PHYSICS

the courses

PHYS 101: 3 s.h.
Survey of Physics (G2)
An elementary treatment of fundamental concepts of classical and modern physics. Selected examples from classical mechanics, electromagnetism, thermodynamics, relativity and quantum mechanics. The solving of numerical problems is de-emphasized. 3 hr. lec. and discussion. No credit in block G2 for majors in the School of Science and Mathematics. Credit will be granted for only one of the courses: PHYS 101, 103 or 104. Offered in spring. Prereq: MATH placement at the 100 level or above.

PHYS 103H: 4 s.h.
Hrs:Introduction to Physics (G2)
PHYS 104: 4 s.h.
Applied Physics (G2)
A study of the application of mathematics to practical problems in physics, using Newtonian ideas, and emphasizing applications to devices such as machines and engines, and systems such as electrical circuits. 3 hrs. lec., 2 hrs. lab. No credit in block G2 for majors in the School of Science and Mathematics. Credit will be granted for only one of the courses: PHYS 101, 103 or 104. Offered in fall, periodically in spring.

PHYS 117: 3 s.h.
General Astronomy (G2)
Astronomy for a general audience; emphasis on the physical nature of the universe. Terrestrial astronomy, light, telescopes, spectra, stars, stellar evolution, galaxies, cosmology, the solar system. 3 hrs. lec. and discussion. No credit in block G2 for majors in the School of Science and Mathematics. Offered in fall.

PHYS 131: 4 s.h.
Physics 1 with Algebra (G2)
An introductory algebra-based course. Fundamental laws and properties of matter, mechanics and heat. Problems dealing with these laws. 3 hrs. lec., 1 hr. recitation and 2 hrs. lab. Prereq: MATH 101 or MPT score sufficient for the student to enroll in MATH courses above MATH 110. Offered fall, summer.

PHYS 132: 4 s.h.
Physics 2 with Algebra (G2)
Continuation of Physics 131. Fundamental laws and properties of electricity, magnetism, waves, sound, light and radiation. 3 hrs. lec., 1 hr. recitation and 2 hrs. lab. Offered spring, summer. Prereq: PHYS 131 or 231.

PHYS 179: 3,4 s.h.
Experimental

PHYS 198: 1 s.h.
Seminar In Physics
An overview of the history, practice, philosophy and unity of physics and its application to other disciplines, orienting beginning physics majors to the study of physics. Mandatory for, and only open to, physics majors in their freshman year. 1 hr. discussion. Offered in fall.

PHYS 205: 3 s.h.
Musical Acoustics (G2)
Intended for musicians dealing with the physical nature of sound and sound sources, and the relation of these to music and musical instruments. The use of mathematics is kept to a minimum. 2 hrs. lec., recitation, 2 hrs. lab. Offered in spring. Prereq: MUSI 112.

PHYS 230H: 1 s.h.
Hrs:General Physics Seminar (G2)
The ideas of introductory physics in extended depth, in the language of calculus, using problems, laboratory exercises, readings and discussion. Grades of B- or higher in both PHYS 231 and PHYS 230H will result in honors designation for the pair. The pair of courses counts as one entry in the science component of the curriculum record form and results in six hours of general education credit. Coreq: Concurrent registration in PHYS 231 required and either good standing in the Honors College or a 3.35 GPA or permission of instructor.

PHYS 231: 5 s.h.
Physics 1 with Calculus (G2)
An introductory course in classical physics dealing with mechanics, fluids, waves and thermodynamics. 3 hrs. lec., 1 hr. recitation, one 3-hr. lab. Offered in fall, spring, summer. Prereq: C- or higher in MATH 161.

PHYS 232: 5 s.h.
Physics 2 with Calculus (G2)
Continuation of PHYS 231. An introductory course in classical physics dealing with electricity, magnetism and optics. 3 hrs. lec., 1 hr. recitation, one 3-hr. lab. Offered in fall, spring, summer. Prereq: C- or higher in PHYS 231. Coreq: MATH 211.

PHYS 233: 3 s.h.
Wave-Particle Theory
Selected topics from the areas of waves and optics, special relativity, an introduction to the concepts and development of modern physics and single-particle quantum mechanics. 3 hrs. lec. Offered in spring. Prereq: C- or higher in PHYS 232. Coreq: MATH 311.

PHYS 266: 3 s.h.
Electronics
The fundamentals of analog devices and their application to electronic circuits. Operational amplifiers, power supplies, semi-conductor devices, oscillators, and an introduction to integrated circuits. One 4-hour Lecture and Lab per week. Prereq: PHYS 132 or 232. Coreq: MATH 161. Offered in spring.

PHYS 279: 1-3 s.h.
Experimental
Experimental

PHYS 279H: 1-3 s.h.
Experimental Honors
Experimental Course for Honors Credit

PHYS 300: 3-12 s.h.
Co-Op Ed Experience in Physics
Co-Op Ed Experience in Physics
PHYS 301: 3 s.h.
Mechanics 1
Lectures, problems and demonstrations developing the fundamental principles and concepts of classical mechanics, including Newton’s laws of motion in three dimensions, conservation laws, linear and nonlinear oscillating systems, gravitation and central force problems. 3 hrs. lec. and discussion. Offered in spring. Prereq: C- or higher in PHYS 232. Coreq: MATH 365.

PHYS 302: 3 s.h.
H:Phys and Evol of West Civ (P)

PHYS 302H: 3 s.h.
H:Phys and Evol of West Civ

PHYS 310: 3 s.h.
Mechanics 2

PHYS 311: 3 s.h.
Introduction to Astronomy
An overview of astronomy and astrophysics for students majoring in the sciences or mathematics, emphasizing selected areas such as terrestrial astronomy, celestial mechanics, stellar evolution, cosmology and the solar system. 3 hrs. lec. Offered in fall of odd years. Prereq: a year of college-level physics and calculus.

