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

Department of Biological Sciences

Secondary Education - Biology, Bachelor of Science in Education

Students who wish to teach middle or high school Biology in the secondary schools (7-12) will find this degree essential. Firmly grounded in Biology, with significant work in teacher preparation through the highly acclaimed NAUTeach science and mathematics teacher certification program, the plan establishes the professional conduit for teaching this exciting subject.

This program is nationally recognized by the National Science Teachers Association (NSTA).

This program is accredited by the Council for the Accreditation of Educator Preparation (CAEP).

Careers

What Can I Do with a Bachelor of Science in Secondary Education - Biology?

Create the middle or high school biology classroom of the future. In this degree plan, you'll learn how to get students involved in learning about the complicated concepts they need to understand to succeed. This degree will help you develop the knowledge and skills you need to be a secondary education teacher with comprehensive expertise in life sciences. Because of your knowledge, your students will tackle the environmental, health, and ecological challenges that lie ahead.

You'll also have the opportunity to complete fieldwork, laboratory exercises, and practicum experiences for your professional preparation. You'll learn advanced approaches to teaching and curriculum in a rigorous, diverse, and collaborative inquiry-based atmosphere. Earning this degree will help you move forward in your teaching career as well as enhance your students' educational experience.

Note: If you want to major in Secondary Education - Biology, you must apply and be accepted to the NAU Professional Education Program's teacher education program in addition to being admitted to the university.

Career opportunities that might be pursued:

- Secondary biology or life science teacher
- Science department chair

With further education, one of these paths is possible:

- Curriculum specialist

- School administrator
- Superintendent

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:

- At least 100 units of major requirements which includes at least 30 units of Mathematics and Science Teaching 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
- Elective courses, if needed, to reach an overall total of at least 120 units

Candidates in this program are required to demonstrate content knowledge, pedagogical knowledge and skills, professional knowledge, and professional dispositions to be eligible to enter student teaching or internship placements. Content, pedagogical, and professional knowledge or skills, professional dispositions are demonstrated through candidate performance on key assessments embedded in the following course(s):

- TSM 303, TSM 450, TSM 495C, TSM 496, BME 437

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

Minimum Units for Completion	120
Major GPA	2.5
Highest Mathematics Required	MAT 125
Additional Admission Requirements	Required
Fieldwork Experience/Internship	Optional
Student Teaching/Supervised Teaching	Required
University Honors Program	Optional
AZ Transfer Students complete AGEC-A	Recommended
Progression Plan Link	View Progression Plan
Licensure	This program may lead to licensure.

Purpose Statement

The NAUTeach program is a challenging undergraduate course of study solely designed to prepare mathematics and science teachers for grades 6-12. The program emphasizes the pre-service teacher's ability to develop research-based pedagogy through a STEM (Science, Technology, Engineering, Mathematics) focused, field intensive, rigorous curriculum. This allows undergraduate students to be highly supported by faculty who specialize in mathematics and science education research and Master Teachers that have years of professional classroom experience. Our program is designed for students with strong skills in mathematics or science seeking certification to teach biology, chemistry, physics, Earth sciences, general science, or mathematics at the secondary level.

The NAUTeach program, modeled after the successful UTeach program at the University of Texas, provides opportunities for you to:

- graduate in four years. Students earn a Bachelor of Science in education in their field of study.
- earn dual degrees. Students have the ability to earn degrees both in specific fields of science or mathematics and in teaching science or math.
- have early classroom teaching immersion. Students are in the K-12 mathematics or science classroom teaching and observing from the first semester and throughout the NAUTeach program to prepare for their capstone student teaching experience.
- work cooperatively in a STEM focused center. Course of study partnered with the department of Mathematics, Biology, Chemistry, Geology, and Physics.
- experience "student-centered" instruction. Course structure supports deep student understanding of concepts related to teaching, science, and mathematics.
- develop numerous STEM based lessons and a full STEM based unit. Students teach numerous STEM lessons and a STEM unit at local secondary schools, which build towards a capstone student teaching experience that utilizes the full range of skills and experiences.
- engage in educational dialogue and planning. Students plan lessons that promote deep content knowledge, analytical reasoning, creative thought and use of appropriate teaching strategies.

