

Physics (PHYS)

PHYS 102 Explorations in Physics 3 Credits (3,0)

Survey of elementary physics concepts. Topics include mechanics, heat, light, sound, electricity, magnetism, and modern physics.

Course Offered at: Worldwide, Asia

PHYS 113 Introductory Physics I 3 Credits (3,0)

Survey course covering Newton's Laws, projectile motion, energy, and momentum. Emphasis on problem-solving logic. Not applicable to engineering degrees.

Prerequisites: MATH 111 or MATH 120 or MATH 140 or MATH 241

Course Offered at: Daytona Beach, Prescott

PHYS 113L Introductory Physics I Laboratory 1 Credit (0,1)

Hands-on experiments in mechanics, covering force, momentum, and torque. Complements Introductory Physics I.

Corequisites: PHYS 113

Course Offered at: Daytona Beach, Prescott

PHYS 116 Foundations in the Sciences 3 Credits (3,0)

Non-mathematical survey course for non-technical majors. Focus on core scientific principles and their relation to daily life.

Course Offered at: Daytona Beach

PHYS 117 Introductory Physics II 3 Credits (3,0)

Covers fluid mechanics, properties of matter, thermodynamics, wave motion, sound, simple harmonic motion, kinetic theory, basic electromagnetic theory, and elementary circuits. Not applicable for credit toward degrees in Aerospace Engineering, Electrical Engineering, Space Physics, Astronomy, or Aircraft Engineering Technology.

Prerequisites: PHYS 113

Course Offered at: Daytona Beach, Prescott

PHYS 117L Introductory Physics II Laboratory 1 Credit (0,1)

Lab experiments in fluids, thermodynamics, and wave motion. Complements Introductory Physics II.

Corequisites: PHYS 117

Course Offered at: Daytona Beach, Prescott

PHYS 123 Science of Flight 3 Credits (3,0)

Explores natural science principles and their application to flight. Topics include aerodynamics, aircraft control, propulsion, hydraulics, materials, atmospheric phenomena, and environmental impacts.

Course Offered at: Worldwide, Asia

PHYS 150 Physics with Calculus I 3 Credits (3,0)

First in a calculus-based sequence on classical mechanics. Topics include vectors, kinematics, Newton's Laws, work-energy principles, momentum, torque, and rotational motion.

Prerequisites: MATH 241

Course Offered at: Daytona Beach, Worldwide, Asia

PHYS 160 Physics with Calculus II 3 Credits (3,0)

Second in a calculus-based sequence on classical mechanics. Topics include rotational motion, harmonic motion, waves, fluid dynamics, thermodynamics, and optics.

Prerequisites: (PHYS 150 or PHYS 226) and MATH 242

Course Offered at: Daytona Beach, Worldwide, Asia

PHYS 161 Physics with Calculus I and II 4 Credits (4,0)

Covers vectors, kinematics, Newtonian mechanics, work-energy, momentum, rotational motion, gravitation, harmonic motion, and waves using calculus.

Prerequisites: MATH 241

Corequisites: MATH 242

Course Offered at: Prescott

PHYS 199 Special Topics in Physics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in physics.

Course Offered at: Daytona Beach, Prescott, Worldwide

PHYS 226 Physics I 3 Credits (3,0)

Calculus-based mechanics course covering kinematics, Newton's Laws, momentum, work-energy principles, rotational kinematics, torque, gravitation, and orbital motion.

Daytona Beach Prerequisites: MATH 241

Daytona Beach Corequisites: PHYS 226L

Prescott Corequisites: MATH 241 and PHYS 226L

Course Offered at: Daytona Beach, Prescott

PHYS 226L Physics I Laboratory 1 Credit (0,1)

Experiments involving force, energy, momentum, torque, etc.

Corequisites: PHYS 226

Course Offered at: Daytona Beach, Prescott

PHYS 227 Physics II 3 Credits (3,0)

Calculus-based exploration of fluid dynamics, thermodynamics, harmonic motion, waves, acoustics, and optics.

Daytona Beach Prerequisites: PHYS 226 and PHYS 226L and MATH 242

Prescott Corequisites: MATH 242 and PHYS 227L

Course Offered at: Daytona Beach, Prescott

PHYS 227L Physics II Laboratory 2 Credits (0,6)

Hands-on experiments in wave motion, thermodynamics, electricity, magnetism, and geometric optics. Conducted in weekly three-hour sessions.

Prerequisites: PHYS 226L

Corequisites: MATH 242 and (PHYS 227 or PHYS 161)

Course Offered at: Prescott

PHYS 228 Physics III 3 Credits (3,0)

Covers electromagnetism, including static electricity, Gauss's Law, Ohm's Law, circuits, magnetism, EM waves, and the nature of light.

