

## PHYSICS COURSES (PHYS)

**PHYS 141-142** **COLLEGE PHYSICS (4, 4)** Each semester: Three hours lecture and two hours laboratory. 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)** *Prerequisites: PHYS 141 or 161, MATH 103, MATH 104 (or concurrent enrollment in MATH 104).* Three hours lecture and two hours laboratory. This continuation of a calculusbased survey of classical physics introduces students to the physics of waves, including sound, to basic electromagnetic 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: PHYS 142 or 162, MATH 211 (or concurrent enrollment in MATH 211).* Three hours lecture and three hours laboratory. This study of twentieth-century developments in physics includes an introduction to condensed-matter physics, relativity, atomic physics, radioactivity, waves and particles, and nuclear processes.

**PHYS 309** **CLASSICAL MECHANICS (4)** *Prerequisites: PHYS 162, MATH 211, MATH 301 (or concurrent enrollment in MATH 301).* Three hours lecture and one-hour problem session. This course introduces the study of kinematics, particle dynamics, central forces and planetary motion, oscillations, energy, and momentum. The Lagrange and Hamilton formulations of mechanics are also introduced.

**PHYS 312** **ELECTROMAGNETIC THEORY (4)** *Prerequisites: PHYS 142 or 162, MATH 211, MATH 301 (or concurrent enrollment in MATH 301).* 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: PHYS 211, MATH 211 and MATH 301 (or concurrent enrollment in MATH 301).* 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: PHYS 211, MATH 211, and MATH 301 (or concurrent enrollment in MATH 301).* 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 375****SPECIAL TOPICS- STATISTICAL THERMODYNAMICS**

**(4)** *Prerequisites: PHYS 211, MATH 211, and MATH 301 (or concurrent enrollment in MATH 301).* 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.

**PHYS 403****INDEPENDENT STUDY IN PHYSICS (1-3)** *Prerequisites:*

*Approval of faculty sponsor and School dean.* This course provides opportunity for pursuit of individual interests and projects not covered in other available courses. The area for investigation is developed in consultation with a faculty member and credit dependent on the nature of the work. May be repeated for no more than six credits.

**PHYS 432****OPTICS (4)** *Prerequisites: PHYS 211, MATH 211, and MATH*

*301 (or concurrent enrollment in MATH 301).* 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.