Physics (PHYS)

Courses

**PHYS 1001 Physics as a Profession: 1 semester hour.**
Introductory course in physics. Seminars and lectures on physics as a discipline, relationship of physics to other disciplines.

**PHYS 2111 General Physics Lab I: 1 semester hour.**
General physics laboratory on concepts of mechanics to include experiments on measurement, vectors-force table, air track, projectile motion, static and kinetic friction, ballistic pendulum, centripetal force, moment of inertia, Hooke's law and simple harmonic motion, standing waves and sound.

**PHYS 2113 General Physics I: 3 semester hours.**
An algebra and trigonometry based introduction to general physics with topics to include measurement system, motion, vector addition, Newton's laws of motion, statics, dynamics, mechanical energy, gravitation, momentum, circular and angular motion, and torque. Prerequisites: MATH 1113 or MATH 1115 or MATH 1123.

**PHYS 2121 General Physics Lab II: 1 semester hour.**
General physics laboratory to include experiments on determination of absolute zero, linear expansion, calorimetry, force of static electricity, Ohm's Law, color-coded resistors, resistors in series and parallel, RC-series transient circuit, RLC-series circuit, AC circuits, concave and convex lenses, and diffraction gratings.

**PHYS 2123 General Physics II: 3 semester hours.**
A continuation of algebra and trigonometry based General Physics I course includes sound, heat, electricity, magnetism, and optics. Prerequisites: PHYS 2113 or PHYS 2513.

**PHYS 2511 University Physics Lab I: 1 semester hour.**
Calculus-based physics laboratory on concepts of mechanics to include experiments on measurement, vectors-force table, air track, projectile motion, static and kinetic friction, ballistic pendulum, centripetal force, moment of inertia, Hooke's law and simple harmonic motion, standing waves and sound.

**PHYS 2513 University Physics I: 3 semester hours.**
A calculus-based introductory physics course for science and engineering students. Course includes measurement, Newton's laws of motion statics, dynamics, mechanical energy, momentum, circular motion, and selected topics from torque, modules, Newton universal law, and fluid mechanics. Prerequisites: MATH 1124.

**PHYS 2521 University Physics Lab II: 1 semester hour.**
Calculus-based physics laboratory to include experiments on determination of absolute zero, linear expansion, calorimetry, string standing waves, sound resonance, force of static electricity, Ohm's Law, color-coded resistors, resistors in series and parallel, RC-series transient circuit, RLC-series circuit, AC circuits, concave and convex lenses, and diffraction gratings.

**PHYS 2523 University Physics II: 3 semester hours.**
A continuation of PHYS 2513, a calculus-based introductory physics course for science and engineering students. Course includes electricity, magnetism, and selected topics from sound and light. Prerequisites: PHYS 2513 and MATH 2024.

**PHYS 3003 Physics Research Internship: 3 semester hours.**
Internship for undergraduate majors in physics and for majors in applied physics related disciplines who are engaged in research/co-op in governmental or industrial labs.

**PHYS 3073 Optics: 3 semester hours.**
Course on geometrical optics, ray tracing, plane surfaces, spherical surfaces, thin lenses, thick lenses, mirrors, stops, lens aberrations, optical instruments, wave optics, interference, Fraunhofer and Fresnel diffraction, diffraction grating, speed of light measurements, absorption and scattering, polarization, etc. Prerequisites: PHYS 2123 or PHYS 2523.

**PHYS 3103 Mechanics I: 3 semester hours.**
The course content includes elements of vector analysis, rectilinear motion of a particle, Newton's laws, damped and forced harmonic motion, Fourier series, motion of a particle in three dimensions, rotating coordinate systems, gravitation, central force motion. Prerequisites: PHYS 2523.

**PHYS 3113 Mechanics II: 3 semester hours.**
A continuation of PHYS 3103. The course content includes motion of systems of particles, center of mass and moment of inertia of rigid bodies, moments and products of inertia, principal axes, Euler's equations, Lagrangian mechanics, coupled harmonic oscillators and normal coordinates, theory of vibrating systems. Prerequisites: PHYS 3103.
PHYS 3123 Electricity and Magnetism I: 3 semester hours.
Basic theory of electrostatics; Coulomb's Law, Gauss's Theorem, Laplace's and Poisson's equations. Calculation of electric fields and potentials for point and continuous charge distributions. Computer-based demonstrations are included.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 3133 Electricity and Magnetism II: 3 semester hours.
Prerequisites: PHYS 3123 (http://catalog.pvamu.edu/search/?P=PHYS%203123).

