



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

**Department of Environmental Engineering and  
Earth Sciences**

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

**CLEMSON UNIVERSITY**

**Updated August 2023**

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## 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 need 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. In 2022 the Department was placed in the School of Civil and Environmental Engineering and Earth Sciences jointly with the Glenn Department of Civil 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 six 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 Jennifer Elliott. Her office is in 445 Brackett Hall. Dr. David Ladner is the Undergraduate Program 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 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 131 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. It is possible to switch your curriculum year to a later one; this should be discussed with your advisor to ensure it benefits you. All curricula currently in use by our students are listed below.

# ENVIRONMENTAL ENGINEERING

2022-2023, 2023-2024 Curriculum

<sup>F</sup>Fall Only    <sup>S</sup>Spring Only

Student: \_\_\_\_\_

Date: \_\_\_\_\_

CUID: \_\_\_\_\_

Advisor: \_\_\_\_\_

| FRESHMAN YEAR  |                |  |  |  |  |
|--|----------------|--|--|--|--|
| Term Info  | Cr             | Course   | Term Info  | Cr   | Course   |
|  | 4              | CH 1010 & 1011 General Chemistry                                 |  | 4  | CH 1020 & 1021 General Chemistry   |
|  | 3              | ENGL 1030 & 1031 Composition and Rhetoric                        |  | 3  | ENGR 1410 & 1411 Programming and Problem Solving <sup>4</sup>  |
|  | 3              | ENGR 1020 & 1021 Engineering Disciplines and Skills <sup>1</sup> |  | 4  | MATH 1080 Calculus of One Variable II  |
|  | 4              | MATH 1060 Calculus of One Variable I <sup>2</sup>                |  | 3  | PHYS 1220 Physics with Calculus I  |
|  | 3              | General Education Requirement <sup>3</sup>                       |  | 3  | General Education Requirement <sup>3</sup>   |
|  | <b>17</b>      |  |  | <b>17</b>  |  |
| SOPHOMORE YEAR   |                |  |  |  |  |
| Term Info  | Cr             | Course   | Term Info  | Cr   | Course   |
|  | 3              | BIOL 1030 General Biology I <sup>5</sup>                         |  | 2  | CE 2080 Dynamics   |
|  | 1              | BIOL 1050 General Biology Lab I <sup>5</sup>                     |  | 3  | CE 2010 Survey of Organic Chemistry <sup>6</sup>   |
|  | 3              | CE 2010 Statics  |  | 4  | EES 2020 & 2021 Environmental Engr Fundamentals II <sup>5</sup>  |
|  | 3              | EES 2010 Environmental Eng Fundamentals I <sup>F</sup>           |  | 2  | ENGR 2100 and 2101 CAD and Engineering Applications <sup>7</sup>   |
|  | 4              | MATH 2060 Calculus of Several Variables                          |  | 4  | MATH 2080 Int. to Ordinary Differential Eqn.   |
|  | 3              | PHYS 2210 Physics with Calculus II                               |  |  |  |
|  | <b>17</b>      |  |  | <b>15</b>  |  |
| JUNIOR YEAR  |                |  |  |  |  |
| Term Info  | Cr             | Course   | Term Info  | Cr   | Course   |
|  | 2              | EES 3030 Water Treatment Systems <sup>F</sup>                    |  | 3  | CE 3410 Intro to Fluid Mechanics   |
|  | 2              | EES 3040 Wastewater Treatment Systems <sup>F</sup>               |  | 1  | CE 3430 Intro to Fluid Mechanics Lab   |
|  | 1              | EES 3050 Water and Wastewater Treatment Lab <sup>F</sup>         |  | 3  | EES 4300 Air Pollution Engineering <sup>5</sup>  |
|  | 3              | MATH 3020 Statistics for Science and Engineering                 |  | 3  | EES 4860 Environmental Sustainability  |
|  | 4              | MICR 3050 & 3051 General Microbiology                            |  | 3  | GEOL 1010 Physical Geology <sup>8</sup>  |
|  | 3              | General Education Requirement <sup>3</sup>                       |  | 1  | GEOL 1030 Physical Geology Lab <sup>8</sup>  |
|  |                |  |  | 3  | ME 3100 Thermodynamics and Heat Transfer <sup>5</sup>  |
|  | <b>15</b>      |  |  | <b>17</b>  |  |
| SENIOR YEAR  |                |  |  |  |  |
| Term Info  | Cr             | Course   | Term Info  | Cr   | Course   |
|  | 3              | EES 4850 Hazardous Waste Management <sup>F</sup>                 |  | 3  | EES 4750 & 4751 Capstone Design Project <sup>5</sup>   |
|  | 1              | EES 4500 Professional Seminar <sup>F</sup>                       |  | 3  | Engineering or Science Req <sup>10</sup>   |
|  | 3              | EES 4800 Environmental Risk Assessment <sup>F</sup>              |  | 3  | Engineering or Science Req <sup>10</sup>   |
|  | 3              | EES 4840 Municipal Solid Waste Management <sup>F</sup>           |  | 3  | General Education Req <sup>3</sup>   |
|  | 2              | Engineering Economics Req <sup>9</sup>                           |  | 3  | Humanities OR Social Science Req <sup>11</sup>   |
|  | 3              | Engineering or Science Req <sup>10</sup>                         |  | 3  | Oral Communication Req <sup>3</sup>  |
|  | <b>15</b>      |  |  | <b>18</b>  |  |
| <b>131 Total Semester Hours</b>  |                |  |  |  |  |
| GENERAL EDUCATION REQUIREMENTS   |                |  |  |  |  |
| Literature   | Non-Literature | Social Science<br>(SC REACH Act,<br>if required)                 | Social Science<br>(from a different<br>department) | Global Challenges<br>(ENGR 1020 at Clemson<br>or another course) | Global Challenges -3000 or 4000 level<br>Or if already met with Tech Requirement, then need<br>Dept Arts & Humanities/Social Sci Req |
|  |                |  |  |  |  |
| CHANGE OF MAJOR REQUIREMENTS: C grade or higher in each class and a 2.0 Clemson cumulative GPA |                |  |  |  |  |
| CH 1010  | ENGL 1030      | ENGR 1020  | ENGR 1410  | MATH 1060  | PHYS 1220  |
|  |                |  |  |  |  |

