Catalogue Description: This course covers topics on basic electricity, magnetism, light, optics, diffraction, interference, and modern physics. 3 hours lecture and 3 hours lab.

Other Requirements and Prerequisites: Physics II Laboratory (PHYS 2106). This course is the laboratory that accompanies PHYS 2306 3 hours lab.

Prerequisites: PHYS 2305, PHYS 2105, credit for or enrolled in PHYS 2106.

This course is the second semester of a two-semester survey of classical physics designed to meet the needs of majors in Engineering, Chemistry, Environmental Science, pre-professional students, and for students in other science-related programs. The course cannot be repeated for credit. Course audience is for freshman through senior level.

Course Description: Topics include an examination and analysis of electric forces, Coulomb’s Law, and electric field associated with charges. The concept of electric potential will lead to an investigation of the common circuit element called a capacitor. The nature of an electric current will include a discussion of factors that contribute to the resistance of flow of charge in conductors. Direct current circuits will be studied by looking at combinations of batteries, resistors, and capacitors. Topics on magnetism will include magnets, magnetic fields, and electromagnetism. A study of induced voltages and inductance including Faraday’s Law of induction, motional emf, and Lenz’s Law will complete the topics on electricity and magnetism. Algebra, trigonometry, and calculus will be used for mathematical analysis and problem solving. Examinations will be given on each of the Physics topics to evaluate each student’s knowledge and comprehension.

Course Topics:
- Electric Charge and Electric Field
- Gauss’s Law
- Electric Potential
- Capacitance and Dielectrics
- Current, Resistance, and Electromotive Force
- DC Circuits
- Magnetic Fields and Forces
- Sources of Magnetic Field
- Electromagnetic Induction
- Alternating Current
- Electromagnetic Waves
- The Nature of Light

Course Outcomes: Expected outcomes include recognizing the nature of electric charges, forces and fields, calculating electric force using Coulomb’s law, and calculating
the magnitude of an electric field due to both a point charge and continuous charges. Students will evaluate the nature of electric potential and capacitance through problem solving. A student will learn how to identify types of electrical devices, and calculate current, resistance (including resistors in series and parallel), power in circuits, and apply Kirchhoff’s rules. Each student will be able to characterize the nature of magnetism and magnetic forces, calculate magnetic flux, and apply Faraday’s Laws and Lenz’s law. Each student will understand the nature of alternating current circuits and electromagnetic waves. Students will apply conceptual skills in deductive reasoning and critical thinking, apply mathematical analysis using algebra and calculus to all physics concepts, collect and organize data, display data through charts and graphs, and interpret data. Students will be able to set up experiments, collect data, make predictions, and interpret experimental results.

Disability Accommodations
The University of the Incarnate Word is committed to providing a supportive, challenging, diverse and integrated environment for all students. In accordance with Section 504 of the Rehabilitation Act – Subpart E and Title III of the Americans with Disabilities Act (ADA), the University ensures accessibility to its programs, services and activities for qualified students with documented disabilities.

For more information, contact the Student Disability Services Office:
Location Administration Building – Room 105
Phone (210) 829-3997
Fax (210) 829-6078
www.uiw.edu/sds

Academic honesty statement:
The highest standards of academic honesty are expected in the course. Forms of academic dishonesty include, but are not limited to cheating, plagiarism, counterfeit work, falsification of academic record, unauthorized reuse of work, theft, collusion. See the student handbook for definitions and procedures for investigation of claims of academic dishonesty.

Coordinator:
Professor Alison Whittemore, Chair, Department of Engineering and Physics

Person who prepared this description:
Michael Frye, Associate Professor, Department of Engineering and Physics

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