

Civil Engineering (BS)

Civil Engineering Degree

The Civil Engineering curriculum provides academic discipline in mathematics, the physical sciences, and the technical aspects of civil engineering. Upon mastering the fundamental principles of engineering mechanics, the student builds additional breadth in several of the civil engineering disciplines such as coastal and water resources, computing and systems, construction, environmental, geotechnical, materials, structural, and transportation engineering. Students learn to include principles of sustainability in civil infrastructure designs and develop skills in communication, leadership, and professional ethics.

Educational Objectives in Civil Engineering

Within a few years of graduation, alumni of the Civil Engineering program will:

1. Function successfully in a professional environment by utilizing and enhancing their leadership, technical, critical thinking, and communication skills.
2. Develop lifelong learning skills through graduate or other professional education and obtaining licensure where appropriate.
3. Function in team-oriented, multidisciplinary open-ended engineering activities considering the societal, economic, public health, and environmental impacts of engineering decisions, and the professional and ethical responsibilities of civil engineers.
4. Promote organizational success with consideration of cost and time management while practicing and promoting ethical behavior and stewardship of a sustainable environment.

Plan Requirements

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
MA 141	Calculus I ¹	4
ENG 101	Academic Writing and Research ²	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1

Hours **15**

Spring Semester

MA 241	Calculus II ¹	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
Select one of the following Economics Courses:		3
ARE 201	Introduction to Agricultural & Resource Economics	
ARE 201A	Introduction to Agricultural & Resource Economics	
EC 201	Principles of Microeconomics	

EC 205	Fundamentals of Economics	
E 102	Engineering in the 21st Century	2
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3

Hours **16**

Second Year

Fall Semester

CE 214	Engineering Mechanics-Statics ²	3
CE 250 or CE 263	Introduction to Sustainable Infrastructure (Footnote 2 for either course) ² or Introduction to Construction Engineering	3
TDE 220	Civil Engineering Graphics	3
MA 242	Calculus III	4
CSC 111	Introduction to Computing: Python	3

Hours **16**

Spring Semester

CE 225	Mechanics of Solids ²	3
CE 282	Hydraulics ²	3
MA 305 or MA 341	Introductory Linear Algebra and Matrices or Applied Differential Equations I	3
MSE 200	Mechanical Properties of Structural Materials	3
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1

Hours **17**

Third Year

Fall Semester

CE 332 or CE 342	Civil Engineering Materials or Engineering Behavior of Soils and Foundations	4
Select one of the following:		3
CE 305	Introduction to Transportation Systems	
CE 327	Reinforced Concrete Design	
CE 339	Civil Engineering Systems	
CE 383	Hydrology and Urban Water Systems	
CE Junior Elective (p. 2)		3
ST 370	Probability and Statistics for Engineers	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3

Hours **16**

Spring Semester

CE 332 or CE 342	Civil Engineering Materials or Engineering Behavior of Soils and Foundations	4
Select one of the following:		3
CE 305	Introduction to Transportation Systems	
CE 327	Reinforced Concrete Design	
CE 339	Civil Engineering Systems	
CE 383	Hydrology and Urban Water Systems	

CE Junior Elective (p. 2)	3
Basic Science Elective (p. 2)	3
Select one of the following Engineering Science Electives:	3
ECE 331 Principles of Electrical Engineering	
MAE 201 Thermal-Fluid Sciences	
MAE 208 Engineering Dynamics	
Hours	16

Fourth Year**Fall Semester**

Select one from the following: ³	3
CE Senior Elective (p. 2)	
CE Senior Design Elective (p. 3)	
Select one from the following: ³	3
CE Senior Elective (p. 2)	
CE Senior Design Elective (p. 3)	
Senior Elective (p. 3)	3
COM 110 Public Speaking	3
or ENG 331 or Communication for Engineering and Technology	
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
Hours	15

Spring Semester

Select one from the following: ³	3
CE Senior Elective (p. 2)	
CE Senior Design Elective (p. 3)	
Select one from the following: ³	3
CE Senior Elective (p. 2)	
CE Senior Design Elective (p. 3)	
CE 420 Structural Engineering Project	3
or CE 450 or Civil Engineering Project	
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
Hours	15
Total Hours	126

¹ A grade of C or higher is required.² A grade of C- or higher is required.³ A minimum of two CE Senior Design Electives are required for graduation. These courses should be in two different areas as defined in the CE Worksheet.

