

PHYSICS (CPHY)

CPHY 102 Physical Science 3 Credits

Basic course in physical science, which satisfies the core science requirement for all non-science majors. Topics include concepts of motion, space sciences, chemical process, conservation of energy, properties of heat, electricity and light. The laboratory is part of the course and students are required to attend one (1) two-hour laboratory each week.

CPHY 102L Physical Science Lab 0 Credits

Basic course in physical science, which satisfies the core science requirement for all non-science majors. Topics include concepts of motion, space sciences, chemical process, conservation of energy, properties of heat, electricity and light. The laboratory is part of the course and students are required to attend one (1) two-hour laboratory each week.

CPHY 104 Intro to Earth System Science 4 Credits

Course provides a scientific understanding of the physical earth system (lithosphere, hydrosphere, atmosphere, and solar system). Topics include common landforms, identification of mineral and rock specimens, major types of earth movements, dating of rock strata, fundamentals of the hydrologic cycle, introduction to oceanography, properties and processes in the earth's atmosphere, and elementary concepts of astronomy. Students are also required to attend one (1) two-hour laboratory each week. This course can be used to satisfy the core science requirements for all non-science majors.

CPHY 104L Intro to Earth Sys. Sci. Lab 0 Credits

Course provides a scientific understanding of the physical earth system (lithosphere, hydrosphere, atmosphere, and solar system). Topics include common landforms, identification of mineral and rock specimens, major types of earth movements, dating of rock strata, fundamentals of the hydrologic cycle, introduction to oceanography, properties and processes in the earth's atmosphere, and elementary concepts of astronomy. Students are also required to attend one (1) two-hour laboratory each week. This course can be used to satisfy the core science requirements for all non-science majors.

CPHY 111 General & Modern Physics I 4 Credits

Lecture and laboratory course for students who desire a basic background in physics. This course is required for biology and chemistry majors. Topics include introduction to basic physics concepts of mechanics, heat, and sound with emphasis on applications in broad areas such as chemistry and biology. Three (3) lecture hours and one (1) three-hour laboratory per week. Prerequisites: three (3) units of high school mathematics, including algebra and trigonometry.

CPHY 111L Gen. & Modern Physics I Lab 0 Credits

Lecture and laboratory course for students who desire a basic background in physics. This course is required for biology and chemistry majors. Topics include introduction to basic physics concepts of mechanics, heat, and sound with emphasis on applications in broad areas such as chemistry and biology. Three (3) lecture hours and one (1) three-hour laboratory per week. Prerequisites: three (3) units of high school mathematics, including algebra and trigonometry.

CPHY 112 General & Modern Physics II 4 Credits

Continuation of CPHY 111. Introduces students to basic principles in the physics of electricity, magnetism, optics, and atomic physics. Three (3) lecture hours and one (1) three-hour lecture-laboratory per week. Prerequisite: CPHY 111.

CPHY 112L Gen. & Modern Physics II Lab 0 Credits

Continuation of CPHY 111. Introduces students to basic principles in the physics of electricity, magnetism, optics, and atomic physics. Three (3) lecture hours and one (1) three-hour lecture-laboratory per week. Prerequisite: CPHY 111.

CPHY 121 Physics I: Mechanics 3 Credits

An introductory physics course for students with a background in basic calculus. Topics include kinematics, dynamics, laws of conservation of momentum and energy, rational motion, oscillatory motion. CPHY 121 and CPHY 121L are separate courses. Three (3) lecture hours per week for the CPHY 121 course, and one (1) three-hour laboratory per week for the CPHY 121L laboratory course. Pre- or Co-requisite: CMAT 111.

CPHY 121L Physics I: Mechanics Lab 1 Credit

An introductory physics course for students with a background in basic calculus. Topics include kinematics, dynamics, laws of conservation of momentum and energy, rational motion, oscillatory motion. CPHY 121 and CPHY 121L are separate courses. Three (3) lecture hours per week for the CPHY 121 course, and one (1) three-hour laboratory per week for the CPHY 121L laboratory course. Pre- or Co-requisite: CMAT 111.

