



# **Handbook for the BS Degree in Environmental Engineering**

**Department of Environmental Engineering and  
Earth Sciences**

**College Of Engineering, Computing and Applied  
Sciences**

**CLEMSON UNIVERSITY**

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## Table of Contents

Introduction.....	3
Program Administration.....	3
Advising.....	4
Curriculum.....	4
Approved electives for BS in Environmental Engineering.....	10
Honors Program.....	12
Undergraduate Research.....	12
Combined BS and MS Degree Program.....	12
Earning Graduate Credit as an Undergraduate.....	18
General Education Requirements.....	18
Registration Requirements.....	19
Graduation Requirements.....	20
Departmental Undergraduate Degree Requirements.....	20
FE Exam Partial Reimbursement.....	20
Student Groups.....	20
Course Descriptions.....	22
Faculty.....	22
Staff.....	22

## Introduction

Welcome to the Bachelor of Science (BS) degree program in environmental engineering at Clemson University. Becoming an environmental engineer is a great way to use your engineering talents for the betterment of your community and the world around you. As an environmental engineer, you can help solve many of the environmental problems faced by society using principles of biology, chemistry, mathematics, and earth sciences. We need a highly trained workforce ready to tackle our increasingly complex environmental problems and design a healthier and more sustainable society. An undergraduate degree in environmental engineering opens the door to a variety of rewarding career options.

This handbook is a guide to the curriculum and graduation requirements in the degree program. It also gives helpful information on our program, its faculty, and its staff. It will help you select courses to meet the degree requirements and introduce you to our profession. You can find additional information about the program and its people at our website: [www.clemson.edu/eees](http://www.clemson.edu/eees).

We are interested in your thoughts on our curriculum and the degree program. If you see the needs for changes or additional information, please feel free to speak to anyone on our faculty or staff. By speaking up, you can help our degree program improve and grow.

## Program Administration

The Department of Environmental Engineering & Earth Sciences (formerly the Department of Environmental Systems Engineering, and subsequently the Department of Environmental Engineering and Science) is an engineering department that has been an important part of Clemson University for over fifty years. It grew out of an environmental program in Civil Engineering in the 1960s and it has become a top twenty graduate program in environmental engineering. The program began with an emphasis on water and wastewater treatment. It has expanded to include the entire environmental engineering discipline, with faculty conducting research and teaching courses in topics such as air pollution, hazardous and municipal solid wastes, environmental chemistry, nuclear environmental engineering, risk assessment, environmental sustainability, remediation of polluted sites, groundwater modeling, and more.

The EEES department has three undergraduate degrees: BS in Environmental Engineering, BS in Biosystems Engineering, and BS in Geology. The department has graduate degrees: MS and PhD in Environmental Engineering & Science (including an MS with an emphasis area of Health Physics), MS and PhD in Biosystems Engineering and MS in Hydrogeology. Departmental faculty teach in one or more degree programs. The courses taught in these other programs often complement the coursework in environmental engineering. Students may find relevant coursework in environmental ecology, renewable fuels, geology, hydrogeology, and geographic information systems (GIS) that can be interesting and useful elective courses.

Dr. David Freedman, Chair of Environmental Engineering & Earth Sciences administers the BS degree program. The Student Services Coordinator for the Environmental Engineering undergraduate degree is Janet Lee. Her office is in 445 Brackett Hall. Dr. David Ladner is the Faculty Coordinator for the BS degree program.

## Advising

You are assigned an academic advisor in environmental engineering when you complete the general engineering program and transition to our department. Students are required to see their advisor and obtain his or her signature for all changes regarding change of major or minor, course selection, advance approval for transfer coursework (summer or study abroad) and when course substitutions are needed, along with other issues that arise. This includes a meeting every semester for registration advising. Students who do not meet with their advisor will not be cleared for registration in the upcoming term.

The undergraduate coordinator for the Environmental Degree oversees the advising process as well as acting as a secondary adviser to the undergraduate students.

## Curriculum

The curriculum for the BS degree in environmental engineering consists of 127 to 128 credit hours depending on the curriculum year. At Clemson, engineering students declare as general engineering (GE) majors for the first year. Upon completion of the GE curriculum, students transfer to their chosen engineering major and follow the required curriculum for the major. The environmental engineering undergraduate curriculum includes a wide range of topics associated with environmental engineering, including water and wastewater treatment, solid and hazardous waste management, air pollution control, pollution prevention, and risk assessment (see next page). All students will also participate in a professional seminar courses and a capstone design project. As a student, you will abide by the curriculum for the year that you matriculated at Clemson University. For most students this will be the year you declared as a general engineering major. For transfer students, it will be the year you transferred to Clemson. All curricula currently in use by our students are listed below.

