

Ph.D. in Physics

Requirements

PHSX 594	Seminar (01 -Teaching Seminar)	1
PHSX 594	Seminar (15 -Research Introduction Seminar)	1
PHSX 501	Mathematical Methods and Their Applications in Classical Mechanics	3
PHSX 506	Quantum Mechanics I	3
PHSX 519	Mathematical Methods and Their Applications in Electromagnetic Theory	3
PHSX 520 or ASTR 550	Electromagnetic Theory II Radiative Processes in Astrophysics	3
PHSX 535	Statistical Mechanics	3
Electives		17
Thesis (an acceptable thesis is required)		
Doctoral Thesis (PHSX 690); minimum of 26 credits is required in addition to the courses listed above		26
Examinations		
A written qualifying examination and a written and oral comprehensive examination are required. A final oral examination is also required, covering the thesis and related areas.		
Total Credits		60

Electives Requirements

All elective courses must be approved by the student's Graduate Committee and the Physics Department Head. This approval will ensure that the electives represent a coherent block of study of substantial relevance to Physics. The following limitations normally apply to Elective Courses which may be listed on the Graduate Program for the M.S. or Ph.D. degree in Physics:

1. No more than half of the Elective credits in the above Course Requirements may be at the 400 level in a student's Graduate Program for any graduate degree in Physics. The remaining Elective credits must be at the 500 level.
2. The Electives will include courses in Physics and minor or supporting fields. At least half of the elective credits must be in Physics.
3. PHSX 461, PHSX 490R, PHSX 492, PHSX 494, PHSX 589, PHSX 590, PHSX 689, and PHSX 690 cannot be used as Electives in any Physics Graduate Program.
4. PHSX 592 is allowed as an Elective to a maximum of 3 credits for an M.S. Program and 6 credits for a Ph.D. Program.
5. No more than 2 credits of non-required seminar courses are applicable as Electives in any Physics Graduate Program.

Examinations

The Ph.D. Qualifying Examination is a written exam. In addition, there is a Ph.D. Comprehensive Examination, taken after passing the Ph.D. Qualifying Examination.

Details concerning the Physics Ph.D. Qualifying Examination and the Physics Ph.D. Comprehensive Examination can be found at:

<http://www.physics.montana.edu/grad/>

Additional requirements: No more than 4 pass/fail credits can be included in any Physics Graduate Program. Only 10 course-work credits must be taken beyond a MS en route or continuing MS toward the PhD.

Required Examinations: Qualifying and Comprehensive Examinations are required. A Final oral defense of the thesis is also required. For details, see the Physics graduate manual that is accessible from the Physics Department Home page <https://physics.montana.edu/>.

Qualifying exam:

The Qualifying Exam assesses a student's competence in fundamental physics. The exam is used to identify areas of weakness the student should address to be successful in the graduate program and beyond. The Qualifying Exam provides a formative experience for solidifying a student's command of fundamental physics. The Qualifying Exam is at the upper-division undergraduate level. The exam tests four subjects: 1) classical mechanics, 2) quantum mechanics, 3) electricity and magnetism, and, 4) statistical/thermal physics. Each subject must be passed for M.S. and Ph.D. students. The Qualifying Exam is in two parts:

- Part A: classical mechanics and quantum mechanics, given in August.
- Part B: electricity and magnetism, and statistical/thermal physics, given in January.

3 problems are given in each subject area, of which 2 must be passed.

Subject areas not passed on the Qualifying Examination can be addressed by taking the appropriate advanced undergraduate course and obtaining a grade of B or higher.

Comprehensive Exam: The Comprehensive/Candidacy Exam for Ph.D. degree-seeking graduate students is a written and oral exam that requires the student to present and defend a thesis research plan to their Ph.D. committee.