- use technology to enhance learning. Students experience technology throughout NAUTeach courses and develop lessons that model technology use in 6-12 classrooms.
- earn scholarships, internships and loan forgiveness. Numerous financial opportunities exist for secondary mathematics and science education majors.
- inspire future scientists, engineers, and mathematicians to change the world. Visit Teachers who inspired great scientists to see how teachers change the world.

Student Learning Outcomes

Outcomes align with Standards from the Council for the Accreditation of Educator Preparation, the National Science Teachers Association, and the Interstate New Teacher Assessment and Support Consortium

- Design instruction that develops all students' abilities to meet academic standards
- Reflect on teaching practices including the creation of a classroom environment based on respect and rapport that fosters a positive climate for learning, equity, and excellence.
- Create and maintain a learning climate that supports the development of all students' abilities to meet academic standards.
- Implement and manage instruction that develops all students' abilities to meet academic standards.
- Assess learning and communicate results to all students, parents and other appropriate professionals with respect to all students' abilities to meet academic standards.
- Collaborate with colleagues, parents the community and other appropriate agencies to design, implement, and support learning that supports all students' abilities to meet academic standards.
- Review and evaluate personal performance in order to improve teaching practices through reflection.
- Develop and nurture current professional knowledge of the teaching/learning process.
- Provide evidence of student learning through the design and implementation of instruction that makes use of effective communication techniques, is based on student prior knowledge, actively engages students in the learning process, and provides timely high-quality feedback.
- Reflect on the roles and responsibilities and adhere to legal and ethical requirements of the profession.
- In collaboration with other professionals, participate in the design, implementation, and assessment of individual education programs.

- Provide evidence of meeting the Arizona Professional Teaching Standards by taking the AEPA Secondary Professional Knowledge exam.

- Core Knowledge in the Biological Sciences:
    - Life processes in living systems including organization of matter and energy
    - Similarities and differences among animals, plants, fungi, microorganisms, and viruses
    - Ecological systems including the interrelationships and dependencies of organisms with each other and their environments
    - Population dynamics and the impact of population on its environment
    - General concepts of genetics and heredity
    - Organizations and functions of cells and multi-cellular systems
    - Behavior of organisms and their relationships to social systems
    - Regulation of biological systems including homeostatic mechanisms
    - Fundamental processes of modeling and investigating in the biological sciences
    - Applications of biology in environmental quality and in personal and community health
    - Bioenergetics including major biochemical pathways
    - Molecular genetics and heredity and mechanisms of genetic modification
    - Molecular basis for evolutionary theory and classification

- Advanced Competencies in the Biological Sciences
    - Biochemical interactions of organisms and their environments
    - Causes, characteristics, and avoidance of viral, bacterial, and parasitic diseases
    - Molecular genetics
    - Issues related to living systems such as genetic modification, uses of biotechnology, cloning, and pollution from faming
    - Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology
    - How to design, conduct, and report research in biology

- General Supporting Competencies
    - Chemistry: Biochemistry
    - Physics: Light, Sound, Optics, Electricity, Energy and order, Magnetism
    - Earth Sciences: Energy and geochemical cycles, Climate, Oceans, Weather, Natural resources, Changes in the Earth
    - Mathematics: Probability, Statistics

Details

Additional Admission Requirements

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

- To be eligible for admission to the teacher education program, candidates must meet the following requirements and apply for the program online.

  30 units of coursework which includes:
  - TSM 101, TSM 102 and TSM 303 with grades of "C" or better
  - Program Mathematics Foundations requirement with a grade of "C" or better
  - The English foundations requirement (ENG 105 or equivalent) with a minimum GPA of 3.0. (If your English GPA is below 3.0, you may take an approved writing course to achieve the 3.0 GPA.)
  - Completion of or enrollment in TSM 303

  - A minimum GPA of 2.5 in all content major coursework (must have taken at least 12 units) AND one of the following grade point average requirements:
    - A cumulative 2.5 GPA in Liberal Studies courses
    - A cumulative 2.5 GPA in all courses
  - You must be declared in this major
  - Submission of a copy of your State-approved Identity-Verified Print (IVP) fingerprint clearance card, obtainable through the Arizona Department of Public Safety (602-223-2279)

