### Senior Year

**First Semester**
- 1 - AVS 4000 Animal and Veterinary Sciences
  Professional Development
- 2 - AVS 4060 Seminars and Related Topics
- 3 - AVS 4150 Contemporary Issues in Animal Sci.
- 2 - AVS Techniques Requirement
- 3 - Departmental Requirement
- 3 - Elective

**Second Semester**
- 3 - AVS 4100 Domestic Animal Behavior
- 3 - AVS 4130 Animal Products
- 2 - AVS Experience-Based Activity
- 3 - Departmental Requirement
- 3 - Social Science Requirement

**Total Semester Hours:** 122–125

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### 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
- 3 - Advanced Mathematics Requirement

**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 Comm 2500 Public Speaking
- 3 - PHYS 2210 Physics with Calculus II
- 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement

**Junior Year**

**First Semester**
- 3 - BCHM 4310 Physical Approach to Biochem.
- 2 - BCHM 4330 General Biochemistry Lab. I
- 3 - CH 3300 Introduction to Physical Chemistry
- 3 - Social Science Requirement
- 2 - Elective

**Second Semester**
- 3 - BCHM 4320 Biochemistry of Metabolism
- 2 - BCHM 4340 General Biochemistry Lab. II
- 3 - BCHM 4360 Molecular Biol.: Genes to Proteins
- 3 - PHIL 3260 Science and Values
- 3 - Social Science Requirement

**Senior Year**

**First Semester**
- 3 - BIOL 4610 Cell Biology
- 3 - GEN (BCHM) 4400 Bioinformatics
- 3 - Science Requirement
- 4 - Elective

**Second Semester**
- 3 - BCHM 4930 Senior Seminar
- 3 - Science Requirement
- 9 - Elective

**Total Semester Hours:** 120–121

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### 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 institutions, and industrial and government laboratories.

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### Freshman Year

**First Semester**
- 1 - BCHM 1010 Frontiers in 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 Accelerated Composition
- 3 - Mathematical Sciences Requirement

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### 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
- 4 - Foreign Language Requirement
- 3 - Social Science Requirement

**Second Semester**
- 3 - BCHM 3050 Essential Elements of Bioch.
- 4 - Foreign Language Requirement
- 4 - Major Requirement
- 4 - Organismal Diversity Requirement

**Junior Year**

**First Semester**
- 3 - BIOL 3350 Evolutionary Biology
- 3 - Foreign Language Requirement
- 3 - Functional Biology Requirement

**Second Semester**
- 3 - BIOL 4930 Senior Seminar
- 3 - Minor Requirement

**Senior Year**

**First Semester**
- 3 - BIOL 4610 Evolutionary Biology
- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - Foreign Language Requirement
- 3 - Minor Requirement

**Second Semester**
- 3 - Arts and Humanities (Non-Lit.) Requirement
- 3 - Foreign Language Requirement
- 3 - Ecology Requirement
- 6 - Minor Requirement

**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 II
- 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 Accelerated Composition
- 3 - Mathematical Sciences Requirement

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### Biology Course Descriptions

- **BCHM 2930 Introduction to Biochemistry:** An introduction to biochemistry, including the structure and function of biological molecules, energy metabolism, and the regulation of metabolic pathways.
- **BCHM 3010 Molecular Biochemistry:** Advanced course in molecular biochemistry, focusing on the molecular basis of biological processes.
- **BCHM 4310 Physical Approach to Biochem.:** An advanced course in physical biochemistry, including biophysical methods and protein structure.
- **BCHM 4320 Biochemistry of Metabolism:** Advanced course in biochemistry, focusing on metabolism and its regulation.
- **BCHM 4330 General Biochemistry Lab:** Practical laboratory work related to general biochemistry.
- **BCHM 4340 General Biochemistry Lab. II:** Advanced laboratory work in biochemistry.
- **BCHM 4360 Molecular Biology:** Genes to Proteins:** Advanced course in molecular biology, focusing on gene expression and regulation.
- **BCHM 4930 Senior Seminar:** Seminar course in biochemistry, offering advanced topics and research projects.

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### General Education Requirements

