

## SCIENCE TEACHING

### 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:

Thomas Brown, Ph.D., Physics  
Donald Friend, Ph.D., Geography  
Bryce Hoppie, Ph.D., Geology  
Beth Lavoie, Ph.D., Biological Sciences  
James Pierce, Ph.D., Astronomy  
Jeffrey R. Pribyl, Ph.D., Chemistry

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 128 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 General Education (3 credits)**

HLTH 310 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 (128 credits)

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

##### **Recommended General Education (22-23 credits)**

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

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

##### **Required for Major (Core, 35 credits)**

CHEM 202 General Chemistry II (5)  
CHEM 305 Analytical Chemistry (4)  
CHEM 320 Organic Chemistry I (5)  
CHEM 360 Principles of Biochemistry (4)  
CHEM 381 Introduction to Research (2)  
CHEM 312 Intermediate Inorganic Chemistry (2)  
CHEM 440 Physical Chemistry I (3)  
CHEM 450 Physical Chemistry Laboratory (1)  
CHEM 479 Teaching Physical Science (4)  
CHEM 495 Senior Seminar (1)  
MATH 121 Calculus I (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 (3 credits)**

##### **Recommended General Education (22-23 credits)**

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

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

##### **Required for Major (Core, 27 credits)**

BIOL 211 Genetics (4)  
BIOL 215 General Ecology (4)  
BIOL 220 Human Anatomy (4)  
BIOL 270 Microbiology (4)

---

## SCIENCE TEACHING

---

|      |     |  |
|------|-----|--|
| BIOL | 301 | Evolution (2)                              |
| BIOL | 408 | Vertebrate Ecology (4) <b>OR</b>           |
| BIOL | 409 | Advanced Field Ecology (4)                 |
| BIOL | 485 | Biology Teaching Methods and Materials (4) |
| BIOL | 499 | Individual Study: Research Project (1)     |

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

Choose a minimum of 9 credits from Biology courses from the 300-400 level

### **PHYSICS (5-12) BS TEACHING**

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

**Recommended General Education (22-23 credits)** Including MATH 121

#### **Required General Science Core (31-33 credits)**

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

#### **Required for Major (Core, 21 credits)**

|      |     |  |
|------|-----|--|
| MATH | 122 | Calculus II (4)  |
| PHYS | 335 | Modern Physics I (3)                                   |
| PHYS | 336 | Modern Physics II (3)                                  |
| PHYS | 381 | Tutoring Physics (2)                                   |
| PHYS | 465 | Computer Applications in Physics (3)                   |
| PHYS | 482 | Teaching Methods and Materials in Physical Science (4) |
| PHYS | 493 | Undergraduate Research (1-6) (2 credits required)      |

#### **Electives (Minimum of 8 Credits)\***

Students may use PHYS 221, PHYS 222, PHYS 223, PHYS 232 and PHYS 233 to fulfill their Physics Electives requirement **only if** PHYS 211 and PHYS 212 are completed successfully.

Alternatively, students with a strong interest in applying advanced mathematical skills to problems in physics are encouraged to choose a minimum of 8 credits\* of higher level Physics or Mathematics as approved by the student's advisor to fulfill the Physics Elective requirement.

\*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.