MASTER OF SCIENCE: PHYSICS

Student Learning Outcomes

Students graduating from this program will:

- Have an advanced knowledge of the basic areas of physics.
- Be able to integrate their knowledge with critical thinking skills in order to become quantitative problem solvers.
- Be able to clearly articulate scientific information, both orally and in writing.
- Be able to effectively use the scientific literature.

Admission to the Master of Science in Physics Program

Admissions Requirements

For admission to the program, an applicant must meet both the School of Graduate Studies (https://catalog.umkc.edu/general-graduate-academic-regulations-information/graduate-admission-policies-procedures/) and specific program of Physics and Astronomy admission requirements described below. The graduate studies committee of the program of Physics and Astronomy will review applications and make admission recommendations to the School of Graduate Studies. Admission to the graduate program is determined by a student's ability to do graduate-level work in physics. An undergraduate major in physics is not required, however a background in a related area of science or engineering is expected. A student's deficiencies in completed coursework and/or background may be overcome by taking certain additional undergraduate-level courses for graduate credit.

Admission decisions are based on the student's academic transcripts and English language abilities (for international students). International students must take the Test of English as a Foreign Language (TOEFL) or sit for an International English Language Testing System (IELTS) exam. Other optional information such as letters of reference (maximum of three), a statement of purpose, standardized test scores, and a personal interview can be provided to support a student's application. Although not required, applicants are encouraged to take both the Graduate Record Examination (GRE) aptitude test and the GRE physics subject test.

Degree Options

The Master of Science (MS) degree in Physics may be earned by fulfilling the requirements for the MS with thesis or the MS without thesis options.

Career Implications

The career implications for students with an MS degree in Physics and seeking employment are similar to those with a BS degree in Physics, except that they will have a more advanced standing and will be recognized as having more experience in science/technical activities. Similarly, for students that intend to pursue further academic or professional training, the MS degree in Physics will give greater weight to your applications.

Graduate Academic Advising

Graduate student academic advising questions should be directed to Professor Paul Rulis (rulisp@umkc.edu), Flarsheim Hall 250D, (816) 235-5945 or Professor Mark Brodwin (brodwinm@umkc.edu), Flarsheim Hall 250L, (816) 235-2508. Academic topics include, for example: the application and admission procedures, coursework plans of study, graduation credit hour requirements, administrative processes, participation in departmental social activities, and advice on how to find a research group, etc.

Graduate Research Advising

Graduate students are strongly encouraged to pursue research activities. Those that wish to do so will need to establish a research relationship with a faculty mentor who will then become the student's graduate research advisor. Because the time and resources of faculty are limited, a specific student-faculty research relationship cannot be guaranteed. Interested graduate students are encouraged to set up appointments to speak with individual faculty about their research activities so as to learn if/how research activities can be integrated into their plan of study.

Scholarships, Fellowships, and Assistantships

Financial support is available through fellowships, teaching assistantships, research assistantships or hourly student wages. *Students wishing to be considered for an assistantship must so specify in their letters and application forms.*

Program Requirements

General Regulations for all MS Degree Seeking Students

1. Students must satisfy the general (https://catalog.umkc.edu/general-graduate-academic-regulations-information/general-graduate-academic-regulations/) regulations and MS degree (https://catalog.umkc.edu/general-graduate-academic-regulations-information/masters-degrees-academic-regulations/) regulations set forth by the School of Graduate Studies (https://catalog.umkc.edu/general-graduate-academic-regulations-information/masters-degrees-academic-regulations/).
2. All graduate students must maintain a grade-point average of 3.0 on a 4.0 scale.
3. No more than twelve (12) credit hours of 400-level undergraduate courses may be taken for graduate credit.

4. No more than six (6) credit hours of 5599 Research and Thesis may be applied toward the degree whether pursuing a thesis-based MS degree or not.

Additional Requirements Specifically for the MS Degree in Physics Without Thesis

1. Completion of thirty-three (33) credit hours of Physics and Astronomy coursework taken for graduate credit.
   a. Select a minimum of fifteen (15) credit hours of core MS courses.
   b. Select no more than eighteen (18) credit hours of elective MS courses.

Additional Requirements Specifically for the MS Degree in Physics With Thesis

1. Completion of thirty (30) credit hours of Physics and Astronomy coursework taken for graduate credit.
   a. Select a minimum of fifteen (15) credit hours of core MS courses.
   b. Select no more than eighteen (18) credit hours of elective MS courses.
2. Maintenance of satisfactory progress toward completion of a research project and the associated written thesis as determined by your graduate research advisor.
3. A satisfactory[1] thesis defense with the following constraints:
   a. The defense may be oral, written, or both and it may include the student's thesis proposal and associated background material.
   b. The thesis defense is administered by the student's supervisory committee.
   c. The thesis defense is publicly accessible.
4. **Note:** Graduate students should consult with the Physics and Astronomy graduate academic advisors prior to enrollment.

   Professor Mark Brodwin (brodwinm@umkc.edu), Flarsheim Hall 250L, 816-235-5945
   Professor Paul Rulis (rulisp@umkc.edu), Flarsheim Hall 250D 816-235-5945

Course List

Code	Title	Credits
MS Core Courses		**15**
PHYSICS 5510	Theoretical Mechanics I	
PHYSICS 5520	Electromagnetic Theory And Applications I	
PHYSICS 5530	Quantum Mechanics I	
PHYSICS 5540	Statistical Physics I	
PHYSICS 5521	Electromagnetic Theory And Applications II	
PHYSICS 5531	Quantum Mechanics II	
MS Elective Courses [2]		**15-18**
PHYSICS 5500	Methods Of Mathematical Physics I	
PHYSICS 5501	Methods Of Mathematical Physics II	
PHYSICS 5511	Theoretical Mechanics II	
PHYSICS 5535	Optical Properties Of Matter	
PHYSICS 5541	Statistical Physics II	
PHYSICS 5550	Atomic And Molecular Structure	
PHYSICS 5553	Practical Astronomy	
PHYSICS 5555	Stellar Astrophysics	
PHYSICS 5556	Galaxies	
PHYSICS 5565	Cosmology	
PHYSICS 5560	Nuclear Physics	
PHYSICS 5570	Quantum Theory Of Solids I	
PHYSICS 5590	Topics In Physics	
PHYSICS 5595L	Computer Interfacing Laboratory	
PHYSICS 5599	Research And Thesis [3]	
PHYSICS 410	Thermal Physics	
PHYSICS 420	Optics	
PHYSICS 476LW	Advanced Laboratory	
PHYSICS 450	Introduction To Solid State Physics	
PHYSICS 460	Electricity And Magnetism I	

	PHYSICS 461	Electricity And Magnetism II
	PHYSICS 472	Introduction To Quantum Mechanics

1 'Satisfactory' is determined by the student's committee.
2 No more than twelve (12) credit hours of 400-level courses.
3 No more than six (6) hours from PHYSICS 5599.