**Physics - Doctor of Philosophy (PhD)**

Graduate study and opportunities for basic research are offered in the areas of nuclear physics, theoretical physics, condensed matter physics, elementary particle physics, plasma physics, atomic and molecular physics, optical science and engineering, laser physics, fundamental measurements, liquid crystal science and technology, biophysics, and physics education research.

Doctoral programs in chemical physics (catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/chemistry-biochemistry/chemical-physics-doctor-philosophy-phd) and geophysics (catalog.colorado.edu/graduate/colleges-schools/arts-sciences/programs-study/geological-sciences/geophysics-doctor-philosophy-phd) are offered jointly with the Department of Chemistry and with the other departments that participate in the interdepartmental geophysics program.

**Requirements**

**Prerequisites**

Entering graduate students must have a thorough undergraduate preparation in physics, equivalent to an undergraduate physics major at a recognized college or university. This preparation includes courses in general physics, analytical mechanics, electricity and magnetism, thermodynamics, quantum mechanics, atomic physics and mathematics through differential equations and complex variables.

Students wishing to pursue graduate work in physics leading to candidacy for an advanced degree should carefully read the Doctoral Degree Requirements (catalog.colorado.edu/graduate/degree-requirements/doctoral-degree-requirements) section of this catalog.

**Qualifying Examination**

The Graduate Record Examination aptitude tests and advanced test in physics are normally used in place of a qualifying examination, and this examination is normally taken before the time of entry into the Graduate School.

**Course Requirements**

To earn a PhD, candidates must complete 30 credit hours of graduate courses and 30 hours of dissertation credit. At least 27 of the 30 credit hours of course work must be physics courses at the 5000 level or above; exceptions may be granted with the discretion of the associate chair of graduate studies. All courses, required or otherwise, must be passed with a grade of B- or better, and a course may be repeated only once.

**Comprehensive Examination**

The comprehensive examination is divided into three parts. Part I consists of passing any five of the following six courses with a B- or better:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 5210</td>
<td>Theoretical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 7230</td>
<td>Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5250</td>
<td>Introduction to Quantum Mechanics 1</td>
<td>3</td>
</tr>
<tr>
<td>&amp; PHYS 5260</td>
<td>and Introduction to Quantum Mechanics 2</td>
<td>6</td>
</tr>
</tbody>
</table>

The associate chair may waive courses for students with graduate-level equivalents. Part II is a three-section examination that includes a formal research review paper and a formal presentation, followed by a question-and-answer oral session. Part III consists of a thesis prospectus presented to the thesis committee.

Part II of the comprehensive examination must be taken after successful completion of Part I, but no later than the student’s sixth enrolled regular semester. Part III will generally take place the semester following Part II. Parts II and III of the comprehensive examination may be taken a second time, no more than one semester after the first attempt.

**Language Requirement**

The department has no requirement in foreign languages.