PHYS 3163 Mathematical Physics I: 3 semester hours.
Advanced mathematics for physicists and engineers; vector analysis, curvilinear coordinates, tensor analysis, matrices and determinants, infinite series, functions of a complex variable. Emphasis throughout is on practical applications of theory and techniques as applied to problems in physics and engineering. Computer programs such as Mathematica and MAT LAB will be used.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 3173 Mathematical Physics II: 3 semester hours.
A continuation of PHYS 3163 (http://catalog.pvamu.edu/search/?P=PHYS%203163). Course topics include second-order differential equations, orthogonal functions, Fourier series and integrals, gamma functions, Laplace transforms, Bessel special functions, Greens functions, calculus of variations. Computer programs such as Mathematica and MAT LAB will be used.
Prerequisites: PHYS 3163 (http://catalog.pvamu.edu/search/?P=PHYS%203163).

PHYS 3183 Modern Physics I: 3 semester hours.
Course content includes relativity, wave-particle duality, atomic structure, quantum mechanics, and quantum theory of the hydrogen atom.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 3193 Modern Physics II: 3 semester hours.
A continuation of PHYS 3183 (http://catalog.pvamu.edu/search/?P=PHYS%203183) to include many-electron atoms, molecules, statistical mechanics, the solid state, the atomic nucleus, radioactivity, nuclear reactions, elementary particles.
Prerequisites: PHYS 3183 (http://catalog.pvamu.edu/search/?P=PHYS%203183).

PHYS 3243 Introduction to Nuclear, Particle and Radiation Physics: 3 semester hours.
Nuclear models, nuclear reactions, fundamentals of particle physics, classification of radiation particles, radiation transport, radiation scattering, radiation decay, radiation measurement, and radiation effects.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 3323 Physics of Medical Imaging: 3 semester hours.
Provides an introduction to physics of imaging relevant to medical applications, including image storage analysis, compression, and retrieval. Computer applications including vision and visualization concepts for medical applications. Telemedicine applications.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 4023 Introductory Quantum Mechanics I: 3 semester hours.
Inadequacy of classical mechanics, wave-particle duality, wave function, uncertainty relation, Schrodinger equation, expectation values, operator formalism, measurement, the correspondence principle, etc.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 4033 Introductory Quantum Mechanics II: 3 semester hours.
A continuation of PHYS 4023 (http://catalog.pvamu.edu/search/?P=PHYS%204023). Exclusion principle, angular momentum, central forces, matrix representations of wave functions and operators, spin, eigenvalue equations, perturbation theory, Zeeman effect, quantum-statistical mechanics, etc.
Prerequisites: PHYS 4023 (http://catalog.pvamu.edu/search/?P=PHYS%204023).

PHYS 4043 Astronomy and Astrophysics: 3 semester hours.
An intermediate level Physics/Physical Science course including Kepler's laws, law of gravitation, earth, moon, solar system, sun stars, stellar evolution, nucleo-synthesis, quarks to quasars, pulsars, nebulae, black holes, orbital transfers, cosmology. Simulation programs will be used.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 4063 Thermodynamics and Statistical Mechanics I: 3 semester hours.
Macroscopic thermodynamic systems, kinetic theory, black body radiation, classical and quantum statistical mechanics to include Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac Statistics.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523) and PHYS 2123 (http://catalog.pvamu.edu/search/?P=PHYS %202123).

PHYS 4073 Thermodynamics and Statistical Mechanics II: 3 semester hours.
A continuation of PHYS 4063 (http://catalog.pvamu.edu/search/?P=PHYS%204063) to include quantum statistical mechanics, approximate methods, master equation, phase transitions, Ising model, Onsager solution, Landau theory, Mean-Field theory, block spin and renormalization group approaches.
Prerequisites: PHYS 4063 (http://catalog.pvamu.edu/search/?P=PHYS%204063).
PHYS 4103 Advanced Physics Lab: 3 semester hours.
Computational physics modeling and simulations; several types of physics problem modeled and solved; software including Mathematica, MATLAB, Numerical Recipes, Electronics Workbench, will be utilized.
Prerequisites: PHYS 2523 (http://catalog.pvamu.edu/search/?P=PHYS%202523).

PHYS 4473 Senior Research Project: 3 semester hours.
Capstone Team Based Project. Covers integrated project team concepts, ethics, responsibility, fiscal aspects, culminating in a comprehensive report and a presentation.

PHYS 4911 Physics Research Project: 1 semester hour.
The first half of a two semester sequence. A research project with a faculty advisor or mentor. Includes literature survey preparation and initiation of a research project.
Prerequisites: PHYS 3183 (http://catalog.pvamu.edu/search/?P=PHYS%203183).

PHYS 4921 Physics Research Seminar: 1 semester hour.
The second half of a two semester sequence. A research project with a faculty advisor or mentor. Continues the initiated research from the earlier course (PHYS 4911 (http://catalog.pvamu.edu/search/?P=PHYS%204911)) towards a research publication.
Prerequisites: PHYS 4911 (http://catalog.pvamu.edu/search/?P=PHYS%204911).

PHYS 4993 Independent Study: 1-3 semester hour.
Readings, research, and/or field work on selected topics.