CPHY 122 Physics II: Elec & Magnetism 3 Credits

Continuation of CPHY 121. Students explore electromagnetic forces, induction, static and time-dependent electromagnetic fields, electric circuits, fields and potentials, and electromagnetic waves. CPHY 122 and CPHY 122L are separate courses. Three (3) lecture hours per week for the CPHY 122 course, and one (1) three-hour laboratory per week for the CPHY 122L laboratory course. Prerequisite: CPHY 121. Pre- or Co-requisite: CMAT 112.

CPHY 122L Physics II:Electricity&Mag.Lab 1 Credit

Continuation of CPHY 121. Students explore electromagnetic forces, induction, static and time-dependent electromagnetic fields, electric circuits, fields and potentials, and electromagnetic waves. CPHY 122 and CPHY 122L are separate courses. Three (3) lecture hours per week for the CPHY 122 course, and one (1) three-hour laboratory per week for the CPHY 122L laboratory course. Prerequisite: CPHY 121. Pre- or Co-requisite: CMAT 112.

CPHY 123 Physics III:Optics/Modern Phys 3 Credits

A continuation of CPHY 121 and CPHY 122. Topics include: wave propagation, sound, heat, and principles of thermodynamics, geometric optics, physical optics, atomic physics and nuclear physics. CPHY 123 and CPHY 123L are separate courses. Three (3) lecture hours per week for the CPHY 123 course, and one (1) three-hour laboratory per week for the CPHY 123L laboratory course. Prerequisite: PHY 122.

CPHY 123L Physics III: Optics&Mod.PhyLab 1 Credit

A continuation of CPHY 121 and CPHY 122. Topics include: wave propagation, sound, heat, and principles of thermodynamics, geometric optics, physical optics, atomic physics and nuclear physics. CPHY 123 and CPHY 123L are separate courses. Three (3) lecture hours per week for the CPHY 123 course, and one (1) three-hour laboratory per week for the CPHY 123L laboratory course. Prerequisite: PHY 122.

CPHY 211 Modern Physics 3 Credits

Basic study of atomic and nuclear physics, with emphasis on the experimental foundation of these subjects. Topics include: introduction to the theory of relativity, atomic theory of matter, Rutherford scattering, photoelectric effect, production and characteristics of x-rays, lasers, introductory quantum physics, atomic spectra, radio activity, elementary particles, and particle accelerators. Prerequisites: CPHY 123.

CPHY 321 Mathematical Physics I 3 Credits

Application of mathematical techniques to physical systems. Students review basic concepts of differential and integral calculus. Topics include infinite sequences and series, systems of linear determinants and matrices, and special functions. The course emphasizes numerical methods and application to physics and chemistry. Three (3) one-hour discussion and problem sessions per week. Prerequisites: CPHY 123, CMAT 112.

CPHY 322 Mathematical Physics II 3 Credits

Continuation of CPHY 321. Topics include partial differentiation, multiple integral, first- and second-order ordinary differential equations, and numerical methods of solving differential equations, vector algebra, vector analysis, probability, and statistics. Prerequisite: CPHY 321.

CPHY 331 Classical Mechanics 3 Credits

A rigorous development of the concepts of classical physics and the mathematical techniques used therein. Students examine the common mathematical formalism in vector analysis, hydrodynamics, and electromagnetism. Other topics include Galilean relativity, kinematics and dynamics of particle systems, rigid bodies, oscillations, wave motion, and Lagrangian mechanics. Prerequisites: CPHY 123.

CPHY 332 Electromagnetic Theory 3 Credits

Physical and mathematical foundations of electromagnetism. Students explore electrostatic fields and potentials, electric fields around conductors, electric current, fields of moving charges, magnetic fields, and electromagnetic induction. Maxwell's equations, alternating current circuits, electric fields in matter, free oscillations in systems with many degrees of freedom, forced oscillations, traveling waves, modulations, pulse and wave packets, reflection, polarization, and interference and diffraction. Prerequisite: CPHY 123.

CPHY 411 Thermo & Statistical Mechanics 3 Credits

The concepts and methods of classical thermodynamics and its relation to statistical mechanics. Topics include thermodynamic laws, kinetic theory, and thermodynamic functions and their application to simple systems. Three (3) one hour lectures per week. Prerequisite: CPHY 321.