**ENVIRONMENTAL ENGINEERING (B.S.)**  
**2017-2018 Curriculum**

FRESHMAN YEAR			
_____ ENGR 1020 Engineering Discipline and Skills	2	_____ ENGR 1410 Programming and Problem Solving	3
_____ CH 1010 General Chemistry (Lab)	4	_____ CH 1020 General Chemistry (Lab)	4
_____ MATH 1060 Calculus of One Variable I	4	_____ MATH 1080 Calculus of One Variable II	4
_____ ENGL 1030 Composition and Rhetoric	3	_____ PHYS 1220 Physics with Calculus I	3
_____ Hum/SS Req. <sup>1</sup> _____	3	_____ HIST 1240 Environmental History Survey <sup>2</sup>	3
	16		17
SOPHOMORE YEAR			
_____ EES 2010 Environmental Engineering Fnd I	3	_____ EES 2020 Environmental Engineering Fnd II (Lab)	4
_____ BIOL 1030 General Biology <sup>3</sup>	3	_____ ENGR 2100 Engineering Graphics <sup>4</sup> (Lab)	2
_____ BIOL 1050 General Biology Lab	1	_____ CH 2010 Organic Chemistry <sup>5</sup>	3
_____ MATH 2060 Calculus of Several Variables	4	_____ MATH 2080 Intro to Ordinary Differential Equations	4
_____ PHYS 2210 Physics with Calculus II	3	_____ CE 2080 Dynamics	2
_____ CE 2010 Statics	3		
	17		15
JUNIOR YEAR			
_____ EES 3030 Water Treatment Systems	2	_____ EES 4840 Municipal Solid Waste Mgmt	3
_____ EES 3040 Wastewater Treatment Systems	2	_____ EES 4850 Hazardous Waste Management	3
_____ EES 3050 Water and Wastewater Treatment Lab	1	_____ ME 3100 Thermodynamics & Heat Transfer	3
_____ MICR 3050 General Microbiology (Lab)	4	_____ CE 3410 Intro to Fluid Mechanics (Lab)	4
_____ MATH 3020 Statistics for Science and Engineering	3	_____ GEOL 1010 Physical Geology <sup>6</sup>	3
_____ Hum/SS Req. <sup>1</sup> _____	3	_____ GEOL 1030 Physical Geology Lab	1
	15		17
SENIOR YEAR			
_____ EES 4300 Air Pollution Engineering	3	_____ EES 4750 Env Engr Capstone Design (Lab)	3
_____ EES 4500 Env Engr Senior Seminar	1	_____ Engr or Sci Req <sup>8</sup> _____	6
_____ EES 4800 Environmental Risk Assessment	3		
_____ EES 4860 Environmental Sustainability	3	_____ Hum/SS Req. <sup>1</sup> _____	3
_____ Engr Econ Req <sup>7</sup> _____	2	_____ Hum/SS Req. <sup>1</sup> _____	3
_____ Engr or Sci Req <sup>8</sup> _____	3		
	15		15

**127 Total Semester Hours**

**General Education Requirements:**

LIT: \_\_\_\_\_  
 Non-Lit: \_\_\_\_\_  
 SS1: \_\_\_\_\_  
 SS2: \_\_\_\_\_  
 ENGR 5th: \_\_\_\_\_  
 CCA: \_\_\_\_\_  
 STS: \_\_\_\_\_

**Other:**

Calhoun Honors   
 ROTC   
     Air Force   
     Army   
 Transfer   
 Co-op

<sup>1</sup>See the Policy on Humanities and Social Sciences for Engineering Curricula. HIST 1240 must be taken as one of the courses; it satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement. Students are encouraged to take PHIL 3450 (Environmental Ethics) to fulfill the non-literature humanities requirement

<sup>2</sup>HIST 1240 satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement in the University's General Education requirements. If a student is not able to enroll in the second semester of the freshman year, this course may be taken at another time.

<sup>3</sup>BIOL 1100 (5hrs) may be substituted for the combination of BIOL 1030 & 1050

<sup>4</sup>ENGR 2080 may be substituted

<sup>5</sup>CH 2230 may be substituted

<sup>6</sup>May Substitute PES 2020 & PES 2021.

<sup>7</sup>The following courses are acceptable: CE 3520 or IE 3840.

<sup>8</sup>Choose any combination of engineering and/or sciences courses from a department-approved list.

**\*\*NOTES\*\***

The following courses must be completed with a grade of C or better: MATH 2060, MATH 2080, CE 2010, CE 2080, CE 3410, PHYS 2210

