

## Science Teaching

Websites: [cset.mnsu.edu/biology/](http://cset.mnsu.edu/biology/)  
[cset.mnsu.edu/chemgeol/](http://cset.mnsu.edu/chemgeol/)  
[cset.mnsu.edu/pa/](http://cset.mnsu.edu/pa/)  
[cset.mnsu.edu/geography/](http://cset.mnsu.edu/geography/)

### Coordinators:

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The State of Minnesota grants science teacher licensure for grades 5-8 general science, 9-12 Chemistry, 9-12 Earth Science, 9-12 Life Science, and 9-12 Physics. Students earning a degree from Minnesota State Mankato will qualify for two licenses (1) 5-8 general science and (2) 9-12 specialty.

Each major requires the 31 credit general core and a science emphasis that ranges from 27-35 credits of science and science teaching methods courses. In addition, the student must complete a 30 credit professional education component and the 3 credit Drug Education course.

The University Science Teaching Program must meet specific competencies to meet professional accreditation and licensure requirements. To stay within the required degree limits of 120 credit hours, students are strongly advised to select courses within the 44 credit general education program that meet both teaching program and general education needs. It is important for the student to meet with their advisor to assist with program planning.

A minor is not required for any of the science teaching programs; however, to broaden one's teaching opportunities, double majors are encouraged. For further details, the student should check with one of the science teaching advisors for an overview of available opportunities.

### POLICIES/INFORMATION

**GPA Policy.** Students obtaining a degree in science teaching must maintain a minimum cumulative GPA of 2.50 in the sciences. Students who are not science teaching majors should consult an advisor concerning possible additional course requirements.

**P/N Grading Policy.** Courses leading to a degree in science teaching may not be taken on a P/N basis except where P/N grading is mandatory.

### SCIENCE TEACHING PROGRAMS

**Required for all Science Teaching Programs unless otherwise noted.**

#### **Required General Education (3 credits)**

HLTH 240 Drug Education (3)

#### **Required General Science Core (31 credits)**

AST 101 Introduction to Astronomy (3)  
 BIOL 105 General Biology I (4)  
 BIOL 106 General Biology II (4)  
 CHEM 201 General Chemistry I (5)  
 GEOL 121 Physical Geology (4)  
 GEOL 310 Earth and Space Systems (3)  
 PHYS 211 Principles of Physics I (4)\*  
 PHYS 212 Principles of Physics II (4)\*

\* PHYS 221, PHYS 222, PHYS 223, PHYS 232 and PHYS 233 may substitute. The additional credit hours will reduce the number of credits in the advanced physics courses.

#### **Required for All Majors . (Professional Education, 30 credits)**

See the SECONDARY EDUCATION section for additional information about admissions to Professional Education, and course requirements.

**Required Minor: None.**

### CHEMISTRY 5-12 BS TEACHING (120 credits)

#### **Required General Education**

BIOL 105 General Biology I (4)  
 CHEM 201 General Chemistry I (5)  
 GEOL 121 Physical Geology (4)  
 HLTH 240 Drug Education (3)  
 MATH 121 Calculus I (4)

#### **Major Common Core**

AST 101 Introduction to Astronomy (3)  
 BIOL 106 General Biology II (4)  
 CHEM 202 General Chemistry II (5)  
 CHEM 305 Analytical Chemistry (4)  
 CHEM 312 Intermediate Inorganic Chemistry (2)  
 CHEM 320 Organic Chemistry I (5)  
 CHEM 360 Principles of Biochemistry (4)  
 CHEM 381W Introduction to Research (2)  
 CHEM 440 Physical Chemistry I (3)  
 CHEM 450 Physical Chemistry Laboratory I (1)  
 CHEM 479 Teaching Physical Science (4)  
 CHEM 495 Senior Seminar (1)  
 GEOL 310 Earth and Space Systems (3)  
 PHYS 211 Principles of Physics I (4)  
 PHYS 212 Principles of Physics II (4)

**Required Minor: None.**

### EARTH SCIENCE 5-12 BS TEACHING

#### **Required General Education (3 credits)**

#### **Required General Science Core (31 credits)**

#### **Required Professional Education (30 credits)**

#### **Required for Major (Core, 24 credits)**

AST 125 Observational Astronomy (3)  
 GEOG 217 Weather (3)  
 GEOG 315 Geomorphology (3)  
 GEOG 410 Climatic Environments (3)  
 GEOL 122 Earth History (4)  
 GEOL 201 Elements of Mineralogy (4)  
 GEOG 464 Teaching Earth Science (4) **OR**  
 GEOL 479 Teaching Earth Sciences (4)

#### **Required for Major (Research, 1-3 credits)**

GEOG 440 Field Studies: Colorado (3)  
 GEOG 440 Field Studies: Field Methods (3)  
 GEOG 480 Seminar (1-4)  
 GEOG 499 Individual Study (1-3)  
 GEOL 499 Individual Study (1-5)

#### **Required for Major (Electives, 9 credits)**

(Must choose from at least two departments)

