

PHYSICS

Damon A. Resnick
Greg Gabrielsen

Assistant Professor
Instructor

Applied Physics majors may complete their degree at Carroll University, the University of Wisconsin – Platteville, or the University of Wisconsin – Milwaukee in accordance with the pre-engineering program. For details on this program see a member of the Physics or Mathematics faculty. In either case, the Applied Physics major provides a strong foundation for further studies in physics, engineering, computers, law and medicine. Applied Physics majors can find jobs immediately after graduation in a variety of technologically demanding careers.

Physics minors are encouraged to select additional supporting courses in the other sciences. The minor provides excellent preparation for a career in many fields including mathematics, chemistry, biology, medicine and physical therapy.

A certification program to teach physics at the secondary level, with a minor in physics, is available. Details of this program can be obtained from either the physics or the education faculty.

Fees

Specific courses that require use of equipment and disposable supplies are assigned a course fee.

Applied Physics Major

Core

Physics 203 & 204, General Physics (recommended) or
Physics 101 & 102, Introductory Physics
Physics 301, Electricity and Magnetism
Physics 303, Modern Physics
Physics 304, Classical Mechanics
Physics 320, Thermodynamics
Mathematics 160, 161, 207, Calculus I, II, III
General Engineering 100, 101, Engineering Seminar I, II
Capstone: Mathematics 450

Required Support Courses

Mathematics 309, Differential Equations
Chemistry 109, Principles of Inorganic Chemistry
Chemistry 110, Principles of Analytical Chemistry
Computer Science 111, Introduction to Java
12 hours of electives in the Mathematics and Physics programs

Physics Minor

Physics 203, 204, General Physics (Recommended) or

Physics 101,102, Introductory Physics

Physics 303, Modern Physics

Physics 304, Mechanics

101. Introductory Physics I

4 credits

The first course of a non-calculus based two-course sequence in the basic principles of physics covering the general areas of mechanics, thermal physics and fluids. The mathematical proficiency expected for this course is algebra and introductory trigonometry. This course satisfies the physics requirement for some majors, and pre-health professional requirements. Four hours of lecture/discussion and two hours of laboratory per week. (Credit cannot be received for both 101 and 203.) (Required course fee) (*Sp, Su*) Prerequisite: MAT 101 or higher.

102. Introductory Physics II

4 credits

The second course of a non-calculus based two-course sequence in the basic principles of physics covering the general areas of wave motion (oscillations, waves and sound), light and optics, and electromagnetism. The mathematical proficiency expected for this course is algebra and introductory trigonometry. This course satisfies the physics requirement for some majors, and pre-health professional requirements. Four hours of lecture/discussion and two hours of laboratory per week. (Credit cannot be received for both 102 and 204.) (Required course fee) (*Fa, Su*) Prerequisite: PHY 101. Instructor consent is necessary for enrollment in 102 without completion of 101.

105. Astronomy

N1

4 credits

The course includes the study of the motions and structures of the earth, the moon, the sun, planets, stars and galaxies, and consideration of cosmological theories. The laboratory includes telescopic observational astronomy. Labs are scheduled for twice a week but only meet once a week on average for three hours. (Required course fee) (*Fa, Sp, Su*) Prerequisites: Satisfaction of the mathematics competency requirement for graduation.

203. General Physics I

4 credits

The first course of a calculus level two-course sequence in the basic principles of physics covering the general areas of mechanics, fluids and wave motion. This course satisfies the physics requirement for some majors, and pre-health professional requirements. Four hours of lecture/discussion and three hours of laboratory per week. (Credit cannot be received for both 101 and 203.) (Required course fee) (*Sp*) Prerequisites: MAT 160.

204. General Physics II

4 credits

The second course of a calculus level two-course sequence in the basic principles of physics covering the general areas of heat, light, electricity and circuits, and magnetism. This course satisfies the physics requirement for some majors, and pre-health professional requirements. Four hours of lecture/discussion and three hours of laboratory per week. (Credit cannot be received for both 102 and 204.) (Required course fee) (*Fa*)

PHYSICS

Prerequisites: MAT 160 and 161. Instructor consent is necessary for enrollment in 204 without the successful completion of 203.

301. Electricity and Magnetism

4 credits

Physical principles underlying modeling of charges and currents, including circuit elements and fundamentals of analog electrical circuits are explored through lecture and laboratory. Topics will include the following: Maxwell's equations, electric and magnetic fields in vacuum and in matter, potentials and the uniqueness theorem, current and voltage sources, resistors, Ohm's Law, Kirchhoff's Laws, Thevenin and Norton theorems. Four hours of lecture/discussion and three hours of laboratory per week. (Required course fee) (*Sp, even years*) Prerequisites: PHY 204, MAT 207.

303. Modern Physics

4 credits

A course in the basic principles of modern physics treating the general subjects of atomic and nuclear physics, relativity, cosmology and quantum physics. Four hours of lecture/discussion and three hours of laboratory per week. (Required course fee) (*Sp, odd years*) Prerequisites: PHY 204 or 102 and MAT 160 and 161.

304. Classical Mechanics

4 credits

An intermediate course in mechanics including vector calculus, conservation laws of mechanics, and dynamics of a particle and of a rigid body. Four hours of lecture/discussion and three hours of laboratory per week. (Required course fee) (*Sp, odd years*) Prerequisites: PHY 204 or 102 and MAT 160 and 161.

320. Thermodynamics

4 credits

An introduction to the basic concepts of thermodynamics, including temperature, thermal expansion, heat flow, calorimetry, the First and Second Laws of Thermodynamics, statistical mechanics and fundamental theories of phase transitions, topics on gas, vapor, combined power cycles, refrigeration cycles, gas mixtures, and gas-vapor mixtures. Engineering applications will be emphasized alongside theoretical fundamentals. (*Sp, even years*) Prerequisites: PHY 204, MAT 207.

380/480. Work-Oriented Experience

4 credits

A work-oriented experience in applied physics. This is to be planned in advance with a physics faculty member. It does not count toward a minor in physics. *S/U* graded.

396/496. Special Problems and Research

4 credits

Prerequisite: Approval of the divisional dean and consent of instructor. (Required course fee)

398. Independent Studies in Physics

1-4 credits

Prerequisites: Junior standing, approval of divisional dean and consent of the instructor.