CIVIL ENGINEERING MAJOR (B.S)

https://ceps.unh.edu/civil-environmental-engineering/program/bs/civil-engineering-major

Description

Matriculating students should have strong aptitudes in mathematics and science along with imagination, spatial and graphic abilities, communication skills, and creativity. Students then follow a four-year program that conforms to the guidelines of, and is accredited by the Engineering Accreditation Commission of ABET, the global accreditor of college and university programs in applied and natural science, computing, engineering and engineering technology. ABET accreditation assures that programs meet standards to produce graduates ready to enter critical technical fields that are leading the way in innovation and emerging technologies, and anticipating the welfare and safety needs of the public.

The first two years of the program provide the necessary technical knowledge in mathematics, chemistry, and physics, while introducing and developing problem-solving techniques in eight courses tailored to civil engineering students. The junior year provides courses in each of the civil engineering sub-disciplines, providing students with skills in each and allowing students to determine which they wish to pursue further. The senior year is flexible, allowing students to choose where to focus attention by selecting from more than forty elective courses in civil and environmental engineering.

The required curriculum includes seven writing-intensive courses, thereby not only satisfying, but exceeding, the University's writing requirement. (See University Academic Requirements.)

Additional opportunities exist for study abroad, cognates, minors, and dual majors, a three-year accelerated track, and early admission into two masters of science degree programs.

Requirements

More than half of the major's total credits and nearly all of the senior-level courses are elected by the student. Of these, there are Discovery Program electives required by the University and other electives required by the department in order to satisfy departmental objectives and accreditation requirements.

The Discovery Program is described in University Academic Requirements. Courses required by the BSCIVE program fulfill Discovery requirements in Inquiry and Environment, Technology, and Society; Writing Skills; Quantitative Reasoning; Physical Sciences and Discovery Lab; and Capstone.

To graduate with a bachelor of science in civil engineering, a student must achieve the following: 129 or more credits, credit for the civil engineering program's major and elective courses, satisfaction of the University's Discovery Program requirements, satisfaction of the University's writing-intensive course requirements, a cumulative grade-point average of 2.0 or better for all courses, and a cumulative grade-point average of 2.0 or better in all CEE courses.

Code	Title	Credits
Major Requirements		
CEE 400	Introduction to Civil Engineering	4
CEE 402	2D Computer Aided Design	3
CEE 403	GIS for Civil and Environmental Engineering	3
or CEE 404	Surveying and Mapping	
or NR 658	Introduction to Geographic Information Systems	
or FORT 581	Applied Geospatial Techniques	
or ANTH 674	Archaeological Survey and Mapping in Belize	
CEE 500	Statics for Civil Engineers	3
CEE 501	Strength of Materials	3
CEE 502	Project Engineering	3
CEE 520	Environmental Pollution and Protection: A Global Context	4
CEE 620	Fundamental Aspects of Environmental Engineering	4
CEE 635	Engineering Materials	4
CEE 650	Fluid Mechanics	4
CEE 665	Soil Mechanics	4
CEE 680	Classical Structural Analysis	3
CEE 797	Introduction to Project Planning and Design	2
CHEM 405	Chemical Principles for Engineers	4
or CHEM 403 & CHEM 404	General Chemistry I and General Chemistry II	
CEE 798	Project Planning and Design	2
ENGL 502	Professional and Technical Writing	4
or ENGL 602	Advanced Professional and Technical Writing	
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527	Differential Equations with Linear Algebra	4
MATH 539	Introduction to Statistical Analysis	4
or MATH 644	Statistics for Engineers and Scientists	
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
Electives		
Choose seven courses from the '700-level CEE Electives Course List' below with the following restrictions:		
1. Courses must be taken in four of six different areas (sustainability, environmental, transportation, water resources, geotechnical, structural).		
2. At least three design courses; including one Project-based Design Elective PDE course.		
3. One of the seven 700-level courses is a senior technical elective.		
Design/Area Elective (Project-based Design Elective PDE)		3-4
Design/Area Elective		3-4
Design/Area Elective		3-4
Area Elective		3-4
CEE Elective		3-4
CEE Elective		3-4
Senior Technical Elective (choose a course from the '700-level CEE Electives Course List' below, CEPS 700-level course, GEOG 757, INCO 795, NR 757, TECH 750, or TECH 780).		3-4
700-Level CEE Electives Course List		
Project-based Design Elective (PDE) courses:		
CEE 733	Public Infrastructure Asset Management	
CEE #734	Bioenvironmental Engineering Design	
CEE 749 & CEE 748	Pavement Design and Analysis and Pavement Design Project	
CEE 755	Design of Pressurized Water Transmission Systems	
CEE 758	Stormwater Management Designs	
CEE 759	Stream Restoration	
CEE 778	Foundation Design I	
CEE 791	Reinforced Concrete Design	
CEE 793	Structural Design in Steel	
Additional Design courses:		
CEE 719	Green Building Design	
CEE 730	Public Health Engineering for Rural and Developing Communities	
CEE 731	Advanced Water Treatment Processes	
CEE 732	Solid and Hazardous Waste Design	
CEE 779	Foundation Design II	
CEE 789	Timber Design	
CEE 790	Structural Design in Masonry	
CEE 792	Pre-stressed Concrete	
CEE 794	Bridge Design	
Structural Engineering (STR) area courses:		