  Major Requirements

- **Take the following 100 - 105 units including 39-41 units of Biology courses with a Grade of "C" or better:**

  Biology courses (39-41 units)
  - BIO 181, BIO 181L, BIO 182, BIO 182L (8 units)
  - BIO 240, BIO 344 (6 units)
  - BIO 435C which meets the senior capstone requirement (3 units)

  Select one of the following which meets the junior-level writing requirement (3-5 units):

  - BIO 226, BIO 226L, BIO 305W (5 units)
  - BIO 365W (3 units)

  (Note: The Department of Biological Sciences is phasing out the BIO 226, BIO 226L and BIO 305W option and transitioning to the BIO 365W course for its majors).

  Physiology - Select one of the following options:

  - BIO 325, BIO 325L (4 units)
  - BIO 201, BIO 201L (If you select this option, BIO 202 and BIO 202L are strongly encouraged for elective credit) (4 units)

- **Botany**
  - Select from: BIO 284, BIO 374, BIO 410, BIO 414, BIO 415, BIO 426C,BIO 431, BIO 517, BIO 570 (3 units)

  - Additional coursework to complete 41 units in the major. The following rules apply to course selection (12 units):

  - **Inclusions**: Any BIO course not excluded or limited below.
    Exclusions: BIO 100, BIO 100L, BIO 310, and BIO recitation (R) courses
    Limitations:
    - Up to 3 units of BIO 300
    - Up to 6 units from BIO 408, BIO 485, BIO 497, BIO 498
    - Up to 6 units from FOR 203, FOR 204, CHM 360, CHM 461

- **Science Support and additional courses (31-34 units)**
  - (MAT 125 and STA 270) or MAT 136 (4-7 units)
  - CHM 151, CHM 151L, CHM 152, CHM 152L, CHM 230, CHM 230L (13 units)
  - PHY 111 (4 units)
  - GLG 101, GLG 103 (4 units)
  - TSM 360 (3 units)
  - ESE 330 (3 units

- **Mathematics and Science Teaching Courses (30 units)**
  - BME 437 with a grade of "C" or better (3 units)
  - TSM 101, TSM 102, TSM 303 with grades of "C" or better (5 units)
  - TSM 350, TSM 404, TSM 450 (9 units)
  - TSM 496 with a grade of "C" or better (1 unit)
  - TSM 495C which meets the senior capstone requirement (12 units)

- Note: In order to be approved for student teaching, you must complete TSM 350, TSM 404, and TSM 450, earning a grade of "B" or better in two of the three courses and earning a "C" or better in the remaining course. TSM 350, TSM 404 and TSM 450 may be repeated with a grade of "C".

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

  The Department of Biological Sciences does not allow dual degrees within the department.

Teacher Preparation

- In all of our teacher education programs, you are required to apply for, and complete a student teaching or internship experience. Applications are due one year prior to the student teaching semester. In addition, a minimum number of units of practicum is required, which involves supervised field experience with a practicing teacher.

  Before being accepted to student teaching, the following criteria must be met:
  - Admission to the teacher education program

- NAU GPA must be at least 2.5, with a GPA of 2.5 in all teacher preparation courses, with no grade lower than a "C"
- Passing score on the required Professional Dispositions Modules
- Complete all plan requirements
- Take the appropriate AEPA or NES Subject Knowledge test.
- All major coursework, with the exception of TSM 101, must be completed within six years prior to student teaching.
- All candidates must demonstrate social and emotional maturity consistent with professional standards of classroom instruction as well as adequate physical health for teaching.

- Candidates requesting student teaching placements in TSM 495C must take the NES Biology Subject Knowledge Exam prior to final clearance to student teach.

- In order to obtain an AZ teaching certificate, you must pass the following required Arizona Educator Exam:
  - Secondary Professional Knowledge Exam

General Electives

- 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.)

Additional Information

- Be aware that Arizona state teacher certification requirements leading to Institutional Recommendations may change at any time, and may impact program of study 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.

- This degree plan is supported through the NAUTeach program.

Campus Availability

- Flagstaff