AST 102 Introduction to the Planets (3)  
 AST 104 Introduction to Experimental Astronomy (2)  
 GEOG 373 Introduction to Geographic Information Systems (4)  
 GEOG 420 Conservation of Natural Resources (3)  
 GEOL 330 Structural Geology (4)  
 GEOL 350 Environmental Geology (4)  
 GEOL 450 Hydrogeology (3)

**Required Minor: None.**

### LIFE SCIENCE 5-12 BS TEACHING (128 credits)

#### **Required General Education**

AST 101 Introduction to Astronomy (3)  
 BIOL 105 General Biology I (4)

CHEM	201	General Chemistry I (5)
GEOL	121	Physical Geology (4)
HLTH	240	Drug Education (3)
KSP	220W	Human Relations in a Multicultural Society (3)
PHYS	211	Principles of Physics I (4)

**Math Requirement** (Choose 3-4 credits)

MATH	113	Trigonometry (3)
MATH	115	Precalculus Mathematics (4)

**Major Common Core**

BIOL	106	General Biology II (4)
BIOL	211	Genetics (4)
BIOL	215	General Ecology (4)
BIOL	220	Human Anatomy (4)
BIOL	270	Microbiology (4)
BIOL	301	Evolution (2)
BIOL	485	Biology Teaching Methods and Materials (4)
GEOL	310	Earth and Space Systems (3)
PHYS	212	Principles of Physics II (4)

**Independent Study** (Choose 1 credits)

At least one credit is required. Additional credits will be counted as electives.

BIOL	499	Individual Study (1-4)
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**Major Restricted Electives** (Choose 4 credits)

BIOL	408	Vertebrate Ecology (4)
BIOL	409	Advanced Field Ecology (4)

**Major Unrestricted Electives**

Choose at least 9 additional credits of 300-400 level Biology courses.

**Other Graduation Requirements**

Professional Education

LEVEL 1

KSP 202 may be taken in LEVEL 1 or LEVEL 2. KSP 464 must be taken in all levels, but credit will be awarded in LEVEL 4 only.

KSP	202	Technology Integration in the Classroom (2)
KSP	220W	Human Relations in a Multicultural Society (3)
KSP	222	Introduction to the Learner and Learning (2)
KSP	464	Professional Seminar (1)

LEVEL 2

KSP 202 may be taken in LEVEL 1 or LEVEL 2. KSP 464 must be taken in all levels, but credit will be awarded in LEVEL 4 only.

KSP	330	Planning, Instruction, and Evaluation in the Classroom (5)
KSP	464	Professional Seminar (1)

LEVEL 3

KSP 464 must be taken in all levels, but credit will be awarded in LEVEL 4 only.

KSP	440	Creating Learning Environments to Engage Children, Families, and Community (3)
KSP	442	Reading, Literacy, and Differentiated Instruction in Inclusive Classrooms (3)
KSP	464	Professional Seminar (1)

LEVEL 4

Course credit for KSP 464 is awarded in LEVEL 4, but it must be taken in all levels.

KSP	464	Professional Seminar (1)
KSP	477	5-12 Student Teaching (11)

**PHYSICS (5-12) BS TEACHING****Required General Education**

AST	101	Introduction to Astronomy (3)
BIOL	105	General Biology I (4)

CHEM	201	General Chemistry I (5)
GEOL	121	Physical Geology (4)
HLTH	240	Drug Education (3)
KSP	220W	Human Relations in a Multicultural Society (3)
MATH	121	Calculus I (4)

**Major Common Core**

PHYS 221, PHYS 222, PHYS 223, PHYS 232 and PHYS 233 may substitute for PHYS 211 and PHYS 212. The additional credit hours will reduce the number of credits on the advanced physics courses.

BIOL	106	General Biology II (4)
GEOL	310	Earth and Space Systems (3)
PHYS	211	Principles of Physics I (4)
PHYS	212	Principles of Physics II (4)
PHYS	335	Modern Physics I (3)
PHYS	336	Modern Physics II (3)
PHYS	465	Computer Applications in Physics (3)
PHYS	482	Teaching Methods and Materials in Physical Science (4)

(Choose 2 credits)

2 credits are required for the core.

PHYS	381	Tutoring Physics (1-3)
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(Choose 2 credits)

2 credits are required for the core.

PHYS	493	Undergraduate Research (1-6)
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**Physics Electives** (Choose 8 credits)

This is reduced to 4 credits if PHYS 221, PHYS 222, PHYS 223, PHYS 232 and PHYS 233 have been taken in place of PHYS 211 and PHYS 212 in partial fulfillment of the General Science Core requirements. If PHYS 211 and PHYS 212 are completed successfully, PHYS 221, PHYS 222, PHYS 223, PHYS 232 and PHYS 233 may be used to fulfill the Physics Elective credits.

PHYS 300-499

**Other Graduation Requirements**

See the SECONDARY EDUCATION section for admission requirements to Professional Education and a list of required professional education courses.