PHYSICS (B.S.)

For information about the B.S. in Physics, M.S. in Mechanical Engineering (an external, 5-year dual degree program with Stevens Institute of Technology), click here (https://www.montclair.edu/physics-astronomy/2020/09/15/partnership-with-stevens-yields-new-32-program/).

Unless otherwise noted, 120 credits of coursework is required for the baccalaureate degree with a minimum 2.0 overall GPA, and a minimum 2.0 major GPA.

Program Requirements Overview

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>World Languages and Cultures Requirements</td>
<td></td>
<td>3-6</td>
</tr>
<tr>
<td>Major Requirements</td>
<td></td>
<td>71-75</td>
</tr>
<tr>
<td>Free Electives</td>
<td></td>
<td>14-7</td>
</tr>
<tr>
<td>Total Credits</td>
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<td>120</td>
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</table>

1 Graduate Swing Courses will count toward free electives for students in combined (UG/GR) programs.

Major Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHYS 191</td>
<td>University Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 192</td>
<td>University Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 198</td>
<td>Introductory Physics Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 210</td>
<td>Intermediate Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 220</td>
<td>Oscillations, Waves, and Optics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 230</td>
<td>Intermediate Physics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 300</td>
<td>Junior/Senior Physics Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 320</td>
<td>Statistical and Thermal Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 330</td>
<td>Advanced Physics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 340</td>
<td>Electricity and Magnetism</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 360</td>
<td>Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 464</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 477</td>
<td>Mathematical Physics</td>
<td></td>
</tr>
</tbody>
</table>

Select 9-12 credits from the list below. 9-12

Physics Elective Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 120</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 121</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CSIT 104</td>
<td>Python Programming I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 122</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>or AMAT 120</td>
<td>Applied Calculus A</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>or AMAT 220</td>
<td>Applied Calculus B</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>AMAT 350</td>
<td>Applied Mathematics I</td>
<td>3-4</td>
</tr>
<tr>
<td>or MATH 325</td>
<td>Ordinary Differential Equation</td>
<td></td>
</tr>
</tbody>
</table>

or PHYS 377  Mathematical Physics

Total Credits 71-75

Major Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 180</td>
<td>Astronomy for Everyone</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 245</td>
<td>Fundamentals of Electronics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 280</td>
<td>Astronomy for Physicists</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 310</td>
<td>Advanced Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 325</td>
<td>Computational Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 341</td>
<td>Electronics and Digital Circuits</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 350</td>
<td>Modern Optics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 368</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 377</td>
<td>Mathematical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 380</td>
<td>Observational Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 399</td>
<td>Special Topics in Physics</td>
<td>1-4</td>
</tr>
<tr>
<td>PHYS 451</td>
<td>Radiation and Medical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 461</td>
<td>General Relativity</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 462</td>
<td>Nuclear Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 470</td>
<td>Solid State Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 480</td>
<td>Astrophysics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 495</td>
<td>Research or Independent Study in Physics</td>
<td>1-4</td>
</tr>
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</table>

General Education Requirements

Click here for a list of courses that fulfill General Education categories. (http://catalog.montclair.edu/programs/general-education-requirements-ba-bs/)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. New Student Seminar</td>
<td>Complete a 1 credit New Student Seminar course.</td>
<td>1</td>
</tr>
<tr>
<td>C. Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Writing</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2. Literature</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3. Communication</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>D. Fine and Performing Arts</td>
<td>Complete a 3 credit Fine and Performing Arts course.</td>
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</tr>
<tr>
<td>F. Humanities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Great Works and Their Influences</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2. Philosophical and Religious Perspectives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>G. Computer Science</td>
<td></td>
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</tr>
<tr>
<td>CSIT 104</td>
<td>Python Programming I (Fulfilled in the major.)</td>
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</tr>
<tr>
<td>H. Mathematics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Natural Science Laboratory</td>
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<td></td>
</tr>
<tr>
<td>J. Physical Education</td>
<td>Complete a 1 credit Physical Education course.</td>
<td>1</td>
</tr>
<tr>
<td>K. Social Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. American and European History</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2. Global Cultural Perspectives</td>
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<td>3</td>
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</table>
Course selected must also satisfy the World Cultures requirement.

3. Social Science Perspectives

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

L. Interdisciplinary Studies

Complete a 3 credit Interdisciplinary Studies course.

Total Credits 32

World Languages and Cultures Requirements

Click here for a list of courses that fulfill World Languages and Cultures categories. (http://catalog.montclair.edu/programs/world-languages-and-cultures-requirements/)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3-6</td>
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</tbody>
</table>

World Languages

Based on language placement exam, complete one or two sequential courses in the same language. Requirement is automatically fulfilled by language major courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3-6</td>
</tr>
</tbody>
</table>

World Cultures

Requirement may be fulfilled by course selected in General Education 0-3 Social Science: Global Cultural Perspectives. Requirement may also be fulfilled by major coursework. See list of courses.

Total Credits 3-9

Recommended Roadmap to Degree Completion

This four-year plan is provided as an outline for students to follow in order to complete their degree requirements within four years. This plan is a recommendation and students should only use it in consultation with their academic advisor.

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL EDUCATION: (A) New Student Seminar</td>
<td>1</td>
<td>GENERAL EDUCATION: (C2) Literature</td>
<td>3</td>
</tr>
<tr>
<td>GENERAL EDUCATION: (C1) Writing</td>
<td>3</td>
<td>GENERAL EDUCATION: (C3) Communication</td>
<td>3</td>
</tr>
<tr>
<td>AMAT 120 or MATH 122</td>
<td>4</td>
<td>AMAT 220 or MATH 221</td>
<td>4</td>
</tr>
<tr>
<td>CSIT 104</td>
<td>3</td>
<td>PHYS 192</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 191</td>
<td>4</td>
<td>PHYS 198</td>
<td>1</td>
</tr>
<tr>
<td>Total Credits</td>
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<td>15</td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL EDUCATION: (K3) Social Science – Social Science Perspectives</td>
<td>3</td>
<td>AMAT 350, MATH 325, or PHYS 377</td>
<td>3</td>
</tr>
<tr>
<td>GENERAL EDUCATION: (L) Interdisciplinary Studies</td>
<td>3</td>
<td>CHEM 121</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 120</td>
<td>4</td>
<td>PHYS 320</td>
<td>3</td>
</tr>
<tr>
<td>MATH 222</td>
<td>4</td>
<td>PHYS 340</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 210</td>
<td>3</td>
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<tr>
<td>Total Credits</td>
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<td>13</td>
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