Science Education

While the term "science" is applied generally to the study of natural phenomena, in the Science degree program at Bemidji State University it applies to a combined study of the life, earth, and physical sciences in the context of teacher certification for grades 5-8. This "broad science" degree is favored by school districts for their junior high/middle school science positions. Students in the Teacher Licensure Grades 5-12 degree program are also required to select at least one specialty for grades 9-12 from one of the following science areas: Chemistry, Earth and Space Science, Life Science, or Physics.

Programs
- Elementary Education, B.S. (Science Endorsement (Teacher Licensure))
- Science Education, B.S. (Physics Specialty (Teacher Licensure))
- Science Education, B.S. (Life Science Specialty (Teacher Licensure))
- Science Education, B.S. (Earth and Space Science Specialty (Teacher Licensure))
- Science Education, B.S. (Chemistry Specialty (Teacher Licensure))

Career Directions
- Middle School Teacher
- Junior High School Teacher
- High School Science Teacher

Preparation

Recommended High School Courses
- Biology
- Chemistry
- Physics
- Algebra
- Trigonometry

Elementary Education, B.S. major

Science Endorsement (Teacher Licensure)

Required Credits: 101
Required GPA: 2.50

I ELEMENTARY EDUCATION FOUNDATION COURSES

COMPLETE THE FOLLOWING COURSES:
- ED 3100 Introduction to the Foundations of Public School Education (3 credits)
- ED 3110 Educational Psychology (3 credits)
- ED 3140 Human Relations In Education (3 credits)
- ED 3350 Pedagogy: Planning for Instruction (3 credits)
- ED 3780 Pedagogy: Planning for Instruction: Designing the Learning Environment (3 credits)
- ED 4799 The Professional Teacher (1 credit)
- HLTH 3400 Health and Drugs in Society (2 credits)

COMPLETE THE FOLLOWING COURSE, UP TO 12 CREDITS:
- ED 4820 Student Teaching - Elementary (1-12 credits)

II ELEMENTARY EDUCATION MAJOR COURSES

COMPLETE THE FOLLOWING COURSES:
- ED 3201 Language Arts I (3 credits)
- ED 3202 Language Arts II (3 credits)
- ED 3203 Language Arts III (3 credits)
- ED 3221 Elementary Math Methods (3 credits)
- ED 3222 Elementary Math Methods (3 credits)
- ED 3240 Social Studies in the Elementary School (3 credits)
- ED 3301 Creative Expressions (3 credits)
- ED 3302 Creative Process Foundations: Patterns (3 credits)
- HLTH 4100 Teaching Elementary School Health (2 credits)

COMPLETE THE FOLLOWING COURSE:
- MATH 1011 Mathematics for Elementary School Teachers I (3 credits)

SCIENCE ENDORSEMENT

COMPLETE THE FOLLOWING COURSES:
- BIOL 1211 Introductory Biology I (4 credits)
- or BIOL 1110 Human Biology (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- or BIOL 1120 General Biology: Evolution And Ecology (3 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
- or CHEM 1111 General Chemistry I (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)
- or CHEM 1112 General Chemistry II (4 credits)
- GEOL 1110 Physical Geology (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)
- SCI 3450 Science Methods For Grades 5-8 (4 credits)
- or ED 3410 Middle School Science Methods (4 credits)

EDUCATION CORE
COMPLETE THE FOLLOWING COURSES:
- ED 3417 Teaching and Learning in the Middle School (3 credits)
- ED 4737 Content Area Reading (3 credits)

COMPLETE THE FOLLOWING COURSE (5 CREDITS):
- ED 4840 Student Teaching - Special Fields (1-12 credits)
Science Education, B.S. **major**

Physics Specialty (Teacher Licensure)

Required Credits: 83
Required GPA: 2.50

**Core Courses for Science Teaching in Grades 5-8**

**COMPLETE THE FOLLOWING COURSES:**

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)
- GEOL 1110 Physical Geology (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)
- SCI 3450 Science Methods For Grades 5-8 (4 credits)

**REQUIRED PROFESSIONAL EDUCATION COURSES**

**COMPLETE THE FOLLOWING COURSES:**

- ED 3100 Introduction to the Foundations of Public School Education (3 credits)
- ED 3110 Educational Psychology (3 credits)
- ED 3140 Human Relations In Education (3 credits)
- ED 3350 Pedagogy: Planning for Instruction (3 credits)
- ED 3780 Adaptation and Management: Designing the Learning Environment (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4799 The Professional Teacher (1 credit)
- HLTH 3400 Health and Drugs in Society (2 credits)

Complete 12 credits of student teaching:

- ED 4830 Student Teaching - Secondary (1-12 credits)

**PHYSICS SPECIALTY**

**COMPLETE THE FOLLOWING COURSES:**

MATH 2471 is recommended (required for PHYS 2101)