**ENVIROMENTAL ENGINEERING (B.S.)**  
**2014-2015, 2015-2016, 2016-2017 Curriculum**

FRESHMAN YEAR			
ENGR 1050 Engineering Discipline and Skills I	1	ENGR 1070 Programming and Problem Solving I	1
ENGR 1060 Engineering Discipline and Skills II	1	ENGR 1080 Programming and Problem Solving II	1
CH 1010 General Chemistry (Lab)	4	ENGR 1090 Program & Problem Solving Applications	1
MATH 1060 Calculus of One Variable I	4	CH 1020 General Chemistry (Lab)	4
ENGL 1030 Accelerated Composition	3	MATH 1080 Calculus of One Variable II	4
Hum/SS Req. <sup>1</sup>	3	PHYS 1220 Physics with Calculus I	3
		HIST 1240 Environmental History Survey <sup>2</sup>	3
	16		17
SOPHOMORE YEAR			
EES 2010 Environmental Engineering Fnd I	3	EES 2020 Environmental Engineering Fnd II (Lab)	4
BIOL 1030 General Biology <sup>3</sup>	3	ENGR 2100 Engineering Graphics <sup>4</sup> (Lab)	2
BIOL 1050 General Biology Lab	1	CH 2010 Organic Chemistry <sup>5</sup>	3
MATH 2060 Calculus of Several Variables	4	MATH 2080 Intro to Ordinary Differential Equations	4
PHYS 2210 Physics with Calculus II	3	CE 2080 Dynamics	2
CE 2010 Statics	3		
	17		15
JUNIOR YEAR			
EES 3030 Water Treatment Systems	2	EES 4840 Municipal Solid Waste Mgmt	3
EES 3040 Wastewater Treatment Systems	2	EES 4850 Hazardous Waste Management	3
EES 3050 Water and Wastewater Treatment Lab	1	ME 3100 Thermodynamics & Heat Transfer	3
MICR 3050 General Microbiology (Lab)	4	CE 3410 Intro to Fluid Mechanics (Lab)	4
MATH 3020 Statistics for Science and Engineering	3	GEOL 1010 Physical Geology <sup>6</sup>	3
Hum/SS Req. <sup>1</sup>	3	GEOL 1030 Physical Geology Lab	1
	15		17
SENIOR YEAR			
EES 4300 Air Pollution Engineering	3	EES 4750 Env Engr Capstone Design (Lab)	3
EES 4500 Env Engr Senior Seminar	1	Engr or Sci Reqt <sup>8</sup>	6
EES 4800 Environmental Risk Assessment	3		
EES 4860 Environmental Sustainability	3	Hum/SS Req. <sup>1</sup>	3
Engr Econ Req. <sup>7</sup>	2	Hum/SS Req. <sup>1</sup>	3
Engr or Sci Reqt <sup>8</sup>	3		
	15		15

**127 Total Semester Hours**

**General Education Requirements:**

LIT: \_\_\_\_\_  
 Non-Lit: \_\_\_\_\_  
 SS1: \_\_\_\_\_  
 SS2: \_\_\_\_\_  
 ENGR 5th: \_\_\_\_\_  
 STS: \_\_\_\_\_  
 CCA: \_\_\_\_\_

**Other:**

Calhoun Honors   
 ROTC   
     Air Force   
     Army   
 Transfer   
 Co-op

<sup>1</sup>See the Policy on Humanities and Social Sciences for Engineering Curricula. HIST 1240 must be taken as one of the courses; it satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement. Students are encouraged to take PHIL 3450 (Environmental Ethics) to fulfill the non-literature humanities requirement

<sup>2</sup>HIST 1240 satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement in the University's General Education requirements. If a student is not able to enroll in the second semester of the freshman year, this course may be taken at another time.

<sup>3</sup>BIOL 1100 (5hrs) may be substituted for the combination of BIOL 1030 & 1050

<sup>4</sup>ENGR 2080 may be substituted

<sup>5</sup>CH 2230 may be substituted

<sup>6</sup>May Substitute PES 2020 & PES 2021.

<sup>7</sup>The following courses are acceptable: CE 3520 or IE 3840.

<sup>8</sup>Choose any combination of engineering and/or sciences courses from a department-approved list.

**\*\*NOTES\*\***

The following courses must be completed with a grade of C or better: MATH 2060, MATH 2080, CE 2010, CE 2080, CE 3410, PHYS 2210

## Environmental Engineering 2013-2014 Curriculum

FRESHMAN YEAR			
_____ ENGR 1020 Engineering Disciplines & Skills (Lab) 2	_____ ENGR 1410 Engineering Fundamentals <sup>2</sup> (Lab) 3		
_____ CH 1010 General Chemistry (Lab) 4	_____ CH 1020 General Chemistry (Lab) 4		
_____ MTHS 1060 Calculus I 4	_____ MTHS 1080 Calculus II 4		
_____ ENGL 1030 Composition I 3	_____ PHYS 1220 Physics I 3		
_____ Hum/SS Req. <sup>1</sup> 3	_____ HIST 1240 Environmental History Survey <sup>3</sup> 3		
16	17		
SOPHOMORE YEAR			
_____ EES 2010 Environmental Engineering Fnd I 3	_____ EES 2020 Environmental Engineering Fnd II (Lab) 4		
_____ BIOL 1030 General Biology <sup>4</sup> 3	_____ EG 2100 Engineering Graphics <sup>6</sup> (Lab) 2		
_____ BIOL 1050 General Biology Lab 1	_____ CH 2010 Organic Chemistry <sup>5</sup> (Lab) 4		
_____ MTHS 2060 Calculus III 4	_____ MTHS 2080 Calculus Diff Eq 4		
_____ PHYS 2210 Physics II 3	_____ CE 2080 Dynamics 2		
_____ CE 2010 Statics 3			
17	16		
JUNIOR YEAR			
_____ EES 4020 Water & Wastewater Treatment 3	_____ EES 4840 Municipal Solid Waste Mgmt 3		
_____ EES 4030 Water & Wastewater Trmt Lab 1	_____ EES 4850 Hazardous Waste Management 3		
_____ MICR 3050 General Microbiology <sup>7</sup> (Lab) 4	_____ ME 3100 Thermodynamics & Heat Transfer 3		
_____ Engr Econ Req <sup>8</sup> 2	_____ CE 3410 Intro to Fluid Mechanics (Lab) 4		
_____ Statistics Requirement <sup>9</sup> 3	_____ Earth Sciences Req <sup>10</sup> 4		
_____ Hum/SS Req. <sup>1</sup> 3			
16	17		
SENIOR YEAR			
_____ EES 4300 Air Pollution Engineering 3	_____ EES 4750 Env Engr Capstone Design (Lab) 3		
_____ EES 4500 Env Engr Senior Seminar 1	_____ Engr or Sci Req <sup>11</sup> 5		
_____ EES 4800 Environmental Risk Assessment 3			
_____ EES 4860 Pollution Prevention 3	_____ Hum/SS Req. <sup>1</sup> 3		
_____ Engr or Sci Req <sup>11</sup> 5	_____ Hum/SS Req. <sup>1</sup> 3		
15	14		

