

DOCTOR OF PHILOSOPHY IN THE FIELD OF PHYSICS (STEM)

OVERVIEW

Graduate students in physics gain knowledge of advanced physics concepts, including advanced mechanics, electromagnetic theory, advanced quantum mechanics, and statistical mechanics, along with mathematical methods in physics and computational physics. Additional courses in quantum field theory, solid-state physics, nuclear physics, astrophysics, and biophysics are offered. An integral part of the program involves students in active and frontier research.

For students interested in experimental, observational, and applied physics, the department's association with national and international laboratories allows hands-on training and original research. The department maintains research affiliations and collaborations with researchers at the National Institute of Standards and Technology, U.S. Naval Research Laboratory, Thomas Jefferson National Accelerator Facility, and NASA. The department also has ties with international research institutions.

Concentrations include nuclear physics, astrophysics, and condensed-matter physics as well as interdisciplinary studies in materials science and biophysics.

This is a STEM designated program.

Visit the program website (<https://physics.columbian.gwu.edu/phd-physics/>) for additional information.

ADMISSIONS

Admission deadlines:

Fall – January 15

Spring – October 1*

Standardized test scores:

GRE general test not required;
GRE subject test recommended
(institutional code 5246).

The Test of English as a Foreign Language (TOEFL), the academic International English Language Testing System (IELTS), or the PTE Academic is required of all applicants except those who hold a bachelor's, master's, or doctoral degree from a college or university in the United States or from an institution located in a country in which English is the official language, provided English was the language of instruction.

Minimum scores for the program are:

- Academic IELTS: an overall band score of 7.0 with no individual score below 6.0; or
- TOEFL: 600 on paper-based or 100 on Internet-based; or
- PTE Academic: 68

Recommendations required:

Three (3) recommendations

Prior academic records:

Transcripts are required from all colleges and universities attended, whether or not credit was earned, the program was completed, or the credit appears as transfer credit on another transcript. Unofficial transcripts from all colleges and universities attended must be uploaded to your online application. Official transcripts are required only of applicants who are offered admission.

If transcripts are in a language other than English, English language translations must be provided. The English translation alone should be uploaded into your application.

Statement of purpose:

In an essay of 250 – 500 words, state your purpose in undertaking graduate study in your chosen field. Include your academic objectives, research interests, and career plans. Also discuss your related qualifications, including collegiate, professional, and community activities, and any other substantial accomplishments not already mentioned on the application. If you are applying for an assistantship or fellowship, you should also describe any teaching experience you have had.

International applicants only:

Please review International Applicant Information (<https://columbian.gwu.edu/international-graduate-applicants/>) carefully for details on required documents, earlier deadlines for applicants requiring an I-20 or DS-2019 from GW, and English language requirements.

* Spring admission to Ph.D. program is not always offered. Check with department for availability.

Supporting documents not submitted online should be mailed to:

Columbian College of Arts and Sciences, Office of Graduate Studies
The George Washington University
801 22nd Street NW, Phillips Hall 107
Washington DC 20052

For additional information about the admissions process visit the Columbian College of Arts and Sciences Frequently Asked Questions (<https://columbian.gwu.edu/graduate-admissions-faq/>) page.

Contact:

askccas@gwu.edu
202-994-6210 (phone)

Hours: 9:00 am to 5:00 pm, Monday through Friday

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Graduate Programs (<http://bulletin.gwu.edu/arts-sciences/#degreeregulationtext>).

The requirements for the Doctor of Philosophy program (<http://bulletin.gwu.edu/arts-sciences/#doctoraltext>).

A minimum of 72 credits in graduate coursework, including at least 45 credits in required and selected courses taken at the pre-candidacy stage and at least 6 and at most 27 credits in dissertation. Up to 12 of these credits may be taken in courses offered by the other affiliated members of the Consortium of Universities of the Washington Metropolitan Area (<https://www.consortium.org/>). Successful completion of a general examination, satisfactory progress toward the degree (documented in the annual student reports and faculty feedback), and an oral defense of the doctoral thesis are also required.

| Code | Title | Credits |
|---|---|---------|
| Required * | | |
| PHYS 6110 | Mathematical Methods of Theoretical Physics | |
| PHYS 6120 | Advanced Mechanics | |
| PHYS 6210 | Electrodynamics and Classical Field Theory | |
| PHYS 6220 | Quantum Mechanics I | |
| PHYS 6310 | Statistical Mechanics | |
| PHYS 6320 | Quantum Mechanics II | |
| PHYS 6130 | Computational Physics I | |
| PHYS 6230 | Computational Physics II | |
| PHYS 6330 | Computational Physics III | |
| Completion of one of the following options: | | |
| Option A | | |
| PHYS 6610 | Nuclear and Particle Physics I | |
| PHYS 6710 | Nuclear and Particle Physics II | |
| Option B | | |
| PHYS 6620 | Biophysics I | |
| PHYS 6720 | Biophysics II | |
| Option C | | |
| PHYS 6630 | Radiative Processes in Astrophysics | |
| PHYS 6730 | High-Energy Astrophysics | |

Additional course requirements

6 additional credits in graduate-level PHYS courses.

6 credits in graduate-level courses related to the student's field(s) of study, which may be taken outside the department, subject to the advisor's approval.

*Specific course requirements can be waived on a case-by-case basis upon approval of the department's graduate advisor.

Research fields

- Nuclear physics—experimental and theoretical studies on the structure, electromagnetic, weak and strong interactions, and scattering of few-body systems at low and intermediate energies;
- Biophysics and condensed-matter physics—experimental, theoretical, and computational studies of structures and functions of cells, biological networks and biomolecules, deciphering information encoded in genome;
- Theoretical and observational astrophysics—high-energy astrophysics, multi-wavelength studies of extreme energy-density environments and huge energy releases in astrophysical objects;
- Interdisciplinary physics, including energy research and physics education research.