Department of Biology

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Degrees Offered

Bachelor of Arts or Bachelor of Science
- Biology:
  - Botany Emphasis
  - Education Emphasis
  - Forensics Emphasis
  - Zoology Emphasis

Bachelor of Interdisciplinary Studies *(see pages 100, 239)*
- Natural Resources and Environmental Studies

Minor
- Biology

Graduate Courses in Biology
Pre-Health Professional Courses in Biology

Department Statement

The biology department maintains a highly educated, academically, philosophically, and culturally diverse faculty in order to:
1. Offer all students the opportunity to understand and use scientific thinking and techniques in the study of living things, to realize the relationships of science to other modes of thought, and to become familiar with contemporary models of biological functions and with the facts of regional ecosystems of southwest Utah and its neighbors,
2. Offer interested students the rigorous opportunity to prepare for advanced study in biology and for careers in agriculture, health care, secondary teaching and biological aspects of land management,
3. Build partnerships for service within the regional community,
4. Foster productive scholarship by students and faculty, and
5. Create a collegial atmosphere and free exchange of ideas in the department.

The department provides undergraduate programs in biology with emphases in botany, forensics, teaching, and zoology. Prescribed course work in the department supports the general education program of the University, builds a solid basis for graduate or professional study, prepares public school teachers, and provides the instructional foundation necessary for careers in many fields.

Goal Statement
Provide our students with quality lecture, laboratory, and field instructional experiences which foster student inquiry into science, and prepare them for post-baccalaureate pursuits.

Intended Outcomes/Objectives
1. Students will demonstrate an understanding of the dynamics of interactions and adaptations within biological/agricultural systems.
2. Students will be able to use appropriate tools to carry out investigations in their intended field.
3. Students will be able to communicate effectively in oral and written formats.
4. Students will be involved in regional service partnerships.
5. Students will be prepared for post-baccalaureate plans. Because there is considerable freedom of choice to design a program of study to meet individual objectives within the biology major, all students are strongly urged to consult a member of the department faculty for advisement within their emphasis every semester. This consultation should begin before the student enrolls for the first semester of her/his undergraduate work. In order to complete the requirements for the degree in eight semesters, students must begin taking courses in the major during the first year of undergraduate work. This is especially important for students who intend to pursue postgraduate training in health care professions because these students must be prepared to take entrance examinations at the end of the third year of instruction in order to enter professional training in a timely fashion.

Degree Requirements

a. All graduating students must satisfy university requirements.
b. All graduating students will complete one of the areas of emphasis: botany, biology education, forensics or zoology;
c. Sufficient additional credit hours from the department's offerings to total 40 credit hours; a minimum of 20 must be upper division credit hours from the department's offerings; additional upper division university offerings to total 40 upper division credit hours.
d. A course with a grade below C- will not be accepted in the major.
e. All graduating students are required to take a national biology exit examination.
f. Cooperative education, internship, or undergraduate research experiences are recommended for all majors.
g. All Biology majors must satisfy university minor degree requirements outside of the Biology offerings.

Degree Recommendations

Although not required, we recommend all Biology majors take the following courses:

BIOL 4840 Cooperative Education (1-9 hours)
BIOL 4890 Internship (1-9 hours)
BIOL 4850 Undergraduate Research (1-9 hours)

Biology, Botany Emphasis Bachelor of Arts/Bachelor of Science	
Course Number and Title	**Credits**
General Education Core (see page 105)	
Core Course Requirements	17-18
Knowledge Areas Requirements	19
University Requirements	
BA Degree – Foreign Language/ASL Requirement (16 hours or proficiency test) BS Degree – Math or Science minimum requirement (12 hours)	
Core Requirements (20 hours)	
All students majoring in biology must complete the following core courses. We recommend this sequence.	
BIOL 1050 General Biology II/1060 Lab	4
BIOL 1030 General Biology I/1040 Lab	4
BIOL 3030 General Ecology/3040 Lab	4
BIOL 3060 Genetics/3070 Lab	4
BIOL 3110 Evolution	3
BIOL 4990 Seminar	1