Code	Title	Hours
GEP Courses		
	GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6
	GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	3
	GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	2

GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)	3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	3
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)	
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)	
Total Hours	17

CE Junior Electives

Code	Title	Hours
CE 301	Civil Engineering Surveying and Geomatics	3
CE 305	Introduction to Transportation Systems	3
CE 325	Structural Analysis I	3
CE 327	Reinforced Concrete Design	3
CE 339	Civil Engineering Systems	3
CE 367	Mechanical and Electrical Systems in Buildings	3
CE 373	Fundamentals of Environmental Engineering	3
CE 383	Hydrology and Urban Water Systems	3

Basic Science Electives

Code	Title	Hours
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4
BIO 183	Introductory Biology: Cellular and Molecular Biology	4
FOR 260	Forest Ecology	4
FW 221	Conservation of Natural Resources	3
MEA 101	Geology I: Physical	3
MEA 110	Geology I Laboratory	1
MEA 200	Introduction to Oceanography	3
MEA 210	Oceanography Lab	1
SSC 200	Soil Science	3

CE Senior Electives

Code	Title	Hours
CE 401/501	Transportation Planning	3
CE 405/505	Railroad System Planning, Design, and Operation	3
CE 437/537	Civil Engineering Computing	3
CE 475/575	Renewable Energy and the Grid	3
CE 478/578	Energy and Climate	3
CE 479/579	Air Quality	3
CE 487	Introduction to Coastal and Ocean Engineering	3
CE 488/588	Water Resources Engineering	3
MEA 479	Air Quality	3

Junior Elective not previously used (<http://catalog.ncsu.edu/undergraduate/engineering/civil-construction-environmental/civil-engineering-bs/ce-junior-electives/>)

CE Senior Design Elective not previously used

Senior Electives

Code	Title	Hours
ARC 521	Daylighting and Passive Energy Systems for Architecture	3
ARC 522	Building Energy Efficiency & Renewable Energy	3
ARC 523	Building Energy Modeling and Simulation	3
CE 401/501	Transportation Planning	3
CE 402/502	Traffic Operations	3
CE 403/503	Transportation System Design	3
CE 405/505	Railroad System Planning, Design, and Operation	3
CE 435	Engineering Geology	3
CE 464/564	Legal Aspects of Contracting	3
CE 468	Building Information Modeling in Construction	3
CE 475/575	Renewable Energy and the Grid	3
CE 476/576	Air Pollution Control	3
CE 477/577	Principles of Solid Waste Engineering	3
CE 478/578	Energy and Climate	3
CE 479/579	Air Quality	3
CE 488/588	Water Resources Engineering	3
CE 499	Undergraduate Research Thesis in Civil, Construction and Environmental Engineering	1-3
CE 507	Sensors, Instrumentation, and Data Analytics for Transportation Networks	3
CE 509	Highway Safety	3
CE 515	Advanced Strength of Materials	3
CE 522	Theory and Design Of Prestressed Concrete	3
CE 523	Theory and Behavior Of Steel Structures	3
CE 524	Analysis and Design Of Masonry Structures	3
CE 525	Advanced Structural Analysis	3
CE 526	Finite Element Method in Structural Engineering	3
CE 527	Structural Dynamics	3
CE 528	Structural Design in Wood	3
CE 529	FRP Strengthening and Repair of Concrete Structures	3
CE 530	Properties of Concrete and Advanced Cement-Based Composites	3
CE 536	Introduction to Numerical Methods for Civil Engineers	3
CE 537	Computer Methods and Applications	3
CE 538	Information Technology and Modeling	3
CE 548	Engineering Properties Of Soils I	3
CE 549	Soil and Site Improvement	3
CE 557	Engineering Measurement and Data Analysis	3
CE 561	Construction Project Management	3
CE 562	Lean Construction Concepts and Methods	3
CE 565	Construction Safety Management	3
CE 567	Risk and Financial Management in Construction	3
CE 568	Building Information Modeling in Construction	3
CE 571	Physical Principles of Environmental Engineering	3
CE 573	Biological Principles of Environmental Engineering	3
CE 574	Chemical Principles of Environmental Engineering	3
CE 581	Fluid Mechanics in Natural Environments	3
CE 582	Coastal Hydrodynamics	3

CE 583	Engineering Aspects Of Coastal Processes	3
CE 584	Hydraulics Of Ground Water	3
CE 585	Principles of Surface Water Quality Modeling	3
CE 586	Engineering Hydrology	3
CE 588	Water Resources Engineering	3
CE 590	Special Topics In Civil Engineering	1-6
CE 591	Special Topics in Civil Engineering Computing	1-6
CE 592	Special Topics in Construction Engineering	1-6
CE 593	Special Topics in Geotechnical Engineering	1-3
CE 594	Special Topics in Structures and Mechanics	1-6
CE 595	Special Topics in Transportation Engineering	1-6
CE 596	Special Topics in Water Resource and Environmental Engineering	1-6
FB 528	Structural Design in Wood	3
MA 302	Numerical Applications to Differential Equations	1
MA 305	Introductory Linear Algebra and Matrices	3
MA 315	Mathematics Methods in Atmospheric Sciences	4
MA 351	Introduction to Discrete Mathematical Models	3
MAE 440	Non-Destructive Testing and Evaluation	3

CE Senior Design Electives

Code	Title	Hours
CE 402/502	Traffic Operations	3
CE 403/503	Transportation System Design	3
CE 413	Principles of Pavement Design	3
CE 426	Structural Steel Design	3
CE 435	Engineering Geology	3
CE 443	Seepage, Earth Embankments and Retaining Structures	3
CE 444	An Introduction to Foundation Engineering	3
CE 466	Building Construction Engineering	3
CE 476/576	Air Pollution Control	3
CE 477/577	Principles of Solid Waste Engineering	3
CE 484	Water Supply and Waste Water Systems	3
CE 488/588	Water Resources Engineering	3