- PHYS 2101 Physics I (5 credits)
- PHYS 2102 Physics II (5 credits)
- PHYS 2500 Electronics I (4 credits)
- PHYS 3600 Modern Physics (4 credits)
- PHYS 4580 Optics (4 credits)

**COMPLETE THE FOLLOWING COURSE:**

- PHYS 4980 Research (3 credits)

---

Science Education, B.S. **major**

Life Science Specialty (Teacher Licensure)

Required Credits: 83
Required GPA: 2.50

**Core Courses for Science Teaching in Grades 5-8**

**COMPLETE THE FOLLOWING COURSES:**

- BIOL 1211 Introductory Biology I (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)
- GEOL 1110 Physical Geology (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)
- SCI 3450 Science Methods For Grades 5-8 (4 credits)

**REQUIRED PROFESSIONAL EDUCATION COURSES**

**COMPLETE THE FOLLOWING COURSES:**

- ED 3100 Introduction to the Foundations of Public School Education (3 credits)
- ED 3110 Educational Psychology (3 credits)
- ED 3140 Human Relations In Education (3 credits)
- ED 3350 Pedagogy: Planning for Instruction (3 credits)
- ED 3780 Adaptation and Management: Designing the Learning Environment (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4799 The Professional Teacher (1 credit)
- HLTH 3400 Health and Drugs in Society (2 credits)

Complete 12 credits of student teaching:

- ED 4830 Student Teaching - Secondary (1-12 credits)

**LIFE SCIENCE SPECIALTY**

A. **REQUIRED BIOLOGY COURSES**

**COMPLETE THE FOLLOWING COURSES:**

- BIOL 2360 Genetics (4 credits)
- BIOL 2610 General Ecology (3 credits)
- BIOL 2620 Field and Laboratory Projects in Ecological Research (2 credits)
- BIOL 3710 Microbiology (4 credits)
- BIOL 4620 Evolution (3 credits)
- BIOL 3720 Plant Form and Function (4 credits)
- BIOL 3830 Aquatic Plants (4 credits)

B. **REQUIRED BIOLOGY ELECTIVE**

**SELECT 1 OF THE FOLLOWING COURSES:**

- BIOL 3150 Animal Behavior (3 credits)
- BIOL 3310 Entomology (4 credits)
- BIOL 4510 Ornithology (4 credits)
- BIOL 4520 Mammalogy (4 credits)
- BIOL 4534 Ichthyology (4 credits)
SUGGESTED SEMESTER SCHEDULE FOR LIFE SCIENCE SPECIALTY, SCIENCE EDUCATION MAJOR, B.S. (TEACHER LICENSURE)

The following is a list of required Science (Life Science) Major, B.S. courses arranged by year. This schedule is intended to assist students in planning their courses. There is some flexibility in this schedule, but graduation within four years will require close adherence to the specified sequence of courses. Always consult your Biology academic advisor as to the proper courses and sequence of courses needed for graduation. It is possible, in some circumstances, that courses in a student's Liberal Education program may be used in his or her academic major.

Freshman
- BIOL 1121 Introductory Biology I (4 credits)
- BIOL 1122 Introductory Biology II (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
- Liberal Education requirements

Sophomore
- BIOL 2360 Genetics (4 credits)
- BIOL 2610 General Ecology (3 credits)
- BIOL 2620 Field and Laboratory Projects in Ecological Research (2 credits)
- BIOL 3720 Plant Form and Function (4 credits)
- GEOL 1110 Historical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)
  or PHYS 2101 Physics I (5 credits)
- Consider starting Professional Education sequence
- Liberal Education requirements

Junior
- BIOL 3710 Microbiology (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)
- SCI 3450 Science Methods For Grades 5-8 (4 credits)
- Other Professional Education requirements
- Liberal Education requirements

Senior
- Biology Elective (BIOL 3150, 3310, 3510, 4520, or 4534)
- BIOL 4620 Evolution (3 credits)
- Complete Professional Education requirements, including one semester of student teaching
- Complete liberal education requirements

Science Education, B.S. major
Earth and Space Science Specialty (Teacher Licensure)

Required Credits: 86
Required GPA: 2.50

Core Courses for Science Teaching in Grades 5-8

COMPLETE THE FOLLOWING COURSES:
- BIOL 1211 Introductory Biology I (4 credits)
  or BIOL 1110 Human Biology (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
  or BIOL 1120 General Biology: Evolution And Ecology (3 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
  or CHEM 1111 General Chemistry I (4 credits)
- CHEM 2212 Principles of Chemistry II (4 credits)
  or CHEM 1112 General Chemistry II (4 credits)
- GEOL 1110 Physical Geology (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)
- SCI 3450 Science Methods For Grades 5-8 (4 credits)
  or ED 3410 Middle School Science Methods (4 credits)

