

## PHYSICS COURSES (PHYS)

**PHYS 141-142 COLLEGE PHYSICS (4, 4)** Three hours lecture and two hours laboratory each semester. This intensive algebra and trigonometry based physics course sequence is for students majoring in the natural sciences. The course is designed to meet the needs of students preparing for MCATs. Content of the course includes mechanics, properties of matter, thermodynamics, waves and sound, electricity and magnetism, optics, quantum physics, and nuclear physics. One laboratory per week.

**PHYS 161 PHYSICS I (4)** *Prerequisite: MATH 103 or concurrent enrollment in MATH 103.* Three hours lecture and two hours laboratory. This course is a calculus-based survey of classical physics, providing a background for persons who intend to use physics as a base for the physics major or for other science disciplines. The first semester introduces the student to Newton's laws including their application to statics and dynamics: to momentum and energy and their respective conservation principles; to rotational and angular quantities: and, if time allows, to the basic ideas of heat and thermodynamics.

**PHYS 162 PHYSICS II (4)** *Prerequisite: MATH 103, 104 (or concurrent enrollment in MATH 104), PHYS 141 or 161.* Three hour lecture and two hours laboratory. This continuation of a calculus based survey of classical physics introduces students to the physics of waves, including sound, to basic electro-magnetic theory and optics.

**PHYS 181 SOLAR SYSTEM ASTRONOMY (4)** Three hours lecture and two hours lab. Basic overview of the properties of the planets, satellites, and minor members of the solar system. No prior experience in astronomy is required. Course meets the general education laboratory science requirement.

**PHYS 182 STELLAR ASTRONOMY (4)** Three hours lecture and two hours lab. Basic overview of current knowledge about the universe beyond the solar system. No prior experience in astronomy is required; course meets the general education laboratory science requirement.

**PHYS 211 PHYSICS III (4)** *Prerequisite: MATH 211 (or concurrent enrollment in MATH 211) and PHYS 162.* Three hours lecture and three hours laboratory. Topics include thermodynamics, waves, and what is called traditionally "modern physics." This latter topic is a study of twentieth century developments in physics including an introduction to condensed matter physics, relativity, atomic physics, radioactivity, waves and particles, and nuclear processes.

**PHYS 302 PHYSICS IV (4)** *Prerequisites: MATH 103, 104, 211, PHYS 161, 162, 211. Corequisite: MATH 301.* This course prepares physics majors for the study of physics at the intermediate and advanced levels. We introduce and develop the following: new mathematical methods of physics, computational techniques, laboratory skills, and scientific writing. We also introduce students to physics research currently being carried on at Lynchburg College.

**PHYS 309 CLASSICAL MECHANICS (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), and PHYS 162.* Three hours lecture and one-hour problem session. This course

introduces the study of kinematics, particle dynamics, central forces and planetary motion, and rigid-body motion. The Lagrange and Hamilton formulations of mechanics are also introduced.

**PHYS 312 ELECTROMAGNETIC THEORY (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), and PHYS 142 or 162.* Three hours lecture and three hours laboratory. This course introduces students to DC and AC circuits, electrostatics and magnetostatics in free space and materials, Maxwell's equations, boundary conditions, and electromagnetic waves.

**PHYS 318 QUANTUM MECHANICS (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), and PHYS 211.* Three hours lecture and one-hour problem session. This course introduces the methods of quantum theory. The Schrodinger approach is developed and is applied to the hydrogen atom, angular momentum, scattering theory, time-independent perturbation theory, and other topics.

**PHYS 333 COMPUTATIONAL PHYSICS (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), and PHYS 211.* Three hours lecture and one-hour problem session. This course develops the application of higher mathematics and the computer to the analysis and simulation of realistic physical systems. Topics covered typically include finite-difference approximations, Fourier analysis, Fourier transforms, Fast Fourier transforms, numerical integration, applications of Monte Carlo methods, solutions of differential equations, numerical solutions of Laplace's equation, and the application of matrix methods. Symbolic mathematical software is also introduced.

**PHYS 397 INDEPENDENT STUDY IN PHYSICS (1-4)** *Prerequisites: Approval of faculty sponsor and school dean; junior or senior standing.* This course provides students the opportunity to pursue individual study of topics not covered in other available courses. The area for investigation is developed in consultation with a faculty sponsor and credit is dependent on the nature of the work. May be repeated for no more than six credits.

**PHYS 398 SPECIAL TOPICS IN PHYSICS (1-4) [credit depends on topic]** *Prerequisite: A background of work in the discipline.* This course will focus on an aspect of the discipline not otherwise covered by the regularly offered courses. The topic will vary according to professor and term; consequently, more than one may be taken by a student during his/her matriculation.

**PHYS 432 OPTICS (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), PHYS 211.* Three hours lecture and three hours laboratory. A study is made of the properties of electromagnetic waves, particularly in the visible spectrum. Wave descriptions of scattering, reflection, interference, diffraction, and polarization are developed. The course also treats aspects of geometrical optics, including lenses and lens defects.

**PHYS 436 STATISTICAL THERMODYNAMICS (4)** *Prerequisites: MATH 211, 301 (or concurrent enrollment in MATH 301), PHYS 211.* Three hours lecture and one-hour problem session. Microscopic analysis of the physical world is developed using statistical methods. Macroscopic thermodynamics is then developed from microscopic results. More formal ideas of classical statistical thermodynamics, including the partition function, are then studied. Quantum statistical mechanics is also introduced.