CPHY 412 Intro to Quantum Mechanics 3 Credits

Concepts of wave particle duality, Heisenberg's Uncertainty Principle, and Schrodinger's Wave Equation, with applications to potential problems of the hydrogen atom and atomic spectra, first-order perturbation theory, spin orbit interaction, and particle theory. Three (3) one-hour lectures per week. Prerequisite: CPHY 332.

CPHY 421 Undergraduate Research I 3 Credits

Individual exposure to the methodology of experimental and theoretical research in physics. Experiments emphasize modern physical techniques and require considerable independent reading and investigation. Individual schedules are arranged at the beginning of the term, depending on the student's interest and experience. Prerequisite: permission of Department Chair.

CPHY 422 Undergraduate Research II 3 Credits

Individual exposure to the methodology of experimental and theoretical research in physics. Experiments emphasize modern physical techniques and require considerable independent reading and investigation. Individual schedules are arranged at the beginning of the term, depending on the student's interest and experience. Prerequisite: Permission of Department Chair

CPHY 441 Internship 3 Credits

Professional work experience for students during the summer months. Interns may work in Atlanta or in other locations. To receive academic credit for internship, students must secure approval from the Department Chair, who will arrange internships with project monitors at specific work sites. Students who do not follow this procedure will not receive internship academic credit.

CPHY 480 Special Topic 3 Credits

Detailed study of topics of special interest. Prerequisite: CPHY 211

CPHY 501 Classical Mechanics 3 Credits

Dynamics of particles and rigid bodies; the Lagrangian and Hamiltonian formulation; Poisson brackets, Hamilton-Jacobi Theory, classical scattering theory, theory of small oscillation.

CPHY 503 Electrodynamics 3 Credits

Maxwell's equations and applications; electrostatics, dielectrics, magnetostatics, scalar and vector potentials; conservation laws; multiple moments and multiple radiation; dispersion; special relativity.

CPHY 515 Quantum Mechanics I 3 Credits

Nonrelativistic quantum mechanics; representation of dynamical variables as operators or matrices; theory of angular momentum; motion in a centrally symmetric field; perturbation theory; identical particles and spin; theory of classic collisions; semiclassical treatment of radiation.

CPHY 516 Quantum Mechanics II 3 Credits

Nonrelativistic quantum mechanics; representation of dynamical variables as operators or matrices; theory of angular momentum; motion in a centrally symmetric field; perturbation theory; identical particles and spin; theory of classic collisions; semiclassical treatment of radiation.

CPHY 520 Thermo & Statistical Mechanics 3 Credits

Review of first, second, and third laws; irreversible processes; microcanonical, canonical and grand canonical ensembles; the density matrix; Bose and Fermi systems. Kinetic theory and the Boltzmann transport equation.

CPHY 531 Mathematical Methods I 3 Credits

Vector analysis, orthogonal curvilinear coordinates; the calculus of variations; functions of a complex variable; ordinary and partial differential equations, hypergeometric functions; orthogonal functions; integral transform methods; Green's functions and integral equations.

CPHY 532 Mathematical Methods II 3 Credits

Vector analysis, orthogonal curvilinear coordinates; the calculus of variations; functions of a complex variable; ordinary and partial differential equations, hypergeometric functions; orthogonal functions; integral transform methods; Green's functions and integral equations.

CPHY 540 Solid State Physics 3 Credits

Brillouin zone treatment of metals, semiconductors and insulators; approximation methods of determining properties of real solids; comparison between theory and experiment for selected solid state phenomena.

CPHY 565 Physics of Surfaces 3 Credits

Fundamentals of physical methods for studying the structures, compositional and electronic properties of solid surfaces, including the verification of principles in laboratory experiments.

CPHY 601 Departmental Seminar 0 Credits

Required of all graduate students in the Department.

CPHY 602 Departmental Seminar 0 Credits

Required of all graduate students in the Department.

CPHY 603 Thesis Research 1-6 Credits

Designed to assist students in the development and writing of the thesis or the nonthesis research project.

CPHY 604 Thesis Consultation 1 Credit

Designed for students who are in the final stage of thesis writing or nonthesis research project writing, which requires minimal supervision and assistance.

CPHY 615 Special Topics in Physics 3 Credits

Special topics of current interest such as general relativity, quantum field theory, scattering theory, elementary particle theory, astrophysics, etc.