REQUIRED PROFESSIONAL EDUCATION COURSES

COMPLETE THE FOLLOWING COURSES:
- ED 3100 Introduction to the Foundations of Public School Education (3 credits)
- ED 3110 Educational Psychology (3 credits)
- ED 3140 Human Relations In Education (3 credits)
- ED 3350 Pedagogy: Planning for Instruction (3 credits)
- ED 3780 Adaptation and Management: Designing the Learning Environment (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4799 The Professional Teacher (1 credit)
- HLTH 3400 Health and Drugs in Society (2 credits)

Complete 12 credits of student teaching:
- ED 4830 Student Teaching - Secondary (1-12 credits)

EARTH AND SPACE SCIENCE SPECIALTY

COMPLETE THE FOLLOWING COURSES:
- ENVR 2000 Introduction to Environmental Science (3 credits)
- GEOL 1120 Historical Geology (4 credits)
- GEOL 2110 Mineralogy and Petrology (4 credits)
- GEOL 3500 Topics in Paleontology (3 credits)
- GEOL 3600 Stratigraphy and Sedimentation (3 credits)
- SCi 2100 Astronomy (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:
- GEOL 3211 Environmental Hydrology (3 credits)
- ENVR 4050 Geochemistry (3 credits)

SELECT 1 OF THE FOLLOWING COURSES:
- GEOL 4970 Internship (3 credits)
- GEOL 4980 Research (3 credits)

Science Education, B.S. major
Chemistry Specialty (Teacher Licensure)

Required Credits: 78
Required GPA: 2.50

Core Courses for Science Teaching in Grades 5-8

COMPLETE THE FOLLOWING COURSES:
- BIOL 1211 Introductory Biology I (4 credits)
  or BIOL 1110 Human Biology (4 credits)
- BIOL 1212 Introductory Biology II (4 credits)
  or BIOL 1120 General Biology: Evolution And Ecology (3 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
  or CHEM 1111 General Chemistry I (4 credits)
CHEM 2212 Principles of Chemistry II (4 credits)

GEOL 1110 Physical Geology (4 credits)

SCI 3100 Integrative Science for Teachers (4 credits)

SCI 3450 Science Methods For Grades 5-8 (4 credits)

or ED 3410 Middle School Science Methods (4 credits)

**REQUIRED PROFESSIONAL EDUCATION COURSES**

**COMPLETE THE FOLLOWING COURSES:**

- ED 3100 Introduction to the Foundations of Public School Education (3 credits)
- ED 3110 Educational Psychology (3 credits)
- ED 3140 Human Relations In Education (3 credits)
- ED 3350 Pedagogy: Planning for Instruction (3 credits)
- ED 3780 Adaptation and Management: Designing the Learning Environment (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4799 The Professional Teacher (1 credit)
- HLTH 3400 Health and Drugs in Society (2 credits)

Complete 12 credits of student teaching:

- ED 4830 Student Teaching - Secondary (1-12 credits)

**CHEMISTRY SPECIALTY**

**COMPLETE THE FOLLOWING COURSES:**

- CHEM 3110 Laboratory Management and Safety (2 credits)
- CHEM 3311 Organic Chemistry I (3 credits)
- CHEM 3312 Organic Chemistry II (3 credits)
- CHEM 3371 Organic Chemistry Laboratory I (1 credit)
- CHEM 3372 Organic Chemistry Laboratory II (1 credit)
- CHEM 3507 Analytical Chemistry (3 credits)
- CHEM 3570 Analytical Chemistry Laboratory (1 credit)
- CHEM 3980 Research (1 credit)

**SELECT 1 OF THE FOLLOWING COURSES:**

- CHEM 4411 Biochemistry I (3 credits)
- CHEM 4811 Advanced Inorganic Chemistry I (3 credits)

**Science Courses**

**SCI 1110 Physical Science I (4 credits)**

A single-semester survey of Physical Science, with laboratory. Includes selected topics in physics, chemistry, geology, astronomy, and meteorology. Includes laboratory and computer sessions. Liberal Education Goal Area 3 (LC).

**SCI 1120 Physical Science II (4 credits)**

Science and Technology in Society (STS). An alternative perspective on Physical Science, using selected topics to discuss societal concerns and responsibilities. Includes laboratory and related computer-based small group sessions. Liberal Education Goal Area 3 (LC).

**SCI 2100 Astronomy (3 credits)**

A one-semester survey course, with emphasis on the history of astronomy, the science of stellar and solar system formation, the evolution of stars and galaxies, and modern cosmology and the fate of the universe. Includes laboratory simulations and field exercises. Liberal Education Goal Area 3.

**SCI 2200 Meteorology (3 credits)**

A one-semester survey course, with emphasis on the science of the atmospheric dynamics of weather and climate, precipitation, storms, and forecasting. Includes laboratory simulations and field exercises. Liberal Education Goal Area 3.