ANDERSON UNIVERSITY

General Physics II (calculus based)

PHYS 2250

Instructor Info

Name: Tyler Williamson

Office Hours: M W: 2-4pm
T F: 1-3pm

Office: Hartung 315A

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Course Info

Prereq: PHYS 2240, MATH 2020

Meeting Days: M W F

Meeting Times: 11am-11:50am

Location: Hartung 318

Lab Info

Meeting Days: Thursday

Meeting Times: LA: 9am-10:50am
LB: 3pm-4:50pm

Location: Hartung 319

Overview

This course will provide a thorough introduction to electromagnetic interactions. Electric charges and the forces they produce will be discussed, along with electronic currents and their corresponding magnetic forces. The manifestation of these phenomena in the form of electric circuits will be discussed and analyzed.

Material

Required Texts

Chabay, R.W. and Sherwood, B.A. *Matter and Interactions*. 4th Edition. Wiley. 2014.

Grading Scheme

Homework	30%
Quizzes	20%
Labs	15%
Exams ($2 \times 10\%$)	20%
Final Exam	15%

$grade \geq 93$	A	$73 \leq grade < 77$	C
$90 \leq grade < 93$	A-	$70 \leq grade < 73$	C-
$87 \leq grade < 90$	B+	$67 \leq grade < 70$	D+
$83 \leq grade < 87$	B	$63 \leq grade < 67$	D
$80 \leq grade < 83$	B-	$60 \leq grade < 63$	D-
$77 \leq grade < 80$	C+	$grade < 60$	F

Note: As the instructor, I reserve the right to change the grade of any student, but only to that student's benefit and only under exceptional circumstances.

Learning Objectives

- Learn to calculate electric fields, potentials, and forces associated with common charge distributions
- Learn to calculate magnetic fields and forces from common current configurations
- Learn to analyze circuits on both a microscopic and macroscopic scale
- Be introduced to electrodynamics: the connection between electricity and magnetism
- Be introduced to electromagnetic radiation and its basic properties
- Learn how to approach complex problems like a physicist

Course Requirements

Homework

Homework problems, designed to give you practice with the material being taugh in class, will be assigned on a regular basis.

Quizzes

Quizzes will be administered frequently. Quizzes will usually resemble the homework and should be easy if the homework has been thoroughly completed.

Labs

Labs provide a hands-on perspective to the physical phenomena being discussed in class. Lab grades will be decided on the basis of a lab report. Expectations for lab reports will be discussed in class.

Exams

Exams will be administered in class and are designed to assess your understanding of the material.

COVID-19 Statement

AU is operating as a fully open campus at this point, but we also acknowledge that in a pandemic we cannot predict conditions that may arise. For the most up-to-date information regarding mask requirements and COVID-19 policies please reference our web page COVID-19 information.

Attendance Policy

Class attendance is fundamental to the teaching/learning process and any absence from a class results in a loss of learning for the student and learning community. In the current pandemic environment, it is imperative that we balance our face-to-face learning with the risk posed by the coronavirus. For this reason, if you need to miss class for any reason (such as feeling a little under the weather), participation in the equivalent online activities will not count as an absence presuming, if applicable, any required assignments are completed. It is the student's obligation to personally notify the course instructor when not attending the class face-to-face, in advance if possible, and to complete the required assignments for that class session prior to the due date, or at a modified date at the discretion of the instructor. In the case of an extended illness or a mandated quarantine, notify the professor as soon as possible to discuss options for modified due dates or other accommodations.

Late Work Policy

Course work should be submitted on or before the specified due date. Homework assignments are a critical component to understanding the material being discussed in class; it is therefore important to complete the homework in a timely fashion (while it is still the topic of discussion in class). For this reason, a penalty will be assessed on work turned in after the due date (see the table). This penalty is only a guideline, and I reserve to right to deviate from it, but only when it is to the student's benefit. Please communicate with me *before* an assignment is due if you think you will have trouble completing it on time.

Date turned in	**Penalty**
≤ 1 day late	-10%
> 1 day late and ≤ 3 days late	-20%
> 3 days late	-30%

Academic Integrity

As an institution of higher education committed to academic and Christian discovery, Anderson University expects faculty and students alike to maintain the highest standards of academic and personal integrity. "Anderson University seeks to support and promote qualities of academic honesty and personal integrity and regards cheating, plagiarism, and all other forms of academic dishonesty as serious offenses against the University community" (Faculty Handbook 4.23 Policy on Academic Integrity). See the student handbook for examples of plagiarism. When an instructor has additional definitions of academic dishonesty, they must be stated in the Syllabus at the beginning of the course.

You are expected to do your own work in this course. While collaboration with others on homework assignments is allowed, the work you turn in must be substantially your own. Be mindful that you personally are responsible for understanding the material during a quiz or exam. Any incidences of academic dishonesty will be handled according to University policy.

