

Physics (PHYS)

PHYS 1101 Coll Physics I Laboratory **1 SCH (0-4)**

A laboratory course to accompany PHYS 1301. Prerequisite: credit or registration in PHYS 1301.
Fee: \$5.00

PHYS 1102 College Physics II Lab **1 SCH (0-4)**

A laboratory course to accompany PHYS 1302. Prerequisite: credit or registration in PHYS 1302.
Fee: \$5.00

PHYS 1103 Stars and Galaxies Laboratory **1 SCH (0-3)**

A laboratory course to accompany PHYS 1303. Prerequisite: credit or registration in PHYS 1303.
Fee: \$5.00

PHYS 1104 Solar System Laboratory **1 SCH (0-3)**

A laboratory course to accompany PHYS 1304. Prerequisite: credit or registration in PHYS 1304.
Fee: \$5.00

PHYS 1301 College Physics I **3 SCH (3-0)**

A trigonometry-based introduction to physics. Topics include kinematics, vector analysis, force dynamics, equilibrium, work, energy, momentum, collisions, fluid dynamics, and thermal physics. Prior knowledge of physics (one year of high school physics; otherwise PHYS 1373 is recommended) is assumed. Prerequisites: MATH 1314 and MATH 1316. Concurrent enrollment in PHYS 1101 is recommended.

PHYS 1302 College Physics II **3 SCH (3-0)**

A continuation of PHYS 1301. Topics include periodic motion, sound, electric force, electric current, resistance, electric circuits, magnetism, electromagnetic induction, AC circuits, light and optics. Prerequisite: PHYS 1301 and PHYS 1101. Concurrent enrollment in PHYS 1102 is recommended.

PHYS 1303 Stars and Galaxies **3 SCH (3-0)**

A survey of stellar astronomy and cosmology. Topics include the behavior of light; the sun as a star; positions, motions and brightness of the stars; stellar evolution; the Milky Way and other galaxies; and cosmology. Concurrent enrollment in PHYS 1103 is recommended.

PHYS 1304 Solar System **3 SCH (3-0)**

A survey of the astronomy of our solar system. Topics include the history of astronomy, naked-eye phenomena, telescopes, gravity and orbits and the nature and history of the Earth, moon, planets, asteroids and comets. Concurrent enrollment in PHYS 1104 is recommended.

PHYS 1373 Preparatory Physics **3 SCH (3-0)**

Topics needed to succeed in College Physics or University Physics. Problem solving using basic techniques of algebra and trigonometry. Topics include vector mechanics, linear and two-dimensional kinematics, and Newtonian dynamics.

PHYS 1375 Physics **3 SCH (3-2)**

A survey of the most basic concepts of physics. Topics include scientific measurements, motion, momentum, energy, gravitation, matter, heat, electricity, magnetism, sound, light, atomic structure and nuclear energy. Prerequisite: MATH 1314.
Fee: \$5.00

PHYS 1471 Acoustical Foundations of Music **4 SCH (3-2)**

A general introduction and survey of the physical and acoustical foundations of music. Topics include the fundamental physics relevant to music, the reception of musical sound, intervals, scales, tuning, temperament, auditorium and room acoustics and the production of sounds by musical instruments including electronic.
Fee: \$5.00

PHYS 2125 University Physics I Lab **1 SCH (0-4)**

A laboratory course to accompany PHYS 2325. Prerequisite: credit or registration in PHYS 2325.
Fee: \$5.00

PHYS 2126 University Physics II Lab **1 SCH (0-4)**

A laboratory course to accompany PHYS 2326. Prerequisite: credit or registration in PHYS 2326.
Fee: \$5.00

PHYS 2325 University Physics I **3 SCH (3-0)**

A calculus-based introduction to physics. Topics include kinematics, vector analysis, force dynamics, equilibrium, work, energy, momentum, collisions, fluid dynamics, and thermal physics. Prior knowledge of physics (one year of high school physics; otherwise PHYS 1373 is recommended) is assumed. Prerequisite: credit or registration in MATH 2413 or equivalent. Concurrent enrollment in PHYS 2125 is recommended.

PHYS 2326 University Physics II **3 SCH (3-0)**

A continuation of PHYS 2325. Topics include periodic motion, sound, electric force, electric current, resistance, electric circuits, magnetism, electromagnetic induction, light, optics and modern physics. Prerequisite: PHYS 2325 and PHYS 2125 or PHYS 1302 and PHYS 1102; credit or registration in MATH 2414 or equivalent or MATH 3415. Concurrent enrollment in PHYS 2126 is recommended.