Required Support Courses (18-28 hours)	
MATH 1040 Applied Statistics	4
MATH 1050 College Algebra	4
and either:	
CHEM 1110 Elem Chem/1130 Lab	4
CHEM 1120 Elem BioOrganic Chem/1140 Lab	6
or	
*CHEM 1210 Chem Principles I/1230 Lab	5
*CHEM 1220 Chem Principles II/1240 Lab	5
*CHEM 2310 Organic Chem I	4
*CHEM 2320 Organic Chem II/2330 Lab	6
*required for advanced degrees (professional, graduate, etc) in biological sciences	
Botany Core Requirements (11 hours)	
BIOL 3510 Plant Anatomy and Diversity/3520 Lab	4
BIOL 3530 Plant Physiology/3540 Lab	4
BIOL 3550 Plant Taxonomy	3
Students who intend to pursue advanced degrees or careers in agronomy will be advised to select the following electives:	
AGSC 1110 Crop Production/ 1120 Lab	4
AGSC 3230 Pests and Pest Management/3240 Lab	4
AGSC 3560 Soils/3570 Lab	4
BIOL 3570 Agrostology	3
AGSC 3700 Irrigation Principles/3710 Lab	4
Students who intend to pursue advanced degrees or careers in horticulture will be advised to select the following electives:	
AGSC 3230 Pests and Pest Management/3240 Lab	4
AGSC 3700 Irrigation Principles/3710 Lab	4
BIOL 3710 Greenhouse Practicum I/3720 Lab	2
BIOL 4530 Plant Propagation/4540 Lab	4
Free Upper Electives (includes completing minor, B.A./B.S. requirements)	24-35
Total Credits, B.A. or B.S. degree	120

Biology, Education Emphasis
Bachelor of Arts/Bachelor of Science

Course Number and Title	Credits
General Education Core (see page 105)	
Core Course Requirements	17-18
Knowledge Areas Requirements	19
University Requirements	
BA Degree – Foreign Language/ASL Requirement (16 hours or proficiency test) BS Degree – Math or Science minimum requirement (12 hours)	
Core Requirements (20 hours)	
All students majoring in biology must complete the following core courses. We recommend this sequence.	
BIOL 1050 General Biology II/1060 Lab	4
BIOL 1030 General Biology I/1040 Lab	4
BIOL 3030 General Ecology/3040 Lab	4
BIOL 3060 Genetics/3070 Lab	4
BIOL 3110 Evolution	3
BIOL 4990 Seminar	1
Required support courses (18-28 hours)	
MATH 1040 Applied Statistics	4
MATH 1050 College Algebra	4
and either:	
CHEM 1110 Elem Chem/1130 Lab	4
CHEM 1120 Elem BioOrganic Chem/1140 Lab	6
or	
*CHEM 1210 Chem Principles I/1230 Lab	5
*CHEM 1220 Chem Principles II/1240 Lab	5
or	
*CHEM 2310 Organic Chem I	4
*CHEM 2320 Organic Chem II/2330 Lab	6
*required for advanced degrees (professional, graduate, etc) in biological sciences	
Biology Teaching Core (17 hours*) (see page 150)	
In order to meet state standards for a license to teach biology in secondary schools in Utah, students will complete the following (in addition to the core requirements listed above):	
BIOL 2010 Human Physiology/2020 Lab	4
BIOL 2110 Microbiology/2120 Lab	4
BIOL 3650 Conservation Biology	3
BIOL 4070 History and Literature of Biology	3
BIOL 4900 Biology Teaching Methods	3
Any one of the following (3-4 hours)	
BIOL 2000 Natural History Studies	3
BIOL 3390 Mammalogy/3400 Lab	4
BIOL 3410 Invertebrate Zoology/3420 Lab	4
BIOL 3430 Entomology/3440 Lab	4
BIOL 3450 Comparative Vert. Studies/3460 Lab	4
BIOL 3370 Ichthyology/3380 Lab	4
BIOL 3470 Herpetology/3480 Lab	4
BIOL 3490 Ornithology/3500 Lab	4
BIOL 4410 Animal Behavior	3
Any one of the following (3-4 hours)	
BIOL 3510 Plant Anatomy and Diversity/3520 Lab	4
BIOL 3530 Plant Physiology/3540 Lab	4
BIOL 3550 Plant Taxonomy	3
Additional coursework in computer science, geology and physics selected in consultation with the departmental adviser.	
1) Secondary Teaching Certification requires specific professional education courses, consult the department of teacher education for additional advisement. 2) This degree does not include the requisite number of upper division hours. Students completing this degree will fill the upper division requirements while completing course work for the Secondary Teaching Certificate. 3) Bachelor of Arts degree must meet language requirements as outlined on page 99 of this catalog.	
Free Upper Electives (includes completing minor, B.A./B.S. requirements)	10-22
Total Credits, B.S. degree	**120**

