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

Visit the Columbian College of Arts and Sciences website for application requirements (https://columbian.gwu.edu/application-requirements/).

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 for questions:

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 (https://bulletin.gwu.edu/arts-sciences/#degreeregulationstext).

The requirements for the Doctor of Philosophy program (https://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.