Second Semester
3 - BE 3220 Small Watershed Hydrology and Sedimentology
3 - BE 4120 Heat and Mass Transport in Biosystems Engineering
3 - BE 4150 Instrumentation and Process Control for Biosystems Engineering
3 - BE 4380 Bioprocess Engineering Design
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Laboratory
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1ENGR 1050 and 1060 may be substituted for ENGR 1020
2Students should choose courses to fulfill General Education requirements including Humanities, Social Science, Cross-Cultural Awareness and Science and Technology in society components. See Undergraduate Announcements and academic advisor for details.

Not for Bioprocess and Ecological Engineering emphasis areas:
1. The following must be completed with Cor better: CE 2010, 2080, 3410; MATH 2060, 2080; ME 3100; PHYS 2210.
2. Bioprocess Engineering students are encouraged to complete a Minor, Coop Ed program, internship (BE 3700) and/or a Study Abroad Program.
3. Departmental Honors Thesis (BE 3000/3010/4000) is available for qualifying Junior/Senior students.

CHEMICAL ENGINEERING
Bachelor of Science
The Department of Chemical and Biomolecular Engineering offers the Bachelor of Science degree in Chemical Engineering. Chemical Engineering students select one of several emphasis areas (such as energy studies or environmental engineering), a concentration in Biomedical Engineering (to prepare them for medical school or a career in biotechnology), or any approved minor.

Chemical engineering is based on chemistry, biology, physics, and mathematics. The curriculum at Clemson includes classroom and laboratory instruction and emphasizes broadly applicable fundamental principles and current technology to prepare graduates for professional practice and professional growth. The Educational Objective of the BS degree program is for graduates to have careers characterized by:
• success in chemical engineering practice, postgraduate education, or other areas making use of engineering skills, as defined by accomplishments and/or job satisfaction;
• demonstrated success in the design of chemical processes and/or identification, formulation, and solution of chemical engineering problems;
• ethical behavior in all endeavors;
• demonstrated effectiveness in teamwork, communication, and service to society through professional contributions;
• demonstrated technical and/or managerial leadership;
• demonstrated commitment to lifelong learning.

Chemical engineers are involved in the research, manufacture, sales, and use of commodity and specialty chemicals, fuels, pharmaceuticals, electronic components, synthetic fibers and textiles, food and consumer goods, and many other products. They work on environmental pollution prevention and remediation and apply engineering science to solve medical and health-related problems.

Combined Bachelor of Science/
Master of Science
Qualified students can reduce the time to earn a Master’s Degree by applying graduate credits to both the Bachelor’s and Master’s program requirements. Undergraduate Chemical and Biomolecular Engineering students who have earned a grade-point average of 3.4 or above and completed 90 credit hours can begin work toward a Master of Science in Chemical Engineering or a Master of Science in Environmental Engineering and Science by selecting approved graduate courses for their emphasis area. Details are available in the ChBE Undergraduate Handbook, which can be found at www.clemson.edu/ces/chbe.
Second Semester
3 - BMOL 4290 Bioprocess Engineering
3 - CHE 3530 Process Dynamics and Control
3 - CHE 4330 Process Design II
1 - CHE 4440 Safety, Environ. and Prof. Practice II
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*

Second Semester
4 - CHE 1020 General Chemistry
4 - CHE 1300 Intro to Chemical Engineering
4 - MATH 1080 Calculus of One Variable II
3 - PHYS 1220 Physics with Calculus I
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*

Sophomore Year
First Semester
5 - BIOL 1100 Principles of Biology I
3 - CH 2230 Organic Chemistry
4 - CHE 2110 Mass and Energy Balances
4 - MATH 2060 Calculus of Several Variables
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*

Second Semester
3 - CH 2240 Organic Chemistry
3 - CH 2290 Organic Chemistry Lab.
3 - CHE 2200 Chemical Engnr. Thermodynamics I
4 - CHE 2300 Fluids/Heat Transfer
4 - MATH 2080 Intro. to Ordinary Diff Equations

Junior Year
First Semester
3 - CHE 3210 Chemical Engnr. Thermodynamics II
4 - CHE 3300 Mass Transfer and Separation Proc.
3 - PHYS 2210 Physics with Calculus II
3 - STAT 4110 Stat Methods for Process Dev & Con
3 - Biochemistry Requirement\*  

Second Semester
3 - CHE 4500 Chemical Reaction Engineering
3 - CHE 4070 Unit Operations Lab. II
3 - CHE 4440 Safety, Environ. & Prof Prac II
3 - CHE 4510 Process Design II
3 - CHE 4330 Process Design II
2 - BIOL 4340 Biological Chem Lab Techniques
3 - BMOL 4250 Biomolecular Engineering
3 - CHE 3070 Unit Operations Lab. I
3 - CHE 3910 Engineering Materials
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*

Senior Year
First Semester
3 - BCHM 4310 Physical Approach to Biochem
3 - CHE 4070 Unit Operations Lab. II
3 - CHE 4310 Chemical Process Design I
2 - CHE 4430 Safety, Environ. & Prof Prac I
3 - CHE 4500 Chemical Reaction Engineering
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*

Second Semester
3 - BMOL 4290 Bioprocess Engineering
3 - CHE 3530 Process Dynamics and Control
3 - CHE 4330 Process Design II
1 - CHE 4440 Safety, Environ. & Prof Prac II
3 - Arts and Humanities Requirement\* or
3 - Social Science Requirement\*
3 - Engineering Requirement\*

CIVIL ENGINEERING
Bachelor of Science
Civil Engineering involves the planning, design, construction management, operation, and maintenance of facilities and systems in the built environment, including bridges, buildings, airports, water supply systems, ports, dams, and highways.

The Bachelor of Science degree program in Civil Engineering includes the common educational goals listed on page 110 for the College of Engineering, Computing and Applied Sciences. The complete objectives of the program can be found at www.clemson.edu/en.

The first two years provide students with building blocks necessary to be successful civil engineers, including proficiency in calculus, engineering mechanics, physics, and chemistry. During the junior year, students receive a broad introduction to the fundamental areas of civil engineering (structures, hydraulics, geotechnical, transportation, environmental, construction materials, and construction engineering and management). Design experiences are integrated throughout the curriculum, culminating in the senior year with a major capstone design project. In addition, during the senior year, students can select from available emphasis areas that serve to strengthen their undergraduate background.

The Civil Engineering program prepares students to work immediately upon graduation in most areas of civil engineering or to pursue graduate degrees. Students are also exposed to issues related to professional practice, including professional registration, lifelong learning, and communication and team skills. Because a concerned society demands a realistic consideration of the impacts of engineering projects, civil engineering students are also educated in the broad areas of the humanities and social sciences.

To be eligible for admission into the Bachelor of Science degree program in Civil Engineering, students must have completed the courses outlined in the freshman core curriculum and have a cumulative grade-point average of 2.6 or higher.

The Department of Civil Engineering allows eligible students to count up to six hours of graduate credit (6000- and 8000-level courses) toward both the bachelor’s and master’s degrees. Students participating in this program must have completed the junior year, must have earned a minimum 3.4 grade-point average, and must be approved by the department. Details of the suggested curriculum and program information are available from the department.