MASTER OF SCIENCE IN PHYSICS

Why study physics and astronomy?
Because understanding the physical universe starts here.

Admission to Graduate Studies
An applicant seeking to pursue graduate study in the College may be admitted as either a degree-seeking or non-degree seeking student. Policies and procedures of Graduate Studies govern the process of Graduate admission. These may be found in the Graduate Studies (http://catalog.ku.edu/graduate-studies) section of the online catalog.

Please consult the Departments & Programs (http://catalog.ku.edu/liberal-arts-sciences) section of the online catalog for information regarding program-specific admissions criteria and requirements. Special admissions requirements pertain to Interdisciplinary Studies degrees, which may be found in the Graduate Studies section of the online catalog.

Graduate Admission
Ordinarily, admission requires an undergraduate grade-point average of at least B (3.0 on a 4.0 scale), overall and in the major. A baccalaureate degree with a major in physics is desirable but not required. Recommended preparation consists of courses in mechanics, electromagnetic theory, thermal physics, introductory quantum mechanics, advanced laboratory, and at least one course in mathematics beyond differential equations. Working knowledge of computers and of an advanced programming language is helpful. A student with less than the recommended preparation may enroll in these courses for graduate credit.

Submit your graduate application online (http://graduate.ku.edu/application-process). Send all other requested application materials to the department:

The University of Kansas
Department of Physics and Astronomy
Graduate Secretary
1251 Wescoe Hall Dr.
1082 Malott Hall
Lawrence, KS 66045-7572

M.S. Degree in Physics
Candidates must complete a minimum of 30 credit hours of advanced lecture courses (numbered 500 or above) in physics and related subjects within a period of 7 years. Credit toward the 30 required hours is not given to students who take courses at a lower level after having completed similar upper level courses (as determined by the department) with a grade of B- or higher.

Program requirements include

1. Within 12 months of entering the program the student must fulfill the requirements of the individualized plan of study (http://physics.ku.edu/individualized-plan-of-study) for all graduate degrees to certify an undergraduate knowledge of Physics. Visit the Department’s website for more information on these requirements and the process of certification.

2. 4 basic courses:
   - PHSX 711 Quantum Mechanics I 3
   - PHSX 718 Mathematical Methods in Physical Sciences 3
   - PHSX 821 Classical Mechanics 3
   - PHSX 831 Electrodynamics I 3

3. 2 additional courses chosen from:
   - PHSX 721 Chaotic Dynamics 3
   - PHSX 731 Molecular Biophysics 3
   - PHSX 741 Nuclear Physics I 3
   - PHSX 761 Elementary Particles I 3
   - PHSX 781 Solid State Physics I 3
   - PHSX 792 Topics in Advanced Astrophysics 3
   - PHSX 793 Physical Cosmology 3
   - PHSX 795 Space Plasma Physics 3
   - PHSX 815 Computational Methods in Physical Sciences 3

4. A minimum of 2 hours in PHSX 899 Master’s Research/Thesis is required, with a maximum of 6 hours that count toward the master’s degree. No more than 3 hours will be allowed unless directed towards completion of a thesis on original research or a written report. Students must consult with the research advisor before enrolling in more than 3 credit hours.

5. The remaining 6 to 10 hours of advanced electives must be either advanced lecture courses or advanced undergraduate laboratory courses. (This proviso excludes seminars and special problems courses.)

6. All graduate students, after their first semester, will deliver at least 1 oral presentation per semester.

7. General Examination: Candidates must pass a general oral examination in physics. The examination is given shortly before completion of other work for the degree. A master’s thesis is not required but may be submitted if the candidate and the director of the candidate’s research believe it to be appropriate.