Daytona Beach Prerequisites: PHYS 226 and MATH 242

Prescott Prerequisites: PHYS 226

Prescott Corequisites: MATH 242

Course Offered at: Daytona Beach, Prescott

PHYS 228L Physics III Laboratory 1 Credit (0,1)

Experiments in thermodynamics, electricity, magnetism, and optics. Complements Physics III coursework.

Corequisites: PHYS 228

Course Offered at: Daytona Beach

PHYS 230 Introduction to Space Weather 3 Credits (3,0)

Examines the societal and technological impacts of solar activity on Earth's near-space environment. Emphasizes solar-Earth relationships and technological effects.

Prerequisites: PHYS 226 and MATH 242

Course Offered at: Daytona Beach

PHYS 232 Computational Methods in the Physical Sciences 3 Credits (3,0)

Focuses on computational techniques to solve complex physics problems. Includes data reduction, error analysis, and graphical representation.

Prerequisites: CPSC 118 or ENGR 115

Corequisites: MATH 243 and (PHYS 228 or PHYS 250)

Course Offered at: Daytona Beach, Prescott

PHYS 250 Physics with Calculus III 3 Credits (3,0)

Final course in a three-part calculus-based classical mechanics sequence. Topics include electromagnetism, electric fields, Gauss's Law, circuits, and cyclotrons.

Daytona Beach Corequisites: PHYS 250L

Prescott Corequisites: PHYS 250L

Worldwide Corequisites: PHYS 250W

Prerequisites: PHYS 160 or PHYS 161

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

PHYS 250L Physics with Calculus III Laboratory 1 Credit (0,1)

Lab experiments complementing topics from Physics I, II, and III. Covers kinematics, energy, rotational motion, thermodynamics, circuits, optics, and error analysis.

Prerequisites: PHYS 160 or PHYS 161

Corequisites: PHYS 250

Course Offered at: Daytona Beach, Prescott

PHYS 250W Physics with Calculus III Laboratory 2 Credits (0,2)

Lab experiments complementing topics from Physics I, II, and III. Covers kinematics, energy, rotational motion, thermodynamics, circuits, optics, and error analysis.

Prerequisites: PHYS 160 or PHYS 161

Corequisites: PHYS 250

Course Offered at: Worldwide

PHYS 290 Physics Laboratory Practicum 0 Credits (0,0)

Non-credit practicum requiring students to manage a laboratory, including experiment preparation, discussions, and grading reports.

Prerequisites: COMM 219

Course Offered at: Daytona Beach

PHYS 299 Special Topics in Physics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in physics.

Course Offered at: Daytona Beach, Prescott, Worldwide

PHYS 303 Modern Physics 3 Credits (3,0)

Covers modern physics concepts such as electromagnetic scattering, relativity, wave-particle duality, quantum theory, x-rays, lasers, and nuclear reactions.

Daytona Beach Prerequisites: PHYS 228 or PHYS 250 (BSAA, BSEP and BSSP majors must have an average GPA of ≥ 2.30 for these three courses: PHYS 226/PHYS 227/PHYS 228)

Prescott Prerequisites: PHYS 228 or PHYS 250

Course Offered at: Daytona Beach, Prescott

PHYS 303L Modern Physics Laboratory 1 Credit (0,3)

Hands-on experiments in atomic and nuclear physics, including spectroscopy, particle analysis, x-ray analysis, and laser applications.

Prerequisites: PHYS 227L or PHYS 228L

Corequisites: PHYS 303

Course Offered at: Daytona Beach

PHYS 303P Modern Physics Laboratory 2 Credits (0,6)

Hands-on experiments in atomic and nuclear physics, including spectroscopy, particle analysis, x-ray analysis, and laser applications. Advanced data analysis techniques will be introduced including linear and non-linear data fitting, chi-square, and error matrix methodologies, to present scientific results in a credible manner.

Prerequisites: PHYS 228L or PHYS 250L. Corequisite: PHYS 303

Course Offered at: Prescott

PHYS 319 Introduction to Particle Physics and Relativity 3 Credits (3,0)

Provides an overview of particle physics and relativity. Topics include GPS applications, medical technology, special relativity, and quantum theory basics.

Course Offered at: Prescott

PHYS 320 Classical Mechanics I 3 Credits (3,0)

Covers mechanics fundamentals, particle systems, gyroscopic motion, and Lagrangian/Hamiltonian formulations. Students develop basic computer programs.

Prerequisites: MATH 345 and (PHYS 228 or PHYS 250)

Course Offered at: Daytona Beach, Prescott

PHYS 322 Classical Mechanics II 3 Credits (3,0)

Advanced mechanics topics including celestial mechanics, rigid bodies, non-inertial motion, coupled oscillations, and special relativity.

Prerequisites: PHYS 320

Course Offered at: Prescott

PHYS 330 Electricity and Magnetism I 3 Credits (3,0)

Focuses on electrostatics, electric fields, electrostatic energy, currents, magnetic fields, and Maxwell's equations.

