Introduction

Please click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/physics/) to see Physics department information.

The department of Physics at the University of Colorado Denver enriches understanding of how the world works by incorporating physics in every aspect of life. Good intuition about how things work has been, since the time of Galileo, a hallmark of physicists.

CU Denver's faculty is committed to providing substantive applied research experiences for our undergraduate students by incorporating aspects of every day life into their classrooms and research. A major in physics is one of the few academic degree programs that prepares its students for an amazing array of careers including computer analyst, engineer, technical writer, industrial marketer, doctor, and lawyer.

Our faculty is committed to providing students with opportunities for laboratory experience in a research environment. Students work elbow-to-elbow with their professor mentors on such projects as:

- Applying chaos and complex systems theory to problems ranging from the onset of turbulence in fluid flows to the erratic motions of loads hanging from cranes aboard ships at sea
- Study of quasar jets and other associated dynamical properties, supernovae and nucleosynthesis
- Superconducting Quantum Interference Devices (SQUIDs) specifically the fabrication of microelectronic SQUIDs
- Applying non-linear dynamics and stochastic modeling to biological systems to understand how variations in genotype can lead to unique behavior
- Developing detection techniques in the search for the Dark Matter component of our Universe
- Applying physics to archaeology and historic preservation
- Developing ways to help students learn physics better

Those students intending to major in physics should have a high school background that includes trigonometry, advanced algebra, chemistry and physics, as well as a good preparation in the arts and humanities. Students have an option during their freshman year to overcome some deficiencies in these areas. Students preparing for employment in an interdisciplinary area (such as environmental, geophysical or energy study) can choose to add an appropriate minor or arrange a specific major program on an individual basis. Students interested in teaching physics in high school are encouraged to consider the CLAS educational minor in addition to their individual major requirements.

To earn a degree, students must satisfy all requirements in each of the three areas below, in addition to their individual major requirements.

For more information, contact:

Michael "Bodhi" Rogers (Physics advisor)
Email: physics.chair@ucdenver.edu
Office: North Classroom 3123B

Program Delivery

- This is an on-campus program.

Declaring This Major

- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/physics/physics-bs/BMA_form_1_1_.pdf) to formally declare this program, as they work very closely with undergraduate and graduate advisors to ensure they are on track and completing requirements as necessary. Students must apply and be accepted to the Integrated Sciences, MIS during the last semester of their undergraduate career. A maximum of 12 credit hours of graduate level courses that are applied to the undergraduate degree will apply to the graduate degree.

- If you are planning on teaching after graduation, the College of Liberal Arts and Sciences (CLAS) has partnered with the School of Education & Human Development (SEHD) to enable CU Denver undergraduates to get a jumpstart on their teaching careers. When you join the minor in Teacher Education, you gain access to a 4+1 program that helps you earn your CLAS degree, a Master's in Teaching, and would qualify for a Colorado Teaching License in five years. Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/interdisciplinary-programs/liberal-arts-sciences-babs-41-teaching-ma/) for more information.

General Requirements

To earn a degree, students must satisfy all requirements in each of the three areas below, in addition to their individual major requirements.

- CU Denver General Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation/)
- CU Denver Core Curriculum (http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation-undergraduate-core-requirements/)
- College of Liberal Arts & Sciences Graduation Requirements (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/#graduationrequirementstext)
- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/) for information about Academic Policies

These degree requirements are subject to periodic revision by the academic department, and the College of Liberal Arts and Sciences reserves the right to make exceptions and substitutions as judged necessary in individual cases. Therefore, the College strongly urges students to consult regularly with their major advisor and CLAS advisor to confirm the best plans of study before finalizing them.
Program Requirements

1. Students must complete a minimum of 61 credits, including a minimum of 39 PHYS credit hours and a minimum of 16 credit hours in ancillary coursework.

2. Students must complete a minimum of 16 PHYS upper-division (3000-level and above) credit hours in the major.

3. Students must earn a minimum grade of C- (1.7) in all courses that apply to the major and must achieve a minimum cumulative major GPA of 2.0. Courses taken using P+/P/F or S/U grading cannot apply to major requirements.