PHYS 3310 Advanced Physics Laboratory **3 SCH (1-4)**

A laboratory course focusing on advanced techniques and experiments drawn from the full range of physics classes. The student will understand the role of experimental design, advanced data analysis and reduction and the use of computers while investigating physical phenomena. Prerequisite: credit or registration in PHYS 3343.

PHYS 3313 Mechanics I **3 SCH (3-0)**

A mathematical treatment of the fundamentals of classical mechanics. Topics include particle dynamics in one, two and three dimensions; conservation laws; dynamics of a system of particles; motion of rigid bodies; central force problems; accelerating coordinate systems; gravitation; Lagrange's equations and Hamilton's equations. Prerequisites: PHYS 2326/PHYS 2126; credit or registration in either MATH 3320 or MATH 3415.

PHYS 3323 Electromagnetic Field Theory **3 SCH (3-0)**

Electrostatics; Laplace's Equation; the theory of dielectrics; magnetostatics; electromagnetic induction; magnetic fields of currents; Maxwell's equations. Prerequisites: PHYS 2326/PHYS 2126; credit or registration in MATH 3320 or MATH 3415 or equivalent.

PHYS 3333 Thermodynamics **3 SCH (3-0)**

Equations of state, ideal gases, first and second laws of thermodynamics, entropy and statistical methods. Prerequisites: PHYS 2326 and 2126; credit or registration in MATH 3415 or equivalent.

PHYS 3343 Modern Physics I **3 SCH (3-0)**

An introduction to special relativity and elementary quantum mechanics. Topics include space-time, relativistic energy and momentum, the uncertainty principle, Schrodinger's equation, observables and operators, bound states, potential barriers and the hydrogen atom. Prerequisites: PHYS 2326 and 2126; credit or registration in either MATH 3320 or MATH 3415 or equivalent.

PHYS 4191 Physics Research Project **1 SCH (1)**

Literature survey and preparation for, and initiation of, a research project agreed to between the student and a faculty advisor, to be completed and reported on in the Research Seminar course. Prerequisite: PHYS 3343.

PHYS 4192 Physics Research Seminar (WI) **1 SCH (1)**

An experimental or theoretical project, begun in the Research Project course, will be concluded by the student and the results reported in a seminar. Students who have not yet taken the ETC major field test in physics are required to do so while enrolled in Seminar. Prerequisite: PHYS 4191.

PHYS 4303 Math Methods for Physicists **3 SCH (0-3)**

Mathematical techniques from the following areas: infinite series, integral transforming, applications of complex variables; vectors, matrices and tensors, special functions, partial differential equations, Greens' functions, perturbation theory, integral equations, calculus of variations and groups and group representations. Prerequisite: credit or registration in MATH 3320.

PHYS 4323 Optics **3 SCH (0-3)**

A mathematical treatment of the modern theory of optics. Topics include Huygen's principle as applied to geometric optics, interference, diffraction, polarization, crystal optics, electromagnetic theory of light, the interaction of light with matter and quantum optics. Prerequisites: PHYS 3323; MATH 3415 or MATH 3320.

PHYS 4353 Quantum Physics **3 SCH (0-3)**

The Schrodinger equation; one dimensional systems; the Heisenberg uncertainty principle; magnetic moments and angular momentum; two and three dimensional systems; approximation methods; scattering theory. Prerequisites: PHYS 3343; credit or registration in either MATH 3320 or MATH 3415 or equivalent.

PHYS 4360 Nuclear Physics **3 SCH (3-0)**

A study of nuclear phenomena and properties including mass, stability, magnetic moment, radioactive decay processes and nuclear reactions. The application of nuclear principles to other fields such as astronomy, engineering, manufacturing and medicine. Prerequisites: PHYS 3343; credit or registration in both PHYS 4353 and either MATH 3320 or MATH 3415.

PHYS 4383 Computational Physics **3 SCH (3-0)**

An introduction to the methods and algorithms used in solving physical problems with computers, and computer-related limitations on such solutions. Prerequisites: knowledge of the C programming language; credit or registration in MATH 3415 or 3320.

PHYS 4390 Sel Topics in Modern Physics **3 SCH (3-0)**

A detailed study of one or more important physical discoveries, developments and/or theories. Course may be repeated for credit. Prerequisite: senior standing.