CEE 735	Properties and Production of Concrete
CEE 780	Matrix Structural Analysis and Modeling
CEE 781	Dynamics of Structures
CEE 789	Timber Design
CEE 790	Structural Design in Masonry
CEE 791	Reinforced Concrete Design
CEE 792	Pre-stressed Concrete
CEE 793	Structural Design in Steel
CEE 794	Bridge Design
Geotechnical Engineering (GEO) area courses:	
CEE 765	Engineering Behavior of Soils
CEE 766	Introduction to Geotechnical Earthquake Engineering
CEE 767	Geological Engineering
CEE 768	Geo-Environmental Engineering
CEE 778	Foundation Design I
CEE 779	Foundation Design II
Transportation (TRA) area courses:	
CEE 704	Transportation Eng & Planning
CEE 733	Public Infrastructure Asset Management (PDE)
CEE 735	Properties and Production of Concrete
CEE 736	Asphalt Mixtures and Construction
CEE 737	Pavement Rehabilitation, Maintenance, and Management
CEE 749	Pavement Design and Analysis
Water Resources WAT area courses:	
CEE #750	Ecohydrology
CEE 751	Open Channel Flow
CEE 754	Engineering Hydrology
CEE 755	Design of Pressurized Water Transmission Systems
CEE #757	Coastal Engineering and Processes
CEE 758	Stormwater Management Designs
CEE 759	Stream Restoration
Environmental Engineering (ENV) area courses:	
CEE 720	Solid and Hazardous Waste Engineering
CEE 721	Environmental Sampling and Analysis
CEE 722	Introduction to Marine Pollution and Control
CEE 723	Environmental Water Chemistry
CEE 724	Environmental Engineering Microbiology
CEE 730	Public Health Engineering for Rural and Developing Communities
CEE 731	Advanced Water Treatment Processes
CEE 732	Solid and Hazardous Waste Design
CEE 733	Public Infrastructure Asset Management
CEE #734	Bioenvironmental Engineering Design (PDE)
CEE 768	Geo-Environmental Engineering
Sustainability (SUS) area courses:	
CEE 705	Introduction to Sustainable Engineering
CEE 706	Environmental Life Cycle Assessment
CEE 719	Green Building Design
Additional CEE Electives:	
CEE 700	Building Information Modeling
CEE #702	Issues in Engineering Practice and Management
CEE 703	Site Design and Project Development

Program Policies and Requirements

To transfer into the BSCIVE major, a student must satisfy the following:

1. Be a CEPS major or have at least 12 credits of graded work at UNH along with Calculus I, and either chemistry or calculus-based physics.
2. Have an overall UNH grade-point average of 2.33 or greater.
3. Have an overall grade-point average of 2.33 or greater in all CEE courses taken to date;
4. Have a grade-point average of 2.33 or greater in courses taken to date at UNH of MATH 425, PHYS 407, CHEM 403 or CHEM 405, CEE 500 or ME 525 , and CEE 501 or ME 526 .
5. Have a grade-point average of 2.33 or greater in courses taken to date of CEE 500, CEE 501, ME 525, ME 526

At the time of transferring into the BSCIVE program, only CEE 600-level and CEE 700-level classes with a grade of C- or better may be transferred in.

BSCIVE majors wishing to participate in domestic or international exchange programs must achieve a cumulative grade-point average of 2.50 or better in all CEE courses taken to date at the time of application to the exchange program.

To begin taking the required CEE 600-level courses in the junior year, students must meet the following requirements:

1. MATH 425, PHYS 407, CHEM 403 or CHEM 405, CEE 500 or ME 525 , and CEE 501 or ME 526 must have been completed with passing grades.
2. The student must have a grade-point average of 2.00 or greater in all CEE courses.
3. The student must have a grade-point average of 2.00 or greater in MATH 425, PHYS 407, CHEM 403 or CHEM 405, CEE 500 or ME 525 , and CEE 501 or ME 526 .
4. The student must have a grade-point average of 2.00 or greater in CEE 500 or ME 525 and CEE 501 or ME 526 .

