DOCTOR OF PHILOSOPHY IN PHYSICS

The Physics program equips students with the foundational skills to become innovators in science and engineering, providing cutting-edge education and research at#Bachelor, Master, and PhD levels. Students perform both experimental and theoretical research, mastering topics in focus#areas that include quantum computing, high-energy plasmas, low-temperature superfluids, photonics, materials science, biomolecular interactions, the physics of animal behavior, fluid#mechanics, and more. Degree candidates work side-by-side with faculty on research that is supported by major national granting agencies, such as the National Science Foundation (NSF), the National Institute of Standards & Technology, Defense Department agencies, and others.

The small size of the program permits the design of individual programs of study and the development of a close working colleagueship among students and faculty. Students engage in physics research from the start of their graduate studies, rather than spending one or two years focused on coursework before starting research. Thus, graduate students join the department's research activities upon arrival.

PhD candidates must take (or place out of) five PhD-level graduate core courses and five advanced topics courses.#Each student is given the opportunity for undergraduate teaching under direct faculty supervision. Direct classroom teaching experience is also a possibility for more advanced and qualified students. Each PhD candidate must write and defend a dissertation on original and significant research. It is expected that the candidate will submit the results of their work to a scholarly journal for publication.

COURSES

PhD students must take (or place out of) five PhD-level graduate core courses and five advanced topics courses. All degree-seeking graduate students are required to register for at least one credit in each semester that they are enrolled in the university. Students must have demonstrated proficiency in the main subject areas of physics by the time they have completed the program. Incoming students plan a course of study in consultation with the graduate advisor to prepare for the qualifying examination. Each student, after passing the first examination (see below), selects an advisory committee of three faculty members. The committee assists the student to design a program of study, monitors progress, and makes annual recommendations to the department regarding the student's continuation in the program. The advisory committee also administers subsequent examinations.

LANGUAGE REQUIREMENT

There is no foreign language requirement.

PROGRESS AND QUALIFYING EXAMS

Three formal examinations serve to define the various stages of the student’s progress to the degree. The qualifying examination, usually taken at the end of the first year, is a written examination on material at an advanced undergraduate level. Advancement to the second stage of candidacy depends on passing this examination as well as on coursework and demonstrated research potential. After passing the qualifying examination, each student should form an advisory committee in consultation with their research advisor. Usually by the end of the second year, each student takes the PhD candidacy examination, which consists of an oral presentation before the student’s advisory committee, describing and defending a specific research proposal. (The proposal might, but need not, grow out of previous research or be adopted by the student as a thesis topic.) The committee then recommends to the department whether to admit the student to the final stage of PhD candidacy or whether to advise the student to seek an MA degree.

Each student who has passed the candidacy examination is required to present an annual informal talk on his or her thesis work in a departmental seminar.

TEACHING

Although the emphasis in the program is on independent research and scholarly achievement, graduate students are expected to improve their skills in teaching and other forms of oral communication. Each student is given the opportunity for some undergraduate teaching under direct faculty supervision. While this usually consists of participation in teaching undergraduate laboratories, direct classroom teaching experience is also possible for more advanced and qualified students.

RESEARCH

Current experimental research areas are concentrated in atomic/molecular physics and condensed matter physics. Current interests include Rydberg states in strong fields, molecular collisions, photo-ionization, laser-produced plasmas, wave transport, granular and turbulent fluid flows, single-molecule biophysics, and optoelectronics of renewable energy materials.

Current theoretical and computational research areas include nonlinear dynamics, quantum chaos, properties of nanostructures, soft condensed matter, and wave transport in complex media.

DISSERTATION AND DEFENSE

Each candidate for the PhD degree is required to write a dissertation on original and significant research supervised by a member of the faculty. The work must be defended in a final oral examination administered by the advisory committee. This oral examination covers the dissertation and related topics and is open to all members of the Wesleyan community. It is expected that the candidate will submit the results of his or her work to a scholarly journal for publication.

ADDITIONAL INFORMATION

For additional information, please visit the department website at wesleyan.edu/physics/graduate (http://wesleyan.edu/physics/graduate/).