

Additional information may be obtained from:

UM-St. Louis Admissions Office
One University Boulevard
St. Louis, Missouri 63121-4400
(314) 516-5451
<http://www.umsl.edu/>



University of Missouri-St. Louis

Physics and Astronomy

Why UMSL?

The Department of Physics and Astronomy is actively involved in research areas that include astrophysics, biophysics, and nanotechnology/materials physics and is closely associated with the Center for Nanoscience and the Center for Neurodynamics. Undergraduates can not only work on undergraduate physics degrees that emphasize these areas, but also gain research experience working alongside faculty members. Research assistantships are available and students can conduct research projects in astronomy and space science funded by the NASA/Missouri Space Grant Consortium. The Department also provides scholarships to qualified students.

Career Outlook

Many of our students have been successful in subsequent graduate studies in astronomy and meteorology as well as in physics. Our alumni have pursued graduate studies and earned doctorate degrees at institutions such as Cornell University, University of Wisconsin, Washington University, University of Chicago, and others. The many students who elected a career in industry are now working in a variety of settings for such firms as International Business Machines, Emerson Electric, Southwestern Bell, Hewlett-Packard, Boeing, and the National Center for Atmospheric Research. Several former students are currently teaching physics in high schools around the St. Louis area.

Undergraduate Studies

Degrees and Areas of Concentration

The Department of Physics and Astronomy offers course work leading to the B.A. in physics, the B.S. in physics, and in cooperation with the College of Education, the B.A. in physics with teacher certification and the B.S. in education with an emphasis in physics.

The Department offers meritorious students opportunities to participate in teaching and research to help prepare them for the independent effort required in industry or graduate school. The Department's faculty members have a diversity of interests and are active in various experimental and theoretical research areas.

Graduate work leading to the Master of Science in physics is also offered. The M.S. in physics program combines a sound basis in the fundamental areas of classical and modern physics from both a theoretical and an applied perspective. The program is designed to enable students with undergraduate backgrounds in physics or other technical areas to further their professional development and maintain and improve their technical development. The program is offered almost entirely in the evening to serve students who

are employed locally. The Department offers the Ph.D. degree in cooperation with the University of Missouri-Rolla Physics Department. Students must satisfy the UM-Rolla admission standards, and the UM-Rolla Qualifying Exam in Physics is required of UM-St. Louis Ph.D. students. However, all course work and dissertation research may be completed while the student is in residence at UM-St. Louis.

Degree Requirements

All physics majors, who are first-time freshmen or transfer students, must complete Physics 1099, Windows on Physics. All physics majors in all programs must complete the physics core curriculum. In addition to the core courses, each individual program has its own specific requirements. Required Physics, Mathematics, Chemistry, Biology, Optometry, and Computer Science courses for a major or minor in physics may not be taken on a satisfactory/unsatisfactory grading basis.

Core Curriculum

The following physics courses are required:

1099, Windows on Physics
2111, Physics: Mechanics and Heat
2112, Physics: Electricity, Magnetism, and Optics
3200, Mathematical Methods of Theoretical Physics
3221, Mechanics
3223, Electricity and Magnetism
3231, Introduction to Modern Physics I

Also required are:

Mathematics 1800, Analytic Geometry and Calculus I
Mathematics 1900, Analytic Geometry and Calculus II
Mathematics 2000, Analytic Geometry and Calculus III
Mathematics 2020, Introduction to Differential Equations
Chemistry 1111, Introductory Chemistry I or equivalent
Computer Science 1250, Introduction to Computer Science

Note: Students are urged to begin the calculus sequence (Mathematics 1800, Analytic Geometry and Calculus I) as soon as possible to avoid delays in graduation.

Students with experience in digital computer programming may be excused from Computer Science 1250.

Bachelor of Arts in Physics

The B.A. program is tailored to students wishing to preserve the option for specialization in graduate school without sacrificing the advantages of a liberal arts education. In addition to the core curriculum, including the foreign language requirement, at least three electives at the 3000- or 4000-level must be completed. At least 31 hours of physics courses, but no more than 45 hours, are required.

