COLLEGE OF SCIENCE

The College of Science offers baccalaureate programs in subjects ranging from mathematics to the physical sciences to the life sciences. World class faculty provide outstanding experiences in classrooms, research labs, and in the field. These degree programs prepare students for graduate study in many disciplines, professional schools, teaching careers, and a variety of industry and government science, technology and mathematics positions. Numerous options and emphasis areas allow students to tailor their curricula to their specific interests. Additional information is available at www.clemson.edu/science.

Modern Language Requirement
A number of Clemson University degree programs require the completion of a modern language through a specific course level. Modern languages taught at Clemson University or accepted for transfer credit include American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian and Spanish. While many degree programs accept any of these modern languages for the requirement, certain programs may have specific modern language requirements. Students should consult their program’s curriculum map for details.

BIOCHEMISTRY
Bachelor of Science
Biochemistry is the study of the molecular basis of life. To comprehend current biochemical information and make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics. This is the basis of the biochemistry curriculum.

The program provides an excellent educational background for professional school (medicine, dentistry, or veterinary medicine) and graduate school in biochemistry, molecular biology, or another biological science discipline. Graduates will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

Freshman Year
First Semester
1 - BCHM 1030 Careers in Biochem. and Genetics
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
14
Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Composition and Rhetoric
4 - MATH 1080 Calculus of One Variable II
16

Sophomore Year
First Semester
2 - BCHM 3040 Molecular Biology Lab.
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - GEN 3020 Molecular and General Genetics
3 - PHYS 1220 Physics with Calculus I
1 - PHYS 1240 Physics Lab. I
14-17
Second Semester
3 - BCHM 3010 Molecular Biochemistry
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - COMM 1500 Intro. to Human Comm. or 3 - COMM 2500 Public Speaking
3 - PHYS 2210 Physics with Calculus II
1 - PHYS 2230 Physics Lab. II
3 - Arts and Humanities (Literature) Requirement
17

Junior Year
First Semester
3 - BCHM 4310 Physical Approach to Biochem.
2 - BCHM 4330 Physical Approach to Biochem. Lab
3 - CH 3300 Introduction to Physical Chemistry
3 - Science Requirement
2 - Social Science Requirement
2 - Elective
16
Second Semester
3 - BCHM 4320 Biochemistry of Metabolism
2 - BCHM 4340 Biochemistry of Metabolism Lab
3 - BCHM 4360 Molecular Bioi.: Genes to Proteins
3 - PHIL 3260 Science and Values
3 - Social Science Requirement
14
Senior Year
First Semester
3 - BIOL 4610 Cell Biology
3 - GEN (BCHM) 4400 Bioinformatics
3 - Science Requirement
4 - Elective
13
Second Semester
2 - BCHM 4930 Senior Seminar
3 - Science Requirement
9 - Elective
14
120–121 Total Semester Hours

BIOLICAL SCIENCES

Biology encompasses the broad spectrum of the modern life sciences, including the study of all aspects of life from the structure and function of the whole organism down to the subcellular levels and up through the interactions of organisms to the integrated existence of life on the entire planet. Descriptive, structural, functional, and evolutionary questions are explored through the hierarchy of the organization of life. Applications of current advances to the health and wellbeing of man and society, to nature and the continuation of earth as a balanced ecosystem, and to an appreciation of the place of natural science in our cultural heritage receive emphasis. Majors in Biological Sciences receive classroom, laboratory, and field training in biology with an emphasis on chemistry, mathematics, and physics as necessary tools.

Bachelor of Arts
The Bachelor of Arts in Biological Sciences provides a strong foundation in biology and is ideal for students desiring a liberal education emphasizing an interdisciplinary approach to a thorough understanding of the life sciences.

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
3 - Oral Communications Requirement
17
Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Composition and Rhetoric
3 - Mathematical Sciences Requirement
15

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
3 - GEN (BCHM) 4400 Bioinformatics
3 - Science Requirement
4 - Elective
13
Second Semester
2 - BCHM 3050 Essential Elements of Bioch.
1 - CH 2270 Organic Chemistry Lab.
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
4 - Modern Language Requirement
3 - Social Science Requirement
17

Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BCHM 4330 Physical Approach to Biochem.
3 - ENGL 3150 Scientific Writing and Comm.
3 - Modern Language Requirement
3 - Minor Requirement
Double Major in Biological Sciences/Science Teaching—Biological Sciences
The Bachelor of Arts Degree in Biological Sciences and Science Teaching—Biological Sciences prepares students for teaching biology on the secondary school level and for graduate studies in any of the life science areas. See page 104 for the curriculum.

Note: To receive a double major in Biological Sciences and Science Teaching—Biological Sciences, the student must complete a change-of-program form to declare both majors.

PREREHABILITATION SCIENCES EMPHASIS AREA

Freshman Year

First Semester
1. BIOL 1010 Frontiers in Biology I
2. BIOL 1030 General Biology I
3. CH 1020 General Chemistry
4. MATH 1080, STAT 2300, or other approved coursework. See General Education Requirements.