Students should always refer to the Academic Catalog for course descriptions and for course pre-requisites, corequisites, and concurrent enrollment requirements. Academic Catalog can be found here: <https://www.clemson.edu/registrar/academic-catalogs/>. Advisors will assist students in scheduling courses to fulfill the requirements of the degree program; nevertheless, it is the responsibility of the student to fulfill the relevant requirements of the degree.

### Footnotes

<sup>1</sup> The combination of [ENGR 1050](#) and [ENGR 1060](#) or the combination of [ENGR 1510](#) and [ENGR 1520](#) may be substituted for [ENGR 1020](#).

<sup>2</sup> Depending on a student's Clemson Mathematics Placement Test score, [MATH 1040](#) and [MATH 1070](#) may be substituted for [MATH 1060](#); or the student may be required to take [MATH 1050](#) before enrolling in [MATH 1060](#).

<sup>3</sup> See [General Education Requirements](#). Three General Education credits must also satisfy the South Carolina REACH Act Requirement. See the South Carolina REACH Act Requirement in the [Academic Regulations](#) section.

<sup>4</sup> [ENGR 1640](#) or the combination of [ENGR 1070](#), [ENGR 1080](#) and [ENGR 1090](#) may be substituted for [ENGR 1410](#).

<sup>5</sup> [BIOL 1100](#) may be substituted for [BIOL 1030](#) and [BIOL 1050](#).

<sup>6</sup> [CH 2230](#) may be substituted.

<sup>7</sup> [ENGR 2080](#) may be substituted.

<sup>8</sup> [PES 2020](#) may be substituted for [GEOL 1010](#) and [GEOL 1030](#).

<sup>9</sup> Select [CE 3520](#) or [IE 3840](#).

<sup>10</sup> Select from [BCHM 3050](#), [BE 3220](#), [BE 4150](#), [BE 4220](#), [BE 4240](#), [BE 4400](#), [BE 4640](#), [BIOL 4100](#), [BIOL 4430](#), [BIOL 4440](#), [CE 2060](#), [CE 2550](#), [CE 3210](#), [CE 3310](#), [CE 3420](#), [CE 4430](#), [CE 4470](#), [CE 4820](#), [CH 3300](#), [CH 3310](#), [CH 4130](#), [ECE 2070](#), [ECE 2080](#), [EES 3000](#), [EES 3010](#), [EES 4000](#), [EES 4100](#), [EES 4110](#), [EES 4120](#), [EES 4140](#), [EES 4270](#), [EES 4370](#), [EES 4910](#), [EES 4950](#), [ENSP 4000](#), [GEOL 2700](#), [GEOL 3000](#), [GEOL 3180](#), [GEOL 4210](#), [GEOL 4820](#), [MATH 3110](#), [MATH 3650](#), [MATH 4340](#), [ME 4260](#), [MICR 4100](#), [MSE 4150](#), [MSE 4160](#), [MSE 4280](#), [MSE 4530](#), [MSE 4580](#), [MSE 4610](#), [PES 4850](#), [PHYS 2400](#), [PHYS 2450](#), [PHYS 4200](#).