1. **Mathematics Courses:** Must be selected from two different fields. AQRB and ECON are considered the same field. Three of these General Education credit hours must also satisfy the Cross-Cultural Awareness Requirement.
2. **See General Education Requirements.** Three of these credit hours may be selected from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2120, 2130, 2140, 3130, 4150 or 4550.
3. **COMM 1500 or 2500**
4. **Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2120, 2130, 3020, 3090, 3130, 4150 or 4550.**
5. **May take GEN 1000 and MICR 3050 in either semester of the junior year.**
6. **Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910.**
7. See General Education Requirements. Social Science courses must be selected from two different fields. AQRB and ECON are considered the same field. Three of these General Education credit hours must also satisfy the Cross-Cultural Awareness Requirement.
8. **Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2120, 2130, 3020, 3090, 3130, 4150 or 4550.**
9. **COMM 1500 or 2500**
10. **Select nine hours from any graded (not Pass/No Pass) 3000- or 4000-level course and/or any of the following: ACCCT 2010, AORB 2020 or ECON 2110, BIOL 2220, 2230, ECON 2120, MGT 2010, PES 2020, SPAN 3100, 3120.**
11. See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
12. **Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2120, 2130, 3020, 3090, 3130, 4150 or 4550.**
13. **May take GEN 1000 and MICR 3050 in either semester of the junior year.**
14. **Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910.**
15. **See General Education Requirements.** Social Science courses must be selected from two different fields. AQRB and ECON are considered the same field. Three of these General Education credit hours must also satisfy the Cross-Cultural Awareness Requirement.
16. **Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2120, 2130, 3020, 3090, 3130, 4150 or 4550.**
17. **May take GEN 1000 and MICR 3050 in either semester of the junior year.**
18. **Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910.**
Second Semester
3 - PHYS 2080 General Physics IIε
1 - PHYS 2100 General Physics II Lab.ε
6 -Minor Requirementβ
3 - Elective
13

121 Total Semester Hours

Students seeking a double major in Science Teaching and Biological Sciences should substitute ED 1050 for BIOL 1100.
BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits.

See General Education Requirements.

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

Four semesters (through 2020) in the same modern foreign language are required.

BIOL 1030/1050 or PHYS 1220/1240 may substitute.

GEN 3020 may substitute.

See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements. The Medical Colleges Admissions Test (MCAT) includes questions on psychology and sociology.

Four semesters (through 2020) in the same modern foreign language are required.

BIOL 1010 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1050 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits.

See General Education Requirements.

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

Four semesters (through 2020) in the same modern foreign language are required.

At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260.

ENGL 3140 may substitute.

See page 63 for approved minors.

At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

Students seeking a double major in Science Teaching/Biological Sciences should substitute EDSC 4470 for Major Requirement.

At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260.

ENGL 3140 may substitute.

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

See page 63 in the Undergraduate Announcements for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYC 2010 and 3830.

ENGL 3140 may substitute.

PHYS 1220/1240 may substitute.

At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

BIOL 4780 or 4790 or MICR 3050. BIOL 4780 or 4790 is recommended for physical and occupational therapy programs. MICR 3050 is recommended for physician assistant programs.

PHYS 2210/2230 may substitute.

BIOLICAL SCIENCES
Bachelor of Science

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 well-being 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. The Bachelor of Science in Biological Sciences curriculum 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.)

PREREHABILITATION SCIENCES
EMPHASIS AREA

Freshman Year
First Semester
1 - BIOL 1030 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
16

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Statistics Requirement
14

Sophomore Year
First Semester
3 - CH 2230 Survey of Organic Chemistry
1 - CH 2270 Survey of Organic Chemistry Lab.
3 - GEN 3000 Fundamental Genetics
4 - Foreign Language Requirement
3 - Oral Communication Requirement
15

Second Semester
3 - BCHM 3050 Essential Elements of Bioch.
3 - PSYC 2010 Introduction to Psychology
3 - Arts and Humanities (Literature) Requirement
4 - Foreign Language Requirement
3 - Social Science Requirement
16

Junior Year
First Semester
4 - BIOL 3150 Functional Human Anatomy
3 - BIOL 3350 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - Foreign Language Requirement
15

Second Semester
4 - BIOL 3160 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Foreign Language Requirement
6 - Minor Requirement
16

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
15

Second Semester
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
6 - Minor Requirement
3 - Prerehabilitation Requirement
2 - Elective
15

122 Total Semester Hours

Rehabilitation programs require BIOL 1030/1050 and 1040/1060 or equivalent; however, BIOL 1100 and 1110 may substitute.

See General Education Requirements.

STAT 2300 or other approved coursework. See advisor. Professional schools have different mathematics requirements.

CH 2230 and 2240 may substitute.

Most professional health sciences schools require two semesters of organic chemistry with laboratory, CH 2230/2270 and 2240/2280.

GEN 3020 may substitute.

Four semesters (through 2020) in the same modern foreign language are required.

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 substitute.

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

See page 63 in the Undergraduate Announcements for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYC 2010 and 3830.

ENGL 3140 may substitute.

PHYS 1220/1240 may substitute.

At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

BIOL 4780 or 4790 or MICR 3050. BIOL 4780 or 4790 is recommended for physical and occupational therapy programs. MICR 3050 is recommended for physician assistant programs.

PHYS 2210/2230 may substitute.

