

# Physics, PhD

## Requirements

The Doctor of Philosophy program in physics requires a minimum of 72 s.h. of graduate credit. At least 39 s.h. must be earned at the University of Iowa to complete the residency requirement. For students interested in doing doctoral work in astronomy, the department offers an astronomy subprogram, including a dissertation, within the PhD program in physics. All students must maintain a program grade-point average of at least 3.00.

All students must earn at least 24 s.h. in departmental courses numbered 5000 or above. They may not count credit earned in PHYS:7990 Research: Physics, PHYS:7992 Individual Critical Study, ASTR:7991 Research: Astronomy, or seminars.

All students must take comprehensive examinations; participate in advanced seminars; do original research in experimental physics, theoretical physics, or astrophysics; and prepare and defend a written dissertation based on this work.

PhD students in physics without the astronomy subprogram must complete the following courses.

Course #	Title	Hours
PHYS:4761 & PHYS:4762	Mathematical Methods of Physics I and Mathematical Methods of Physics II (students who pass a written examination are exempt from this requirement)	6
PHYS:5710	Classical Mechanics	3
PHYS:5730	Statistical Mechanics I	3
PHYS:5741 & PHYS:5742	Quantum Mechanics I and Quantum Mechanics II	6
PHYS:5811 & PHYS:5812	Classical Electrodynamics I and Classical Electrodynamics II	6

These courses freely use advanced mathematics (e.g., complex variables, tensor analysis). An introduction is provided in PHYS:4761 Mathematical Methods of Physics I and PHYS:4762 Mathematical Methods of Physics II. The selection of less advanced coursework depends on the adequacy of a student's preparation for graduate work; students' choice of more advanced and specialized courses depends on the direction in which their interests develop.

PhD students in physics with the astronomy subprogram must complete a total of six courses from the following.

Course #	Title	Hours
Four of these:		
ASTR:6782	Extragalactic Astronomy	3
ASTR:6785	The Interstellar Medium	3
ASTR:6790	Stellar Astrophysics	3
ASTR:6870	Radiative Processes in Astrophysics	3
ASTR:6880	High Energy Astrophysics	3
ASTR:7775	Special Topics in Astrophysics	3
ASTR:7830	Space and Astrophysical Plasma Physics	3

PHYS:7760	General Relativity	3
PHYS:7761	Cosmology	3
Two of these:		
PHYS:5710	Classical Mechanics	3
PHYS:5730	Statistical Mechanics I	3
PHYS:5741	Quantum Mechanics I	3
PHYS:5742	Quantum Mechanics II	3
PHYS:5811	Classical Electrodynamics I	3
PHYS:5812	Classical Electrodynamics II	3

After a student has chosen a research specialty, the student must submit a formal thesis proposal and defend the proposal in an oral comprehensive exam. The appropriate thesis advisor then becomes the candidate's general advisor and the chair of the comprehensive and final examination committee. The comprehensive exam must be taken before the beginning of the fourth year of graduate study.