Environmental Engineering (MS)

Master of Science Degree Requirements

Students may choose from the degree tracks below to complete coursework within a focus area.

Degrees earned will be distributed as: "Master of Science" without specialization specifications.

Environmental, Water Resources, and Coastal Engineering Specialization

Code	Title	Hours
Required Cour	ses	
CE 607	Water Resource and Environmental Engineering Seminar	, 1
CE 695	Master's Thesis Research	1-6
Total Hours		2-7

Water Resources Engineering Specialization

Code	Title	Hours
CE 584	Hydraulics Of Ground Water	3
CE 586	Engineering Hydrology	3
CE 588	Water Resources Engineering	3
CE 596	Special Topics in Water Resource and Environmental Engineering (Fluid Mechanics in Natural Environments)	1-6
Core Electives		
Technical Electives		
Total Hours		10-15

Core Electives

Code	Title	Hours
CE 583	Engineering Aspects Of Coastal Processes	3
CE 596	Special Topics in Water Resource and Environmental Engineering (Coastal Hydrodynamics)	1-6
CE 772	Environmental Exposure and Risk Analysis	3
CE 776	Advanced Water Management Systems	3
CE 784	Ground Water Contaminant Transport	3
CE 791	Advanced Topics in Civil Engineering Computin (Complex Adaptive Systems Analysis)	ig 1-3
CE 796	Advanced Topics in Water Resource and Environmental Engineering (Statistical Methods	1-3

Technical Electives

Code	Title	Hours
CE 536	Introduction to Numerical Methods for Civil Engineers	3
CE 537	Computer Methods and Applications	3
CE 571	Physical Principles of Environmental Engineerin	ng 3
CE 574	Chemical Principles of Environmental Engineer	ing 3

CE 583	Engineering Aspects Of Coastal Processes	3
CE 596	Special Topics in Water Resource and Environmental Engineering (Introduction to Coastal and Ocean Engineering)	1-6
BAE 573	Introduction to Hydrologic and Water Quality Modeling	3
BAE 574		3
BAE 575	Design of Structural Stormwater Best Management Practices	3
BAE 576		3
BAE 581	Open Channel Hydraulics for Natural Systems	3
BAE 584	Introduction to Fluvial Geomorphology	3
BAE/SSC 771		3
FOR 784		4
MEA 540	Principles of Physical Oceanography	3
MEA/GIS 582	Geospatial Modeling	3
MEA 700	Environmental Fluid Mechanics	3
NR 500	Natural Resource Management	4

Accelerated Bachelor's/Master's Degree Requirements

The Accelerated Bachelors/Master's (ABM) degree program allows exceptional undergraduate students at NC State an opportunity to complete the requirements for both the Bachelor's and Master's degrees at an accelerated pace. These undergraduate students may double count up to 12 credits and obtain a non-thesis Master's degree in the same field within 12 months of completing the Bachelor's degree, or obtain a thesisbased Master's degree in the same field within 18 months of completing the Bachelor's degree.

This degree program also provides an opportunity for the Directors of Graduate Programs (DGPs) at NC State to recruit rising juniors in their major to their graduate programs. However, permission to pursue an ABM degree program does not guarantee admission to the Graduate School. Admission is contingent on meeting eligibility requirements at the time of entering the graduate program.

CCEE Department ABM Admission

The CCEE department encourages excellent undergraduate students to obtain a master's degree in their chosen field of specialization within 2 to 3 semesters past BS graduation, through double counting up to 9 credit hours towards both bachelor's and master's degrees. This is referred to as the Accelerated Bachelor's/Master's (ABM) degree program. Following is the pathway for the ABM program.

Step 1 – Verify your eligibility for applying to the ABM program

- You must have completed at least 75 credit hours (this typically means junior standing)
 - If you are a transfer student, you must have completed at least two semesters at NCSU, earning a minimum of 24 credit hours
- You must not have already received a BS degree
- You must have an overall GPA # 3.5 and major GPA # 3.25

Step 2 – Apply for ABM by following the steps below

- Determine your area of interest from the list of graduate specialty areas on the next page.
- Talk to the ABM advisor in the specialty area (provided below), and agree on a tentative ABM Plan of Work (POW) that would suit your interests and satisfy the ABM requirements. A finalized ABM POW must be in place before completion of the BS degree.
- Submit an application at go.ncsu.edu/ccee-abm (https:// applygrad.ncsu.edu/register/?id=4d63529c-6ad8-4680-9655e4e49554ac56), which includes the tentative ABM POW.
 - The application will first be reviewed by the ABM advisor and a recommendation will be made to the department. The final determination will be made after a joint review by the directors of undergraduate and graduate programs, after which you will be notified.

Step 3 – While in the ABM program, maintain status by following the steps below:

- With the specialty area ABM advisor's help, prepare a tentative Graduate POW, that complements the Undergraduate POW.
 - Up to 9 credit hours can be double counted, they must be at the 500 level, and they must be selected from the approved list of courses in the specialty area (provided in the subsequent pages).
 - The (tentative) Graduate POW must be formally approved by the ABM advisor.
- It is your responsibility to ensure that both the Graduate POW and Undergraduate POW satisfy the respective master's and undergraduate degree requirements
- You must maintain an overall GPA # 3.5 and a major GPA # 3.25 until you enter the master's program.
- Only graduate courses with a grade # B can be double counted. Courses with a grade # B- cannot be counted towards the master's degree.
- Towards the end of your bachelor's program, you must formally apply to the master's program, per deadlines published by the graduate school. Note that the GRE may be waived for ABM students – consult with your ABM advisor. The application must include to include a completed and signed ABM Plan of Work (https://grad.ncsu.edu/wpcontent/uploads/2015/11/abm-plan-of-work.pdf).
- You must complete the master's degree within a time limit (12 months if MCE/MENE, 18 months if MSCE/MSENE), to take advantage of the double counting associated with the ABM. If you do not graduate within this time, you will be considered a regular master's student needing to take the full 30/31 graduate credits solely towards your master's degree.

