PHYSICS B.A. - COMPUTATIONAL PHYSICS

The computational physics concentration provides a thorough study of computer science and computational physics as well as a solid background in physics and mathematics. Graduates from this program have gone on to graduate programs in physics and computer science while others have found career opportunities in technical fields.

Bachelor of Arts - Physics; Computational Physics Concentration

College of Humanities & Sciences

Degree Specific Credits: 73

Required Cumulative GPA: 2.0

Catalog Year: 2018-2019

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>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower-Division Physics Core</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Upper-Division Physics Core</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Physics Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math Requirements</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Computer Science Requirements</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Computer Science Core Courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced College Writing Requirement</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>73</td>
<td></td>
</tr>
</tbody>
</table>

Lower-Division Physics Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra- and Trigonometry-based Physics:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHSX 205N &amp; PHSX 206N</td>
<td>College Physics I and College Physics I Laboratory</td>
<td>10</td>
</tr>
<tr>
<td>PHSX 207N &amp; PHSX 208N</td>
<td>College Physics II and College Physics II Laboratory</td>
<td></td>
</tr>
<tr>
<td>Calculus-based Physics (strongly recommended):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHSX 215N &amp; PHSX 216N</td>
<td>Fund of Physics w/Calc I and Physics Laboratory I w/Calc</td>
<td></td>
</tr>
<tr>
<td>PHSX 217N &amp; PHSX 218N</td>
<td>Fund of Physics w/Calc II and Physics Laboratory II w/Calc</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Upper-Division Physics Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete all of the following courses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHSX 301</td>
<td>Intro Theoretical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 311</td>
<td>Oscillations and Waves</td>
<td>2</td>
</tr>
<tr>
<td>PHSX 320</td>
<td>Classical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 333</td>
<td>Computational Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 343</td>
<td>Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 423</td>
<td>Electricity &amp; Magnetism I</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 499</td>
<td>Senior Capstone Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Total Hours</td>
<td>18</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Physics Elective

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete one of the following courses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHSX 141N</td>
<td>Einstein's Relativity</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 323</td>
<td>Intermediate Physics Lab</td>
<td></td>
</tr>
<tr>
<td>PHSX 327</td>
<td>Optics</td>
<td></td>
</tr>
<tr>
<td>PHSX 330</td>
<td>Communicating Physics</td>
<td></td>
</tr>
<tr>
<td>PHSX 425</td>
<td>Electricity &amp; Magnetism II (strongly recommended)</td>
<td></td>
</tr>
<tr>
<td>PHSX 444</td>
<td>Advanced Physics Lab</td>
<td></td>
</tr>
<tr>
<td>PHSX 446</td>
<td>Thermodyn &amp; Stat Mech</td>
<td></td>
</tr>
<tr>
<td>PHSX 461</td>
<td>Quantum Mechanics I (strongly recommended)</td>
<td></td>
</tr>
<tr>
<td>PHSX 462</td>
<td>Quantum Mechanics II</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Math Requirements

Note: In addition, M 307, STAT 341, and STAT 458 are recommended.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete all of the following courses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 171</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>M 172</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>M 221</td>
<td>Introduction to Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>M 225</td>
<td>Introduction to Discrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>M 273</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Total Hours</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Computer Science Requirements

Rule: Complete the following subcategories of courses. 20 total credits required.
Computer Science Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 135</td>
<td>Fund of Computer Science I</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 136</td>
<td>Fund of Computer Science II</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 232</td>
<td>Data Structures and Algorithms</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 332</td>
<td>Design/Analysis of Algorithms</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Computer Science Electives

Complete 7 credits from any CSCI course numbered 200 and above. The following courses are recommended:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 205</td>
<td>Programming Languages w/ C/C++</td>
<td></td>
</tr>
<tr>
<td>CSCI 361</td>
<td>Computer Architecture</td>
<td></td>
</tr>
<tr>
<td>CSCI 477</td>
<td>Simulation</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Advanced College Writing Requirement

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</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><strong>3</strong></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-