**PHYSICS (PHYS)**

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. Since some of the required courses are not offered every semester, students entering the Major in Honours Physics should plan their program in consultation with the Department of Physics Faculty Advisor.

**Major (Honours Program)**

This major requires the completion of 20.00 credits. At least 1.00 credits must be from Arts and/or Social Science courses.

Students who are lacking one 4U/grade 12 course in Biology, Chemistry or Physics must take the equivalent introductory course in first semester. The required first-year science courses in that subject should be completed according to the revised schedule of studies available at: https://www.uoguelph.ca/bsc/revised_SS/

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1040</td>
<td>General Chemistry I</td>
<td>0.50</td>
</tr>
<tr>
<td>CIS*1300</td>
<td>Programming</td>
<td>0.50</td>
</tr>
<tr>
<td>IPS*1500</td>
<td>Integrated Mathematics and Physics I</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Select 0.50 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Biodiversity</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOL*1090</td>
<td>Introduction to Molecular and Cellular Biology</td>
<td>0.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM*1050</td>
<td>General Chemistry II</td>
<td>0.50</td>
</tr>
<tr>
<td>IPS*1510</td>
<td>Integrated Mathematics and Physics II</td>
<td>1.00</td>
</tr>
<tr>
<td>MATH*1160</td>
<td>Linear Algebra I</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Select 0.50 credits from the following:

<table>
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<tr>
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<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BIOL*1070</td>
<td>Discovering Biodiversity</td>
<td>0.50</td>
</tr>
<tr>
<td>BIOL*1080</td>
<td>Biological Concepts of Health</td>
<td>0.50</td>
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<td>BIOL*1090</td>
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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH*2200</td>
<td>Advanced Calculus I</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*2270</td>
<td>Applied Differential Equations</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2240</td>
<td>Thermal Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2330</td>
<td>Electricity and Magnetism I</td>
<td>0.50</td>
</tr>
<tr>
<td>0.50 Liberal Education electives</td>
<td></td>
<td>0.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*2180</td>
<td>Experimental Techniques in Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2310</td>
<td>Mechanics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2340</td>
<td>Electricity and Magnetism II</td>
<td>0.50</td>
</tr>
<tr>
<td>1.00 electives</td>
<td></td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPS*3000</td>
<td>Science Communication</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3130</td>
<td>Mathematical Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3230</td>
<td>Quantum Mechanics I</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3400</td>
<td>Advanced Mechanics</td>
<td>0.50</td>
</tr>
<tr>
<td>0.50 electives</td>
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<td>0.50</td>
</tr>
</tbody>
</table>

**Semester 6**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>NANO*3600</td>
<td>Computational Methods in Materials Science</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3000</td>
<td>Optics: Fundamentals and Applications</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*3510</td>
<td>Intermediate Laboratory</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4040</td>
<td>Quantum Mechanics II</td>
<td>0.50</td>
</tr>
<tr>
<td>MATH*3260</td>
<td>Complex Analysis (or 0.50 electives)</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**Semester 7**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*4500</td>
<td>Advanced Physics Laboratory</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4180</td>
<td>Advanced Electromagnetic Theory</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4240</td>
<td>Statistical Physics II (or 0.50 electives)</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4001</td>
<td>Research in Physics (or 0.50 electives)</td>
<td>0.50</td>
</tr>
<tr>
<td>0.50 electives</td>
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<td>0.50</td>
</tr>
</tbody>
</table>

**Semester 8**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*4002</td>
<td>Research in Physics (or 0.50 electives)</td>
<td>0.50</td>
</tr>
<tr>
<td>2.00 electives</td>
<td></td>
<td>2.00</td>
</tr>
</tbody>
</table>

Students who have taken physics courses other than IPS*1500 Integrated Mathematics and Physics I or PHYS*1080 Physics for Life Sciences in Semester 1 and IPS*1510 Integrated Mathematics and Physics II or PHYS*1010 Introductory Electricity and Magnetism in Semester 2 may proceed to semester 3 with the permission of the Department of Physics (https://www.physics.uoguelph.ca/)

Students going on to graduate school in physics should take PHYS*4002 Research in Physics, PHYS*4120 Atomic and Molecular Physics, PHYS*4130 Subatomic Physics, PHYS*4150 Solid State Physics, PHYS*4240 Statistical Physics II

At least 1.00 credits must be from the restricted electives listed below.

**Restricted Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*4120</td>
<td>Atomic and Molecular Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4130</td>
<td>Subatomic Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*4150</td>
<td>Solid State Physics</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**Credit Summary**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First year science credits</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>Required science courses semesters 3 – 8</td>
<td>8.50</td>
</tr>
<tr>
<td></td>
<td>Restricted Electives</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Approved Science Electives</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>Liberal Education Electives</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Free Electives - any approved elective for B.Sc. students</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>Total Credits</td>
<td>20</td>
</tr>
</tbody>
</table>
Of the total credits required, students are required to complete 16.00 credits in science of which 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

**Minor (Honours Program)**

A minor in Physics requires 5.00 credits in interdisciplinary physical science or physics courses including:

<table>
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<tbody>
<tr>
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<td>Experimental Techniques in Physics</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2310</td>
<td>Mechanics</td>
<td>0.50</td>
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<tr>
<td>PHYS*2330</td>
<td>Electricity and Magnetism I</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*2340</td>
<td>Electricity and Magnetism II</td>
<td>0.50</td>
</tr>
</tbody>
</table>

A maximum of 1.00 credits from the following courses may be used towards the minor:

<table>
<thead>
<tr>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS*1010</td>
<td>Introductory Electricity and Magnetism</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1070</td>
<td>Physics for Life Sciences II</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1080</td>
<td>Physics for Life Sciences</td>
<td>0.50</td>
</tr>
<tr>
<td>PHYS*1130</td>
<td>Physics with Applications</td>
<td>0.50</td>
</tr>
<tr>
<td>IPS*1510</td>
<td>Integrated Mathematics and Physics II</td>
<td>1.00</td>
</tr>
</tbody>
</table>

A minimum of 1.00 credits are required at the 3000 or 4000 level.

**Note:** PHYS*1300 Fundamentals of Physics, PHYS*1600 Contemporary Astronomy and PHYS*1810 Physics of Music may not be taken for credit toward this minor.