

General Education Course Objectives and Learning Outcomes

Course Name: Calculus-Based Physics II
and Physics II lab

Course Number: PHYS 2124 & 2010

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COMMON COURSE OBJECTIVES AND STUDENT LEARNING OUTCOMES THAT ARE OR WILL BE LISTED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE:

<i>Course objectives:</i>	<p>For Lecture (PHYS 2124)</p> <p>Students will understand basic electromagnetic concepts (including light and circuits) and will be able to apply these concepts in future upper-level courses.</p>
<i>Student learning outcomes:</i>	<p>Students completing PHYS 2124 and PHYS 2010 will be able to</p> <ul style="list-style-type: none"> • draw electric field lines of discrete and continuous charge distributions, apply understanding of charge to calculate the electric field of discrete and continuous charge distributions using Coulomb’s Law and Gauss’ Law. • calculate current, voltage, and/or resistance of basic DC circuits using Ohm’s law and Kirchhoff’s rules. • calculate the capacitance of capacitors using the definition of capacitance, determine equivalent capacitance of simple circuits and demonstrate conceptual understanding of time-dependence of RC circuits. • determine the force on a charged particle or current carrying wire in a magnetic field and use Ampere’s law to calculate the magnetic field of current carrying wires. • use Faraday and Lenz’s law to calculate the magnitude and direction of the current the current (or EMF) induced in a wire by a changing magnetic field. • Study and understand properties of simple RLC (AC and DC) circuits. • analyze basic optical arrangements consisting of lenses and mirrors using geometric optics • analyze phenomena like thin slit(s) and thin film interference and diffraction patterns using wave optics

ADHE ACTS INFORMATION FOR THIS COURSE (IF APPROPRIATE)

<i>ACTS Course number:</i>	PHYS2044 Calculus-Based Physics II (ATU PHYS 2124 + PHYS 2010, taken together meet the acts requirements)
<i>Copy the ACTS course objectives and learning outcomes:</i>	<p>Continuation of Calculus-Based Physics I (PHYS 2034). Topics include electricity & magnetism and optics. Lab required. This is a calculus-based course and it is strongly recommended that the student should have completed both Calculus I and Calculus-Based Physics I with a “C” or better and should take Calculus II as a corequisite.</p> <p>Expected Student Learning Outcomes:</p> <p>The student will use calculus in order to be able to explain, describe, discuss, recognize, and/or apply knowledge and understanding of the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electric force and fields <input type="checkbox"/> Gauss’s Law <input type="checkbox"/> Electric potential <input type="checkbox"/> Capacitance and energy <input type="checkbox"/> Current and resistance

- Circuits
- Magnetic force, fields, and flux
- Induction and inductance
- Maxwell's Equations and electromagnetic waves
- Optics

WHICH ATU GENERAL EDUCATION GOALS DOES THIS COURSE FULFILL? (NO MORE THAN TWO)

- Communicate effectively
 - Written communication
 - Oral communication
- Think critically
- Develop ethical perspectives
 - Diversity
 - Empathy
 - Leadership
- Apply scientific and quantitative reasoning** ✓
 - Scientific reasoning
 - Quantitative reasoning
- Apply the value of the arts and humanities
- Practice civic engagement

DESCRIPTION OF HOW THIS COURSE MEETS THE GENERAL EDUCATION GOALS CHOSEN ABOVE (TO BE INCLUDED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE)

In this course (lab and lecture) students are introduced to basic electromagnetic principles that govern the physical world. The students practice applying the principles to situations and using scientific and quantitative reasoning to make predictions or describe the outcomes.