



# 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)) *major*
- Science Education, B.S. (Earth and Space Science Specialty (Teacher Licensure)) *major*
- Science Education, B.S. (Physics Specialty (Teacher Licensure)) *major*
- Science Education, B.S. (Life Science Specialty (Teacher Licensure)) *major*
- Science Education, B.S. (Chemistry Specialty (Teacher Licensure)) *major*

## 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)

A total of 120 semester credits are needed for the **Elementary Education, Science endorsement (Teacher Licensure) B.S.** degree and include the following:

- Completion of a minimum of 40 upper division credits (level 3000/4000)
- Completion of all required major credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10 with a minimum of 40 credits) required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

### Dual Degrees

Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

### Multiple Credentials

Any additional major, minor or certificate in a degree must have at least 6 credits of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 98

Required GPA: 2.50

## I ELEMENTARY EDUCATION FOUNDATION COURSES

Complete the following courses:

- ED 1100 Education & Society (3 credits)
- ED 2110 Educational Psychology and Learning Theories (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4778 Teacher Leadership (3 credits)

Complete the following course, up to 12 credits:

- ED 4820 Student Teaching - Elementary (1-16 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 Science Methods (3 credits)
- ED 3240 Social Studies in the Elementary School (3 credits)
- ED 3310 Creative Arts in Education (3 credits)
- HLTH 4100 Teaching Elementary School Health (2 credits)
- PHED 4200 Methods of Teaching Elementary Physical Education to Classroom Teachers (1 credit)

Complete the following course:

- MATH 1011 Mathematics for Elementary School Teachers I (3 credits)

Complete the following course:

- MATH 1013 Mathematics for Elementary School Teachers II (3 credits)

## SCIENCE ENDORSEMENT

COMPLETE THE FOLLOWING COURSES:

- BIOL 1400 Cellular Principles (4 credits)  
*or* BIOL 1110 Human Biology (4 credits)
- BIOL 1500 Diversity of Life (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 Secondary 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)

#### PROFESSIONAL EDUCATION COURSES MUST BE COMPLETED

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#### Program Learning Outcomes | Elementary Education, B.S. major Science Endorsement (Teacher Licensure)

8710.2000 Standards of Effective Practice: <https://www.revisor.mn.gov/rules/8710.2000/>

8710.3200 Teachers of Elementary Education: <https://www.revisor.mn.gov/rules/8710.3200/>

8710.3340 Middle Level Endorsement License for Teachers of General Science: <https://www.revisor.mn.gov/rules/8710.3340/>

#### Suggested semester schedule | Elementary Education, Science endorsement B.S. major

##### Freshman - 1st semester

- ED 1100 Education & Society (3 credits)
- Core Curriculum Goal 4
- Nisidotaading Course Requirement
- Core Curriculum (3 credits)
- GEOL 1110 Physical Geology (4 credits)

##### Freshman - 2nd semester

- MATH 1011 Mathematics for Elementary School Teachers I (3 credits)
- Core Curriculum (9 credits)
- BSU Focus (1 credit)
- BIOL 1110 Human Biology (4 credits)  
or BIOL 1400 Cellular Principles (4 credits)

##### Sophomore - 3rd semester

- ED 2110 Educational Psychology and Learning Theories (3 credits)
- MATH 1013 Mathematics for Elementary School Teachers II (3 credits)
- Core Curriculum (6 credits)
- CHEM 1111 General Chemistry I (4 credits)  
or CHEM 2211 Principles of Chemistry I (4 credits)

##### Sophomore - 4th semester

- CHEM 1112 General Chemistry II (4 credits)  
or CHEM 2212 Principles of Chemistry II (4 credits)
- Core Curriculum (12 credits)

##### Junior - 5th semester

- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3201 Language Arts I (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3417 Teaching and Learning in the Middle School (3 credits)
- PHED 4200 Methods of Teaching Elementary Physical Education to Classroom Teachers (1 credit)
- HLTH 4100 Teaching Elementary School Health (2 credits)

##### Junior - 6th semester

- ED 3240 Social Studies in the Elementary School (3 credits)
- ED 3202 Language Arts II (3 credits)
- ED 3310 Creative Arts in Education (3 credits)
- ED 3410 Secondary Science Methods (4 credits)
- SCI 3100 Integrative Science for Teachers (4 credits)  
(take when offered; see advisor)