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science ¹	3
CH 102	General Chemistry Laboratory ¹	1
E 101	Introduction to Engineering & Problem Solving ²	1
E 115	Introduction to Computing Environments	1
ENG 101	Academic Writing and Research ²	4
MA 141	Calculus I ¹	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1

Hours 15

Spring Semester

EC 205	Fundamentals of Economics	3
MA 241	Calculus II ¹	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ¹	4
E 102	Engineering in the 21st Century	2
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16

Second Year**Fall Semester**

CE 214	Engineering Mechanics-Statics ²	3
CE 250 or CE 263	Introduction to Sustainable Infrastructure (Footnote 2 for either course) ² or Introduction to Construction Engineering	3
CSC 111	Introduction to Computing: Python	3
TDE 220	Civil Engineering Graphics	3
MA 242	Calculus III	4
Hours		16

Spring Semester

CE 225	Mechanics of Solids ²	3
CE 282	Hydraulics ²	3
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
MA 341 or MA 305	Applied Differential Equations I or Introductory Linear Algebra and Matrices	3
MSE 200	Mechanical Properties of Structural Materials	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
Hours		17

Third Year**Fall Semester**

CE 332 or CE 342	Civil Engineering Materials or Engineering Behavior of Soils and Foundations	4
CE Core Course – Elective I		3
CE Junior Elective I (p. 2)		3
ST 370	Probability and Statistics for Engineers	3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		16

Spring Semester

CE 332 or CE 342	Civil Engineering Materials or Engineering Behavior of Soils and Foundations	4
CE Core Course – Elective II		3
CE Junior Elective (p. 2)		3
Basic Science Elective (p. 2)		3
Select one of the following Engineering Science Electives:		3

ECE 331	Principles of Electrical Engineering	
MAE 201	Thermal-Fluid Sciences	
MAE 208	Engineering Dynamics	
Hours		16

Fourth Year**Fall Semester**

Select one from the following for CE Senior Elective or CE Senior Design Elective I: ³		3
CE Senior Elective (p. 2)		
CE Senior Design Elective (p. 3)		
Select one from the following for CE Senior Elective or CE Senior Design Elective II: ³		3
CE Senior Elective (p. 2)		
CE Senior Design Elective (p. 3)		
Senior Elective (p. 3)		3
COM 110	Public Speaking	3
or ENG 331	or Communication for Engineering and Technology	
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Spring Semester

Select one from the following for CE Senior Elective or CE Senior Design Elective III: ³		3
CE Senior Elective (p. 2)		
CE Senior Design Elective (p. 3)		
Select one from the following for CE Senior Elective or CE Senior Design Elective IV: ³		3
CE Senior Elective (p. 2)		
CE Senior Design Elective (p. 3)		
Select one of the following CE Capstone courses:		3
CE 420	Structural Engineering Project	
CE 450	Civil Engineering Project	
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15
Total Hours		126

¹ C or better grade required² C- or better grade required³ A minimum of two CE Senior Design Electives are required for graduation. These courses should be in two different areas as defined in the CE Worksheet.**Career Opportunities**

Society will always need constructed facilities to live, work, and sustain their lives and environment, and civil, construction, and environmental engineers will always be needed to plan, design, and construct these facilities. Civil, construction, and environmental engineering comprise such diversified fields that graduates have a wide choice in types and locations of employment. Jobs range from federal, state, or municipal agencies to a variety of manufacturing and processing industries, consulting firms or construction companies. The work may be performed

partially or wholly in an office or in the field and may be located in a small community, a big city, an industrial center, or even in a foreign country. Careers in either professional practice or teaching and research are common for many graduates who complete advanced degrees.

Career Titles

- Civil Engineer
- Coastal Engineer
- Geotechnical Engineer
- Geoenvironmental Engineer
- Structural Engineer
- Transportation Engineer
- Water/Wastewater Engineer
- Municipal Engineer
- Project Manager
- Engineering Professor

Learn More About Careers

NCcareers.org (<https://nccareers.org/>)

Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (<https://www.bls.gov/ooh/architecture-and-engineering/civil-engineers.htm#tab-1>)

Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (<https://www.careeronestop.org/>)

View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (<https://careers.dasa.ncsu.edu/explore-careers/career-assessments/>) (NC State student email address required)

This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (<https://careers.dasa.ncsu.edu/about/hours-appointments/>) to discuss the results.

Focus 2 Apply Assessment (<https://www.focus2career.com/Portal/Register.cfm?SID=1929>) (Available to prospective students)

A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Society of Civil Engineers (<https://www.asce.org/>)

American Water Resources Association (<https://www.awra.org/>)

Institute of Transportation Engineers (<https://www.ite.org/>)

National Society of Professional Engineers (<https://www.nspe.org/>)