

PHYS 360: ELECTRICITY AND MAGNETISM

INSTRUCTOR: Jim Drachenberg, Ph.D. Office: Onstead Science Center 123A
Phone: 325-674-6150 E-mail: jld00a@acu.edu
Office Hours: MTWF 10:00 – 11:00 AM or by appointment

LECTURE: TR 1:30-2:50 PM in Onstead Science Center 345
TEXTBOOK: *Introduction to Electrodynamics* by David Griffiths

COURSE DESCRIPTION: Electro- and magneto-statics theory, Maxwell's equations, electromagnetic field theory, dielectrics, displacement current, current density, Poynting vector, scalar potentials, vector potentials and design applications. Prerequisite: PHYS 222. Corequisite: PHYS/MATH 463.

GRADE: Course grades will be based on the following with **approximate weights** as shown.

Exams (2)	20% each for a total of	40%
Homework		20%
Independent Project		20%
Final Exam		20%

Course letter grades will be assigned using the following **approximate** scale:

A: 90 – 100% B: 80 – 89% C: 70 – 80% D: 60 – 70% F: < 60%

Grades are considered set **two weeks** after the grades have been posted to Canvas. Any objection must be received prior to conclusion of the two-week period, otherwise I will assume you consent to the posted grade.

DROP POLICY: All university policies and deadlines must be followed.

HOMEWORK: Homework assignments will generally be given weekly and due on Wednesdays the **beginning** of class. What you submit should be of professional quality, legible, and well-enough organized that you have an inkling of what you were thinking when you review it, later!

COLLABORATION: As with your other physics courses, collaboration is strongly encouraged! **HOWEVER**, it is still critical for you to “own” material. As a reminder, assistance should be limited to verbal help. **Do not take written information from others.** This will help you think independently after receiving assistance. Excellent performance on homework correlated with poor performance on exams is one indicator you are receiving too much help.

INDEPENDENT PROJECT: A couple of options: 1) Read a chapter, which we do not cover in class and write a 2 to 3-page report on it. Additionally, compile in Word or LaTeX a “solution manual” for 10 of the end-of-chapter problems from your selection. 2) Using the concepts discussed in class, design and construct an application along with a 2 to 3-page paper highlighting the connections with the course material. All project proposals must be cleared with me, ahead of time.

EXAMS: There will be two exams during the semester. Make-up exams may be administered only for university-approved absences (e.g. university-sponsored activity), provided you furnish me with written notification and documentation **prior to the absence.**

The comprehensive final examination will be **Friday, May 8, from 12 – 1:45 PM in Onstead Science Center 345.** **There will be no make-up final exam.**

ATTENDANCE: Daily attendance in class is **essential**. If you are unable to attend, you should notify me by e-mail, phone, or in person **before** class. If so doing is impossible, I expect you to contact me after the absence to offer an explanation. I will take attendance during class and participation will be considered in your final grade assessment at my discretion. Regardless of absence, you are fully responsible for material discussed in class. If absent from a quiz or exam, your grade will be zero unless I grant prior approval.

DRESS CODE: Please follow the student guide. **If you aren't sure, don't wear it.** I reserve the right to ask you to remove hats at any time, e.g. during exams.

ELECTRONICS: No cell phones, laptops, iPods, or other electronic devices are allowed in class unless we are using them corporately. **If I determine your electronic device is disturbing the class or distracting you or others, you will be dismissed.** If such distractions become a pattern, I will not hesitate from further action, including expulsion from the course.

**ACADEMIC
INTEGRITY:**

DO. NOT. CHEAT.

I expect you to report cheating if you witness it. **Failure to report academic dishonesty is considered academic dishonesty, at my discretion.**

Required University statement:

*"Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failing to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submitting papers or projects obtained from another source (e.g., research service or club paper file) as one's own, 3) Falsifying information orally or in writing, and 4) Receiving, giving, or using unauthorized aid on an examination or quiz. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link:
<http://www.acu.edu/academics/provost/policies/index.html>."*

For exams and quizzes, I will give specific instructions concerning authorized resources. Do not discuss quizzes or exams with anyone who has yet to take them. You are **strongly encouraged** and **welcomed** to consult me for assistance on homework. However, assignments submitted in your name must reflect your original work. **Copying the work of students past or present is a violation of the Academic Integrity Policy and will lead to disciplinary action including but not limited to loss of credit, course grade reduction, and automatic course failure.**

ACU MISSION: To educate students for Christian service and leadership throughout the world.

DISCLAIMER: To the best of my knowledge, this syllabus is currently complete and correct. If I determine it is in the best interest of the class, I reserve the right to modified this syllabus, at any time.

COURSE SCHEDULE: The following tentative course schedule based on the textbook material indicates textbook chapters and exam dates, all of which are subject to change.

DATE	TOPICS COVERED	CHAPTERS
01/14	Intro, overview, electrostatics, E fields, curly r	1.1-1.3; pg. xiv-xviii; 2.1.1-2.1.3
01/16	Computing E from continuous charge distributions	2.1.4
01/21	Divergence, Flux, and Gauss's Law	2.2.1; 2.2.2; 1.3.4
01/23	Delta functions and Applying Gauss's Law	1.5; 2.2.2; 2.2.3
01/28	Curl, Curl(E), Stokes, and Voltage	2.2.4; 2.3.1; 2.3.2
01/30	Voltage, Boundary conditions, and energy	2.3.3; 2.3.4; 2.3.5; 2.4.1-2.4.4
02/04	Boundary conditions, conductors, and capacitors	2.3.5; 2.5.1-2.5.2; 2.5.4
02/06	Laplace's equation and intro to method of images	3.1
02/11	Method of images & Intro to separation of variables	3.2; 3.3.1
02/13	Separation of variables and Fourier's trick	3.3.1
02/18	Cartesian and Spherical separation of variables	3.3.2
02/20	Exam 1	1-3
02/21	<i>Independent Project Proposal Due</i>	
02/25	Multipoles	3.3.2
02/27	Intro to fields in matter	4.1.1; 1.2; 1.4
03/03	Polarization continued	4.2
03/05	Electric Displacement: define D, E, and P	4.3
03/09-13	Spring Break (no class)	
03/17	Linear Dielectrics, finding D, using D	4.4
03/19	Boundary conditions with dielectrics	4.4
03/24	B fields and currents / current density	5.1.1-5.1.3
03/26	Current density, current convs., intro to Biot-Savart	5.1.3; 5.2; 5.3.1-5.3.2
03/27	<i>Independent Project Progress Report Due</i>	
03/31	Biot-Savart, Intro to Ampere's Law	5.3.2-5.3.4
04/02	Ampere's Law	5.3.2-5.3.4
04/07	Finish Ampere's Law and begin vector potentials	5.3.2-5.3.4; 5.4.1
04/09	Vector potentials and boundary conditions	5.4.1; 5.4.2
04/14	Exam 2	3-5
04/16	Bound. cond. & intro to magnetic dipole moments	5.4.2-5.4.3
04/21	Dipole expansion, torque & force, magnetization	6.1.1-6.1.4
04/23	Magnetization, dia/para-magnetism, H field	6.2
04/24	<i>Independent Project Due</i>	
04/28	H field, magnetic susceptibility, and linear materials	6.4
04/30	Bound. cond., linear materials, ferromagnetism	6.4
05/08	Final Exam, 12:00-1:45 PM	1-6