##### Senior - 7th semester

- ED 3203 Language Arts III (3 credits)
- ED 3221 Elementary Math Methods (3 credits)
- ED 3222 Elementary Science Methods (3 credits)
- ED 4778 Teacher Leadership (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4737 Content Area Reading (3 credits)

##### Senior - 8th semester

- ED 4820 Student Teaching - Elementary (1-16 credits)  
(take for 7 credits)
- ED 4840 Student Teaching - Special Fields (1-12 credits)  
(take for 5 credits)

## Science Education, B.S. major

### Earth and Space Science Specialty (Teacher Licensure)

A total of 120 semester credits are needed for the **Science Education, Earth and Space Science specialty (Teacher Licensure) B.S.** degree and include the following:

- Completion of a minimum of 40 upper division credits (level 3000/4000)
- Completion of all required major credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10 with a minimum of 40 credits) required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

#### Dual Degrees

Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

#### Multiple Credentials

Any additional major, minor or certificate in a degree must have at least 6 credits

of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 86

Required GPA: 2.50

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

Complete the following courses:

- BIOL 1400 Cellular Principles (4 credits)  
or BIOL 1110 Human Biology (4 credits)
- BIOL 1500 Diversity of Life (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 Secondary Science Methods (4 credits)

### REQUIRED PROFESSIONAL EDUCATION COURSES

Complete the following courses with a minimum 2.50 GPA:

- ED 1100 Education & Society (3 credits)
- ED 2110 Educational Psychology and Learning Theories (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4778 Teacher Leadership (3 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 Intro to Fossils and History of Planet Earth (4 credits)
- GEOL 2110 Crystals, Minerals and Rocks (4 credits)
- GEOL 3500 Topics in Paleontology (3 credits)
- GEOL 3600 Stratigraphy and Sedimentation (3 credits)
- PHYS 2000 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*

### Physics Specialty (Teacher Licensure)

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A total of 120 semester credits are needed for the **Science Education, Physics specialty (Teacher Licensure) B.S.** degree and include the following:

- Completion of a minimum of 40 upper division credits (level 3000/4000)
- Completion of all required major credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10 with a minimum of 40 credits) required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

### Dual Degrees

Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

### Multiple Credentials

Any additional major, minor or certificate in a degree must have at least 6 credits of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 82

Required GPA: 2.50

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

Complete the following courses:

- BIOL 1400 Cellular Principles (4 credits)  
or BIOL 1110 Human Biology (4 credits)
- BIOL 1500 Diversity of Life (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 Secondary Science Methods (4 credits)

### REQUIRED PROFESSIONAL EDUCATION COURSES

Complete the following courses with a minimum 2.50 GPA:

- ED 1100 Education & Society (3 credits)
- ED 2110 Educational Psychology and Learning Theories (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4778 Teacher Leadership (3 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 University Physics I (4 credits)  
or PHYS 1101 General Physics I (4 credits)
- PHYS 2102 University Physics II (4 credits)  
or PHYS 1102 General Physics II (4 credits)
- PHYS 3103 University Physics III (4 credits)

- PHYS 3300 Thermal and Statistical Physics (3 credits)  
or CHEM 4711 Physical Chemistry I (3 credits)
- PHYS 4300 Optics (4 credits)

Complete the following course:

- PHYS4980

## Science Education, B.S. *major* Life Science Specialty (Teacher Licensure)

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A total of 120 semester credits are needed for the **Science Education, Life Science specialty (Teacher Licensure) B.S.** degree and include the following:

- Completion of a minimum of 40 upper division credits (level 3000/4000)
- Completion of all required major credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10 with a minimum of 40 credits) required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

### Dual Degrees

Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

### Multiple Credentials

Any additional major, minor or certificate in a degree must have at least 6 credits of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 83

Required GPA: 2.50

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

Complete the following courses:

- BIOL 1400 Cellular Principles (4 credits)  
or BIOL 1110 Human Biology (4 credits)
- BIOL 1500 Diversity of Life (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 Secondary Science Methods (4 credits)

### REQUIRED PROFESSIONAL EDUCATION COURSES

Complete the following courses with a minimum 2.50 GPA:

- ED 1100 Education & Society (3 credits)
- ED 2110 Educational Psychology and Learning Theories (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4778 Teacher Leadership (3 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 3710 Microbiology (4 credits)
- BIOL 4620 Evolution (3 credits)
- BIOL 3720 Plant Form and Function (4 credits)  
or BIOL 3830 Aquatic Plants and Algae (4 credits)
- BIOL 4894 Advanced Research Project I (2 credits)  
or BIOL 4895 Advanced Research Project II (2 credits)

#### B. Required Biology Elective

Select 1 of the following courses:

- BIOL 3150 Animal Behavior (3 credits)
- BIOL 3310 Entomology (3 credits)
- BIOL 4510 Ornithology (3 credits)
- BIOL 4520 Mammalogy (3 credits)
- BIOL 4534 Ichthyology (4 credits)

### Suggested Semester Schedule | Science Education, B.S. Life Science Specialty (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 Core Curriculum program may be used in his or her academic major.

