Physics M.S.

The graduate plan in Physics leads to the master of science (M.S.) degree at UHCL. The goal of this program is to prepare students for Ph.D. level work and advanced research in Physics and Astronomy. This program also serves to expand the knowledge base of practicing engineers. Students in this program gain better problem-solving abilities as well as increased knowledge of several aspects of Physics and Astronomy. The physics program provides students with a deeper understanding of the essential science used in many of the engineering disciplines and in the space industry.

Degree Requirements

Physics Basic Preparation

Applicants for candidacy should have a Bachelor of Science (B.S.) degree in one of the physical sciences, mathematics or engineering disciplines. Applicants with other degrees may also apply if they meet the requirements listed below. Equivalent courses or appropriate substitutions will be determined in consultation with a faculty adviser. If background deficiencies exist, students may be required to take courses that will not apply toward the graduate degree.

Students should take the following courses (or equivalents) in preparation for the program. (Note: PHYS 3311 and PHYS 3312 satisfy many of these requirements):

- University Physics I and II with Laboratory
- Modern Physics with Laboratory
- Calculus I, II and III
- Differential Equations
- Complex Variables
- Linear Algebra
- Probability and Statistics
- Intermediate Electromagnetism
- Intermediate Mechanics
- Quantum Theory
- Thermodynamics and Statistical Mechanics

Physics Core Requirements

<table>
<thead>
<tr>
<th>Physics Core Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following 24 hours of graduate physics courses are required for both the thesis and extended coursework options.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PHYS 5331</td>
<td>Electrodynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5311</td>
<td>Recitation for Electrodynamics</td>
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</tr>
<tr>
<td>PHYS 5431</td>
<td>Classical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5411</td>
<td>Recitation for Classical Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 5531</td>
<td>Mathematical Methods</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5511</td>
<td>Recitation for Mathematical Methods in Physics I</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 5631</td>
<td>Quantum Mechanics I</td>
<td>3</td>
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<tr>
<td>PHYS 5611</td>
<td>Recitation for Quantum Mechanics I</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 5632</td>
<td>Quantum Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5612</td>
<td>Recitation for Quantum Mechanics II</td>
<td>1</td>
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<tr>
<td>PHYS 5731</td>
<td>Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 5711</td>
<td>Recitation for Statistical Mechanics</td>
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</table>

Additional Information

PHYS 5532, PHYS 5612: (Not required for students completing the sub-plan in technical management)
Physics Advanced Electives

Advanced SCE courses that meet the needs of students’ professional goals may be selected in consultation with a faculty adviser.

Physics Thesis Option

Under the thesis option, a minimum of 24 hours of formal course work must be completed. In addition, students must complete a minimum of six hours of PHYS 6939; Master’s Thesis Research. A maximum of 12 hours of PHYS 6939 can be applied toward graduation requirements. Remaining course work for a total of 36 hours may come from additional formal courses.

Physics Non-Thesis Option

Under the non-thesis option, a minimum of 30 hours of formal course work must be completed. In addition, students must choose an adviser and complete three credit hours of Independent Research (PHYS 5739, PHYS 5939 or PHYS 6837) and three hours in the Research Project and Seminar Course (PHYS 6838). Students completing the sub-plan in Technical Management should take either PHYS 5739 or PHYS 6838.

Specialization Requirements

Engineering Management Specialization

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMGT 5130</td>
<td>New Business Development</td>
<td>3</td>
</tr>
<tr>
<td>EMGT 5131</td>
<td>Legal Issues in Engineering Management</td>
<td>3</td>
</tr>
<tr>
<td>EMGT 5231</td>
<td>Engineering Management Planning</td>
<td>3</td>
</tr>
<tr>
<td>EMGT 5430</td>
<td>Professional Project Management</td>
<td>3</td>
</tr>
<tr>
<td>EMGT 5530</td>
<td>Organizational Analysis and Management</td>
<td>3</td>
</tr>
<tr>
<td>EMGT 5531</td>
<td>Technology Planning and Management</td>
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</tbody>
</table>

Systems Engineering Specialization

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>SENG 5130</td>
<td>Systems Engineering Processes</td>
<td>3</td>
</tr>
<tr>
<td>SENG 5230</td>
<td>Systems Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>SENG 5231</td>
<td>Concurrent Engineering</td>
<td>3</td>
</tr>
<tr>
<td>SENG 5330</td>
<td>Risk Management</td>
<td>3</td>
</tr>
<tr>
<td>SENG 5332</td>
<td>Decision Analysis for Systems</td>
<td>3</td>
</tr>
<tr>
<td>SENG 5532</td>
<td>Advanced Decision Analysis for System Engineering</td>
<td>3</td>
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</tbody>
</table>

Management Specialization

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MGMT 5032</td>
<td>Human Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 5133</td>
<td>Teamwork and Leadership Skills: Theory in Practice</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 5233</td>
<td>Entrepreneurship and Corporate</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 5331</td>
<td>Personnel Management</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 5636</td>
<td>Management of Technology</td>
<td>3</td>
</tr>
</tbody>
</table>

Technical Management Specialization

A good technical manager needs both an advanced broad-based technical background and insight into how to lead a team of people from different technical disciplines. Because physics is the scientific basis of all engineering, it can satisfy much of the broad-based technical requirement for a degree training technical managers. The physics core is complemented by a combination of systems engineering, engineering management and management courses in order to create a plan that provides both the technical background and the leadership training. This results in a unique new approach to training technical managers. Please note that students in this specialization are not required to take PHYS 5532/PHYS 5612. Students enrolled in the Technical Management Specialization should choose 4 courses from those shown below.
<table>
<thead>
<tr>
<th>MGMT 5638</th>
<th>Leading Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Credit Hours: 3</td>
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</tbody>
</table>