College of the Environment, Forestry, and Natural Sciences 2020-2021

Department of Biological Sciences

Ecology and Evolutionary Biology, Bachelor of Science

This degree is for students who are fascinated by questions of how life has evolved and how organisms function in the nature. Students will have the opportunity to apply knowledge of ecology and evolution to environmental and societal problems and to experience fieldwork among the diverse habitats of the Colorado Plateau. Opportunities to specialize include any of the diverse areas of expertise of our faculty from wildlife to plants to microbes and from evolutionary genetics to population ecology to ecosystem ecology.

This degree is offered by the Department of Biological Sciences, ensuring a well-rounded foundation in the understanding life of earth. In the course of this major, students will identify, describe, and apply the major concepts, theoretical perspectives, and empirical findings in ecology and evolution. Students will master the theory of evolution; examine the genetic and environmental bases of variation in organisms; and describe how populations are regulated, species interact in communities, and the major nutrients cycle in natural ecosystems. These objectives are supported by a comprehensive set of courses addressing ecology, evolution, and genetics in the sophomore year and by research investments in faculty and facilities made by NAU.

In their upper division coursework, students will apply this knowledge to scientific and societal problems by using quantitative reasoning, synthesizing, and effectively communicating theory and empirical findings in ecology and evolutionary biology. Students will connect this body of knowledge to specific organisms and how they function in nature though examining a group of organisms in depth and conducting field studies on the Colorado Plateau. Students will be poised to contribute to managing the increasing environmental impact of humans on the Colorado Plateau and beyond. The Ecology and Evolutionary Biology degree will assist students in preparing for research and internship experiences to help make them competitive for positions in graduate and professional schools and for jobs in natural resources, public, non-profit, and educational sectors.

Careers

What Can I Do with a Bachelor of Science in Ecology and Evolutionary Science?

This major is a great foundation for many careers across diverse fields where expertise is required in genetics, evolution, natural history, ecology, organismal biology, natural history, agriculture, or environmental impacts and their mitigation. Career options with the BS degree include technicians in everything from molecular genetics laboratories to field survey for universities, non-profits, consulting firms, and government agencies. Positions in informal science education and interpretation are also available at a range of institutions from zoos to

arboreta to parks. Environmental compliance professionals are in demand for environmental consulting firms and agencies.

Many students in this major will also go on to complete master's degrees which open a range of higher-level job classifications with the further development of technical skills. This pathway is particularly applicable for skilled technical positions at agencies and consulting firms. An EEB degree at NAU also provides a strong background for continuing to professional school in veterinary, law, and public health arenas or to PhD programs in ecology, evolution, and related fields. With a PhD students may continue to become researchers, faculty, and science or natural history managers.

Career opportunities that might be pursued:

- Field/laboratory technician
- Natural Resource Agencies
- Environmental compliance professional
- Environmental consulting
- Zoos, Arboreta, Botanical Gardens, Natural History Museum
- Informal Conservation and Science Education
- Non-profit environmental/conservation organizations

With further education, one of these paths is possible:

- Higher-level and supervisory agency positions
- Researcher
- College and University Faculty
- K-12 Teacher
- Proposal writer
- Environmental Consulting
- Environmental compliance

University Requirements

- To receive a bachelor's degree at Northern Arizona University, you must complete at least 120 units of credit that minimally includes a major, the liberal studies requirements, and university requirements as listed below.
    - All of Northern Arizona University's liberal studies, diversity, junior-level writing, and capstone requirements.
    - All requirements for your specific academic plan(s).
    - At least 30 units of upper-division courses, which may include transfer work.
    - At least 30 units of coursework taken through Northern Arizona University, of which at least 18 must be upper-division courses (300-level or above). This requirement is not met by credit-by-exam, retro-credits, transfer coursework, etc.

- A cumulative grade point average of at least 2.0 on all work attempted at Northern Arizona University.

The full policy can be viewed here.

Overview

In addition to University Requirements:

- Complete individual plan requirements.
- At least 69 units of major requirements
- Up to 9 units of major prefix courses may be used to satisfy Liberal Studies requirements; these same courses may also be used to satisfy major requirements

Please note that you may be able to use some courses to meet more than one requirement. Contact your advisor for details.

- Elective courses, if needed, to reach an overall total of at least 120 units

Minimum Units for Completion	120
Major GPA	C
Highest Mathematics Required	MAT 125
Fieldwork Experience/Internship	Optional
Research	Optional
University Honors Program	Optional
Some online/blended coursework	Required
Progression Plan Link	View Progression Plan

Purpose Statement

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Student Learning Outcomes

1. Identify, describe, and apply the major concepts, theoretical perspectives, and empirical findings in ecology and evolution with a strong basis in the natural sciences including:

- The basic molecular and cellular units of structure that define the function of all living things.
- The limits and functions of biological systems as they operate through chemical transformations and are governed by the laws of thermodynamics.
- Mastery of the theory of evolution; and how the diversity of life evolved and is evolving via population genetic mechanisms.

