

PHYSICS (MS)

Master of Science in Physics

Unit: College of Arts and Sciences (<https://louisville.edu/artsandsciences/>) (GA)

Department: Physics & Astronomy (<http://www.physics.louisville.edu>)

Program Website (http://www.physics.louisville.edu/?option=com_content&view=category&layout=as002063free:category&id=108&Itemid=110)

Academic Plan Code(s): PHYSMS, PHYSMS_ACC

Program Information

Mission Statement

The Master of Science degree in Physics will prepare students for PhD level graduate work in Physics or a related STEM discipline, or for a science-related career in education or industry. Students in this program develop strong analytical, quantitative, and problem solving skills, including a deep appreciation for connections between physics and scientific computing, physics and engineering, or physics and mathematics, that serve to expand their career options in computer hardware/software companies, large semiconductor industries and many non-STEM job sectors such as finance, business and health care.

General Information

The MS is a two-year degree program available to qualified individuals possessing a bachelor's degree in Physics from an accredited college or university. Students with a bachelor's degree in other related subjects, e.g., Mathematics, Chemistry, or Engineering, also will be considered.

Qualified students will be considered for Graduate Teaching Assistantships (GTAs). As part of the educational experience, GTAs perform certain undergraduate teaching responsibilities in exchange for a stipend and full tuition remission.

The MS can be earned via a thesis or non-thesis option. The thesis option requires at least six (6) credit hours of research leading to submission of the thesis. Non-thesis students are also required to become involved in research.

BS/MS Five-Year Accelerated Program

We also offer a five-year accelerated program leading to a Bachelor of Science degree and Master of Science degree in Physics. This program allows students to complete one semester [nine (9) credit hours] of graduate coursework while enrolled as undergraduate students. Students must apply for admission to the program no later than the end of their junior year to be eligible enroll in graduate coursework in their final year of the program. The student may take a maximum of nine (9) credit hours for graduate credit, which will also apply to the requirements for the baccalaureate degree. Those nine (9) credit hours of graduate credit must be transferred to the student's graduate record after the student completes one semester as a graduate student.

The general information described above is equally applicable to this program. Specific admission requirements and programmatic details are listed under the Admissions and Degree Requirements tabs.

MS Admission Requirements

Departmental requirements for admission are as follows:

- A baccalaureate degree with at least 24 credit hours in physics, or the equivalent.
- A minimum quality-point standing of 3.0 (base 4.0) in physics courses.
- Mathematics coursework through differential equations. (MATH 405 or equivalent).
- Submission of the (general) Graduate Record Examination scores.

For general information concerning admission to graduate programs at the University of Louisville consult the application directions from the Graduate School (<http://louisville.edu/graduate/futurestudents/apply-materials/application/>).

Program Admission Procedure

Admission into the Physics MS program is competitive. The application procedure is as follows:

- Submit a completed graduate application (<http://louisville.edu/graduate/futurestudents/apply-materials/application/>) to the University of Louisville Graduate School, together with the required application fee. Admitted students are most commonly accepted to begin their program of studies in the Fall semester (which starts in late August). However, programs beginning in the Spring semester (which begins in early January) can be arranged. There is no formal application deadline, but to ensure full consideration for Fall entry applications should be received no later than February 1.
- Official transcripts from each university or college attended must be submitted to the Graduate School.
- Take the general section of the Graduate Record Examination and arrange for the official score to be sent to the Graduate School. The Physics GRE is not required, but is preferred for PhD applicants.
- Arrange for at least two letters of recommendation to be sent to the Graduate School. These letters should be written by persons familiar with the applicant's academic work. Please use the recommendation form from the Graduate School (<http://louisville.edu/graduate/futurestudents/apply-materials/application/>) or complete the relevant section in the online application so that your letter writers will receive an email request to submit their recommendation electronically.
- All applicants, whose native language is not English, are required to achieve a TOEFL score greater than 79 on the internet-based test, a composite score of at least 6.5 on the IELTS test or Duolingo score of 105. Students holding a bachelor's degree from an accredited institution in the United States are exempt from this requirement.

In individual cases, the department may recommend conditional admission of a student who does not satisfactorily meet the above requirements. If admission is granted, that student will be subject to those conditions specified by the Department of Physics and Astronomy, the College of Arts and Sciences and the Graduate School as being necessary to remedy the conditional admission.

BS/MS Five-Year Accelerated Program Admission Requirements

- The applicant will apply for admission to the five-year accelerated program no later than the end of their junior year to be eligible enroll in graduate coursework in their final year of the program.
- The applicant will have completed at least 21 credit hours in Physics before applying to the program.

- The applicant will have maintained at least a 3.0 GPA in Physics courses and a 3.35 GPA overall.

Program Admission Procedure

The procedure for admission is identical to admission to the two-year MS described above except that general GRE scores may be submitted any time prior to completion of the BS part of the program.

Once accepted, the student must meet (or have already met) the following requirements:

- Take at least nine (9) credit hours in 500-level physics courses for graduate credit. Two of the courses must be PHYS 542 and PHYS 556. Preferably these courses will be taken during the same semester in the student's senior year.
- Maintain a 3.0 GPA.

Program Requirements

Specific requirements for the MS degree in Physics are as follows:

Thesis Option

Code	Title	Hours
PHYS 605	Theoretical Mechanics	3
PHYS 611	Electromagnetic Theory I	3
PHYS 621	Quantum Mechanics I	3
PHYS 622	Quantum Mechanics II	3
Physics Electives ¹		6-9
Courses in one minor field ²		3-9
PHYS 699	Research	6
At least 21 credit hours must be at the 600 level or above		
Minimum Total Credit Hours		30

¹ Courses numbered 500 or above. Courses at 500 level or above which are required for the BA/BS degree will not normally satisfy this requirement.

² Mathematics is the usual minor, but another field may be chosen with the approval of the department.

Non-Thesis Option

Code	Title	Hours
PHYS 605	Theoretical Mechanics	3
PHYS 611	Electromagnetic Theory I	3
PHYS 621	Quantum Mechanics I	3
PHYS 622	Quantum Mechanics II	3
Physics Electives ¹		12-15
Courses in one minor field ²		3-9
PHYS 699	Research	3
At least 17 credit hours must be at the 600 level or above		
Minimum Total Credit Hours		33

¹ Courses numbered 500 or above. Courses at 500 level or above which are required for the BA/BS degree will not normally satisfy this requirement.

² Mathematics is the usual minor, but another field may be chosen with the approval of the department.

BS/MS Accelerated Program

The non-physics undergraduate requirements of this degree are identical to the standard BS in physics.

Undergraduate physics requirements are as follows:

Code	Title	Hours
PHYS 298	Introductory Mechanics, Heat and Sound - S	4
PHYS 299	Introductory Electricity, Magnetism and Light	4
PHYS 295	Introductory Laboratories I - SL	1
PHYS 296	Introductory Laboratories II - SL	1
PHYS 300	Introductory Modern Physics	3
PHYS 301	Introductory Modern Physics Laboratory	1
PHYS 390	Introductory Computational Physics	3
PHYS 450	Introductory Mathematical Physics	3
PHYS 460	Mechanics	3
PHYS 541	Electromagnetic Fields	3
PHYS 555	Elementary Quantum Mechanics	3
PHYS 498	Undergraduate Research	3
Minimum Total Hours		32

Graduate requirements for the five-year BS/MS program are identical to the standard MS program (thesis or non-thesis option) except that the physics electives must include PHYS 542 and PHYS 556.