### 128 Total Semester Hours

#### General Education Requirements:

LIT: \_\_\_\_\_  
 Non-Lit: \_\_\_\_\_  
 SS1: \_\_\_\_\_  
 SS2: \_\_\_\_\_  
 ENGR 5th: \_\_\_\_\_  
 STS: \_\_\_\_\_  
 CCA: \_\_\_\_\_

#### Other:

Calhoun Honors   
ROTC   
     Airforce   
     Army   
Transfer   
Co-op

<sup>1</sup>See the Policy on Humanities and Social Sciences for Engineering Curricula. HIST 1240 must be taken as one of the courses; it satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement. Students are encouraged to take PHIL 3450 (Environmental Ethics) to fulfill the non-literature humanities requirement

<sup>2</sup>ENGR 1300 may be substituted

<sup>3</sup>HIST 1240 satisfies 3 credit hours of the social science requirement and the Science and Technology in Society requirement in the University's General Education requirements. If a student is not able to enroll in the second semester of the freshman year, this course may be taken at another time.

<sup>4</sup>May substitute BIOL 1100 for BIOL 1030 and BIOL 1050; BIOL 1100 is 5 hours

<sup>5</sup>CH 2230 & 2270 may be substituted

<sup>6</sup>EG 2080 or EG 2090 is an acceptable substitute.

<sup>7</sup>May substitute BIOL 2110, which is 3 hours; must make up the 1 hour in any manner.

<sup>8</sup>The following courses are acceptable: CE 3520 or IE 3840.

<sup>9</sup>The following courses are acceptable: EXST 3010 for 3 credit hours; MTHS 3020 for 3 credit hours; or GEOL 2110 for 4 credit hours

<sup>10</sup>The following courses are acceptable: GEOL 1010 + GEOL 1030 or CSEN 2020.

<sup>11</sup>Choose any combination of engineering and/or sciences courses from a department-approved list.

## Approved electives for BS in Environmental Engineering

Students must meet the prerequisites of any course. Alternative elective classes may be taken with the written permission of their advisor.

### Engineering Options

Course	Title	Credits
BE 3220	Small Watershed Hydrology & Sedimentology	3
BE 4150	Instrumentation and Control for Biosystems Engineers	3
BE 4220	Hydrologic Modeling of Small Watersheds	3
BE 4240	Ecological Engineering	3
BE (EES, GEOL) 4270‡	Ecohydrology	3
BE (CE) 4400	Sustainable Energy Engineering	3
BE 4640	Non-Point Source Management in Engineered Ecosystems	3
CE 2060	Structural Mechanics	4
CE 2550	Geomatics	3
CE 3210	Geotechnical Engineering	4
CE 3310	Construction Engineering and Management	3
CE 3420	Applied Hydraulics and Hydrology	3
CE 4430	Water Resources Engineering	3
CE 4470	Stormwater Management	3
CE (GEOL) 4820	Groundwater and Contaminant Transport	3
ECE 2070	Basic Electrical Engineering	2
ECE 2080	Electrical Engineering Laboratory	1
EES 4090‡	Introduction to Nuclear Engineering and Radiological Sciences	3
EES 4100	Environmental Radiation Protection I	3
EES 4110	Ionizing Radiation Detection and Measurement	3
EES 4120	Nuclear Fuel Cycle and Radioactive Waste Management	3
EES 4370	Biodegradation and Bioremediation	3
EES 4910	Selected Topics in Environmental Engineering	1 to 3
ME 4260	Nuclear Energy	3

‡To be added to the approved list for 2018-2019. Course substitution forms may be used in the meantime.

### Science Options

Course	Title	Credits
BCHM 3050	Essential Elements of Biochemistry	3
BIOL 2110	Introduction to Toxicology	3
BIOL 4100	Limnology	3
BIOL 4430	Freshwater Ecology	3
BIOL 4440	Freshwater Ecology Laboratory	2
CH 3300	Introduction to Physical Chemistry	3
CH 3310	Physical Chemistry	3
CH 4130	Chemistry of Aqueous Systems	3
EES 4140‡	Radioecology	3
ENSP 4000	Studies in Environmental Science	3

Course	Title	Credits
GEOL 2700	Experiences in Sustainable Development: Water	3
GEOL 3000	Environmental Geology	3
GEOL 3180	Introduction to Geochemistry	3
GEOL 4210	GIS Applications in Geology	3
GEOL (CE) 4820	Groundwater and Contaminant Transport	3
MATH 3110	Linear Algebra	3
MATH 3650	Numerical Methods for Engineers	3
MATH 4340	Advanced Engineering Mathematics	3
MICR 4100	Soil Microbiology	3
PES 2020	Soils	4
PES (ETOX, GEOL) 4850	Environmental Soil Chemistry	3
PHYS 2400	Physics of the Weather	3
PHYS 2450	Physics of Global Climate Change	3
PHYS 4200	Atmospheric Physics	3

‡To be added to the approved list for 2018-2019. Course substitution forms will be used in the meantime.