The departmental web page with some additional information, e.g., milestones, can be found at http://www.physics.ku.edu/~physics/graduate/about.shtml

Please go to this website to see the University’s policy on time limits: https://documents.ku.edu/policies/Graduate_Studies/maprogramtimeconstraints.htm

M.S. Subspecialty in Computational Physics and Astronomy
This degree is a subspecialty program for students with a background in physics, astronomy, computer science, mathematics, or engineering who wish to become familiar with computer-based approaches to problems in these fields. Minimum preparation expected includes a year’s course in general physics, mathematics through differential equations, and a knowledge of FORTRAN, C++, or another programming language.

A total of 30 hours of graduate credit is required. The 33 hours listed below under 2 and 3 may include certain undergraduate-level electrical engineering and computer science courses. (Only courses numbered 500 and above count as graduate credit.) Students entering the program may have satisfied several of these requirements, but a total of 30 hours of graduate credit is still required. No more than the required 6 hours of
PHSX 899 Master’s Research/Thesis may be counted toward the degree.

Degree requirements include

1. Within 12 months of entering the program the student must
fulfill the requirements of the individualized plan of study (http://
physics.ku.edu/individualized-plan-of-study) for all graduate
degrees to certify an undergraduate knowledge of Physics. Visit the
Department’s website for more information on these requirements
and the process of certification.

2. Required Courses (21 credit hours)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX/ASTR 815</td>
<td>Computational Methods in Physical Sciences</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 718</td>
<td>Mathematical Methods in Physical Sciences</td>
<td>3</td>
</tr>
<tr>
<td>MATH/EECS 781</td>
<td>Numerical Analysis I</td>
<td>3</td>
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EECS – 1 course at the 300 level or above (in addition to
EECS 781) (Note: courses below the 500 level will not count
in the required 30 hours of graduate credit.)

1 additional PHSX/ASTR/ATMO lecture course at the 500 level or
above

PHSX 899 Master’s Research/Thesis 1-10

3. 12 or more credits from the following list of courses:

Note: Double counting of courses is not allowed, e.g. a course used
to fulfill a requirement under part 2. (e.g. EECS 448) may not also be
counted under part 3.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>EECS 360</td>
<td>Signal and System Analysis</td>
<td>4</td>
</tr>
<tr>
<td>EECS 368</td>
<td>Programming Language Paradigms</td>
<td>3</td>
</tr>
<tr>
<td>EECS 388</td>
<td>Embedded Systems</td>
<td>4</td>
</tr>
<tr>
<td>EECS 448</td>
<td>Software Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>EECS 560</td>
<td>Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>EECS 672</td>
<td>Introduction to Computer Graphics</td>
<td>3</td>
</tr>
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Select 1 of the following - Special Topics (Examples of recent
topics: Mathematics of Wall Street Computer-aided, Study of
Differential Geometry, Chaos and Fractals, Fractional Brownian
Motion and Its Applications, Wavelet Analysis, Statistical Theory,
Stochastic Differential Equations and Applications)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 596</td>
<td>Special Topics: ____</td>
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<tr>
<td>MATH 696</td>
<td>Special Topics: ____</td>
<td></td>
</tr>
<tr>
<td>MATH 796</td>
<td>Special Topics: ____</td>
<td></td>
</tr>
<tr>
<td>MATH 611</td>
<td>Time Series Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 627</td>
<td>Probability</td>
<td>3</td>
</tr>
<tr>
<td>MATH 647</td>
<td>Applied Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH/EECS 782</td>
<td>Numerical Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 783</td>
<td>Applied Numerical Methods for Partial Differential Equations</td>
<td>3</td>
</tr>
</tbody>
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PHSX/ASTR/ATMO Courses Numbered 500 and above

Courses below the 500 level do not count towards the required 30
hours of graduate credit.

4. All graduate students, after their first semester, will deliver at least 1
oral presentation per semester.

5. Thesis: An important component of this degree is the completion and
documentation of a successful computer project. A thesis must be
presented that describes the basic physics involved in the project, the
method of implementing the project, and a discussion of the results.

An oral defense of the thesis is required before a committee of at
least 3 members of the graduate faculty.

The departmental web page with some additional information, e.g.,
the Graduate Handbook and milestones, can be found at http://
physics.ku.edu/graduate-studies