Prerequisites: MATH 345 and PHYS 303

Corequisites: MATH 441

Course Offered at: Prescott

PHYS 331 Electricity and Magnetism II 3 Credits (3,0)

Advanced exploration of electromagnetic radiation, culminating in the relativistic formulation of electrodynamics. Topics include waveguides, potentials, and radiation.

Prerequisites: PHYS 330

Corequisites: MATH 442

Course Offered at: Prescott

PHYS 350 Quantum Mechanics 3 Credits (3,0)

Covers Schrodinger equation, step potentials, harmonic oscillators, hydrogen atoms, spin, and scattering theory.

Prerequisites: MATH 441 and PHYS 303

Course Offered at: Prescott

PHYS 380L Optics Laboratory 3 Credits (0,3)

Hands-on experiments in geometrical and physical optics, including spectroscopy, diffraction, lasers, and interferometers.

Prerequisites: PHYS 303L and PHYS 330

Course Offered at: Prescott

PHYS 399 Special Topics in Physics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in physics.

Course Offered at: Daytona Beach, Prescott, Worldwide

PHYS 400L Senior Physics Laboratory I 3 Credits (0,3)

Focuses on advanced laboratory techniques involving topics in modern physics, optics, and electromagnetics. Students maintain logbooks and present findings.

Prerequisites: PHYS 303L

Course Offered at: Daytona Beach

PHYS 405 Atomic Nuclear Physics 3 Credits (3,0)

Explores multielectron atoms, radiative transitions, nuclear stability, nuclear reactions, and nuclear forces, with emphasis on theoretical models.

Prerequisites: ENGP 432 or PHYS 350

Course Offered at: Daytona Beach, Prescott

PHYS 410 Space Physics I 3 Credits (3,0)

Structure of the neutral and ionized atmosphere, solar electromagnetic radiation, photoionization, ionosphere and magnetosphere, solar disturbances, satellite orbit decay, long-distance communication, composition, thermodynamics, and processes of near-Earth space.

Prerequisites: PHYS 320

Corequisites: ENGP 323

Course Offered at: Daytona Beach

PHYS 411 Space Physics II 3 Credits (3,0)

Plasma physics applied to planetary magnetospheres; solar wind, magnetohydrodynamics, planetary atmospheres and ionospheres, auroral dynamics, magnetosphere-ionosphere coupling, space radiation environment, and satellite missions.

Prerequisites: PHYS 410 and ENGP 323

Course Offered at: Daytona Beach

PHYS 412 Particle Physics and Cosmology I 3 Credits (3,0)

Explores particle physics and general relativity. Topics include the Standard Model, conservation laws, relativity, and quantum scattering theory.

Prerequisites: PHYS 350 and MATH 441

Course Offered at: Prescott

PHYS 413 Particle Physics and Cosmology II 3 Credits (3,0)

Advanced cosmology and general relativity, covering the Big Bang, dark matter, dark energy, and quantum cosmology.

Prerequisites: PHYS 412 and MATH 441

Course Offered at: Prescott

PHYS 415 Thermodynamics and Statistical Mechanics 3 Credits (3,0)

Basic thermodynamics, entropy, kinetic theory, molecular velocity distributions, Maxwell-Boltzmann statistics, Bose-Einstein statistics, Fermi-Dirac statistics, microcanonical and canonical ensembles.

Prerequisites: PHYS 303

Course Offered at: Daytona Beach, Prescott

PHYS 425 General Relativity 3 Credits (3,0)

Advanced coverage of Einstein's theory of general relativity, tensor analysis, solar system dynamics, gravity waves, and quantum mechanics applications in gravitation.

Prerequisites: MATH 345 and (PHYS 228 or PHYS 250)

Course Offered at: Daytona Beach

PHYS 435 Solid State Theory 3 Credits (3,0)

Introduction to solid state physics. Crystalline structure, X-ray scattering, phonons (acoustic and optical), Brillouin zones, Umklapp processes, the free electron Fermi gas, energy bands, Bloch waves, Fermi surfaces, semiconductors and transistors, transport phenomena, optical absorption.

Prerequisites: PHYS 350 and MATH 345

Course Offered at: Prescott

PHYS 490 Senior Thesis I 3 Credits (2,3)

First semester of a senior research project for Space Physics students, culminating in a research paper with faculty supervision.

Prerequisites: B or better in (PHYS 320, PHYS 330, PHYS 350 and PHYS 380L)

Course Offered at: Prescott

PHYS 491 Senior Thesis II 3 Credits (1,6)

Completion of senior research project with final research paper following scientific publishing standards.

Prerequisites: PHYS 490

Course Offered at: Prescott

PHYS 499 Special Topics in Physics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in physics.

Course Offered at: Daytona Beach, Prescott, Worldwide