### Graduate Course Options

Course	Title	Credits
EES 8020†	Environmental Engineering Principles	3
EES 8030†	Physicochemical Operations in Water and Wastewater Treatment Systems	3
EES 8040†	Biochemical Operations in Wastewater Treatment Systems	3
EES 8430†	Environmental Chemistry	3
EES 8510†	Biological Principles of Environmental Engineering	3

†For students eligible to take graduate courses either for undergraduate credit or via the BS/MS program.

### Research Options

Course	Title	Credits
EES 4900	Approved creative inquiry experience classes such as EES 4990	up to 2
EES 3000	Introduction to Research in Environmental Engineering	1
EES 3010	Honors Research in Environmental Engineering I	3
EES 4000	Honors Research in Environmental Engineering II	3
EES 4950	Honors Thesis in Environmental Engineering	1

## Honors Program

Students who are members of the Calhoun Honors College (<https://www.clemson.edu/cuhonors/>) have the option of earning Departmental level honors, as described by the Honors College:

<https://www.clemson.edu/cuhonors/current-students/student-handbook/departmental-honors.html>

Students who are not members of the Honors College may apply to join, if their cumulative GPR is 3.5 or higher by the end of the semester that they apply. The purpose of Departmental Honors is to provide Calhoun Scholars a unique opportunity to do advanced, in-depth study and research within their major academic disciplines. For the BS degree in Environmental Engineering, a four-course sequence must be completed:

EES 3000 - Honors Seminar: Introduction to Research in Environmental Engineering (1 credit hour)

EES 3010 - Honors Research in Environmental Engineering I (3 credit hours)

EES 4000 - Honors Research in Environmental Engineering II (3 credit hours)

EES 4950 - Honors Thesis in Environmental Engineering

Students who are interested in earning Departmental Honors are encouraged to contact a faculty member in EES who is willing to supervise these courses. Arrangements should be made prior to the start of a student's junior level courses.

## Undergraduate Research

While there is no formal program to involve undergraduate students in Departmental research, an appreciable number of Environmental Engineering undergraduates do find opportunities. Students are encouraged to peruse the web pages for faculty members in the Department to learn about their research activities. The faculty are receptive to student inquiries about working in a laboratory. The EEES student services coordinator stands ready to help students approach a faculty member.

The Department offers a number of Creative Inquiry courses (EES 4900) that focus on Environmental Engineering topics. Up to 2 credit hours of Creative Inquiry courses can be applied towards the elective credit hours in the degree.

## Combined BS and MS Degree Program

Environmental Engineering undergraduates at Clemson University may begin a Masters of Science (MS) degree in Environmental Engineering and Science while completing their Bachelor of Science (BS) degree and use graduate courses to satisfy the requirements of both their undergraduate and graduate degrees. A complete description of the program may be found at:

<https://www.clemson.edu/cecas/departments/ees/academics/bsms.html>

The following specific requirements apply:

#### **Undergraduate/graduate transition (4<sup>th</sup> year)**

- Undergraduate students must have an overall GPR of 3.4 or higher through their junior year. Students are expected to maintain this GPR to continue enrollment in the combined program.
- Up to 9 semester hours of 6000- or 8000- level EES courses may be used to satisfy the requirements of their BS degree. The 9 credit hours earned at the undergraduate level will be combined with 21 hours earned at the Masters level, for a total of 30 hours needed for a Master's degree. If fewer than 9 hours are taken at the BS level, these must be made up at the graduate level in order to reach the 30 hours for a Master's degree. The 9 hours taken at the undergraduate level towards the MS degree replaces the 9 hours of courses needed for the "Engineering or Science Requirement" category.
- Graduate assistantships cannot be accepted until full graduate status is attained and are contingent on availability of funds in alignment with departmental policy. Non-thesis students are not eligible for graduate assistantships.

#### **Graduate program (5<sup>th</sup> year)**

- Students will be accepted into a thesis or non-thesis program. Most students will be non-thesis, with thesis reserved for those who show special interest and ability for research. At least one additional semester is typically needed to complete a thesis.
- Students in a combined degree program are conditionally accepted to the graduate program until completion of the BS degree requirements. Students interested in this combined degree program should consult the Graduate Program Coordinator and the Undergraduate Program Coordinator in the Department of Environmental Engineering and Earth Sciences. Application for this program should be made by the end of the junior year, but no later than one semester prior to the expected BS graduation. Application details are available in the Academic Regulations section of the Graduate School Announcements.
- EES Masters students are required to take three core courses: EES 8020, EES 8430, and EES 8510. One or more may be taken while the student is an undergraduate.

