

PHYSICS

Department of Earth, Environment and Physics

A physics minor is useful in many technical fields because the study of physics develops an understanding of basic principles, mathematical modeling, and practical applications. Specific areas where a physics background is useful include imaging techniques in medicine and biology, analytical instrumentation in chemistry, remote-sensing techniques in the geosciences, and development of realistic physical models in computer science and mathematics.

- Physics Minor

Faculty

William J. Hansen, Professor (2005), B.A. State University of New York Albany; M.A. Hunter College; Ph.D. City University of New York Graduate Center

Nabin K. Malakar, Assistant Professor (2017), M.S., Ph.D., University at Albany, State University of New York (SUNY)

Ian W. Stephens, Assistant Professor (2020), B.S., Georgia Institute of Technology; Ph.D., University of Illinois at Urbana - Champaign

Courses

PY-101 Introduction to Astronomy

LASC Categories: NSP

Tools of the astronomer. The nature of stars, their location and cosmology. Planets and the solar system.

Every year. 3 Credits

PY-105 Concepts in Physics I

LASC Categories: NSP, LAB

Prerequisites: Math placement exam score of 3 or above or successful completion of college-level math class

Concepts and physical principles of motion, force, mechanical work, energy, and momentum. Torque and angular momentum. Fluids, heat, and thermodynamics. Two hours lecture and one two-hour laboratory. Credit will not be awarded for more than one of PY 105, PY 221, and PY 241.

Every year. 3 Credits

PY-106 Concepts in Physics II

LASC Categories: NSP

Prerequisites: Math placement exam score of 3 or above or successful completion of a college-level math class.

Electrostatics, including electric forces and electric potential. Simple circuits, electrical power, and generators. Magnetic fields and forces, light, and relativity. Credit will not be awarded for more than one of PY 106, PY 222, and PY 242."

Every year. 3 Credits

PY-112 Physics in Art

LASC Categories: NSP, LAB, QAC, WAC

Prerequisites: Math placement exam score of 3 or above or successful completion of a college-level math class, and EN-102.

Concepts in optics and modern physics applied to the analysis of paintings, conservation of art objects, and detection of forgeries. Three hours lecture and two hours laboratory.

Every year. 4 Credits

PY-114 Physics of Waves

LASC Categories: NSP, QAC

Prerequisites: Math placement exam score of 3 or above or successful completion of a college-level math class.

Wave phenomena, including water waves, sound, acoustics, musical instruments, optics and quantum mechanics. Analysis of propagation, power, scattering and interference.

Every year. 3 Credits

PY-193 First Year Seminar

LASC Categories: FYS

Introductory level course covering topics of special interest to first-year students. Offered only as a First-Year Seminar.

Every year. 3 Credits

PY-221 General Physics I

LASC Categories: LAB, NSP, QAC

Prerequisites: MA-190 (or higher)

Physics with algebra and trigonometry, including kinematics, dynamics, energy, momentum, gravity, oscillators, waves and heat. Three hours lecture and two hours lab. Credit will not be awarded for more than one of PY 105, PY 221, and PY 241.

Every year. 4 Credits

PY-222 General Physics II

LASC Categories: LAB, NSP

Prerequisites: PY-221

Physics with algebra and trigonometry including electric and magnetic fields, resistance, capacitance, inductance, reflection, refraction, interference, relativity and quantum physics. Three hours lecture and two hours laboratory. Credit will not be awarded for more than one of PY 106, PY 222, and PY 242.

Every year. 4 Credits

PY-240 Optics

Prerequisites: one semester of college level physics and MA-190, or consent of instructor.

Image formation with mirrors and lenses. Interference, diffraction, dispersion, and polarization. Lasers. Microscopes and spectrometers. Cameras and image processing.

Every 2-3 years. 3 Credits

PY-241 Physics I (Mechanics)

LASC Categories: LAB, NSP, QAC

Prerequisites or Corequisite: one semester of calculus either previous or concurrent to PY 241.

Physics with calculus, including kinematics, dynamics, energy, momentum, gravity, oscillators, waves and heat. Three hours lecture and two hours lab. Credit will not be awarded for more than one of PY 105, PY 221, and PY 241.

Every year. 4 Credits

PY-242 Physics II (Electricity, Magnetism and Optics)

LASC Categories: LAB, NSP

Prerequisites: PY-241 and one semester of calculus.

Physics with calculus including electric and magnetic fields, resistance, capacitance, inductance, reflection, refraction, interference, relativity and quantum physics. Three hours lecture and two hours lab. Credit will not be awarded for more than one of PY 106, PY 222, and PY 242.

Every year. 4 Credits

PY-250 Observational Astronomy

LASC Categories: LAB, QAC, NSP

Prerequisites: MA-190

Orientation in the night sky. Use of telescopes and cameras. Conduct astronomical observations. Analysis and interpretation of astronomical data.

Fall only and every year. 3 Credits

PY-297 Selected Topics in Physics

Lecture or laboratory course in a selected area in physics. Topics announced in advance. Prerequisite: Consent of Instructor.

1-6 Credits

PY-310 Modern Physics

Prerequisites: MA-200 and either PY-222 or PY-242

Special relativity. The wave nature of matter, introductory quantum mechanics, and atomic physics. Condensed matter. Radioactivity. Nuclear and particle physics.

Every 2-3 years. 3 Credits

PY-360 Introduction to Materials Science

Prerequisites: CH-120, CH-121, and either PY-221 and PY-222, or PY-241 and PY-242

Physical structures of solids. Electrical, magnetic, thermal and optical properties of solids, liquids and soft matter. Structure-property relationships in materials. Cross-listed with CH-360.

Every 2-3 years. 3 Credits

PY-370 Introduction to Nuclear Science

Prerequisites: CH-120, CH-121, MA-200, and either PY-221 and PY-222 or PY-241 and PY-242

Fundamentals of nuclear science. Topics include nuclear structure and forces, radioactive decays, nuclear reactions, and modern applications. Cross-listed with CH-370.

Every 2-3 years. 3 Credits

PY-408 Directed Study: Physics

Directed study offers students, who because of unusual circumstances may be unable to register for a course when offered, the opportunity to complete an existing course with an established syllabus under the direction and with agreement from a physics faculty member.

3-4 Credits

PY-410 Independent Study: Physics

Opportunity for advanced students to pursue a topic of special interest involving extensive reading, experimentation, and research. Prerequisite: Consent of Instructor.

Every year. 1-6 Credits

PY-460 Physics Internship

Advanced students assigned to external public or private agency, working under agency and physics faculty supervision. Prerequisite: Consent of physics faculty.

Fall and Spring and every year. 1-4 Credits