women Engineers (SWE)	Prof. Megan Killian	killianm@udel.edu

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 Freshmen Design. Construction Engineering and Management students will be introduced to CAD software in CIEG291 CAD and Building Information Modeling in Construction.