#### **Example course map**

- An example course map is provided so that students can see a path forward for obtaining the BS and MS degrees in five years. The three courses (3 hours each) that count towards both degrees are shown in italics. *This example is for students who select the process engineering focus area for the Master's degree.* Students who select other focus areas should consult with the EES Graduate Program Coordinator for advice on course selection. Regardless of the focus area selected, all graduate students in the EES MS degree program are required to take EES 8020, EES 8430, and EES 8510. Furthermore, all MS degree candidates are required to enroll in EES 8610 each semester, but it does not count towards the 30 credit hours needed to fulfill the MS degree requirements.

**EXAMPLE COURSE MAP FOR BS/MS IN ENVIRONMENTAL ENGINEERING**

**FRESHMAN YEAR**

<b>First Semester</b>	<b>Second Semester</b>
1 ENGR 1050 Engineering Discipline and Skills I	1 ENGR 1070 Programming & Problem Solving I
1 ENGR 1060 Engineering Discipline and Skills II	1 ENGR 1080 Programming & Problem Solving II
4 CH 1010 General Chemistry (Lab)	1 ENGR 1090 Program & Problem Solving Apps
4 MATH 1060 Calculus of One Variable I	4 CH 1020 General Chemistry (Lab)
3 ENGL 1030 Accelerated Composition	4 MATH 1080 Calculus of One Variable II
<u>3</u> Humanities/Social Science Requirement <sup>1</sup>	3 PHYS 1220 Physics with Calculus I
16	<u>3</u> HIST 1240 Environmental History Survey <sup>2</sup>
	17

**SOPHOMORE YEAR**

<b>First Semester</b>	<b>Second Semester</b>
3 EES 2010 Environ Engineering Fund I	4 EES 2020 Environ Engineering Fund II
3 BIOL 1030 General Biology <sup>3</sup>	2 ENGR 2100 Engineering Graphics <sup>4</sup> (Lab)
1 BIOL 1050 General Biology Lab	3 CH 2010 Organic Chemistry <sup>5</sup>
4 MATH 2060 Calculus of Several Variables	4 MATH 2080 Intro to Ordinary Differential Eqs
3 PHYS 2210 Physics with Calculus II	<u>2</u> CE 2080 Dynamics
<u>3</u> CE 2010 Statics	
17	15

**JUNIOR YEAR**

<b>First Semester</b>	<b>Second Semester</b>
2 EES 3030 Water Treatment Systems	3 EES 4840 Municipal Solid Waste Mgmt
2 EES 3040 Wastewater Treatment Systems	3 EES 4850 Hazardous Waste Management
1 EES 3050 Water & Wastewater Treatment Lab	3 ME 3100 Thermodynamics & Heat Transfer
4 MICRO 3050 General Microbiology (Lab)	4 CE 3410 Intro to Fluid Mechanics (Lab)
3 MATH 3020 Statistics for Science and Engin	3 GEOL 1010 Physical Geology <sup>6</sup>
<u>3</u> Humanities/Social Science Requirement <sup>1</sup>	<u>1</u> GEOL 1030 Physical Geology Lab
15	17

**SENIOR YEAR**

<b>First Semester</b>	<b>Second Semester</b>
3 EES 4300 Air Pollution Engineering	3 EES 4750 Env Eng Capstone Design (Lab)
1 EES 4500 Env Engr Senior Seminar	3 EES 8030 Physicochemical Operations
3 EES 4800 Environmental Risk Assessment	3 EES 8040 Biochemical Operations
3 EES 4860 Environmental Sustainability	3 Humanities/Social Science Requirement <sup>1</sup>
2 Engineering Economics Requirement <sup>7</sup>	<u>3</u> Humanities/Social Science Requirement <sup>1</sup>
<u>3</u> EES 8020 Environmental Engineering Principles	
15	15

**TOTAL HOURS = 127**

**FIFTH YEAR, to Complete the MS Degree**

<b>First Semester</b>	<b>Second Semester</b>
3 EES 8430 Environmental Chemistry	3 EES 8050 Laboratory Water Wastewater
3 EES 8510 Biological Principles Env Engr	3 EES 8810 Special Project
3 EES 8060 Design of Env Engr Systems	3 Elective (6000 or 8000 level)
3 Elective (6000 or 8000 level)	<u>1</u> EES 8610 Graduate Seminar
<u>1</u> EES 8610 Graduate Seminar	
13	10

## Earning Graduate Credit as an Undergraduate

Any senior with a 3.0 or higher university grade-point ratio may take graduate courses in excess of the requirements for their undergraduate degree. They may request that these courses be included as part of their graduate program if they are later admitted to the Graduate School. 6000-level courses cannot be taken if the corresponding 4000-level course is required for undergraduate degree in the same academic major as the proposed graduate course.

To obtain permission to take graduate level courses as an undergraduate, students need to fill out a GS6 form: <https://www.clemson.edu/graduate/students/forms.html>.

## General Education Requirements

The University has General Education requirements that must be satisfied prior to graduation. Some of these are built into the Environmental Engineering curriculum. Others are satisfied by selecting the appropriate elective courses in the curriculum.