#### Freshman

- BIOL 1400 Cellular Principles (4 credits)
- BIOL 1500 Diversity of Life (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)
- Core Curriculum requirements

#### Sophomore

- BIOL 2360 Genetics (4 credits)
- BIOL 2610 General Ecology (3 credits)
- BIOL 4894 Advanced Research Project I (2 credits) or BIOL 4895
- BIOL 3720 Plant Form and Function (4 credits)
- GEOL 1110 Physical Geology (4 credits)
- PHYS 1101 General Physics I (4 credits)  
or PHYS 2101 University Physics I (4 credits)
- Consider starting Professional Education sequence
- Core Curriculum 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
- Core Curriculum 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 Core Curriculum requirements

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

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A total of 120 semester credits are needed for the **Science Education, Chemistry specialty (Teacher Licensure) B.S.** degree and include the following:

- Completion of a minimum of 40 upper division credits (level 3000/4000)
- Completion of all required major credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10 with a minimum of 40 credits) required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

### Dual Degrees

Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

### Multiple Credentials

Any additional major, minor or certificate in a degree must have at least 6 credits of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 78

Required GPA: 2.50

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

Complete the following courses:

- BIOL 1400 Cellular Principles (4 credits)  
*or* BIOL 1110 Human Biology (4 credits)
- BIOL 1500 Diversity of Life (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 Secondary Science Methods (4 credits)

### REQUIRED PROFESSIONAL EDUCATION COURSES

Complete the following courses with a minimum 2.50 GPA:

- ED 1100 Education & Society (3 credits)
- ED 2110 Educational Psychology and Learning Theories (3 credits)
- ED 3140 Human Diversity and Educational Equity (3 credits)
- ED 3350 Principles and Strategies of Teaching (3 credits)
- ED 3780 Inclusive Teaching and Classrooms (3 credits)
- ED 4737 Content Area Reading (3 credits)
- ED 4778 Teacher Leadership (3 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 (1-2 credits)

Select 1 of the following courses:

- CHEM 3811 Intermediate Inorganic Chemistry (3 credits)
- CHEM 4411 Biochemistry I (3 credits)

## Science Courses

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### SCI 1110 Exploring Science (4 credits)

An interdisciplinary course incorporating the areas of biology, chemistry, earth science, and physics. Connections to everyday life and environmental issues will be emphasized. Includes a laboratory component. (LC) [Core Curriculum Goal Area 3 & 10.]

### 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.

### SCI 2925 People of the Environment: Science Perspective (3 credits)

The discussions of this section will include the specific relation between air, water, and solid waste pollution and the effect on the environment, including the following: acid rain, smog, global warming, measurement of environmental pollutants, and the role of science in solving pollution problems.

### SCI 2951 Study-Travel Natural Science (1-6 credits)

Study Travel course in Science.

### SCI 3100 Integrative Science for Teachers (4 credits)

An interdisciplinary laboratory-based course incorporating the areas of biology, chemistry, earth science, and physics. Focuses on conducting a series of investigations by Science Inquiry and demonstrating the connection between the various disciplines. Prerequisites: 2 courses each in the life sciences and physical sciences.

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

Strategies for implementation of the Minnesota Graduation Standards in the areas of Science and Inquiry for grades 5-8. Strategies include laboratory activities, discussions, the development of classroom activities, and the adaptation of these strategies for use in the elementary and high school science classroom. Prerequisite: Senior status or consent of instructor.

### SCI 4917 DIS Tchg Assoc | (1-2 credits)

Directed Independent Study | Teaching Associate

### All-University Courses

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY  
1920, 2920, 3920, 4920 DIRECTED GROUP STUDY  
1930, 2930, 3930, 4930 EXPERIMENTAL COURSE  
1940, 2940, 3940, 4940 IN-SERVICE COURSE  
1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR  
1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION  
1970, 2970, 3970, 4970 INTERNSHIP  
1980, 2980, 3980, 4980 RESEARCH  
1990, 2990, 3990, 4990 THESIS