PHYSICS, PHD

for the degree of Doctor of Philosophy in Physics

Department head: Matthias Grosse Perdekamp (mgp@illinois.edu)
Director of graduate studies: Lance Cooper (lcooper@illinois.edu)
Overview of admissions & requirements: https://physics.illinois.edu/admissions/graduates/admissions-requirements.html
Overview of grad college admissions & requirements: https://grad.illinois.edu/admissions/apply
Department website: http://physics.illinois.edu
Program website: https://physics.illinois.edu/academics/graduates/department-faculty
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Phone: (217) 333-3645
Email: grad@physics.illinois.edu

Opportunity exists for specializing in computational science and engineering via the Computational Science & Engineering (http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering) optional graduate concentration.

Admission Requirements
Admission to the physics graduate program requires an outstanding record of accomplishment in an undergraduate physics program and clear evidence of considerable academic promise, as judged by test scores, letters of recommendation, and strong intellectual achievements. A bachelor’s degree or its equivalent from an accredited college or university in the U.S. or an approved institution of higher learning abroad, with at least 20 semester hours (30 quarter hours) of intermediate and advanced undergraduate physics course work, is required for admission. Course preparation in electricity and magnetism, optics, mechanics, atomic and nuclear physics, quantum mechanics, mathematical physics, differential equations, and analysis is essential. Any deficiency in these areas may delay degree completion by as much as a year. Students are expected to make up deficiencies during the first graduate year.

A minimum GPA of 3.00 (A = 4.00) for the last two years of undergraduate work is required; however, because of space limitations, applicants with GPAs below 3.50 are rarely admitted. Students with prior graduate course work must have a minimum GPA of 3.50 for those courses. All applicants must provide test scores from the General GRE Graduate Record Examination (GRE) (http://www.ets.org). The Physics GRE subject test is optional.

Graduates of curricula in the physical and biological sciences, mathematics, or computer science may be admitted with limited standing if they are judged to have the necessary aptitudes to profit from graduate work in physics. Such students are admitted to full standing after completing course work to remove deficiencies in physics preparation.

All applicants whose native language is not English are required to submit TOEFL (http://www.toefl.org) or International English Language Testing System (IELTS) (http://www.ielts.org) scores as evidence of English proficiency. Minimum admission requirements (https://grad.illinois.edu/admissions/instructions/04c) are set by the Graduate College.

A few applicants may be admitted for the spring semester, in addition to the customary fall semester admissions. See the Physics graduate admissions Web site (http://physics.illinois.edu/grad/apply.asp) for lists of deadlines and application materials.

Financial Aid
Fellowships, research assistantships, and teaching assistantships (all of which include waivers of tuition and some fees) are available for the majority of admitted students. Starting in Fall 2020, Grainger Engineering PhD students in their first five years of enrollment who meet the minimum eligibility requirements (https://grainger.illinois.edu/academics/graduate/phd-funding-guarantee) are guaranteed a funded appointment for fall and spring that includes a full tuition waiver, a partial fee waiver, and a stipend.

All applicants, regardless of US citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate spoken English language proficiency (http://grad.illinois.edu/admissions/taengprof.htm) by achieving a minimum score of 24 on the speaking subsection of the TOEFL IBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the IBT or IELTS, a minimum score of 4CP is required on the EPI test (http://cte.illinois.edu/testing/oral_eng/epi_overview.html), offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (https://citl.illinois.edu/citl-101/teaching-learning/grad-academy-for-college-teaching) conducted prior to the start of the semester.

Department Research
The research specialties of Physics faculty fall into the broad categories described in the graduate programs section of this document. Details of each individual’s specific interests are available at the department’s faculty research Web site. (http://physics.illinois.edu/research) Included are faculty whose primary appointments are in other departments but who supervise Physics students.

The Department of Physics offers world-class research facilities in traditional areas of physics, including condensed matter, nuclear, particle, and optical physics, as well as state-of-the-art instruments for quantum information, nanoscale science and engineering, and biological physics. For a complete description of physics facilities, please consult the department’s research facilities Web site (https://physics.illinois.edu/research/facilities).