<sup>11</sup> See the Policy on Humanities and Social Sciences for Engineering Curricula.

### Other notes

1. The following courses must be completed with a grade of C or better: [CE 2010](#), [CE 2080](#), [CE 3410](#), [CH 1010](#), [ENGL 1030](#), [ENGR 1020](#) (or [ENGR 1050](#) and [ENGR 1060](#) or [ENGR 1510](#) and [ENGR 1520](#) if substituted for [ENGR 1020](#)), [MATH 1060](#), [MATH 1080](#), [MATH 2060](#), [MATH 2080](#), [PHYS 1220](#), and [PHYS 2210](#).
2. Depending on a student's math placement, they may be invited to take part in the General Engineering Learning Community where they complete the following courses: [ENGR 1000](#), [ENGR 1010](#), [ENGR 1100](#), [ENGR 1110](#), [ENGR 1510](#), [ENGR 1520](#), and [ENGR 1640](#). The combination of [ENGR 1510](#) and [ENGR 1520](#) may be substituted for [ENGR 1020](#). [ENGR 1640](#) may be substituted for [ENGR 1410](#).
3. A transfer course may not be used to satisfy the General Education Global Challenges Requirement. While a transfer course may fulfill other degree requirements, students must enroll in a Clemson course(s) on the Global Challenges list to fulfill the Global Challenges Requirement.

**ENVIRONMENTAL ENGINEERING (B.S.)  
2020-2021 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  | ____ Hum/SS Req. <sup>1</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 4300 Air Pollution Engineering                 | 3  |
| ____ EES 3040 Wastewater Treatment Systems            | 2  | ____ EES 4860 Environmental Sustainability              | 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 4850 Hazardous Waste Management              | 3  | ____ EES 4750 Env Engr Capstone Design (Lab)            | 3  |
| ____ EES 4500 Env Engr Senior Seminar                 | 1  | ____ Engr or Sci Reqt <sup>8</sup> _____                | 3  |
| ____ EES 4800 Environmental Risk Assessment           | 3  | ____ Engr or Sci Reqt <sup>8</sup> _____                | 3  |
| ____ EES 4840 Municipal Solid Waste Mgmt              | 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: \_\_\_\_\_  
 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>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 (B.S.)**  
**2017-2018, 2018-2019 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 4850 Hazardous Waste Management                 | 3  |
| ___ EES 3040 Wastewater Treatment Systems            | 2  | ___ EES 4860 Environmental Sustainability               | 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>                       | 3  |
| ___ EES 4800 Environmental Risk Assessment           | 3  | ___ Engr or Sci Reqt <sup>8</sup>                       | 3  |
| ___ EES 4840 Municipal Solid Waste Mgmt              | 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: \_\_\_\_\_  
 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



**ENVIRONMENTAL 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         |
|  | <u>16</u> |   | <u>17</u> |

| 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         |  |           |
|  | <u>17</u> |  | <u>15</u> |

| 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         |
|  | <u>15</u> |   | <u>17</u> |

| 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         |   |           |
|  | <u>15</u> |   | <u>15</u> |

**127 Total Semester Hours**

|  |  |
|--|--|
| <b>General Education Requirements:</b> | <b>Other:</b>                                |
| LIT: _____                             | Calhoun Honors <input type="checkbox"/>      |
| Non-Lit: _____                         | ROTC <input type="checkbox"/>                |
| SS1: _____                             | Air Force <input type="checkbox"/>           |
| SS2: _____                             | Army <input type="checkbox"/>                |
| ENGR 5th: _____                        | Transfer <input checked="" type="checkbox"/> |
| STS: _____                             | op <input type="checkbox"/>                  |
| CCA: _____                             |  |

<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

## 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 (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 4120            | Nuclear Fuel Cycle and Radioactive Waste Management           | 3       |
| EES 4140            | Radioecology  | 3       |
| EES (BE, GEOL) 4270 | Ecohydrology  | 3       |
| EES 4370            | Biodegradation and Bioremediation                             | 3       |
| EES 4910            | Selected Topics in Environmental Engineering                  | 1 to 3  |
| ME 4260             | Nuclear Energy  | 3       |
| MSE (CH) 4150       | Polymer Science and Engineering                               | 3       |
| MSE 4160            | Electrical Properties of Materials                            | 3       |
| MSE 4280            | Phase Diagrams for Materials Processing & Applications        | 3       |
| MSE (CE) 4530       | Non-Destructive Evaluation                                    | 3       |
| MSE 4580            | Surface Phenomena in Materials Science and Engineering        | 3       |
| MSE 4610            | Polymer Fiber Engineering                                     | 3       |