Second Semester
3. PHYS 2070 General Physics I
1. PHYS 2090 General Physics I Lab
3. Functional Biology Requirement
5. Social Science Requirement

12 First Semester Hours

Senior Year

First Semester
2. BIOL 4930 Senior Seminar or 2. MICR 4930 Senior Seminar
3. ENGL 3150 Scientific Writing and Comm.
3. PHYS 2070 General Physics I
1. PHYS 2090 General Physics I Lab
3. Ecology Requirement
3. Minor Requirement

Second Semester
3. PHYS 2080 General Physics II
1. PHYS 2100 General Physics II Lab
6. Minor Requirement
5. Elective
15 122 Total Semester Hours

Biology and Science Teaching—Biological Sciences prepares students for graduate study in any of the life science areas (such as agricultural sciences, biochemistry, botany, cell and molecular biology, conservation, ecology and environmental science, entomology, forestry, genetics, industrial and regulatory biology, microbiology, morphology, physiology, wildlife biology, and zoology; for the health professions (medicine, dentistry, etc.), veterinary medicine; and for science teaching.
Freshman Year

First Semester
1 - BIOL 1010 Frontiers in Biology I
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
3 - Oral Communications Requirement

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Composition and Rhetoric
3 - Mathematical Sciences Requirement

Sophomore Year

First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
2 - Organismal Diversity Requirement
2 - Elective

Second Semester
3 - BCHM 3050 Essential Elements of Bioch.
4 - Major Requirement
3 - Social Science Requirement
6 - Elective

Junior Year

First Semester
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Lab.
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement

Second Semester
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Functional Biology Requirement
2 - Major Requirement

Senior Year

First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
2 - Elective

Second Semester
4 - Entomology Requirement
3 - Major Requirement
6 - Elective
13

121 Total Semester Hours

Senior Year

First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
2 - Elective

Second Semester
4 - Entomology Requirement
3 - Major Requirement
6 - Elective
13

121 Total Semester Hours

**See General Education Requirements.**

**MATH 1080, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements. The Medical Colleges Admissions Test (MCAT) includes questions on statistics.**

**Most professional health sciences schools require the second semester of organic chemistry with laboratory, CH 2240/2260.**

**At least one elective must be satisfied by completing 1–2 credits required must be satisfied by completing 1–2 extra credits.**

PREPHARMACY EMPHASIS AREA

Freshman Year

First Semester
1 - BIOL 1010 Frontiers in Biology I
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
3 - Oral Communication Requirement

Second Semester
3 - BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining
12

121 Total Semester Hours

**Most professional health sciences schools require two semesters of organic chemistry with laboratory, CH 2240/2260.**

**See General Education Requirements.**

**PHYS 2210/2230 may be substituted.**

**Seven credit hours must be selected from BIOL or MICR courses at the 3000 level or above (except MICR 3000) or CH 2240/2260.**

**See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.**

**PHYS 1220/1240 may be substituted.**

**At least one course selected from BIOL 4100, 4140, 4150, 4160, 4190, 4200, 4430, 4460, 4700, MICR 4010, or 4030.**

**ENGL 3140 may be substituted.**

**PHYS 2210/2230 may be substituted.**

**At least one course selected from BIOL 4010, 4080, 4200, 4400, 4590, 4750, 4800, 4830, 4840, or MICR 4140.**

PREPHARMACY EMPHASIS AREA

Freshman Year

First Semester
1 - BIOL 1010 Frontiers in Biology I
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
3 - Oral Communication Requirement

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Composition and Rhetoric
3 - Mathematical Sciences Requirement

Sophomore Year

First Semester
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement
3 - Entomology Requirement

Second Semester
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Functional Biology Requirement

Third Semester
3 - CH 2270 Organic Chemistry
2 - CH 2230 Organic Chemistry
1 - CH 2240/2280.

Fourth Semester
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement
3 - Entomology Requirement

Junior Year

First Semester
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Lab.
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement

Second Semester
3 - ENGL 3150 Scientific Writing and Comm.
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Functional Biology Requirement
2 - Major Requirement

Senior Year

First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
2 - Elective

Second Semester
4 - Entomology Requirement
3 - Major Requirement
6 - Elective
13

121 Total Semester Hours

**See General Education Requirements.**

**MATH 1080, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements. The Medical Colleges Admissions Test (MCAT) includes questions on statistics.**

**Most professional health sciences schools require the second semester of organic chemistry with laboratory, CH 2240/2260.**

**At least one elective must be satisfied by completing 1–2 credits required must be satisfied by completing 1–2 extra credits.**

**See General Education Requirements.**

**PHYS 2210/2230 may be substituted.**

**Seven credit hours must be selected from BIOL or MICR courses at the 3000 level or above (except MICR 3000) or CH 2240/2260.**