Other Graduate Programs in the Department of Physics

Degrees:

Physics, MS (http://catalog.illinois.edu/graduate/engineering/physics-ms)
Teaching of Physics, MS (http://catalog.illinois.edu/graduate/engineering/teaching-physics-ms)

The Department of Physics offers graduate programs leading to the degrees of Master of Science and Doctor of Philosophy in Physics and Master of Science in Teaching Physics. The Department is actively developing a new paradigm for graduate physics education and research for the 21st century, aimed at enhancing interdisciplinary interactions and creating an integrated approach to educational and research training. Outstanding graduate research opportunities are available in many subdisciplines of physics, including condensed matter physics, high energy and nuclear physics, astrophysics, atomic physics, molecular energy and nuclear physics, astrophysics, atomic physics, molecular
and optical physics, complex systems, quantum information, biological physics, physics education research.

Students may select experimental, theoretical, or computational thesis projects. Multidisciplinary projects are especially encouraged, and, with the consent of other departments, students may earn master's degrees in areas such as materials science and engineering, or computer science, simultaneously with their PhD degrees in physics.

Opportunity also exists for specializing in energy and sustainability engineering via the Energy and Sustainability Engineering (EaSE) Graduate Certificate Option (http://ease.illinois.edu) for the degree of Doctor of Philosophy in Physics.

For additional details and requirements refer to the department's Degree Requirements (http://physics.illinois.edu/grad/degree-requirements.asp) and the Graduate College Handbook (http://grad.illinois.edu/gradhandbook). Learn more about the Qualifying Exam (https://physics.illinois.edu/academics/graduates/qualifying-examination).

**Entering with approved M.S. degree**

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<tr>
<th>Code</th>
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<th>Hours</th>
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<tr>
<td>PHYS 599</td>
<td>Thesis Research (min applied toward the degree)</td>
<td>6</td>
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Select two of the following breadth courses:

- PHYS 513 Quantum Optics & Information
- PHYS 514 Modern Atomic Physics
- PHYS 540 Astrophysics
- PHYS 550 Biomolecular Physics
- PHYS 560 Condensed Matter Physics I
- PHYS 569 Emergent States of Matter
- PHYS 570 Subatomic Physics

PHYS 597 Individual Study (prior to the preliminary exam) 1-16

Elective courses – chosen in consultation with advisor 49 max

Total Hours 64

**Other Requirements and Conditions**

**Recommended elective courses:**

- PHYS 504, 505, 508 & 509, 580 & 581 (& denotes sequence)

A minimum of 12 500-level credit hours applied toward the degree.

A minimum of 16 PHYS credit hours, with 8 at the 500 level.

PHYS 599 (thesis research) cannot be taken until after the preliminary exam is passed.

An additional maximum of 8 hours of PHYS 597 (or other individual study) may be applied toward the elective course work requirement.

These students may earn a Master of Science degree during the Ph.D. program.

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<td>Final exam or dissertation defense</td>
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| Minimum GPA: | 2.75 |

**Entering with approved B.S. degree**

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<td>6</td>
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Select two of the following breadth courses:

- PHYS 513 Quantum Optics & Information
- PHYS 514 Modern Atomic Physics
- PHYS 540 Astrophysics
- PHYS 550 Biomolecular Physics
- PHYS 560 Condensed Matter Physics I
- PHYS 569 Emergent States of Matter
- PHYS 570 Subatomic Physics

PHYS 597 Individual Study (prior to the preliminary exam) 1-16

Elective courses – chosen in consultation with advisor 81 max

Total Hours 96

**Other Requirements and Conditions**

**Recommended elective courses:**

- PHYS 504, 505, 508 & 509, 580 & 581 (& denotes sequence)

A minimum of 12 500-level credit hours applied toward the degree.

A minimum of 16 PHYS credit hours, with 8 at the 500 level.

PHYS 599 (thesis research) cannot be taken until after the preliminary exam is passed.

An additional maximum of 8 hours of PHYS 597 (or other individual study) may be applied toward the elective course work requirement.

These students may earn a Master of Science degree during the Ph.D. program.

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