4. Students must complete a minimum of 12 PHYS credit hours with CU Denver faculty.

Program Restrictions, Allowances and Recommendations

1. Students must declare their intention to major in Physics by the time they have completed 60 semester hours.

2. Students pursuing the 4+1 track must apply and be accepted for participation in the BS/MIS program prior to completion of the BS degree in consultation with both the undergraduate and graduate advisors. Students must complete a 4+1 intent form (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/physics/physics-bs/BMA_form_1_1_.pdf) to formally declare this program, as they work very closely with undergraduate and graduate advisors to ensure they are on track and completing requirements as necessary.

   a. A maximum of 12 credit hours of graduate level courses that are applied to the undergraduate degree will apply to the graduate degree. Students must also earn a B- or higher in graduate level coursework, for it to apply to the Integrated Science, MIS.

3. The introductory labs, PHYS 2351 Applied Physics Lab I and PHYS 2361 Applied Physics Lab II, are required for all physics majors. If the department is unable to offer one or both of these labs then PHYS 2321 Intro Experimental Phys Lab I may be substituted for PHYS 2351 Applied Physics Lab I and PHYS 2341 Intro Experimental Phys Lab II may be substituted for PHYS 2361 Applied Physics Lab II, upon prior advisor approval.

4. Students earning a Physics major cannot earn a Physics minor.

5. All physics majors must complete a capstone thesis or capstone project. Writing and defending a thesis is required for all students wishing to graduate with departmental honors.

6. The physics faculty also encourage all physics majors to enroll in PHYS 1450, 3450, and 4450 Professional Development I, II, and III seminar courses.

Complete all of the following required courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 2311</td>
<td>General Physics I: Calculus-Based</td>
<td>30</td>
</tr>
<tr>
<td>PHYS 2351</td>
<td>Applied Physics Lab I</td>
<td></td>
</tr>
<tr>
<td>PHYS 2331</td>
<td>General Physics II: Calculus-Based</td>
<td></td>
</tr>
<tr>
<td>PHYS 2361</td>
<td>Applied Physics Lab II</td>
<td></td>
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</tbody>
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Complete one of the following options:

Option 1

- PHYS 4751 Physics Capstone Proposal
- PHYS 4751 Physics Capstone Thesis (must take twice and complete two credit hours)

Option 2

- PHYS 4751 Physics Capstone Proposal
- PHYS 4711 Physics Capstone Project

Complete all of the following required ancillary courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>MATH 1401</td>
<td>Calculus I</td>
</tr>
<tr>
<td>MATH 2411</td>
<td>Calculus II</td>
</tr>
<tr>
<td>MATH 2421</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MATH 3191</td>
<td>Applied Linear Algebra</td>
</tr>
<tr>
<td>MATH 3200</td>
<td>and Elementary Differential Equations</td>
</tr>
<tr>
<td>MATH 3195</td>
<td>Linear Algebra and Differential Equations</td>
</tr>
</tbody>
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Total Hours 61-65

Students following the Physics, BS 4+1, Masters of Integrated Science track complete 12 credit hours from the following courses. These courses will also apply to the MIS:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>MINS 5200</td>
<td>Research Methods in Interdisciplinary Science</td>
</tr>
<tr>
<td>PHYS 5211</td>
<td>Quantum Mechanics</td>
</tr>
<tr>
<td>PHYS 5311</td>
<td>Electricity &amp; Magnetism</td>
</tr>
</tbody>
</table>

One graduate level STEM (MATH, PHYS, ELEC, BIOL, etc.) course chosen to meet the student’s MIS Program Goals, in consultation with the MIS Program Director.

To learn more about the Student Learning Outcomes for this program, please visit our website (https://clas.ucdenver.edu/physics/academics/program-learning-goals/).
To review the Degree Map for this program, please visit our website. 
(https://www.ucdenver.edu/student/advising/undergraduate/degree-maps/clas/)