Program Overview: Bachelor of Science, Physics

About This Major . . .

Physics is the study of the natural world, based on understanding its most fundamental workings. Physicists explore diverse natural systems and phenomena such as photons, atoms, liquid crystals, superconductors, solids, stars, galaxies and black holes, and search for a unifying understanding of these. Physics also contributes to technological developments in diverse fields such as nanotechnology, semiconductors, lasers, magnetic resonance, and space exploration.

With CMU's Bachelor of Science in Physics degree you will gain expertise in core physics theory areas such as classical mechanics, electromagnetism, quantum theory and statistical and thermal physics; these will equip you with strong problem solving, mathematical and analytical thinking skills. Physics laboratory and electronics courses will provide you with hands-on skills using modern equipment, software, and data analysis techniques.

The physics degree culminates in a yearlong research project in an area of current interest; recent examples include quantum information, computational astrophysics, low temperature physics and general relativity. Students present this work in a public seminar and sometimes at conferences and in professional journals.

CMU physics majors have entered graduate programs in physics, astrophysics, chemistry, materials science, aerospace engineering, and electrical engineering, and have been accepted to medical school. The strong analytical, technical, experimental, problem solving, and communication skills that the CMU physics degree provides have also proved attractive outside of academia. Examples of areas where CMU physics graduates have been hired for employment include electrical engineering, software engineering, military research and the energy industry.

For more information on what you can do with this major, go to:
http://whatcanidowiththismajor.com/major/physics/

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning.

By completing a physics major, you will be able to:

1. show fluency with the major fields of physics including classical mechanics, electromagnetism, statistical physics, and quantum theory.
2. use mathematical representations to analyze physical scenarios.
3. use laboratory techniques to investigate physical phenomena experimentally.
4. communicate effectively about topics in physics.
5. execute a project which addresses a significant and complex issue in physics. This project will integrate knowledge and techniques from different areas of physics.

Program Highlights:

Get Involved
Join CMU's award-winning Society of Physics Students Chapter, which stages fun physics demonstrations for CMU students and local K-12 students.

Participate in Research
Choose from a wide variety of research projects in physics and astrophysics. CMU Physics majors have won awards for presenting results of research at national and regional conferences and have published their work in peer-reviewed journals.

Launch your Career
With a position in physics research, engineering, software engineering, or business.

Continue your Studies
By completing an advanced degree in physics, astrophysics, aerospace engineering, or electrical engineering, or applying to medical school. Our physics majors have pursued advanced degrees from the University of Colorado-Boulder, Purdue University, and other major research universities.

Program Requirements

A student must follow CMU graduation requirements by completing 120 semester credit hours, including 40 credits of coursework at the 300+ level. See the "Undergraduate Graduation Requirements" in the catalog for additional graduation information. Students should work closely with a faculty advisor when selecting and scheduling courses prior to registration. In general, CMU's programs of study are based on two curriculum groups:

1. Essential Learning

CMU's Essential Learning program provides the foundation of skills and information that cuts across all fields of study and the support for advanced concepts that students will later encounter in their majors. Before moving into work at the 300+ level, students complete the Maverick Milestone and its co-requirement, Essential Speech. This pair of courses is a capstone experience where students integrate what they have learned from their foundation courses by making connections among diverse areas of knowledge. The capstone is also an opportunity for students to work with disparate ideas, a critical skill expected of all CMU graduates that will aid them in solving the complex and unscripted problems they will encounter in their personal, professional, and civic lives.

2. What You Will Study in This Major. . .

Core Courses

These courses, taken over the first two years of the Physics degree, provide an overview of Physics, relevant Mathematics and a foundation for further study.

- Fundamental Mechanics and Lab
- Electromagnetism and Optics and Lab
- Intermediate Dynamics
- Modern Physics
- Electronics
- Calculus I, II, and III
- Differential Equations

Advanced Core

The core advanced courses each focus on specific areas of Physics or Mathematics and offer sophisticated coverage of the major subfields of Physics. All Physics majors take research and seminar courses twice.

- Electromagnetic Theory I
- Quantum Theory I
- Quantum Theory II
- Advanced Dynamics
- Advanced Lab
- Statistical and Thermal Physics
- Modern Optics
- Senior Research
- Seminar
- Methods of Applied Mathematics

Electives

Electives allow you to supplement or complement your core courses with additional work in mathematics and physics, or explore any other discipline that may interest you. A strategic selection of electives can help you "cross-pollinate" your understanding of Physics with concepts from other fields.

Examples of Physics electives that have been offered in recent years or are planned are:

- Low Temperature Physics
- General Relativity
- Quantum Optics
- Electromagnetic Theory II
- Stellar Astrophysics
- Solid State Physics
- Computational Physics

Examples of Mathematics electives that physics majors take are:

- Numerical Analysis
- Fourier Analysis
- Mathematical Modeling
- Complex Variables
- Linear Algebra

For more information about this major, go to: http://www.coloradomesa.edu/physics/degrees.html or contact the Academic Department Head for Physical and Environmental Sciences, 228G Wubben Hall, 970.248.1162.