PHYS 312: 3 s.h.
Electrostatic and magnetic fields in vacuum and in dielectric and magnetic materials. Maxwell’s equations are developed. 3 hrs. lec. and discussion. Offered periodically. Prereq: a physical science course, COMM 100, ENGL 110 and junior status.

PHYS 316: 3 s.h.
Experimental
Selected Experiments in classical and modern physics introducing a variety of experimental techniques. 3 hours lab. Prereq: PHYS 232 and either PHYS 266 or CSCI 370. Offered in fall.

PHYS 317: 3 s.h.
Intermediate Physics Lab 1

PHYS 318: 3 s.h.
Intermediate Physics Lab 2
Continuation of PHYS 317. 3 hrs. lab. Offered in spring. Prereq: PHYS 317.

PHYS 321: 3 s.h.
Electrostatics
Electrostatics

PHYS 322: 3 s.h.
Electromagnetic Fields 2
Consequences of Maxwell’s equations. Solutions to Laplace’s equation, electromagnetic radiation and relativistic electrodynamics are discussed. 3 hrs. lec. Offered in fall. Prereq: PHYS 321. Coreq: PHYS 335.

PHYS 331: 2 s.h.
Fundamentals of Optics
Lab-based course in physical optics, including applications of geometrical optics such as image formation by mirrors and lenses, microscopy, reflection, refraction, and basic phenomena in wave and quantum optics such as interference, diffraction, color mixing and filtration, polarization, birefringence, absorption, dispersion, scattering, laser properties and laser application. 1 hr. lec., 3 hrs. lab. Offered in fall. Prereq: PHYS 232 or PHYS 132 and MATH 211.

PHYS 332: 3 s.h.
Quantum Systems
Multi-electron atoms, statistical mechanics of classical and quantum systems and introduction to nuclear physics. Principles are applied to selected examples. 3 hrs. lec. Offered in fall. Prereq: PHYS 233, 334.

PHYS 345: 3 s.h.
Techniques of Mathematical Physics
Treatment of advanced mathematical techniques such as complex analysis, matrices, Fourier series, calculus of variations, special functions and integral transforms applied to selected areas of physics. Offered in spring. Prereq: PHYS 233, MATH 365.

PHYS 351: 1 s.h.
Experimental
Experimental

PHYS 351H: 1 s.h.
Hon: Techniques/Mathmt Physics

PHYS 352: 1 s.h.
Hon: Techniques/Mathmt Physics

PHYS 355: 3 s.h.
Co-Op Ed Experience in Physics
Co-Op Ed Experience in Physics
PHYS 431: 3 s.h.
**Solid State Physics**
Classical and quantum analyses of solid matter. Topics include crystal structure, the reciprocal lattice and X-ray diffraction; mechanical properties phonons; semiclassical analysis of electrical and magnetic properties of insulators and metals; electron band theory of metals, insulators and semiconductors. 3 hrs. lec. Offered in spring of odd years. Prereq: PHYS 335.

PHYS 435: 3 s.h.
**Statistical Mechanics**
Lectures, problems, and computer simulations developing the fundamental principles of classical and quantum statistical mechanics. Subjects include probability theory, the foundations of ensemble development, and their application to classical, Fermi, and Bose systems. Of special interest is the phenomenology of phase transitions and the modern development of the renormalization group. Prereq: PHYS 334.

PHYS 451: 1 s.h.
**Advanced Physics Lab 1**
Selected experiments in classical and modern physics, with opportunities to apply sophisticated techniques to extended experimental problems. Prereq: PHYS 352.

PHYS 452: 1 s.h.
**Advanced Physics Lab 2**
Continuation of PHYS 451. 3 hrs. lab. Offered in spring. Prereq: PHYS 451.

PHYS 462: 3 s.h.
**Advanced Electronics**
Microprocessor applications and interfacing, real-time programming. Topics are selected from computer design, control loops, phase-locked loops and communications. Two 3-hr. labs. Offered infrequently. Prereq: PHYS 266, 365 or permission of instructor.

PHYS 471: 3 s.h.
**Quantum Mechanics**
An introduction to formal quantum theory in terms of operators in Hilbert space and Dirac notations which will be used in finding the solutions of eigenvalue problems of several potentials, addition of angular momenta, dynamics of spin 1/2 particle, and introduction to perturbation theory. Prereq: PHYS 233, MATH 322, and MATH 365 or permission of instructor. Offered fall of even year.

PHYS 479: 3 s.h.
**Experimental**
Experimental

PHYS 489: 1-4 s.h.
**Honors Course**
Honors Course

PHYS 492: 1,2 s.h.
**Physics Research and Seminar**
The first semester of an independent research experience supervised by a faculty mentor. Attendance at weekly seminars is also required. Offered in fall. Prereq: PHYS 335 and 351.

PHYS 495: 1-3 s.h.
**Topics in PHYS**
Selected topics chosen from the areas across physics including astronomy and astrophysics, classical physics, theoretical physics, applied physics, and modern physics. Permission of instructor. Offered infrequently.

PHYS 498: 1-4 s.h.
**Independent Study/Research**
An independent research experience supervised by a faculty mentor. Attendance at the weekly seminars associated with PHYS 492 is also required. Prereq: PHYS 492 or permission of instructor. Offered in fall, spring.

PHYS 499: 1-4 s.h.
**Departmental Honors**
Departmental Honors

PHYS 500: 3-12 s.h.
**Co-Op Ed Expereince in Physics**
Co-Op Ed Expereince in Physics