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

Catalog Year: 2022-23

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>
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<tbody>
<tr>
<td></td>
<td>Lower-Division Physics Core</td>
<td>10</td>
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<tr>
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<td>Upper-Division Physics Core</td>
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<td></td>
<td>Physics Elective</td>
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<td>Math Requirements</td>
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<td>Computer Science Requirements</td>
<td>20</td>
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<tr>
<td></td>
<td>Computer Science Core Courses</td>
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<td>Computer Science Electives</td>
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<td>Advanced College Writing Requirement</td>
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<td>Total Hours</td>
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Degree Specific Credits: 73

Required Cumulative GPA: 2.0

Lower-Division Physics Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td></td>
<td>Complete one of the following Physics sequences:</td>
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<tr>
<td></td>
<td>Algebra- and Trigonometry-based Physics:</td>
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<tr>
<td></td>
<td>PHSX 205N &amp; PHSX 206N</td>
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<tr>
<td></td>
<td>College Physics I &amp; College Physics I Laboratory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PHSX 207N &amp; PHSX 208N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>College Physics II &amp; College Physics II Laboratory</td>
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</tr>
<tr>
<td></td>
<td>Calculus-based Physics (strongly recommended):</td>
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</tr>
<tr>
<td></td>
<td>PHSX 215N &amp; PHSX 216N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fundamentals of Physics with Calculus I &amp; Physics Laboratory I with Calculus</td>
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<tr>
<td></td>
<td>PHSX 217N &amp; PHSX 218N</td>
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<tr>
<td></td>
<td>Fundamentals of Physics with Calculus II &amp; Physics Laboratory II with Calculus</td>
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<td>Total Hours</td>
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</table>

Minimum Required Grade: C-

Upper-Division Physics Core

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>Complete all of the following courses:</td>
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<tr>
<td>PHSX 301</td>
<td>Intro Theoretical Physics</td>
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<tr>
<td>PHSX 311</td>
<td>Oscillations and Waves</td>
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<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>
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<tr>
<td>PHSX 423</td>
<td>Electricity &amp; Magnetism I</td>
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<td>PHSX 499</td>
<td>Senior Capstone Seminar</td>
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Minimum Required Grade: C-

Physics Elective

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<tr>
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<th>Hours</th>
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<tr>
<td></td>
<td>Complete one of the following courses:</td>
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<tr>
<td>PHSX 141N</td>
<td>Einstein's Relativity</td>
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</tr>
<tr>
<td>PHSX 323</td>
<td>Intermediate Physics Lab</td>
<td></td>
</tr>
<tr>
<td>PHSX 327</td>
<td>Optics</td>
<td></td>
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<tr>
<td>PHSX 330</td>
<td>Communicating Physics</td>
<td></td>
</tr>
<tr>
<td>PHSX 425</td>
<td>Electricity &amp; Magnetism II (strongly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recommended)</td>
<td></td>
</tr>
<tr>
<td>PHSX 444</td>
<td>Advanced Physics Lab</td>
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</tr>
<tr>
<td>PHSX 446</td>
<td>Thermodynamics &amp; Statistical Mechanics</td>
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<tr>
<td>PHSX 461</td>
<td>Quantum Mechanics I (strongly recommended)</td>
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<tr>
<td>PHSX 462</td>
<td>Quantum Mechanics II</td>
<td></td>
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</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></td>
<td>Complete all of the following courses:</td>
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<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>
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</tr>
<tr>
<td>M 225</td>
<td>Introduction to Discrete Mathematics</td>
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<tr>
<td>M 273</td>
<td>Multivariable Calculus</td>
<td>4</td>
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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>
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<tbody>
<tr>
<td>CSCI 151</td>
<td>Interdisciplinary Computer Science I</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 152</td>
<td>Interdisciplinary Computer Science II</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 232</td>
<td>Intermediate Data Structures and Algorithms</td>
<td>4</td>
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<tr>
<td>CSCI 332</td>
<td>Advanced Data Structures and Algorithms</td>
<td>3</td>
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</table>

**Total Hours**: 13

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>
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<tbody>
<tr>
<td>CSCI 205</td>
<td>Programming with C/C++</td>
<td></td>
</tr>
<tr>
<td>CSCI 361</td>
<td>Computer Architecture</td>
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<tr>
<td>CSCI 477</td>
<td>Simulation</td>
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**Total Hours**: 7

Minimum Required Grade: C-

**Advanced College Writing Requirement**

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

<table>
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<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>PHSX 330</td>
<td>Communicating Physics</td>
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**Total Hours**: 3

Minimum Required Grade: C-