

PHYSICS (PHYS)

PHYS 130 Descriptive Astronomy (4 Units)

Qualitative introduction to astronomy, intended primarily as a first science course for non-science majors. Includes laboratory and observational activities. (Formerly 3650:130)

Ohio Transfer 36: Yes

Gen Ed: Natural Science with Lab

PHYS 132 Physics of Sound (3 Units)

Qualitative introduction to the physics of sound, its properties, perception and reproduction, including acoustical principles of musical instruments; virtual activities included.

Gen Ed: Natural Science

PHYS 133 Music, Sound & Physics (4 Units)

Qualitative introduction to the physics of sound, its properties, perception and reproduction, including acoustical principles of musical instruments. Laboratory and observational activities included. (Formerly 3650:133)

Ohio Transfer 36: Yes

Gen Ed: Natural Science with Lab

PHYS 137 Light (4 Units)

Introductory, qualitative course dealing with the nature of light and the interaction of light with various materials to produce common visual effects. Laboratory activities provide experience in scientific investigation. (Formerly 3650:137)

Ohio Transfer 36: Yes

Gen Ed: Natural Science with Lab

PHYS 150 Manufacturing Physics (4 Units)

Prerequisite: Admission to the Manufacturing Engineering Technology program. Corequisite: MATH 154. Applications of physics to manufacturing including two dimensional motion, vectors, forces, statics, torque and simple electronic circuits. Laboratory. (Formerly 3650:150)

PHYS 160 Technical Physics: Mechanics (4 Units)

Corequisite: MATH 154. Applications of mechanics which include one and two dimensional motion, vectors, forces, equilibrium, work, power, conservation of energy, rotational motion & torque. Laboratory (Formerly 3650:160)

Ohio Transfer 36: Yes

PHYS 161 Technical Physics: Mechanics I (2 Units)

Corequisite: MATH 153. Principles of mechanics that include motion, vectors, forces, equilibrium; also significant figures and unit conversions. Laboratory. (Formerly 3650:161)

PHYS 162 Technical Physics: Mechanics II (2 Units)

Prerequisites: MATH 153 and PHYS 161. Principles of mechanics that include work, power, conservation of energy, rotational motion, torque. Laboratory. (Formerly 3650:162)

PHYS 163 Technical Physics: Electricity & Magnetism (2 Units)

Prerequisites: MATH 154 and PHYS 160 with a grade of C- or better in both. Principles and applications of electricity and magnetism. Electrostatics, DC circuits, magnetism, electromagnetism, and AC circuits. Laboratory. (Formerly 3650:163)

Ohio Transfer 36: Yes

PHYS 164 Technical Physics: Heat & Light (2 Units)

Prerequisites: [PHYS 160 with a grade of C- or better] and MATH 154.

Principles and applications of heat and light: heat energy, thermodynamics, electromagnetic waves, geometric and physical optics, introduction to quantum mechanic, and radiation. (Formerly 3650:164)

Ohio Transfer 36: Yes

Gen Ed: Natural Science

PHYS 261 College Physics I (4 Units)

Prerequisites: MATH 143, MATH 144, or MATH 145 with a grade of C- or better, or placement . First course in physics using methods of algebra and trigonometry. The course includes the study of motion in one and two dimensions, and the applications of the concepts of force, work, energy, and momentum to linear and rotational motion. Simple harmonic motion, waves, and properties of solids, fluids, and gases are also explored. (Formerly 3650:261)

Gen Ed: Natural Science with Lab

PHYS 262 College Physics II (4 Units)

Prerequisite: PHYS 160 or PHYS 261. Second course in physics using methods of algebra and trigonometry. The course includes optics, electricity and magnetism, simple circuit analysis, and thermal physics. Elementary concepts of quantum mechanics are explored and applied to atomic and nuclear physics. (Formerly 3650:262)

Gen Ed: Natural Science with Lab

PHYS 267 Life Science Physics Computations I (1 Unit)

Corequisites: PHYS 261. Optional companion courses to PHYS 261 and PHYS 262 provides additional computational experience in applications of physics to life sciences, emphasizing use of algebra and trigonometry. Particularly recommended for student with modest mathematical preparation. (Formerly 3650:267)

PHYS 268 Life Science Physics Computations II (1 Unit)

Corequisites: PHYS 262. Optional companion courses to PHYS 261 and PHYS 262 provides additional computational experience in applications of physics to life sciences, emphasizing use of algebra and trigonometry. Particularly recommended for student with modest mathematical preparation. (Formerly 3650:268)