Degree Plan

Course	Title	Credits
First Year		
Fall		
CEE 400	Introduction to Civil Engineering	4
CEE 520	Environmental Pollution and Protection: A Global Context	4
MATH 418	Analysis and Applications of Functions (if necessary, 0-4 credits)	
Elective AutoCAD [3]		3
Elective Discovery Program requirement [1]		4
	Credits	**15**
Spring		
MATH 425	Calculus I	4
PHYS 407	General Physics I	4
Elective Spatial Metrics [3]		4
ENGL 401	First-Year Writing	4
	Credits	**16**
Second Year		
Fall		
CEE 500	Statics for Civil Engineers	3
MATH 426	Calculus II	4
PHYS 408	General Physics II	4
Elective Technical Writing [3]		4
Elective Discovery Program requirement [1]		4
	Credits	**19**
Spring		
CEE 501	Strength of Materials	3
CEE 502	Project Engineering	3
CHEM 405	Chemical Principles for Engineers	4
MATH 527	Differential Equations with Linear Algebra	4

Elective Discovery Program requirement		4
	Credits	**18**
Third Year		
Fall		
CEE 635	Engineering Materials	4
CEE 650	Fluid Mechanics	4
CEE 680	Classical Structural Analysis	3
Elective Discovery Program requirement [1]		4
	Credits	**15**
Spring		
CEE 620	Fundamental Aspects of Environmental Engineering	4
CEE 665	Soil Mechanics	4
Elective Statistics [3]		4
Elective Discovery Program requirement [1]		4
	Credits	**16**
Fourth Year		
Fall		
CEE 797	Introduction to Project Planning and Design	2
Elective Project-Based Design Elective [3]		4
Elective Area Elective 2 [3]		3
Elective Civil Engineering [3]		3
Elective Discovery Program requirement [1]		4
	Credits	**16**
Spring		
CEE 798	Project Planning and Design	2
Elective Area Elective 3 [3]		3
Elective Area Elective 4 [3]		3
Elective Civil Engineering [3]		3
Elective Senior Technical Elective [3]		3
	Credits	**14**
	Total Credits	**129**

[1] A course satisfying one each of the Discovery Program categories of Biological Science, Humanities, Fine and Performing Arts, Historical Perspectives, Social Science and World Cultures, preferably taken in this order. The Discovery Social Science elective must be selected from CEP 415, CSL 401, ECON 401, ECON 402, ECON 444, EREC 411, GEOG 582, GEOG 584, or POLT 402.

[2] Satisfies capstone requirement for Discovery.

[3] Approved list available in the CEE office.

Student Learning Outcomes

BSCIVE Program Student Outcomes[3]

(What students are expected to know and be able to do by the time of graduation.)

- To have obtained a working knowledge[4] in the civil engineering areas of environmental, geotechnical, structural, sustainability, transportation, and water resources.
- To be able to locate, assess, and compile data,and to conduct experiments to gather data, and analyze and interpret data using engineering judgement to draw conclusions.
- To have an ability to acquire and apply new knowledge, techniques, skills, and software necessary for engineering practice.
- To be able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, use project management skills to establish goals, plan tasks, and meet objectives.
- To be able to effectively communicate and support ideas in documents and presentations to a range of audiences.
- To be able to apply principles of mathematics, science, and engineering to identify, formulate, and solve complex engineering problems.
- To have been prepared for the Fundamentals of Engineering examination and understand the importance of professional licensure.
- To have an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, social, economic, public policy, and environmental issues.
- To recognize the roles and responsibilities of public institutions, private organization, and businesses in project development, management, and regulatory compliance.
- To be able to apply engineering design to produce solutions [5] that meet specified needs with consideration of public health, safety, and welfare as well as global, cultural, social, environmental, and economic factors.

[1] Approved by the Faculty on 29 Oct 2013, Feb 2015, 12 Dec 2016, 2 Oct 2018, May 2019; 3 Sept 2019.

[2] Approved by the Faculty on 10 Oct 2013, 24 Feb 2015, 22 May 2015, 12 Dec 2016, 2 Oct 2018, May 2019, 3 Sept 2019.

[3] Approved by the Faculty on 17 Oct 2013, 24 Feb 2015, 22 May 2015, 12 Dec 2016, 27 Mar 2017, May 2019. Updated 3 Sept 2019.

[4] A “working knowledge” is defined as understanding and being able to apply a sub-discipline in analysis and design as demonstrated by successful completion of two or more courses with a substantial focus in at least four sub-disciplines.

[5] “Solutions” consists of systems, components, or processes that may consider risk, uncertainty, sustainability, life-cycle principles, and environmental impacts.