- I. General Education Coursework: 31 credit hours
  - A. Communication
    - a. English composition: Satisfied by ENGL 1030 in the curriculum.
    - b. Oral communication: Satisfied through environmental engineering courses in the curriculum
  - B. Mathematical, Scientific, and Technological Literacy.
    - a. Mathematics: Satisfied through the mathematics courses in the curriculum.
    - b. Natural Science with Lab: Satisfied by general chemistry or general biology requirements in the curriculum.
    - c. Mathematics or Natural Science: Satisfied by a mathematics, general chemistry or general biology course in the curriculum not already used in Section B.
  - C. Arts and Humanities
    - a. Literature: Choose 3 credits of approved courses, as outlined in the [Undergraduate Catalog](#).
    - b. Non-Literature: PHIL 3450 (recommended) or 3 credits of approved courses, as outlined in the [Undergraduate Catalog](#).
  - D. Social Sciences: HIST 1240 (required) and 3 additional credits of approved courses in a field other than HIST, as outlined in the [Undergraduate Catalog](#).
  - E. Cross-Cultural Awareness: Choose 3 credits of approved courses, as outlined in the [Undergraduate Catalog](#). These credit hours may also satisfy a requirement from Sections A-D (a.k.a. “double-dipped”).
  - F. Science and Technology in Society: Satisfied by HIST 1240 in the curriculum.

## II. Distributed Competencies: 2 credit hours

- A. Academic and Professional Development: 1 credit is satisfied directly by EES 4500 – Professional Seminar and the remaining credit through environmental engineering courses in the curriculum.
- B. Distributed Competencies Coursework: Satisfied through environmental engineering courses in the curriculum.

A minimum of 31 General Education credits, in addition to 2 credits of Academic and Professional Development included within the major, is required. BS environmental engineering students take at least fourteen credits of science courses that are not counted under general education in Degree Works. These include: BIOL 1030/1050 (4), GEOL 1010/1030 (4), PHYS 1220 (3) and PHYS 2210 (3). In addition, many of the courses taken to satisfy the the Arts & Humanities/Social Science Requirement for Engineering are on the general education list. Any BS environmental engineering student that completes these courses and the general education requirements in Degree Works satisfies the 31-credit General Education rule.

### **Arts/Humanities and Social Sciences Policy**

This program of study must include a minimum of 15 credits in the Engineering Arts/Humanities and Social Sciences. Twelve credits are satisfied by completing the appropriate General Education requirements in Art & Humanities and Social Sciences. The additional requirement is called the “Engineering 5<sup>th</sup> requirement”. A list of courses which satisfy the Engineering 5<sup>th</sup> requirement can be found on the CECAS website:

[http://www.clemson.edu/cecas/current-students/humanities\\_policy.html](http://www.clemson.edu/cecas/current-students/humanities_policy.html)

### **Cross-Cultural Awareness Requirement**

Students desiring to minimize total credits required to graduate can do so by strategically choosing their Non-Literature Arts and Humanities course, Social Science Course or Engineering 5<sup>th</sup> requirement also fulfill the Cross-Cultural Awareness requirement. (Examples: AAH 2100, ASL 3050, HUM 3090, MUSC 2100, MUSC 3140, or REL 1020 satisfies Non-Literature requirement in Arts and Humanities and the Cross-Cultural Awareness requirements of General Education). The General Engineering General Education Worksheet is helpful for finding courses which satisfy the CCA requirement:

<http://www.clemson.edu/cecas/departments/ge/advising/documents/curriculum-worksheets/Environmental%20Engineering.pdf#page=2>

### **Science and Technology in Society Requirement**

The STS requirement is satisfied by a required course in the curriculum, HIST 1240 Environmental History Survey.

## **Registration Requirements**

A cumulative grade-point ratio of 2.0 or higher is required for registration in engineering courses at the 3000-level or higher. Priority for registration in engineering courses is given to those majors for whom the course is a degree requirement. Exceptions to this requirement may be granted by the department offering the course.

## Graduation Requirements

In addition to other institutional requirements, candidates for a baccalaureate degree in Engineering are required to have a 2.0 or higher cumulative grade-point ratio in all engineering courses taken at Clemson. All courses with “Engineering” in the course designator (e.g., ENGR 1410, EES 2020, etc.) are used in this calculation. The student’s advisor or the student services coordinator can provide a student’s eGPR.

## Departmental Undergraduate Degree Requirements

All environmental engineering majors are encouraged to complete a Senior Exit Interview and Online Survey prior to graduation. Normally, graduating seniors are contacted toward the end of their final semester in order to schedule a date and time for the Senior Exit Interview. Unless there are unusual circumstances, all graduating seniors are expected to participate in the exit interview at the specified time.

The Exit Interview takes approximately 15 minutes and consists of a meeting with either the department chair or a representative. The meeting is a candid conversation about the program and its strengths and weaknesses with the topics being student-led. The online survey takes up to 20 minutes and asks students to evaluate the program and respond to specific questions and inquiries. These confidential ratings and accompanying comments are important as they are considered in degree program accreditation processes.

At the time of the Senior Exit Interview, you will also be asked to provide personal contact information. This is important as it allows us get in touch with you about job openings or other opportunities that may arise once you have left campus. Your name will also be placed on the mailing list of alumni; among other things, you will receive copies of the departmental newsletter, which will allow you to stay abreast of what is happening in the Department of Environmental Engineering and Earth Sciences.