PHYS 291 Elementary Classical Physics I (4 Units)

Prerequisite: Completion of MATH 221 with a grade of 'C-' or better, or AP Calculus AB, or BC test score of 3 or better. Introductory physics for students of science and engineering. Classical kinematics and dynamics as related to contemporary physics. Oscillations, thermodynamics. Vectors and some calculus introduced as needed. Includes laboratory activities. (Formerly 3650:291)

Ohio Transfer 36: Yes

Gen Ed: Natural Science with Lab

PHYS 292 Elementary Classical Physics II (4 Units)

Prerequisite: PHYS 291. Fluid mechanics, mechanical and electromagnetic waves and wave phenomena, basic laws of electromagnetism, interference and diffraction, coherence, geometrical and physical optics. Includes laboratory activities. (Formerly 3650:292)

Ohio Transfer 36: Yes

Gen Ed: Natural Science with Lab

PHYS 293 Physics Computations I (1 Unit)

Corequisite: PHYS 291. Optional companion courses to PHYS 291 and PHYS 292 provides experience in problem solving, and elaborates application of calculus to simple physical phenomena. Particularly recommended for a freshman and for student with modest preparation in mathematics or physical sciences. (Formerly 3650:293)

PHYS 294 Physics Computations II (1 Unit)

Corequisite: PHYS 292. Optional companion courses to PHYS 291 and PHYS 292 provides experience in problem solving, and elaborates application of calculus to simple physical phenomena. Particularly recommended for a freshman and for student with modest preparation in mathematics or physical sciences. (Formerly 3650:294)

PHYS 301 Modern Physics (3 Units)

Prerequisite: PHYS 292. Special relativity, introduction to quantum physics, hydrogen atom, atomic physics, selected applications of quantum physics. (Formerly 3650:301)

PHYS 322 Intermediate Laboratory I (3 Units)

Prerequisites: [PHYS 262 and MATH 221] or PHYS 292. Modern physics experiments focusing on electronic phenomena such as: electron charge/mass ratio, semiconductor devices, superconductivity, and energy quantization. (Formerly 3650:322)

PHYS 323 Intermediate Laboratory II (3 Units)

Prerequisites: [PHYS 262 and MATH 221] or PHYS 292. Contemporary experiments focusing on optical phenomena such as: interference, diffraction, holography, fiber optics, and spectroscopy. (Formerly 3650:323)

PHYS 340 Thermal Physics (3 Units)

Prerequisite: PHYS 262 or PHYS 292. Basic principles of thermal and statistical physics. Ensembles, laws of thermodynamics, equilibrium, irreversibility, equipartition theorem, canonical distribution, Maxwell distribution, phase changes, cyclic processes, transport processes. (Formerly 3650:340)

PHYS 350 Modeling & Simulation (4 Units)

Prerequisites: [PHYS 262 or PHYS 292] and MATH 221. Corequisite: MATH 222. Interdisciplinary course stressing modeling of natural phenomena using fundamental principles and their simulation. Topics may include oscillations and chaos, random systems, potentials and fields, wave phenomena. (Formerly 3650:350)

PHYS 399 Undergraduate Research (1-6 Units)

(May be repeated) Prerequisite: Permission of instructor. Participation in current research project in department under supervision of faculty member. (Formerly 3650:399)

PHYS 401 Everyday Physics (4 Units)

Prerequisite: Permission of instructor. College-level physics content for future teachers. Inquiry, discovery, activities, discussion, and experiential learning take place in a laboratory/embedded-lecture environment. (Formerly 3650:401)

PHYS 406 Elements of Optics (3 Units)

Prerequisites: PHYS 292 and MATH 335. Selected topics in optics such as geometrical, wave (diffraction and interference, polarization, scattering etc.), and quantum optics (lasers); design of optical systems based on optical design platforms.