Academic Support

Accessibility and Accommodations

Important: If you have any special accessibility needs (i.e. use of screen reading software, captioning, etc.), please notify your professor and the Director of Disability Services for Students (Kissinger Academic Center for Excellence, Nicholson Library; 765-641-4223) as soon as possible. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Director of Disability Services for Students (Kissinger Academic Center for Excellence, Nicholson Library; 765-641-4223). To receive reasonable accommodations, you must contact Disability Services for Students, provide documentation, and request accommodations. You should also notify your course instructor during the first week of classes.

Kissinger Academic Center for Excellence

The Kissinger Academic Center for Excellence (KACE), located on the ground floor of the Nicholson Library, provides excellent resources in all areas of study regardless of academic ability. Many students can benefit from academic support and/or sharpen their skills through studying with others. In addition, excellent students often maintain their skills by working as peer tutors. The services are available for all enrolled students at no charge. For information, call 765-641-4225.

Pathways Program

Anderson University has a robust referral system that was created to connect students with the campus resources that will be most beneficial to them. Students may be referred by faculty for any student success issue. Students will be contacted by an appropriate staff or faculty member to provide support and care. For more information please see: anderson.pharos360.com.

Diversity and Inclusivity Statement

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Class Schedule

Subject to change

Week 1	Syllabus/Course intro; review of vectors	-
	Electric charge, force, and fields	Chabay & Sherwood 13.1-13.4
	Electric fields and superposition	Chabay & Sherwood 13.5
Week 2	*Labor Day*	
	Electric fields and superposition	Chabay & Sherwood 13.5
	Superposition and dipoles	Chabay & Sherwood 13.5-13.6
Week 3	Polarization; Charged and neutral matter	Chabay & Sherwood 14.1-14.2
	Conductors and insulators; Polarization	Chabay & Sherwood 14.3-14.5
	Charge motion in metals; Charge transfer	Chabay & Sherwood 14.5-14.8
Week 4	Procedure for calculating field of distributed charge	Chabay & Sherwood 15.1-15.2
	Uniformly charged rod; Field of a ring;	Chabay & Sherwood 15.2-15.3
	Field of a disk; capacitor	Chabay & Sherwood 15.4-15.5
Week 5	Spherical charge distributions	Chabay & Sherwood 15.6-15.7
	Electric Potential energy	Chabay & Sherwood 16.1-16.2
	The Electric potential	Chabay & Sherwood 16.3-16.4
Week 6	Potential difference in a varying field; path independence; round trip potential difference	Chabay & Sherwood 16.5-16.6
	The potential at one point	Chabay & Sherwood 16.7
	Magnetic field of a moving charge; electron current	Chabay & Sherwood 17.1-17.3
Week 7	Conventional current; magnetic field of a long straight wire	Chabay & Sherwood 17.5-17.7
	Magnetic field of a loop; magnetic dipole moment	Chabay & Sherwood 17.8; 17.10
	Fall Break	
Week 8	Field of a bar magnet; atomic structure of magnets	Chabay & Sherwood 17.11-17.12
	Current in parts of a circuit; the Drude model	Chabay & Sherwood 18.1-18.3
	Charge and field in circuits; Surface charge distributions; The initial transient	Chabay & Sherwood 18.4-18.6
Week 9	Feedback; Surface charge and resistors; Energy conservation in circuits	Chabay & Sherwood 18.7-18.9

	Capacitors in circuits; Charging and discharging	Chabay & Sherwood 19.1
	Macroscopic analysis of circuits	Chabay & Sherwood 19.2-19.3
Week 10	Power, non-ideal batteries, meters	Chabay & Sherwood 19.4-19.6
	RC circuits	Chabay & Sherwood 19.7-19.8
	Magnetic force on a particle; Circular motion; force on a wire	Chabay & Sherwood 20.1-20.2
Week 11	Electric and magnetic forces; Velocity selector; Hall effect	Chabay & Sherwood 20.3-20.4
	Motional emf	Chabay & Sherwood 20.5
	Patterns of electric fields; Gauss's Law	Chabay & Sherwood 21.1-21.3
Week 12	Reasoning from Gauss's law; Gauss's Law for magnetism	Chabay & Sherwood 21.4-21.5
	Ampere's Law; Maxwell's equations	Chabay & Sherwood 21.6-21.7
	Changing magnetic fields and curly electric fields; Faraday's Law	Chabay & Sherwood 22.1-22.2
Week 13	Faraday's Law and motional EMF; Maxwell's equations;	Chabay & Sherwood 22.3-22.4
	Thanksgiving Break	
	Thanksgiving Break	
Week 14	Fields traveling through space	Chabay & Sherwood 23.1-23.2
	Production of radiative electric and magnetic fields	Chabay & Sherwood 23.3-23.4
	Energy and momentum in electromagnetic radiation	Chabay & Sherwood 23.5
Week 15	Effects of radiation on matter; light propagation through a medium	Chabay & Sherwood 23.6-23.7
	Refraction/reflection; lenses and image formation	Chabay & Sherwood 23.8-23.10
	Review	-