- Examine the molecular genetic and environmental bases of variation and how the phenotype of an organism is controlled by its genotype and the environment.
- Describe how populations are regulated, species interact in communities, and the major elements cycle in natural ecosystems.

2. Apply quantitative reasoning, mathematical, statistical and/or informatics tools in data analysis and interpretation.

- Apply quantitative reasoning to chemistry, physics, population genetic and demographic models, and energy fluxes.
- Interpret and apply basic statistical methods and graphical presentation of data.
- Develop quantitative skills within the students' area of interest, including mathematical modeling, statistics, computing and/or informatics, as appropriate.

3. Examine, synthesize, effectively communicate, and apply to other fields theory and empirical findings in ecology and evolutionary biology.

- Interpret scientific data and papers in ecology and evolutionary biology, evaluate primary sources, the quality of information, and determine a source's credibility.
- Synthesize empirical findings related to ecology and evolutionary biology, and communicate the results of scientific research to a range of audiences from the public to managers to scientists.
- Apply empirical findings in ecology and evolutionary biology to issues in conservation, climate change, natural resource management, forestry, agriculture, and/or human health (as determine by the interest of the student).

4. Apply depth of ecological and evolutionary knowledge through application of concepts to a group (or groups) of organisms and how they function in nature, with an emphasis on the Colorado Plateau.

Details

- Admission requirements over and above admission to NAU are required.

Major Requirements

- Take the following 66 - 69 units including 42 units of Biology and Biology-related courses with a Grade of "C" or better in each course:
    - BIO 181, BIO 181L, BIO 182, BIO 182L, BIO 226, BIO 226L, (BIO 240 or BIO 244) (15 units)

- BIO 365W which meets the junior-level writing requirement (3 units)

Select one course which meets the senior capstone requirement (3-4 units):

- BIO 426C, BIO 435C, BIO 471C

Select additional EEB depth courses from (6 units):

- BIO 240, BIO 244, BIO 325, BIO 325L, BIO 343, BIO 344, BIO 344H, BIO 349L, BIO 350, BIO 366, BIO 369, BIO 373, BIO 424, BIO 426C, BIO 435C, BIO 436, BIO 441, BIO 450, BIO 467, BIO 468, BIO 469, BIO 471C, BIO 479, BIO 571, BIO 573
- ENV 460
- FOR 240

Select additional EEB applied courses from (6 units):

- BIO 345, BIO 374, BIO 375, BIO 376, BIO 401C, BIO 409, BIO 432C, BIO 442, BIO 477, BIO 478, BIO 482C, BIO 488C, BIO 488L
- ENV 425, ENV 495, INF 413, INF 421, INF 422, INF 423
- FOR 213, FOR 454
- GSP 239, GSP 320, GSP 331

Select additional EEB organismal courses from (6 units):

- BIO 205, BIO 205L, BIO 221, BIO 222, BIO 223, BIO 227, BIO 284, BIO 322, BIO 346, BIO 402, BIO 410, BIO 411, BIO 414, BIO 415, BIO 429, BIO 431, BIO 475, BIO 517, BIO 525, BIO 527, BIO 526, BIO 528, FOR 250, FOR 453

Please note many of the following major requirements also satisfy Liberal Studies requirements.

- Basic chemistry sequence: CHM 151, CHM 151L, CHM 152, CHM 152L (9 units)
- Select one additional chemistry course from (3 units):
  - CHM 230, CHM 235, (CHM 440 or ENV 430)
- Select one from each of the following math/analysis options (7 units):
  - MAT 125 or MAT 136 (4 units)
  - (STA 270, PSY 230, or INF 205) (3 units)
- Select one of the following physics sequences (8 units):
  - (PHY 111, and PHY 112) OR (PHY 161, PHY 262, PHY 262L)

All prerequisite coursework must also be completed with grades of C or better.

- The Department of Biological Sciences does not allow dual majors withing the department.
- Additional coursework is required, if, after you have met the previously described requirements, you have not yet completed a total of 120 units of credit.

  You may take these remaining courses from any academic areas, using these courses to pursue your specific interests and goals. We encourage you to consult with your advisor to select the courses that will be most advantageous to you. (Please note that you may also use prerequisites or transfer credits as electives if they weren't used to meet major, minor, or liberal studies requirements.)
- Be aware that some courses may have prerequisites that you must also take. For prerequisite information click on the course or see your advisor.

Campus Availability

- Flagstaff