Biology, Forensic Emphasis Bachelor of Science	
Course Number and Title	**Credits**
General Education Core (see page 105)	
Core Course Requirements - (must take Math 1050)	17-18
Knowledge Areas Requirements (must take BIOL 1050/1060, CHEM 1210/1230, & CJ 1010)	19
University Requirements	
BA Degree – Foreign Language/ASL Requirement (16 hours or proficiency test) BS Degree – Math or Science minimum requirement (12 hours)	
Core Requirements (20 hours)	
All students majoring in biology must complete the following core courses. We recommend this sequence.	
BIOL 1030 General Biology I/1040 Lab	4
BIOL 3030 General Ecology/3040 Lab	4
BIOL 3060 Genetics/3070 Lab	4
BIOL 3110 Evolution	3
BIOL 4990 Seminar	1
Required support courses (18-28 hours)	
Math 1040 Applied Statistics	4
CHEM 1220 Chem Principles II/1240 Lab	5
CHEM 2310 Organic Chem I	4
CHEM 2320 Organic Chem II/2330 Lab	6
CHEM 4110 Biochemistry	4
CHEM 3220 Quant. Analysis	3
CHEM 4540 Qual. Analysis	3
CHEM 4230 Instrumental Analysis / 4240 Lab	5
Forensics Core Requirements (28 hours)	
BIOL 2010 Human Physiology/2020 Lab	4
BIOL 2210 Human Anatomy/2220 Lab	4
BIOL 3250 Histology/3260 Lab	4
BIOL 3310 Cell and Molecular Biology/3320 Lab	4
BIOL 4310 Biotechnology/4320 Lab	4
And either BIOL 3430 Entomology/3440 Lab	4
or BIOL 3510 Plant Anatomy and Diversity/3520 Lab	4
CJ 1400 Criminal Investigation	3
CJ 2150 Principles of Forensic Science	3
CJ 2350 Laws of Evidence	3
CJ 3100 Advanced Criminalistics	3
Free Upper Electives (includes completing minor, B.A./B.S. requirements)	8-18
Total Credits, B.S. degree	**120**

Biology, Zoology Emphasis Bachelor of Arts/Bachelor of Science	
Course Number and Title	**Credits**
General Education Core (see page 105)	
Core Course Requirements	17-18
Knowledge Areas Requirements	19
University Requirements	
BA Degree – Foreign Language/ASL Requirement (16 hours or proficiency test) BS Degree – Math or Science minimum requirement (12 hours)	
Core Requirements (20 hours)	
All students majoring in biology must complete the following core courses. We recommend this sequence.	
BIOL 1050 General Biology II/1060 Lab	4
BIOL 1030 General Biology I/1040 Lab	4
BIOL 3030 General Ecology/3040 Lab	4
BIOL 3060 Genetics/3070 Lab	4
BIOL 3110 Evolution	3
BIOL 4990 Seminar	1
Required support courses (18-28 hours)	
MATH 1040 Applied Statistics	4
MATH 1050 College Algebra	4
and either:	
CHEM 1110 Elem Chem/1130 Lab	4
CHEM 1120 Elem Bio Organic Chem/1140 Lab	6
Or	
*CHEM 1210 Chem Principles I / 1230 Lab	5
*CHEM 1220 Chem Principles II / 1240 Lab	5
*CHEM 2310 Organic Chem I	4
*CHEM 2320 Organic Chem II / 2330 Lab	6
*required for advanced degrees (professional, graduate, etc) in biological sciences	
Zoology Core Requirements (15-16 hours)	
All students will complete, in addition to the core requirements listed above:	
Any three of the following (12 hours):	
BIOL 3250 Histology/3260 Lab	4
BIOL 3270 Vertebrate Physiology / 3280 Lab	4
BIOL 3290 Vertebrate Embryology / 3300 Lab	4
BIOL 3310 Cell and Molecular Biology/3320 Lab	4
BIOL 3390 Mammalogy / 3400 Lab	4
BIOL 3410 Invertebrate Zoology/3420 Lab	4
BIOL 3430 Entomology / 3440 Lab	4
BIOL 3450 Comparative Vert. Studies/3460 Lab	4
BIOL 3370 Ichthyology / 3380 Lab	4
BIOL 3470 Herpetology/3480 Lab	4
BIOL 3490 Ornithology/3500 Lab	4
AGSC 3400 Feeding and Nutrition of Horses and Livestock/3410 Lab	4
AGSC 3500 Applied Reproduction in Livestock and Horses/3510 Lab	4
Any one of the following (3-4 hours)	
BIOL 4070 History and Literature of Biology	3
BIOL 4310 Biotechnology/4320 Lab	4
BIOL 4410 Animal Behavior	3
BIOL 4620 Bioinformatics	3
AGSC 4150 Animal Breeding	3
Students who intend to apply to health care professional school will be advised to select the following electives:	
BIOL 2110 Microbiology/2120 Lab	4

