Physics

PHY 101 General Physics I

Mechanics, heat and fluids. Algebra/trigonometry-based course satisfying requirements for preprofessional courses in physical therapy, dentistry, medicine. Scientific Reasoning. Fall Term. Prerequisite: MA 90 competency; MA 190 or one semester of calculus recommended.

PHY 102 General Physics II

Electricity, magnetism, wave motion and optics. Algebra/ trigonometry-based course satisfying requirements for preprofessional courses in physical therapy, dentistry, medicine. Winter Term. Prerequisite: PHY 101.

PHY 120 Science of Water

Identical with BI 120. Investigation of physical and chemical properties of water as applied to geological, meteorological, and ecological phenomena. Multidiscipline science course. Project based. Laboratory work required. Interconnected: Natural Science. Fee. May Term even years.

PHY 130 Physics of Ordinary Things

Observations of ordinary phenomena to develop basic physical concepts. Various forms of scientific representations are used to develop explanatory models. Laboratory work required. Intended for elementary education majors. Scientific Reasoning. Fall Term.

PHY 132 Earth Science

Basic elements of geology and meteorology using local environments as much as possible. Laboratory and field work. Interconnected: Natural Science. Fee. May Term odd years.

PHY 150 Science for Society

Techniques for understanding and evaluating theoretical hypotheses, statistical and causal hypotheses. Application of these techniques to a variety of historical and contemporary scientific cases. Exploration of how scientific knowledge may be combined with individual or social values to reach personal or public policy decisions. Scientific Reasoning. Prerequisite: MA 90 competency.

PHY 170 Astronomy

Structure of physical universe, emphasis on development and evolution of our understanding over time, impact on various civilizations. Planetary science, stellar evolution, galaxies, exotic phenomena. Laboratory work, telescopic observation, computer simulation. Interconnected: Natural Science.

PHY 195, 295, 395, 495 Special Topics

Topics and credit vary. See course schedule.

PHY 203 Classical Physics I

Kinematics, linear and rotational dynamics, energy, momentum, and thermodynamics. Calculus-based. For physics, chemistry, mathematics, and engineering science majors. Interconnected: Natural Science. Fall Term. Prerequisite: MA 252 or concurrent enrollment.

PHY 204 Classical Physics II

Wave motion, electricity, magnetism, optics. Calculus-based. For physics, chemistry, mathematics, and engineering science majors. Scientific Reasoning. Winter Term. Prerequisite: PHY 203.

PHY 207 Modern Physics

Introduction to relativity and relativistic mechanics; quantum theory with applications to atomic and molecular physics; condensed matter physics; nuclear and particle physics. Fall Term alternate years. Prerequisites: PHY 102 or PHY 204: MA 255 or concurrent enrollment.

PHY 281 Field Experience (variable credit)

Supervised exploratory experience outside classroom. Application of academic learning to practical experience. Not applicable toward major. P/D/F only. Prerequisite: Second-year standing, 2.5 minimum cumulative GPA.

PHY 305 Electronics and Digital Systems

Identical with ES 305. Logic circuits, microprocessors, computer-based instrumentation. Diodes, amplifiers, FETs, BJTs, op-amps. Lab. Winter Term odd years. Prerequisite: ES 204.

PHY 311 Electricity and Magnetism

Electrostatics, dielectrics, magnetism, magnetic induction, alternating current, Maxwell's equations. Alternate years. Prerequisites: PHY 102 or PHY 204; MA 255 or concurrent enrollment.

PHY 313 Digital Electronics

Switching circuits, digital logic, flip-flops, sequential and combinational circuits, number systems and arithmetic operations, counting circuit design, analog-to-digital converters, microprocessors. Independent study using programmed textual and laboratory materials. Offered as conventional course by request.

PHY 317 Optics

Geometrical optics, physical optics using Fourier transform techniques, optical instrumentation, lasers, holography. Alternate years. Prerequisites: PHY 102 or PHY 204; MA 255 or concurrent enrollment.

PHY 320 Statistical Mechanics and Thermal Physics

A rigorous treatment of classical thermodynamics, introduction to statistical mechanics including quantum statistics, canonical and grand canonical ensembles, general properties of the partition function, applications of statistical mechanics to fluid and solid systems. Winter Term even years. Prerequisite: PHY 207 or concurrent enrollment.

PHY 370 Topics in Astrophysics

Introductory astrophysics course with rotating subjects. May focus on stellar astrophysics, planetary mechanics/planetology, or relativity/cosmology. Some laboratory work and telescopic observation is required. May repeat for credit. Alternate years. Prerequisite: PHY 207 or concurrent enrollment.

PHY 371, 372 Internship

Integration of classroom theory with planned and supervised periods of progressively challenging employment related to students' career objectives. Course credit applied toward a major requires department approval. P/D/F only. Possible off-campus costs. Prerequisites: Third- or fourth-year standing, PHY 204, and two physics courses, 2.5 cumulative and major grade point average, department approval.

PHY 399 Supplemental Instruction: Physics (½ course credit)

Teaching practicum in a specific area of study. Student SI leaders participate in leader training, attend classes for which they serve as leaders, prepare and lead study sessions that reinforce course content, model and teach effective study strategies. P/D/F only.

PHY 402 Advanced Mechanics

Identical with MA 402. Statics, kinematics, dynamics of particles and rigid bodies, Lagrange's equations, Hamilton's equations, oscillating systems, introduction to the mechanics of deformable bodies. Prerequisites: MA 250, MA 252; PHY 203; MA 401 recommended.

PHY 414 Quantum Mechanics

Discussion of inadequacies of classical physics when applied to problems in atomic and nuclear physics and development of mathematical formalism used in basic quantum theory, with applications to simple models of physical systems. Alternate years. Prerequisites: PHY 207 and third-year standing.

PHY 450 Independent Study and Research (variable credit)

Independent study of selected topics arranged with the department.

PHY 455 Methods of Physical Research (½ course credit)

Methods of scientific study. Literature searches. Research process, data collection and analysis, preparation of figures and tables, grant/research proposal. Literature critiques and research proposal required. Prerequisite: Third- or fourth-year standing or department approval.

PHY 456 Student-Originated Research (½ course credit)

Hands-on research experience. Students conduct independent research projects developed in PHY 455. Lecture topics cover manuscript, poster preparation. Laboratory notebook, formal poster presentation, major report required. Writing Intensive. Prerequisite: PHY 455.

PHY 460 Perspectives in Physics

Student readings, discussion, papers, presentations on the history and philosophy of physics, current ethical and social issues involving physics and society. Writing Intensive. Capstone. Alternate years. Prerequisite: Third- or fourth-year physics major.

PHY 470 Secondary Content Methods: Science

Identical with BI 470 and CH 470. Designed to precede secondary student teaching with emphasis on introducing, developing, practicing discipline-specific pedagogy, reviewing general teaching methods. Fall Term even years. Prerequisites: ED 229 and admission to Teacher Education Program.