## FE Exam Partial Reimbursement

Students may be reimbursed for \$50 of the cost to take the FE exam. Students are strongly encouraged to take the exam and seek reimbursement while they are still enrolled as a student.

In order to receive reimbursement, an itemized receipt showing your registration, date of exam, and payment for the exam is required. Unless requested otherwise, the reimbursement will be sent to the official address the student has on file with the university. These requests are to be submitted to the main Brackett Hall office, room 445.

Students may still seek reimbursement after graduation, but will be required to register as a vendor in Clemson’s procurement system, Buyways, in order to receive reimbursement. Students must submit any reimbursement requests within one year of graduation to qualify.

## Student Groups

### **Environmental Engineering Club**

The environmental engineering club is a club for undergraduates in the BS environmental engineering program. The club provides a link between students, faculty, administration, and alumni in order to promote a network in department and field. The student chapter holds meetings, on-campus activities, and field trips to stay engaged with one another and the community. Through activities such as the annual career panel, students are assisted in launching satisfying careers in environmental engineering and other related fields. Overall, the club is a place for those with common interests in environmental engineering to connect. Dr. David Freedman is the faculty advisor for the student chapter and can be contacted for more information ([dfreedm@clemson.edu](mailto:dfreedm@clemson.edu)).

### **AWWA Student Chapter**

The Department of Environmental Engineering and Earth Sciences sponsors a student chapter for the American Water Works Association (AWWA). AWWA ([www.awwa.org](http://www.awwa.org)) is a professional organization focused on the drinking water industry. The student chapter holds meetings, on-campus activities, and field trips to stay engaged with one another and the community. AWWA offers information about internships and full-time employment and invites industry representatives to chapter activities so students can network with professionals in the field. Through activities such as the annual career panel, students are assisted in launching satisfying careers in environmental engineering and other related fields. Dr. David Ladner is the faculty advisor for the student chapter and can be contacted for more information ([ladner@clemson.edu](mailto:ladner@clemson.edu)).

### **Engineers Without Borders**

The Clemson University student chapter of Engineers Without Borders (EWB) develops sustainable solutions to meet basic needs in areas of clean water, power, sanitation and education for communities in developing countries. Current projects are in Nicaragua and Liberia. Past projects have been in El Salvador, Vietnam, and the assistance to hurricane-ravaged residents of New Orleans. There is interest in domestic outreach projects closer to Clemson. Students have traveled to these countries to evaluate the needs of the communities. During the semester teams of EWB members, working in conjunction with the Creative Inquiry program, meet weekly to develop a solution plan for each project. There are also monthly meets for the entire club where a guest will speak about their projects or industries. . Dr. Mark Schlautman is the faculty advisor for the student chapter and can be contacted for more information ([mschlau@clemson.edu](mailto:mschlau@clemson.edu)).

### **Sustainable Remediation Forum (SURF)**

The Department of Environmental Engineering and Earth Sciences sponsors a student chapter for the Sustainable Remediation Forum (SURF). SURF ([www.sustainableremediation.org](http://www.sustainableremediation.org)) is a professional organization focused on promoting sustainability in the field of remediation. SURF provides an ongoing forum for incorporating societal and economic considerations into environmental cleanup projects. By including representatives of government, industry, consultancy, and academia, SURF allows students to become a part of the growing network of the field. The student chapter holds meetings, on-campus activities, and field trips to stay engaged with one another and the community. Dr. David Freedman is the faculty advisor for the student chapter and can be contacted for more information ([dfreedm@clemson.edu](mailto:dfreedm@clemson.edu)).

## Course Descriptions

The best way to find the most recent course descriptions is in the University's online course catalog. The 2017-2018 descriptions may be found at: <http://catalog.clemson.edu/content.php?catoid=16&navoid=485>

Use EES as the "Prefix" and click on "Filter."

## Faculty

Faculty in EEES who teach Environmental Engineering courses and advise undergraduates are listed on the Department's web site, under People and Current Faculty:

<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/index.html>

Faculty members who are predominantly affiliated with the undergraduate Environmental Engineering program include:

- **Dr. Michael Carbajales-Dale**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/dale.html>
- **Dr. Kevin T. Finneran**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/finneran.html>
- **Dr. David L. Freedman**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/freedman.html>
- **Dr. David A. Ladner**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/ladner.html>
- **Dr. Nicole Martinez**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/martinez.html>
- **Dr. Andrew R. Metcalf**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/metcalf.html>
- **Dr. Sudeep Popat**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/popat.html>

## Staff

Staff members in EEES are listed on the Department's web site, under People and Current Faculty:

<https://www.clemson.edu/cecas/departments/ees/people/staff.html>

The staff who work most closely with Environmental Engineering undergraduate students include:

**Janet Lee**

Undergraduate Coordinator

444 Brackett Hall

864-656-0470 [jlee6@clemson.edu](mailto:jlee6@clemson.edu)

**Briana Peele**

Administrative Assistant

445 Brackett Hall

864-656-3438 [bkloc@clemson.edu](mailto:bkloc@clemson.edu)