BIOL 2210 Human Anatomy/2220 Lab	4
BIOL 3050 Biomedical Ethics	2
BIOL 3270 Vertebrate Physiology/3280 Lab	4
BIOL 3310 Cell and Molecular Biology/3320 Lab	4
BIOL 3450 Comparative Vertebrate Studies/3460 Lab	4
BIOL 3990 Pre-professional Seminar	1
Students who intend to apply to veterinary school or seek advanced degrees in animal science will be advised to select the following electives:	
AGSC 1100 Principles of Animal Science	3
AGSC 3400 Feeding and Nutrition of Horses and Livestock/3410 Lab	4
AGSC 3500 Applied Reproduction in Livestock and Horses/3510 Lab	4
AGSC 3150 Genetics of Livestock and Horse Improvements	3
BIOL 2110 Microbiology/2120 Lab	4
BIOL 3270 Vertebrate Physiology/3280 Lab	4
BIOL 3290 Vertebrate Embryology/3300 Lab	4
Students who intend to work or seek advanced degrees in Natural Resources or Wildlife will be advised to select the following electives with a minimum of 9 hours of Botany courses.	
BIOL 3390/ Mammalogy/3400 Lab	4
BIOL 3430 Entomology/3440 Lab	4
BIOL 3470 Herpetology/3480 Lab	4
BIOL 3490 Ornithology/3500 Lab	4
BIOL 3370 Ichthyology/3380 Lab	4
BIOL 3510 Plant Anatomy and Diversity/3520 Lab	4
BIOL 3550 Plant Taxonomy	3
BIOL 3570 Agrostology	3
Free Upper Electives (includes completing minor, B.A./B.S. requirements)	19-31
Total Credits, B.S. degree	**120**

Biology Minor

Course Number and Title	Credits
Recommended Sequence	
BIOL 1050 General Biology II/1060 Lab	4
BIOL 1030 General Biology I/1040 Lab	4
BIOL 3030 General Ecology/3040 Lab	4
BIOL 3060 Genetics/3070 Lab	4
Plus one additional upper division course of three or more credit hours offered by the department of biology. (see course offerings)	
Total Credits	19

Biology Graduate Courses

Course Number and Title	Credits
Offerings	
BIOL 6000 Ecology of Southern Utah	3

An advanced biology course designed for Master's of Education degree students who are teaching biology or other sciences in the secondary schools. The course provides both lecture and field experience, culminating in a 10-14 day field trip among the life zones of Southern Utah and northern Arizona. Emphasis will be on the vegetation communities and associated animals, but geology and water resources will also be discussed.

SUMMARY OF FIELDS OF STUDY FOR THE BACHELOR OF INTERDISCIPLINARY STUDIES IN NATURAL RESOURCES AND ENVIRONMENTAL STUDIES

MISSION

To provide Southern Utah University students with the unique set of interdisciplinary skills needed to excel in the diverse array of careers involving natural resources and environmental studies.

DEGREE OVERVIEW - BIS/NRES

All students must complete the core requirements (42 credits), required courses from one of two sub-tracks: social science (24 credits), and natural science (25 credits), and a senior capstone service project. The core is designed to provide the foundations in natural, social, and physical sciences common to all natural resource and environment studies disciplines. The natural science track is designed for students interested in natural resource management, stewardship, and research in the natural sciences. The social science track is designed for students interested in public policy, advocacy, interpretation, or research in the social sciences. Within each track there are also a set of courses that are recommended to fulfill university general education requirements. To provide flexibility, students may choose from elective courses in either track to round out their degree. Additionally, all students will be required to perform a senior service learning project in interdisciplinary teams with students from both the social science track and natural science track.
See pages 100 and 239 for complete description of requirements, offerings and advisors.

Professional Education Requirements for Secondary Licensure

Course Number and Title	Credits
Required Credits: 30-31 minimum in Education	
EDUC 2000 Exploring Education in Society*	3
EDUC 3170 Instructional Technology for Educators	3
SCED 3200 Secondary Educational Psychology	3
SPED 3030 Foundations of Special Education	2
4900 (methods of teaching course in the area(s) seeking licensure	2-3
Secondary Block as noted below	
SCED 3570 Motivation and the Management of Diverse Instructional Environments for Secondary Teachers	3
SCED 3590 Instructional Planning, Delivery, and Assessment for Secondary Teachers	3
SCED 3720 Content Literacy	2
SCED 4520 Secondary Practicum/Seminar Clinical Practice (student teaching) is taken the semester prior to secondary block as noted below	3
SCED 4980 Clinical Practice	7
4980 Clinical Practice (student teaching in the content area(s) of licensure) is taken the semester following the secondary block	2
Total Credits	**33-34**
*Meets general education requirement in the interdisciplinary knowledge area	