PHYS 431 Mechanics (3 Units)

Prerequisites: PHYS 291 and MATH 335. Mechanics at an intermediate level. Newtonian mechanics, motion of a point particle, momentum and energy, oscillations, Lagrange's equations, central force problems, non-inertial frames, rotation of rigid bodies, coupled oscillators and normal modes. (Formerly 3650:431)

PHYS 432 Mechanics II (3 Units)

Prerequisite: PHYS 431. Advanced mechanics at the senior or beginning graduate level, moving coordinate systems, mechanics of continuous media, Lagrange's equations, tensor algebra and stress analysis, rotation of rigid bodies, vibration theory. (Formerly 3650:432)

PHYS 436 Electromagnetism (3 Units)

Prerequisites: PHYS 292 and MATH 335 or permission of instructor. Electricity and magnetism using vector calculus. Electrostatics and magnetostatics, electric and magnetic fields, dielectric and magnetic materials, electromagnetic induction, Maxwell's field equations in differential form, wave solutions. (Formerly 3650:436)

PHYS 437 Electromagnetism II (3 Units)

Prerequisite: PHYS 436. Special relativity, four vectors, Maxwell's equations in covariant form; propagation, reflection and refraction of electromagnetic waves; multipole radiation. (Formerly 3650:437)

PHYS 441 Quantum Physics (3 Units)

Prerequisites: PHYS 301 and MATH 335. Introduction to quantum theory, Schrödinger equation, observables, angular momentum, perturbation theory, variational principle, bound states, scattering theory, radiative interactions, spin, Pauli Exclusion Principle, applications of quantum mechanics to atomic, nuclear and solid state physics. (Formerly 3650:441)

PHYS 442 Quantum Physics II (3 Units)

Prerequisite: PHYS 441. Applications of quantum mechanics to atomic, nuclear and solid state physics. Tunneling and alpha decay, periodic potential, hydrogen and helium atoms, interatomic forces, quantum statistics. (Formerly 3650:442)

PHYS 451 Advanced Laboratory (3 Units)

Prerequisite: PHYS 323. Experimental techniques, applicable to research-type projects in contemporary physics. Advanced scanning probe techniques including atomic force microscopy, electrostatic nanolithography, radioactive spectroscopy, and lasers. (Formerly 3650:451)

PHYS 452 Advanced Laboratory II (3 Units)

Prerequisite: PHYS 323 or permission of instructor. Experimental projects applicable to contemporary physics. Diode and dye lasers, NMR, SPM, chaos, electron tunneling and fiber optics. (Formerly 3650:452)

PHYS 470 Introduction to Solid-State Physics (3 Units)

Prerequisite: PHYS 441. Account of basic physical processes occurring in solids, with emphasis on fundamental relation between these processes and periodicity of crystalline lattice. (Formerly 3650:470)

PHYS 481 Methods of Mathematical Physics (3 Units)

Prerequisites: PHYS 292 and MATH 335. Survey of mathematical techniques useful in physics. Matrices, eigenvalues, vector analysis, ordinary and partial differential equations, Green's functions, complex variable theory, Fourier series, integral transforms. (Formerly 3650:481)

PHYS 482 Methods of Mathematical Physics II (3 Units)

Prerequisites: PHYS 292, MATH 335 and senior or graduate standing in a physical science or engineering. Vectors, generalized coordinates, tensors, calculus of variations, vector spaces, linear transformations, matrices, eigenvalues, Hilbert space, boundary value problems, transcendental functions, complex variables, analytic functions, Green's functions, integral equations. (Formerly 3650:482)

PHYS 488 Selected Topics: Physics (1-4 Units)

(May be repeated) Prerequisite: Permission. Consideration of selected topics, procedures, techniques, materials or apparatus of current interest in physics. (Formerly 3650:488)

PHYS 490 Workshop: Physics (1-4 Units)

(May be repeated) Group studies of special topics in physics. May not be used to meet undergraduate or graduate major requirements in physics. May be used for elective credit only. (Formerly 3650:490)

PHYS 491 Capstone Project in Physics A (2 Units)

Prerequisites: PHYS 301 and MATH 335 and permission. Proposal phase of a capstone research project in physics or a research topic relevant to physics, supervised by a faculty member of the department.

Gen Ed: Capstone

PHYS 492 Capstone Project in Physics B (2-4 Units)

Prerequisite: Permission. Pre/Corequisite: PHYS 491. Final phase of a capstone research project in physics or a research topic relevant to physics, supervised by a faculty member of the department. (Formerly 3650:492)

PHYS 497 Independent Study: Physics (1-4 Units)

(May be repeated) Prerequisite: Permission. Further investigations of various selected topics in physics, under guidance of faculty member. (Formerly 3650:497)

PHYS 498 Physics Colloquium (1 Unit)

Lectures on current research topics in physics by invited speakers. May be repeated but only one credit counts toward the M.S. Degree. Offered on a credit/noncredit basis only. (Formerly 3650:498)