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

## Science Options

| Course                | Title  | Credits |
|-----------------------|--|---------|
| BCHM 3050             | Essential Elements of Biochemistry                   | 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       |
| FOR (ENR, WFB) 4340   | Geographic Information Systems for Natural Resources | 3       |
| 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 4000             | Public Health Microbiology                           | 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       |

## 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 |
|----------------|---|---------|
| <i>various</i> | Approved creative inquiry experience classes such as EES 4900 | up to 3 |
| 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 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 the honors program is a formal way for undergraduate students to perform research, an appreciable number of students find other 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 (CI) courses (usually EES 4900) that focus on Environmental Engineering topics. Up to 3 credit hours of CI courses can be applied towards the elective credit hours in the degree if the courses are approved by the student's advisor and the department chair. Preference is given to CI courses offered by our department. Students should obtain the approvals before enrolling in each CI course they wish to use for elective credit.

## Combined BS and MS Degree Program

Environmental Engineering undergraduates at Clemson University may begin a Master 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/documents/bsms/BS-MS\\_EES.pdf](https://www.clemson.edu/cecas/departments/ees//academics/documents/bsms/BS-MS_EES.pdf)

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"(electives) 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 can complete 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. This program should be started by the end of the junior year, but no later than one semester prior to the expected BS graduation. 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.

## 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 the 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. More information about General Education requirements can be found in the [Undergraduate Catalog](#).

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 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 includes a minimum of 15 credits in the Engineering Arts/Humanities and Social Sciences. Twelve credits are satisfied by completing the appropriate General Education requirements. The additional three credits are called the “Engineering 5<sup>th</sup> requirement”.

### **Global Challenges Requirement**

Global Challenges credit hours must be selected from two different fields unless identified as interdisciplinary. At least three credit hours must be selected from a course(s) at the 3000-level or higher. A transfer course may not be used to satisfy the General Education Global Challenges Requirement. While a transfer course may fulfill other degree requirements, students must enroll in a Clemson course(s) on the Global Challenges list to fulfill the Global Challenges Requirement.

## **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.

## 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 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.

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. 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. Students in the club hold meetings, on-campus activities, and field trips to stay engaged with one another and the community. 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 Environmental Engineering Club and can be contacted for more information ([dfreedm@clermson.edu](mailto:dfreedm@clermson.edu)).

### **AWWA-WEF Student Chapter**

The Department of Environmental Engineering and Earth Sciences sponsors a student chapter for the American Water Works Association (AWWA) and the Water Environment Federation (WEF). AWWA ([www.awwa.org](http://www.awwa.org)) is a professional organization focused on the drinking water industry. WEF ([www.wef.org](http://www.wef.org)) is a professional organization focused on the wastewater and water resource recovery 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@clermson.edu](mailto:ladner@clermson.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. Past projects have been in Nicaragua, Liberia, El Salvador, and Vietnam. Students have traveled to these countries to evaluate the needs of the communities. Additionally, the group has assisted hurricane-ravaged residents of New Orleans. There is interest in other domestic outreach projects closer to Clemson. 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 meetings for the entire club where a guest will speak about their projects or industries. Dr. Mark Schlautman is the faculty advisor and can be contacted for more information ([mshclau@clermson.edu](mailto:mshclau@clermson.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@clermson.edu](mailto:dfreedm@clermson.edu)).

## Course Descriptions

The best way to find the most recent course descriptions is in the University's online course catalog. The 2022-2023 descriptions may be found at

<https://catalog.clemson.edu/content.php?catoid=39&navoid=1236>

For environmental engineering courses 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 teach courses and/or advise students in the undergraduate Environmental Engineering program include:

- **Dr. Michael Carbajales-Dale**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/dale.html>
- **Dr. Ezra Cates**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/cates.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 Papat**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/papat.html>
- **Dr. Mark Schlautman**  
<https://www.clemson.edu/cecas/departments/ees/people/facultydirectory/schlautman.html>

## Staff

Staff members in EEES are listed on the Department's web site:

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

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

**Jenna Elliott**

Undergraduate Coordinator

444 Brackett Hall

864-656-0470

[elliott3@clemson.edu](mailto:elliott3@clemson.edu)

**Briana Peele**

Administrative Assistant

445 Brackett Hall

864-656-3438

[bkloc@clemson.edu](mailto:bkloc@clemson.edu)