CAREER

Bachelor of Science in Physics

The B.S. degree provides students with five options: general physics, astrophysics, engineering physics, medical physics, or optical biophysics.

General Physics Option

This option may be elected by students desiring a greater concentration in physics and mathematics and is recommended for students wishing to enter graduate study in physics. At least 49 hours, but no more than 52, are required. Additional courses will be required for this option.

Astrophysics Option

This option may be elected by students who have interests in the aerospace sciences or anticipate graduate studies in astrophysics. At least 47 hours, but not more than 51, must be taken. Additional courses will be required for this option.

Engineering Physics Option

Students interested in careers in the research and development field of industry should consider this option. This program exposes the student to a basic engineering curriculum, as well as to areas of physics with industrial applications, such as electronics, modern optics, and linear analysis. At least 49 hours, but no more than 51, are required. Additional courses will be required for this option.

Medical Physics Option

This option is designed for students who are interested in careers in various medical fields or biophysics. This option provides a strong preparation in physics, mathematics, chemistry, and biology for students who intend to apply for admission to medical schools. At least 41 hours of physics and biology combined, but no more than 51, are required. Additional courses will be required for this option.

Optical Biophysics Option

This program is designed for students wanting to obtain a strong biophysics emphasis that will also prepare them for the optometry program at UM-St. Louis. This 3+4 program allows students to complete their B.S. in physics and Doctor of Optometry degrees in seven years. Students can complete their B.S. in physics degree in their fourth year while starting coursework in the College of Optometry. A total of 52 hours in physics, biology, and optometry courses are required. Additional courses will be required for this option.

Note: Upon declaring physics as a major and selecting this option, students should seek an initial interview with the Director of Student Affairs and the Pre-Optometry Advisor in the UM-St. Louis College of Optometry to ensure that all prerequisites for the College of Optometry will be completed. A similar review is recommended at the beginning of the Winter Semester of the second year. In August following the completion of their second year of this program, students may apply formally to the UM-St. Louis College of Optometry and arrange to take the Optometry Admissions Test (OAT) in October of their third year. The applicant will be invited for a formal interview for acceptance into the College of Optometry professional program following receipt of a completed application in the Fall Semester of the candidate's third year. Following the formal interview with the College of Optometry at the beginning of the third year, students with a 3.0 or better grade point average in the science prerequisites for optometry and a score of 310 or better on the OAT exam may be accepted into the College of Optometry.

B.S. degree in Secondary Education with an Emphasis in Physics

All candidates must enroll in a program that includes Levels I, II, and III coursework in the College of Education. In addition, students must complete the Science Core Courses and the courses listed under Physics Endorsement.

Minor in Physics

Students may complete a minor in physics with the flexibility of emphasis on classical physics, modern physics, or a combination of the two areas. Additional courses will be required for this minor.

Graduate Studies

About the Program

The Department of Physics and Astronomy at the University of Missouri-St. Louis offers programs of study leading to a Master of Science degree and a Ph.D. degree in physics. The doctoral degree is in cooperation with the UM-Rolla Physics Department. Students may utilize resources of both campuses in their programs as well as the interdisciplinary Center for the Nanoscience and the Center for Neurodynamics on the UM-St. Louis campus.

The Department requires applicants to have adequate backgrounds in such areas as mechanics, thermodynamics, electromagnetism, optics, electronics, and modern physics. Students admitted to the program with deficiencies in these areas are required to take appropriate undergraduate courses. If necessary, a remedial program is determined in consultation with the Department graduate studies director at the time of application for admission.

Financial Support

Graduate teaching and research assistantships are available to full-time graduate students and qualify the student for a 9-month stipend and a full tuition remission. Summer employment as a teaching or research assistant is usually provided.

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One University Boulevard

St. Louis, Missouri 63121-4400

(314) 516-5451

Toll-free in MO and IL 618 area code:

1-888-GO-2-UMSL

Career Services: (314) 516-5111

For information on research opportunities and Physics and Astronomy Scholarships, contact the Physics and Astronomy Department: (314) 516-5931

<http://www.umsl.edu/~physics>