

# Physics (PHYS)

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## Courses

### **PHYS 1101 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.

Prerequisites: PHYS 1301 (may be taken concurrently) or PHYS 2113 (may be taken concurrently).

### **PHYS 1102 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.

Prerequisites: (PHYS 1301 or PHYS 2113) and (PHYS 1302 (may be taken concurrently) or PHYS 2123 (may be taken concurrently)).

### **PHYS 1301 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 1314 or MATH 1113) or (MATH 1511 or MATH 1115) or (MATH 1316 or MATH 1123).

### **PHYS 1302 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 1301 or PHYS 2113) or (PHYS 2325 or PHYS 2513).

### **PHYS 2125 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.

Prerequisites: PHYS 2325 (may be taken concurrently) or PHYS 2513 (may be taken concurrently).

### **PHYS 2126 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.

Prerequisites: PHYS 2326 (may be taken concurrently) or PHYS 2523 (may be taken concurrently).

### **PHYS 2325 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 2413 or MATH 1124.

### **PHYS 2326 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 2325 or PHYS 2513) and (MATH 2414 or MATH 2024).

### **PHYS 3310 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 2326 or PHYS 2523.

### **PHYS 3312 Electricity and Magnetism I: 3 semester hours.**

Basic theory of electrostatics; Coulomb's Law, Gauss's Theorem, simple potential theory, 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 2326 or PHYS 2523.

### **PHYS 3316 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 2326.

### **PHYS 3318 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 2326.

**PHYS 3324 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 2326.

**PHYS 4191 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 3318 or PHYS 3183.

**PHYS 4192 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) towards a research publication.

Prerequisites: PHYS 4191.

**PHYS 4302 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 2326 or PHYS 2523.

**PHYS 4306 Thermodynamics and Statistical Mechanics: 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 2326 or PHYS 2523 and (PHYS 2123 or PHYS 2312) and (MATH 3014 or MATH 3401).

**PHYS 4310 Advanced Physics Lab: 3 semester hours.**

Computational physics modeling and simulations; several types of physics problem modeled and solved; software including Mathematica, MA TLAB, Numerical Recipes, Electronics Workbench, will be utilized.

Prerequisites: PHYS 2326.

**PHYS 4316 Special Topics PHYS: 3 semester hours.**

Selected current and emerging topics in Physics. Courses may be repeated for credit when topics vary.

**PHYS 4399 Independent Study: 1-3 semester hour.**

Readings, research, and/or field work on selected topics.