

# PHYSICS B.A. - TEACHING BROADFIELD SCIENCE

Individuals interested in teaching in K-12 schools must complete a degree in the content area they want to teach plus the Teacher Education Program through the Department of Teaching and Learning. Individuals must complete the teaching track within that degree program, which may contain different course requirements than the non-teaching track since the sequence of courses is designed to meet state standards. Upon completion of the degree program with the teaching track and the secondary licensure program, one will be eligible for a standard Montana teaching license in this content area.

- Secondary Education Licensure Program (<http://www.coehs.umn.edu/departments/currinst/undergradprograms/seced/default.php>)
- Licensure Degree Requirements (<http://catalog.umn.edu/colleges-schools-programs/education/teaching-learning/lic-secondary-licensure/>)

## Bachelor of Arts - Physics; Broadfield Teaching Science Concentration

### General Education Requirements

Information regarding these requirements can be found in the General Education Section (<http://catalog.umn.edu/academics/general-education-requirements/>) of the catalog.

### Summary

| Code | Title                                | Hours        |
|------|--------------------------------------|--------------|
|      | Physics Requirements                 | 24           |
|      | Required Physics Courses             |              |
|      | Physics Elective                     |              |
|      | Math Requirements                    | 15           |
|      | Statistics Requirements              | 3-4          |
|      | Astronomy Requirements               | 4            |
|      | Geology Requirements                 | 7            |
|      | Biology Requirements                 | 12           |
|      | Chemistry Requirements               | 11           |
|      | Advanced College Writing Requirement | 3            |
|      | Teaching Methods Requirement         | 4            |
|      | <b>Total Hours</b>                   | <b>83-84</b> |

**Degree Specific Credits:** 83-84

**Required Cumulative GPA:** 2.0

**Note:** Students must be formally admitted to the Teacher Education Program and complete all of the professional education licensure requirements. See the Department of Teaching and Learning in the College of Education for more information. A major GPA of 2.75 is required to be eligible for student teaching.

### Physics Requirements

**Rule:** Complete the following subcategories. 24 total credits required.

#### Required Physics Courses

| Code  | Title                                    | Hours     |
|---|--|-----------|
| <b>Complete all of the following courses:</b> |  |           |
| PHSX 215N                                     | Fundamentals of Physics with Calculus I  | 4         |
| PHSX 216N                                     | Physics Laboratory I with Calculus       | 1         |
| PHSX 217N                                     | Fundamentals of Physics with Calculus II | 4         |
| PHSX 218N                                     | Physics Laboratory II with Calculus      | 1         |
| PHSX 301                                      | Intro Theoretical Physics                | 3         |
| PHSX 311                                      | Oscillations and Waves                   | 2         |
| PHSX 330                                      | Communicating Physics                    | 3         |
| PHSX 343                                      | Modern Physics                           | 3         |
| <b>Total Hours</b>                            |  | <b>21</b> |

Minimum Required Grade: C-

#### Physics Elective

| Code  | Title | Hours    |
|---|-------|----------|
| <b>Complete 1 additional upper division Physics course.</b> |       | <b>3</b> |
| <b>Total Hours</b>  |       | <b>3</b> |

### Math Requirements

| Code  | Title                                  | Hours     |
|---|--|-----------|
| <b>Complete all of the following courses:</b> |  |           |
| M 171   | Calculus I                             | 4         |
| M 172   | Calculus II                            | 4         |
| M 273   | Multivariable Calculus                 | 4         |
| M 274   | Introduction to Differential Equations | 3         |
| <b>Total Hours</b>                            |  | <b>15</b> |

Minimum Required Grade: C-

### Statistics Requirements

| Code  | Title                                      | Hours      |
|---|--|------------|
| <b>Complete one of the following courses:</b> |  |            |
| STAT 216                                      | Introduction to Statistics                 | 3-4        |
| or STAT 341                                   | Introduction to Probability and Statistics |            |
| <b>Total Hours</b>                            |  | <b>3-4</b> |

Minimum Required Grade: C-

### Astronomy Requirements

| Code  | Title                   | Hours    |
|---|-------------------------|----------|
| <b>Complete all of the following courses:</b> |                         |          |
| ASTR 131N                                     | Planetary Astronomy     | 3        |
| ASTR 134N                                     | Planetary Astronomy Lab | 1        |
| <b>Total Hours</b>                            |                         | <b>4</b> |

Minimum Required Grade: C-

## Geology Requirements

**Rule:** Complete the following subcategories. 7 total credits required.

### Required Geology Courses

| Code  | Title                                | Hours    |
|---|--------------------------------------|----------|
| <b>Complete all of the following courses:</b> |                                      |          |
| GEO 101N                                      | Introduction to Physical Geology     | 3        |
| GEO 102N                                      | Introduction to Physical Geology Lab | 1        |
| <b>Total Hours</b>                            |                                      | <b>4</b> |

Minimum Required Grade: C-

### Geology Electives

| Code  | Title             | Hours    |
|---|-------------------|----------|
| <b>Complete one of the following courses:</b> |                   |          |
| ASTR 351                                      | Planetary Science | 3        |
| GEO 105N                                      | Oceanography      | 3        |
| <b>Total Hours</b>                            |                   | <b>3</b> |

Minimum Required Grade: C-

## Biology Requirements

| Code  | Title                            | Hours     |
|---|----------------------------------|-----------|
| <b>Complete all of the following courses:</b> |                                  |           |
| BIOB 160N                                     | Principles of Living Systems     | 3         |
| BIOB 161N                                     | Principles of Living Systems Lab | 1         |
| BIOB 260                                      | Cellular and Molecular Biology   | 4         |
| BIOB 272                                      | Genetics and Evolution           | 4         |
| <b>Total Hours</b>                            |                                  | <b>12</b> |

Minimum Required Grade: C-

## Chemistry Requirements

| Code  | Title  | Hours     |
|---|--|-----------|
| <b>Complete all of the following courses:</b> |  |           |
| CHMY 141N<br>& CHMY 142N                      | College Chemistry I<br>and College Chemistry I Lab   | 5         |
| CHMY 143N<br>& CHMY 144N                      | College Chemistry II<br>and College Chemistry II Lab | 5         |
| CHMY 485                                      | Laboratory Safety                                    | 1         |
| <b>Total Hours</b>                            |  | <b>11</b> |

Minimum Required Grade: C-

## Advanced College Writing Requirement

**Note:** May substitute another advanced writing course as approved by the department chair.

| Code                                  | Title                 | Hours    |
|---------------------------------------|-----------------------|----------|
| <b>Complete the following course:</b> |                       |          |
| PHSX 330                              | Communicating Physics | 3        |
| <b>Total Hours</b>                    |                       | <b>3</b> |

Minimum Required Grade: C-

## Teaching Methods Requirement

**Note:** The EDU 497 course number is used for multiple courses. Students should register for EDU 497 Methods: 5-12 Science.

| Code                                  | Title                  | Hours    |
|---------------------------------------|------------------------|----------|
| <b>Complete the following course:</b> |                        |          |
| EDU 497                               | Teaching and Assessing | 3        |
| <b>Total Hours</b>                    |                        | <b>3</b> |

Minimum Required Grade: C-

## Secondary Teaching Licensure

**Note:** For endorsement to teach Physics, Broadfield Science, a student also must gain admission to the Teacher Education Program and meet all the requirements for secondary teaching licensure (<http://catalog.umn.edu/colleges-schools-programs/education/teaching-learning/lic-secondary-licensure/>). For more information, see the Teaching and Learning Department (<http://catalog.umn.edu/colleges-schools-programs/education/teaching-learning/>).