

Physics (BS)

|Affiliation: School of Sciences & Mathematics

“The science of physics seeks to understand the behavior of matter and energy at the most general and fundamental level. The sister sciences of chemistry, earth sciences, and biology (including parts of medical science) build on the laws of physics and rely on many instruments originally devised by physicists. Physics underlies engineering and most of modern technology, and it plays a basic and essential role in our economy and our culture...” (National Academy of Sciences)

The mission of the Physics Department at Truman State University is to support the liberal learning of all students at Truman State University through excellence in teaching, and by broadly espousing the notion that the pursuit of understanding in physics is worthwhile, interesting, and deeply satisfying; to support students whose primary field of study overlaps with physics (e.g., chemistry, biology, medicine, and mathematics); and to provide Physics majors with the knowledge, skills, methods, and attitudes necessary to understand and engage professionally in inquiry into the nature and behavior of the physical world.

In order to serve this mission, the Physics program is designed to achieve the following general goals: 1) to help students appreciate and understand the process of science, in particular its ever-changing nature, the fact that it is a human endeavor, the back and forth between experiment and abstract reasoning, and the importance of internal consistency; 2) to stimulate lifelong, independent learning; 3) to awaken and nurture appreciation for the beauty of physics; and 4) to contribute to a realistic understanding of technology and its role in society.

Specifically, the Physics Department strives to provide an environment where all our students: 1) develop a broad and coherent knowledge of physics; 2) experience activities unique to scientific research; 3) develop positive work habits, including collaboration, self-discipline, high aspirations, responsibility and honesty; and 4) are prepared for success in graduate school, professional school, engineering school, or in the workforce.

For all Physics majors, a strong emphasis is placed on close and frequent contact with individual faculty members. Upper-level classes are small, and one-on-one interactions between the faculty and students are common. Many Physics majors have strong ties to other disciplines such as mathematics, computer science, chemistry, music, philosophy, education, business, or political science which then become part of their research endeavors, minors, second majors, and post-graduate study.

The Physics Bachelor of Science degree is a rigorous and challenging program designed to prepare students for graduate-level study in physics or a related field. Because physics is so fundamental a science and because it involves intense training in critical thinking, quantitative analysis, and creative problem solving, the physics graduate adapts easily to a large number of high-tech fields including biophysics, geophysics, engineering, systems analysis, information science, and medicine. Physics majors are also well-prepared to follow

careers in the technology sectors of business and law.

For those students who are interested in astronomy and astrophysics we have an astronomy and astrophysics track within the BS. The astronomy and astrophysics track substitutes some physics courses focused on astronomy and astrophysics for some of the more traditional physics courses.

Students intending to receive a bachelor's degree in physics must take the Major Field Test-Physics during their last regular semester (fall or spring). In addition, students who wish to apply for admission to graduate programs in physics should take the Graduate Record Examination (GRE) (subject Physics) in the semester prior to submitting applications.

DEPARTMENTAL HONORS IN PHYSICS

Departmental Honors in Physics are awarded to graduating students who meet at least one of the following two requirements:

1. a grade point average in physics courses required for the major which equals or exceeds 3.50, and a score at or above the 90th percentile in the Physics Major Field Test, **OR**
2. a grade point average in physics courses required for the major which equals or exceeds 3.75, and a score at or above the 80th percentile in the Physics Major Field Test.

DEGREE REQUIREMENTS:

Dialogues Requirements: 42-61 Credits

Missouri Statute (1-4 credits)

Bachelor of Science Requirement: 6 Credits

MATH 365 - Ordinary Differential Equations Credit(s): 3

STAT 290 - Statistics Credit(s): 3

MAJOR REQUIREMENTS:

The Physics BS major consists of three (3) parts: Required Support, Core Requirements, and Track Requirements. Each student must complete all three parts.

Part I: Required Support (17 Credits)

MATH 198 - Analytic Geometry and Calculus I Credit(s): 5
MATH 263 - Analytic Geometry and Calculus II Credit(s): 5
MATH 264 - Analytic Geometry and Calculus III Credit(s): 3
CS 170 - Introduction to Computer Science I Credit(s): 4 **OR** **CS 180 - Foundations of Computer Science I** Credits: 4

Part II: Core Requirements (27 Credits)

PHYS 195 - Physics I Credit(s): 5
PHYS 196 - Physics II Credit(s): 5
PHYS 250 - Modern Physics I Credit(s): 3
PHYS 351 - Modern Physics II Credit(s): 3
PHYS 310 - Intermediate Laboratory Credit(s): 2
PHYS 345 - Junior Seminar Credit(s): 1
PHYS 275 - Vibrations and Waves Credit(s): 3
PHYS 382 - Mathematical Physics Credit(s): 3
PHYS 445 - Physics Capstone Credit(s): 2

Part III: Track Requirements

Choose General Physics Track or Astrophysics Track

General Physics Track (19-23 Credits)

PHYS 320 - Electronics Credit(s): 3
PHYS 386 - Classical Mechanics Credit(s): 3
PHYS 446 - Advanced Laboratory Credit(s): 3
PHYS 482 - Electricity and Magnetism Credit(s): 3
PHYS 486 - Thermodynamics and Statistical Mechanics Credit(s): 3
PHYS 518 - Advanced Topics Credit(s): 1 to 5
PHYS 580 - Quantum Mechanics Credit(s): 3

Astrophysics Track (23 Credits)

PHYS 131 - Introduction to Astronomy Credit(s): 4

PHYS 331 - Stellar Astrophysics Credit(s): 3

PHYS 332 - Galactic Astrophysics Credit(s): 3

PHYS 346 - Observational Astronomy Credit(s): 4

And choose 9 credits from the following:

PHYS 320 - Electronics Credit(s): 3

PHYS 386 - Classical Mechanics Credit(s): 3

PHYS 482 - Electricity and Magnetism Credit(s): 3

PHYS 486 - Thermodynamics and Statistical Mechanics Credit(s): 3

Electives to Total: 120 Credits