**See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.**

**PHYS 1220/1240 may be substituted.**

**At least one course selected from BIOL 4100, 4140, 4150, 4160, 4190, 4200, 4430, 4460, 4700, MICR 4010, or 4030.**

**ENGL 3140 may be substituted.**

**PHYS 2210/2230 may be substituted.**

**At least one course selected from BIOL 4010, 4080, 4200, 4400, 4590, 4750, 4800, 4830, 4840, or MICR 4140.**

**See General Education Requirements.**

**PHYS 2210/2230 may be substituted.**

**Seven credit hours must be selected from BIOL or MICR courses at the 3000 level or above (except MICR 3000) or CH 2240/2260.**

**See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.**

**PHYS 1220/1240 may be substituted.**

**At least one course selected from BIOL 4100, 4140, 4150, 4160, 4190, 4200, 4430, 4460, 4700, MICR 4010, or 4030.**

**ENGL 3140 may be substituted.**

**PHYS 2210/2230 may be substituted.**

**At least one course selected from BIOL 3160, 4010, 4080, 4200, 4400, 4590, 4750, 4800, 4830, 4840, or MICR 4140.**
TOXICOLOGY EMPHASIS AREA
See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year
First Semester
3 - BIOL 2110 Introduction to Toxicology
1 - CH 2270 Organic Chemistry1,2
1 - GEN 3000 Fundamental Genetics3
3 - Social Science Requirement4
2 - Elective
15
Second Semester
3 - BCHM 3050 Essential Elements of Bioch.5
3 - BIOL 3350 Evolutionary Biology
4 - Major Requirement6
4 - Organismal Diversity Requirement7
3 - Elective
17
Junior Year
First Semester
3 - BIOL 4610 Cell Biology Laboratory
2 - BIOL 4620 Cell Biology Laboratory
3 - ETOX 4300 Toxicology
3 - PHYS 2070 General Physics I8
1 - PHYS 2090 General Physics I Lab.8
3 - Ecology Requirement9
15
Second Semester
3 - BCHM 3010 General Microbiology
3 - Major Requirement10
4 - Elective
13
Senior Year
First Semester
1 - CH 2280 Organic Chemistry Lab.1,2
3 - CH 2240 Organic Chemistry
2 - Elective
15
Second Semester
3 - CH 3350 Evolutionary Biology
3 - BCHM 3050 Essential Elements of Bioch.5
3 - BIOL 3350 Evolutionary Biology
4 - Major Requirement6
4 - Organismal Diversity Requirement7
3 - Elective
17
Junior Year
First Semester
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - ETOX 4300 Toxicology
3 - PHYS 2070 General Physics I8
1 - PHYS 2090 General Physics I Lab.8
3 - Ecology Requirement9
15
Second Semester
3 - ENGL 3150 Scientific Writing and Comm.10
3 - PHYS 2080 General Physics II9
1 - PHYS 2100 General Physics II Lab.9
3 - Arts and Humanities (Non-Lit.) Requirement11
3 - Economics Requirement10
17
Senior Year
First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
3 - Ecology Requirement9
3 - Social Science Requirement 1
2 - Elective
15
Second Semester
3 - MICR 3050 General Microbiology
3 - Major Requirement11
6 - Elective
13
121 Total Semester Hours
1Pharmacy programs require BIOL 1030/1050 and 1040/1060 or equivalent; however, BIOL 1100 and 1110 may substitute.
The additional 1–2 credit hours will be subtracted from Major Requirement credits.
See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness Requirement and the Science and Technology in Society Requirement.
MATH 1080, STAT 2300, or other approved coursework. See advisor. Professional schools have different mathematics requirements.
ENG 3020 may be substituted.
At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260.
BCHM 3010 may be substituted.
PHYS 2210/2220 may be substituted.
BCHM 3010 may be substituted.
At least one course selected from BIOL 4100, 4410, 4420, 4430, 4460, 4700, MICR 4010, or 4030.
Six credit hours must be selected from BIOL or MICR courses at the 3000 level or above (except MICR 3000).

CHEMISTRY
Bachelor of Arts
Freshman Year
First Semester
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
6 - Arts and Humanities Requirement1 or
6 - Social Science Requirement1
1 - Elective
15
Second Semester
4 - CH 1020 General Chemistry
3 - ENGL 1030 Composition and Rhetoric
6 - Modern Language Requirement2
1 - Elective
15
Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry1,2
1 - CH 2270 Organic Chemistry Lab.1,2
1 - GEN 3000 Fundamental Genetics3
3 - Social Science Requirement4
2 - Elective
15
Second Semester
3 - CH 3130 Quantitative Analysis
2 - CH 3170 Quantitative Analysis Lab.
3 - Social Science Requirement4
5 - Elective
15
Second Semester
3 - CH 4130 Chemistry of Aqueous Systems or
3 - ETOX 4210 Chemical Sources and Fate in Environmental Systems
3 - Arts and Humanities (Non-Lit.) Requirement4
3 - Toxicology Requirement4
3 - Elective
12
121 Total Semester Hours
Most professional health sciences courses require the second semester of organic chemistry with laboratory, CH 2240/2280.
CH 2100 and CH 2200 may be substituted.
GEN 3020 may be substituted.
See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.
BCHM 3010 may be substituted.