Graduate Specialty Areas for ABM

Degrees earned will be distributed as: "Master of Civil Engineering" without specialization specifications.

- Computing and Systems
- Construction Engineering
- EWC Air
- EWC Environmental Process Engineering
- EWC Water Resource and Coastal Engineering
- Geotechnical Engineering

- Structural Engineering and Mechanics
- Transportation Materials
- Transportation Systems

Allowable Courses by Specialty Area COMPUTING SYSTEMS

Code	Title	Hours
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 590	Special Topics In Civil Engineering (Civil Engineering Systems)	1-6

CONSTRUCTION ENGINEERING

Code	Title	Hours
CE 561	Construction Project Management	3
CE 562	Lean Construction Concepts and Methods	3
CE 564	Legal Aspects of Contracting	3
CE 565	Construction Safety Management	3
CE 567	Risk and Financial Management in Construction	n 3
CE 592	Special Topics in Construction Engineering	1-6
Other courses may selected and approved in conjunction with the academic committee, examples include but are not subject to:		

Advanced Strength of Materials
Theory and Design Of Prestressed Concrete
Theory and Behavior Of Steel Structures
Analysis and Design Of Masonry Structures
Engineering Properties Of Soils I

EWC – AIR

Code	Title	Hours
CE 576	Engineering Principles Of Air Pollution Control	3
CE 578	Energy and Climate *	3
CE 579	Principles of Air Quality Engineering *	3

EWC – ENVIRONMENTAL PROCESS ENGINEERING

Code	Title Ho	ours
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 577	Engineering Principles Of Solid Waste Management	3
CE 578	Energy and Climate *	3
CE 596	Special Topics in Water Resource and Environmental Engineering (Global Sanitation) *	1-6

EWC – WATER RESOURCES, COASTAL

Code	Title	Hours
CE 581	Fluid Mechanics in Natural Environments	3
CE 583	Engineering Aspects Of Coastal Processes	3
CE 584	Hydraulics Of Ground Water	3

CE 586	Engineering Hydrology	3
CE 588	Water Resources Engineering *	3
CE 596	Special Topics in Water Resource and Environmental Engineering (Coastal Hydrodynamics)	1-6
CE 596	Special Topics in Water Resource and Environmental Engineering (Coastal Modeling)	1-6
CE 596	Special Topics in Water Resource and Environmental Engineering (Surface Water Quality Modeling)	1-6

GEOTECHNICAL ENGINEERING

Code	Title	Hours
CE 548	Engineering Properties Of Soils I	3
CE 584	Hydraulics Of Ground Water	3
CE 593	Special Topics in Geotechnical Engineering (Dynamics of Soils and Foundations)	1-3
Other courses ma academic commit	ay selected and approved in conjunction with the tee, examples include but are not subject to:	
CE 515	Advanced Strength of Materials	
CE 526	Finite Element Method in Structural Engineering	g
CE 577	Engineering Principles Of Solid Waste	

CE 577	Engineering Principles Of Solid V	V
	Management	

STRUCTURAL ENGINEERING AND MECHANICS

Code	Title	Hours
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	j 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

TRANSPORTATION MATERIALS

Code	Title	Hours
CE 515	Advanced Strength of Materials	3
CE 530	Properties of Concrete and Advanced Cement- Based Composites	3
CE 548	Engineering Properties Of Soils I	3
CE 595	Special Topics in Transportation Engineering (A Asphalt and Bituminous Materials)	1-6

TRANSPORTATION SYSTEMS

Code	Title	Hours
CE 501	Transportation Planning *	3
CE 502	Traffic Operations *	3
CE 503	Transportation System Design *	3
CE 504	Airport Planning and Design	3

CE 505	Railroad System Planning, Design, and Operation	3
CE 509	Highway Safety	3

* This course is not a prerequisite but recommended to be completed prior to enrollment.

Full Professors

Sankarasubramanian Arumugam

Morton A. Barlaz

Emily Zechman Berglund

Joseph F. DeCarolis

Joel Casey Dietrich

Andrew P. Grieshop

Francis Lajara De Los Reyes III

Joel Ducoste

Henry C. Frey

Mohammed Awad Gabr

Detlef R. Knappe

Gnanamanikam Mahinthakumar

Brina Mortensen Montoya

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Ranji Ranjithan

Benjamin Shane Underwood

Associate Professors

Tarek Aziz

Douglas F. Call

Angela Rose Harris

Fernando Garcia Menendez

Daniel R. Obenour

Assistant Professors

Katherine Anarde

Jorge Emilio San Juan Blanco

Khara Deanne Grieger

Jordan Kern

Jacelyn Jaunice Rice-Boayue

Practice/Research/Teaching Professors

Florentino Banaag De La Cruz

Meagan Kittle Autry

James William Levis

Gregory W. Lucier

Anderson Rodrigo de Queiroz

Elizabeth J. Sciaudone

Adjunct Faculty

Michael Scott Breen

Daniel J. Findley

Alejandra C. Geiger-Ortiz

Aditya Sinha

Assistant Research Professor

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Emeritus Faculty

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