

PhD in Physics

The doctor of philosophy degree is designed to educate scientists to be capable of independently formulating and solving problems of fundamental scientific importance. Detailed policies for the PhD degree are listed at the MU Graduate School. Here we give details specific to the Physics program.

Degree Requirements

A Ph.D. Degree requires completion of a minimum of 18 hours beyond the Master's Degree, with a grade of 3.0 (B) or better, and completion of the Department Qualifying Examination at the PhD pass level. The degree candidate must also meet the residency requirements. There is no foreign language requirement.

The required courses for a PhD Degree (in addition to those for the MS Degree in physics) are as follows:

Required Courses

PHYSICS 8640	Electrodynamics II	3
PHYSICS 8720	Quantum Mechanics II	3
Four elective graduate-level courses in Physics and Astronomy		12

At least three of the four elective courses must be 8000+ level, one of them may be 7000+ level. Included in this should be essential courses in the area of specialization. Students may also choose selected 7000+ and 8000+ level courses from other departments, if relevant for their research projects, and with the approval of their advisor and the DGS.

A student is required to have taken a minimum of three full years of graduate work beyond the Bachelor's Degree. All acceptable graduate work, including one year's residence for a Master's Degree, is used to compute the three-year requirement for the PhD Degree. It is important to note that this is not a requirement for three calendar years of work, but rather a three-year's equivalent of full time study. When this three-year residency requirement is satisfied, a student should have finished a minimum of 72 credit hours of graduate work.

Within the three-year residence, each doctoral student must successfully complete at least two 12-hour semesters or three 8-hour semesters of graduate level program within a period of 18 calendar months. During this period, the student must be fully involved in academic pursuit, be it study, teaching, or research. This period of full-time reading, reflection, study, teaching, and research is considered necessary to give the student's program continuity and to fulfill the spirit and special demands of the doctoral program.

A student who is a graduate assistant, or who is engaged in other activities that reduce the time available for graduate study, may need more than the anticipated time to meet course and dissertation requirements. Nonetheless, a reasonable rate of progress is required. A PhD student must successfully complete the comprehensive examination within a period of five years beginning with the first semester of enrollment as a PhD student. In addition, the program for the doctoral degree must be completed within five years of passing the comprehensive examination.

For an extension of this time, the student must, before the expiration of the normal period, petition the Graduate School by submitting a request to the advisor who, in turn, submits a written recommendation to the Graduate School which has been endorsed by the departmental Director

of Graduate Studies. An extension, if granted, may entail a revision of the candidate's program to update course work and research.

For more details, please consult the department's website or ask the director of graduate studies.

Transfer of Credit

A student who has completed a master's degree at the University of Missouri-Columbia or elsewhere may, upon recommendation of the advisor and approval by the departmental Director of Graduate Studies and the Graduate School, transfer a maximum of 36 credit hours toward the total hours required for the doctoral degree. Transfer credit for doctoral students who do not have an earned master's degree is limited to a maximum of 12 hours of graduate credit.

Plan of Study

The doctoral program committee guides the student in planning a program of study. The Chair of the Doctoral Program Committee, after conferring with the student and the Doctoral Program Committee, submits to the Graduate School a report, including a copy of the proposed course of study and any request for transfer of graduate credit. This plan of study will, when completed,

- prepare the student for research in the chosen field of Physics or Astronomy,
- satisfy the credit-hour and residency requirements.

The student must substantially complete the course work outlined in the "Plan of Study for the Doctoral Degree" form (Form D2), to the satisfaction of the Doctoral Program Committee and the Dean before being considered for the Comprehensive Examination.

Comprehensive Examination

To be an official candidate, the student must pass the Doctoral Comprehensive Examination, which is based upon graduate coursework in the Department (PHYSICS 8610, PHYSICS 8620, PHYSICS 8660, PHYSICS 8710, PHYSICS 8720, and other optional courses). The student must be enrolled to take this examination. It is to be administered only when MU is officially in session. The major advisor applies to the Dean for the Doctoral Program Committee to administer the Comprehensive Examination when the doctoral student has

- passed the Qualifying Examination,
- substantially completed the planned course work, and
- completed two years of the residence requirement.

The Comprehensive Examination is the most advanced general exam posed by MU. It may consist of both written and oral sections. It must be completed at least seven months before the final Dissertation Defense. The two sections of the examination must be completed within one month.

