Ph.D. in Physics

Description

The Ph.D. degree is the terminal degree in physics and is designed primarily to meet the needs of students who intend to pursue professional careers in physics, either as teachers or as research physicists.

Minimum Total Credit Hours: 54

Course Requirements

In addition to the general Graduate School requirements, candidates for the Ph.D. must complete a minimum of 54 credit hours of graduate coursework, including 18 hours of dissertation research (Phys 797) and 36 hours of graduate courses. Of the 36 required classroom hours, up to six may be in a related field, such as mathematics, chemistry, or engineering; 12 must consist of courses in physics numbered 700 or higher, and another 18 must be in physics courses numbered 600 or higher. Ph.D. students must pass the five core courses Advanced Mechanics I (Phys 709), Quantum Mechanics I (Phys 711), Thermodynamics and Statistical Mechanics I (Phys 727), and Advanced Electromagnetic Theory (Phys 721 and 722), and at least three breadth courses. The pool of breadth courses consists of Advanced Acoustics (Phys 605), Atomic and Nuclear Physics (Phys 607), Quantum Mechanics II (Phys 712), Solid State Physics I (Phys 725), Quantum Field Theory I (Phys 731), Elementary Particle Physics (Phys 733), and Gravitational Physics (Phys 735).

Other Academic Requirements

Each entering student must take a preliminary examination (based on undergraduate physics) to aid the student and the graduate adviser in selecting a course of study. All students must teach laboratory or lecture sections for at least two semesters as part of their graduate training. Students who are present on campus during a regular semester are required to enroll in Phys 510 (Physics and Astronomy Colloquium).

Students in the Ph.D. program are required to pass a Comprehensive Examination covering standard physics material at the introductory graduate level. The examination has both written and oral components. The written part consists of three three-hour examinations as follows: (1) quantum mechanics; (2) classical mechanics, thermodynamics, and statistical mechanics; (3) electromagnetic theory. The oral part can be taken only after the written part has been passed. Students must attempt the exam at the first opportunity after completing three semesters as graduate students in physics at UM at the latest, and must pass it no later than at the first opportunity after completing five semesters in order to remain in the Ph.D. program.