2015-2016 Undergraduate Announcements
Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
5 - BIOL 1100 Principles of Biology I
3 - 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 Accelerated Composition
3 - Mathematical Sciences Requirement
15
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 - Elective
16
Second Semester
3 - BCHM 3050 Essentials of Biochem.
3 - BIOL 3350 Evolutionary Biology or
3 - Elective
3 - Social Science Requirement
3 - Elective
16
Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology or
3 - Elective
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
1 - Elective
15
Second Semester
3 - GEN 3000 Fundamental Genetics
3 - BIOL 3350 Evolutionary Biology
4 - Elective
2 - MICR 4930 Senior Seminar
2 - Elective
13
Senior Year
First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
4 - Entomology Requirement
3 - Social Science Requirement
4 - Elective
13
121 Total Semester Hours

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
3 - Entomology Requirement
3 - Functional Biology Requirement
16

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar or
2 - MICR 4930 Senior Seminar
4 - Entomology Requirement
3 - Major Requirement
6 - Elective
13

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

PREPHARMACY EMPHASIS AREA
Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
3 - BIOL 1030 General Biology II
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
4 - MATH 1060 Calculus of One Variable I
3 - Oral Communication Requirement
16
Second 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
15

Junior 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
15

Second Semester
9 - Major Requirement
3 - Elective
12
121 Total Semester Hours
Sophomore Year

First Semester
- CH 2230 Organic Chemistry
- BIOL 4610 Cell Biology
- PHYS 2070 General Physics I
- PHYS 2090 General Physics I Lab.
- PSYC 2010 Introduction to Psychology

Second Semester
- BIOL 4620 Cell Biology Laboratory
- BIOL 3150 Scientific Writing and Comm.
- ECON 2100, 2110, or 2120
- At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.
- Six credit hours must be selected from BIOL or MICR courses at the 3000 level or above or from the department-approved list.

Junior Year

First Semester
- BIOL 3150 Functional Human Anatomy
- BIOL 4610 Cell Biology
- PHYS 2070 General Physics I
- PHYS 2090 General Physics I Lab.
- PSYC 2010 Introduction to Psychology

Second Semester
- BIOL 3160 Human Physiology
- ENGL 3150 Scientific Writing and Comm.
- PHYS 2080 General Physics II
- PHYS 2100 General Physics II Lab.
- Arts and Humanities (Non-Lit.) Requirement
- Economics Requirement

Senior Year

First Semester
- BIOL 4930 Senior Seminar
- MICR 4930 Senior Seminar
- Ecology Requirement
- Major Requirement
- Elective

Second Semester
- MICR 3050 General Microbiology
- Major Requirement
- Elective

TOXICOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Sophomore Year

First Semester
- BIOL 2110 Introduction to Toxicology
- CH 2230 Organic Chemistry
- CH 2270 Organic Chemistry Lab.
- GEN 3000 Fundamental Genetics
- Organismal Diversity Requirement
- Elective

Second Semester
- BCHM 3050 Essential Elements of Bioch.
- BIOL 3350 Evolutionary Biology
- Major Requirement
- Social Science Requirement
- Elective

Junior Year

First Semester
- BIOL 4610 Cell Biology
- BIOL 4620 Cell Biology Laboratory
- ETOX 4300 Toxicology
- PHYS 2070 General Physics I
- PHYS 2090 General Physics I Lab.
- Ecology Requirement

Second Semester
- ENGL 3150 Scientific Writing and Comm.
- PHYS 2080 General Physics II
- PHYS 2100 General Physics II Lab.
- Arts and Humanities (Literature) Requirement
- Functional Biology Requirement
- Elective

Senior Year

First Semester
- BIOL 4930 Senior Seminar
- MICR 4930 Senior Seminar
- CH 3130 Quantitative Analysis
- CH 3170 Quantitative Analysis Lab.
- Social Science Requirement
- Elective

Second Semester
- CH 4130 Chemistry of Aqueous Systems
- ETOX 4210 Chemical Sources and Fate in Environmental Systems
- Arts and Humanities (Non-Lit.) Requirement
- Toxicology Requirement
- Elective

Most professional health sciences schools require the second semester of organic chemistry with laboratory, CH 2240/2280.

CH 2010 and CH 2020 may substitute.

GEN 3020 may substitute.

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 substitute.

Four credit hours must be selected from BIOL or MICR courses at the 3000 level or above or CH 2240/2280, or from the department-approved list.

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

Most ENGL 3140 may substitute.

At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

Any 4000-level ETOX course.

Combined Bachelor of Science in Biological Sciences/Master of Science in Bioengineering

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See Academic Regulations in this catalog for enrollment guidelines and procedures. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.

ENVIRONMENTAL AND NATURAL RESOURCES

Bachelor of Science

The Environmental and Natural Resources curriculum produces professionals who have a broad-based knowledge in natural resources and an ability to interact with other resource professionals to provide thoughtful solutions to environmental and natural resource problems. The world is blessed with an abundance of natural resources, but the problems associated with their conservation are immense. Protection of rare and endangered species, preventing and controlling invasions of exotics, protecting old growth forests, restoring degraded ecosystems, and balancing the resource demands of industry and the public are some of the environmental issues which are enmeshed in politicized environments.

Three concentrations are offered within the Environmental and Natural Resources major, which is administered by the Department of Forestry and Environmental Conservation. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to taxa, their habitats, and their interrelationships. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications.