# PHYSICS

## Bachelor of Arts - Physics

**College Humanities & Sciences**

**Degree Specific Credits:** 68

**Required Cumulative GPA:** 2.0

**Catalog Year:** 2017-2018

## General Education Requirements

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

## Summary

<table>
<thead>
<tr>
<th>Lower Division Physics</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>College Physics</td>
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<tr>
<td>Physics with Calculus</td>
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<tr>
<td>Upper Division Physics</td>
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<tr>
<td>Physics Electives</td>
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<td>Math Requirements</td>
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<td>Computer Science Requiremets</td>
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<td>Advanced College Writing Requirement</td>
<td>3</td>
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<tr>
<td><strong>Total Hours</strong></td>
<td>68</td>
</tr>
</tbody>
</table>

### Lower Division Physics

**Rule:** Must complete all of the courses in one of the two sequences:

#### Physics

Select one of the following Physics sequences:

- Algebra- and Trigonometry-based:
  - PHSX 205N & PHSX 206N
  - College Physics I and College Physics I Laboratory
  - PHSX 207N & PHSX 208N
  - College Physics II and College Physics II Laboratory

- Calculus-based (strongly recommended):
  - PHSX 215N & PHSX 216N
  - Fund of Physics w/Calc I and Physics Laboratory I w/Calc
  - PHSX 217N & PHSX 218N
  - Fund of Physics w/Calc II and Physics Laboratory II w/Calc

**Total Hours:** 10

**Minimum Required Grade:** C-

### Upper Division Physics

**Rule:** Complete the following courses

- PHSX 301 Intro Theoretical Physics
- PHSX 311 Oscillations and Waves
- PHSX 320 Classical Mechanics
- PHSX 323 Intermediate Physics Lab
- PHSX 343 Modern Physics
- PHSX 423 Electricity & Magnetism I
- PHSX 444 Advanced Physics Lab
- PHSX 461 Quantum Mechanics I
- PHSX 499 Senior Capstone Seminar

<table>
<thead>
<tr>
<th>Choose any 2 courses from the following</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 425 Electricity &amp; Magnetism II</td>
<td></td>
</tr>
<tr>
<td>PHSX 446 Thermodynamics &amp; Stat Mech</td>
<td></td>
</tr>
<tr>
<td>PHSX 462 Quantum Mechanics II</td>
<td></td>
</tr>
</tbody>
</table>

**Total Hours:** 30

**Minimum Required Grade:** C-

## Physics Electives

**Note:** Other PHSX courses may be substituted with adviser approval.

Select two courses from the following list:

- PHSX 141N Einstein's Relativity
- or ASTR 142N The Evolving Universe
- PHSX 327 Optics
- PHSX 330 Communicating Physics
- PHSX 333 Computational Physics
- PHSX 425 Electricity & Magnetism II (2 of these 3 courses must be taken in the physics core, the remaining course can be used as an elective)
- or PHSX 446 Thermodynamics & Stat Mech
- or PHSX 462 Quantum Mechanics II

**Total Hours:** 6

**Minimum Required Grade:** C-

## Math Requirements

**Rule:** Complete all of the following courses

- M 171 Calculus I
- M 172 Calculus II
- M 221 Introduction to Linear Algebra
- M 273 Multivariable Calculus

**Total Hours:** 16

**Minimum Required Grade:** C-

## Computer Science Requirements

Select one of the following:

- CSCI 100 Intro to Programming
- CSCI 135 Fund of Computer Science I
- CSCI 250 Computer Mdlng/Science Majors (strongly recommended)
- PHSX 333 Computational Physics (strongly recommended)

**Total Hours:** 3

**Minimum Required Grade:** C-
Advanced College Writing Requirement

**Rule:** Must take the following course

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 330</td>
<td>Communicating Physics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

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Teaching Physics Track

Individuals interested in teaching in K-12 schools must complete a degree in the content area they want to teach plus the teacher preparation program through the Department of Teaching and Learning. Individuals must complete the teaching major/teaching track within that degree program, which may contain different course requirements than the academic major 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.umt.edu/departments/currinst/undergradprograms/seced/default.php)
- Licensure Degree Requirements (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences/teaching-learning/lic-secondary-licensure)

To sign up for this option, you need to contact the Teaching and Learning Department. Do not fill out a major/minor form for graduation or the major/minor/concentration section of the major change form. Approvals for this option must come from the Teaching and Learning Department.

Tracks will not appear on your UM transcript, diploma, university lists, student data system, or university publication and are used for advising purposes only. You do not fill out a major change for a track.

Teaching Licensure Requirements

**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 (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences/teaching-learning) in the College of Education and Human Sciences for more information. A major GPA of 2.75 is required to be eligible for student teaching. This major does not qualify as a single field endorsement. Individuals must complete a second teaching major or minor in another content area.

Teaching Licensure Course

**Rule:** Must complete the following course

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 497</td>
<td>Teaching and Assessing</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-