The written segment of the Comprehensive Examination is arranged and supervised by the major advisor. It consists of either (1) written questions prepared and graded by members of the Doctoral Program Committee, or (2) a research proposal on the work to be done for the PhD. Normally, the student will have two weeks to answer eight questions. Upon satisfactory completion of the written examination (or research proposal), the student is then given an oral examination by the committee.

For the Comprehensive Examination to be successfully completed, all or all but one of the committee, must vote to pass the student on the entire examination, both written and oral. A report of this examination, as in

the “Doctoral Comprehensive Examination Results Form” (Form D3), carrying the signatures of all members of the committee, must be sent to the Graduate School and the student no later than two weeks after the completion of the examination.

A failure of either the written or oral section of the examination constitutes failure of the comprehensive examination. If a failure is reported, the committee will include in the report an outline of the general weaknesses of deficiencies of the student’s work. The student and the committee will work together to identify steps the student might take to become fully prepared for the next examination. If at any time the student believes that the advice given by the committee is inadequate, the student may send a written request for clarification to the committee. A copy of this request should be sent to the Graduate School as well. The committee must respond to this request in writing within two weeks and a copy must be filed with the Graduate School. A student who fails may not take a second examination for 12 weeks. Failure to pass two Comprehensive Examinations automatically prevents candidacy.

Doctoral Candidacy and Continuous Enrollment

Candidacy for a doctoral degree is established by passing the comprehensive examination. Status as a continuous enrollment doctoral student begins the term after the term in which the comprehensive exam was successfully completed. Candidacy is maintained by enrolling in PHYSCS 9090 research for two semester hours each fall and winter semester and for one semester hour each summer session up to and including the term in which the dissertation is defended. Continuous enrollment provides access to an advisor’s support, doctoral program committee guidance and University research facilities for completion of the dissertation. Failure to continuously enroll in PHYSCS 9090 research until the doctoral degree is awarded terminates candidacy.

Candidacy may be reestablished by paying the registration and late fees owed and completing the requirements specified by the student’s doctoral program committee. Registration fees owed may not exceed the amount owed for seven terms, regardless of the number of terms beyond seven for which the student failed to continuously enroll. The committee’s requirements may include a second comprehensive examination of evidence of currency in the research field as suggested by publications in refereed journals. Candidacy is reestablished when the student’s advisor and the departmental Director of Graduate Studies submit a written request to the Graduate School explaining the basis of the decision. Once approved, a Request to Re-enroll form must be completed by the student and sent to the department for processing.

Dissertation and Defense

The dissertation must be written on a subject approved by the candidate’s Doctoral Program Committee, must embody the results of original and significant investigation, and must be the candidate’s own work. Candidates should consult the Graduate School’s Theses and Dissertations Guidelines.

All dissertation defenses shall be open to all Physics and Astronomy faculty and graduate students. Dissertation defense dates should be publicly announced in advance. The candidate must be enrolled to defend the dissertation, which is administered when MU is officially in session. A report of the dissertation defense form (Form D4), carrying the signatures of all members of the committee, is sent to the Graduate School before the deadline preceding the anticipated date of graduation. For the dissertation to be successfully defended, the student’s doctoral

committee must vote to pass the student on the defense with no more than one dissenting or abstaining vote.

Admissions

Application Process

Applications for admission for graduate study in physics have to be completed online. Your online application should include the following material (to be uploaded in electronic format):

- University of Missouri Graduate School Application. Use the online application system (<https://applygrad.missouri.edu/apply/>) to fill out the application form and upload the required documents.
- We no longer require verbal, quantitative, or analytical GRE scores. We also do not require the Advanced Physics GRE. However, if you wish to supply these scores, you may supply them as part of your supplemental documentation. MU institutional code for GRE: 6875 GRE department code: 0808
- For international applicants, the results of the TOEFL Test. A minimum test score of 80 is required. The IELTS test with a minimum score of 6.5 is an acceptable alternative to the TOEFL.
- A statement of purpose, in which you tell us a bit about yourself (e.g. your motivations, career goals, and research interests, and why you chose to apply at the University of Missouri).
- Three letters of recommendation.
- Your official transcripts from all undergraduate and graduate institutions attended.

Admission Criteria

- Fall deadline: February 1 for full consideration
- Spring deadline: Rolling (target date: October 1)
- Minimum GRE score: none set
- Minimum TOEFL scores (international applicants only):

Internet-based test (iBT)	Paper-based test (PBT)
80	550

Note: MU institutional code for TOEFL: 6875. TOEFL department code: 76