**PHYS 213 UNIVERSITY PHYSICS II**

**Department:** Physics

**Designation:** Required

**Catalog Data:** (3-0) 3 credits. Prerequisite: PHYS 211. This course is the second course in a two semester calculus-level sequence, covering fundamental concepts of physics. This is the preferred sequence for students majoring in physical science or engineering. Topics include electricity and magnetism, sound, light, and optics. The School of Mines course covers electricity and magnetism only.

**Prerequisites:** PHYS 211.

**Textbook:** *Fundamentals of Physics,* Part 3, Halliday, Resnick, Walker, 8th Ed. with Wiley Plus

**Course Learning Outcomes:**

As a result of taking courses meeting this goal, students will:

1. Critically evaluate data using the scientific method. **Assessment:** Students will be able to critically evaluate data (given or obtained), with proper accuracy, using appropriate physical laws and formulas for laboratory reports, homework assignments, and solutions on quizzes and exams.
2. Identify and explain the basic concepts, terminology, and theories of the selected natural sciences. **Assessment:** Students will identify and apply basic concepts and appropriate physical laws in order to solve assigned problems in homework, quizzes, exams, and oral presentations.
3. Apply selected natural science concepts and theories to contemporary issues. **Assessment:** Students will be able to explain how physics concepts, laws, and phenomena relate to contemporary engineering and science in classroom discussions and written assignments.

**Topics:**

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| --- |
| ***Electric Charge***, charge, conductors and insulators, Coulomb’s Law |
| Applications of Coulomb’s Law |
| Applications of Coulomb’s Law |
| ***Electric Fields***, electric field lines, electric field due to a point charge |
| Electric field due to a dipole, continuous charge distributions |
| Electric fields due to continuous charge distributions |
| Electric fields due to continuous charge distributions |
| Point charge and dipole in a electric field |
| ***Gauss’ Law****,* flux of an electric field, Gauss’ Law |
| ***Electric Potential*** , electric potential energy, electric potential, potential from the field | |
| Potential due to a point charge | |
| Potential due to continuous charge distributions | |
| Field from potential | |
| ***Capacitance***, calculating the capacitance | |
| Capacitors in parallel and in series | |
| Energy stored in an electric field | |
| Capacitor with a dielectric | |
| ***Current and Resistance***, current and current density | |
| Resistance and resistivity | |

**Class/Laboratory Schedule:** Varies

**Contribution to Criterion 5:** basic math and sciences

**Relationship of Course to ABET Outcomes (a) through (k)**

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| --- | --- | --- | --- |
|  | **Level of Emphasis** | | |
|  | Low | Medium | High |
| **ABET Outcome** |  |  |  |
| (a) an ability to apply knowledge of mathematics, science, and engineering |  |  | X |
| (b) an ability to design and conduct experiments, as well as to analyze and interpret data |  |  |  |
| (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability |  |  |  |
| (d) an ability to function on multidisciplinary teams |  |  |  |
| (e) an ability to identify, formulate, and solve engineering problems |  |  |  |
| (g) an ability to communicate effectively |  |  |  |
| (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context |  |  |  |
| (i) a recognition of the need for, and an ability to engage in life-long learning |  |  |  |
| (j) a knowledge of contemporary issues |  |  |  |
| (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |  |  |  |

**Prepared By:** Dr. Andre Petukhov, Department Head; June 1, 2010