

PHYS 231: Electricity and Magnetism (Engineers)—Spring 2021

Particulars

Instructor	Prof. Michael Fitzsimmons
Office	HAM-330; Zoom office
Office hours	M 1:00-2:00 pm, W 3:00-4:00 pm, or by appointment
E-mail	mfitzsi1@utk.edu N.b., please allow 24 hours for a response. Please do not expect a response immediately before a homework assignment is due or a test is taken.
Class time	MW 9:15-10:05 am
Class location	Synchronous lecture via Zoom (Lab is face-to-face)
Communication	Most communication will use Zoom and the Canvas site.

Course Description and Goals

- Overview:** PHYS 231 is a 3 credit-hour course covering the fundamentals of electricity and magnetism. The course goal will familiarize students with concepts of electromagnetism and develop skills to solve problems analytically and numerically and to perform experiments related to electromagnetism. The course consists of lecture and lab components.
- Objectives:**
- Understand the distinctions between electrostatics, electrodynamics, magnetostatics and magnetism.
 - Understand the concepts of resistance, capacitance and inductance.
 - Understand the origins of electric and magnetic properties of materials.
- Outcomes:**
- Students shall calculate electric and magnetic fields of simple geometrical systems.
 - Students shall describe how an electric motor operates.
 - Students shall calculate the electronic properties of an electrical circuit.
 - Students shall calculate the attractive force of a magnet.
- Prerequisites:** The course and text assume familiarity with calculus and vector algebra. The prerequisite(s) for the course are: PHYS 135 or PHYS 137 or EF 151 or EF 152 and the corequisite is MATH 142.
- Resources:** (1) Pearson MyLab and Mastering Physics for University Physics with Modern Physics (15th Edition) by Young and Freedman. For registering with Pearson Mastering Physics, please follow the *Vital Source Bookshelf* tab on the left sidebar in Canvas. For details, please see: <https://youtu.be/5HpBeu3G6gQ>.

- (2) An eText version of the textbook is included in Pearson MyLab. If the eText suffices for you, then you do not need to purchase the print textbook. If you prefer the print textbook, then you do not need to purchase the current edition of the textbook (though homework problems will be assigned from the 15th edition—available in eText).
- (3) Contemporary Introductory Physics Experiment, 2nd Edition by James E. Parks, Hayden-McNeil Publishing, ISBN 978-0-7380-6168-9. You are required to purchase a current edition of the Laboratory Manual. Please wait to hear from your TA for the details about the manual and other lab resources.

Course Format: We will cover the electromagnetism section of the textbook (chapters 21-31, inclusive). We will build heavily on concepts of previous physics courses.

The course consists of two 50-minute lectures and one 2-hour lab per week. You should expect to spend even more time working on the reading and homework assignments

Students are expected to have read the assigned chapter before attending lecture. Chapter 21 should be read before the first lecture.

Clickers: We will be using clickers using your mobile phone. Please install the app and have it ready for the first class. You can visit the UTK OIT website: <https://help.utk.edu/kb/index.php?func=show&e=2784> for instructions. Note that your clicker must be enabled with your UTK email (the email address that appears in your Canvas profile) in order for your quiz results to be registered in Canvas.

Course Schedule: A tentative schedule is below.

Day	Week	Chapter	Topic	Homework
20-Jan	1	21	Electric charge	
25-Jan	2	21	Electric force and field	
27-Jan		22	Gauss' law	HW21 due
1-Feb	3	22	Gauss' law	
3-Feb		23	Electric potential	HW22 due
8-Feb	4	23	Electric potential	
10-Feb		24	Capacitance & dielectrics	HW23 due
15-Feb	5	24	Capacitance & dielectrics	
17-Feb			Review	HW24 due
22-Feb	6		Exam 1	
24-Feb		25	Current, resistance, EMF	
1-Mar	7	25	Current, resistance, EMF	
3-Mar		26	DC circuits	HW25 due
8-Mar	8	26	DC circuits	
10-Mar		27	Magnetic fields	HW26 due
15-Mar	9	27	Magnetic fields	

17-Mar		28	Sources of magnetism	HW27 due
22-Mar	10	28	Sources of magnetism	
24-Mar			Review	HW28 due
29-Mar	11		Exam 2	
31-Mar		29	Electromagnetic induction	
5-Apr	12	29	Electromagnetic induction	
7-Apr		30	Inductance	HW29 due
12-Apr	13	30	Inductance	
14-Apr		31	Alternating Current	HW30 due
19-Apr	14	31	Alternating Current	
21-Apr			AC circuits	HW31 due
26-Apr	15		AC circuits	
28-Apr			Review	
tbd			Final exam	

Grading and Evaluation

Assignments: I will assign problems and/or lab exercises at regular intervals. The assignments will be turned in during class on the indicated date. If an assignment is turned in late, then I will reduce the mark for each 24-hour period it is overdue (unless you have made prior arrangements to turn the material in at a later time). Late homework will not be accepted once the assignment is discussed in lecture.

Laboratory: The Laboratory sections are mandatory. If you fail the Laboratory section of the course, you will fail the course regardless of your scores in class. Lab reports will be turned into your Teaching Assistant. The Teaching Assistant is responsible for grading the reports. Please resolve disputes regarding your laboratory grade with your TA. If you are unable to reconcile the issue, please contact me.

Midterm exams: We will have two midterm exams covering $\sim 1/3$ of the subject matter. Exams will be given online, and you are to answer the questions on your own.

Final exam: The final exam will cover all the material presented in the course. The final exam will occur during the assigned exam time and be given online. You are to answer the questions on your own.

You are allowed to use the textbook, a calculator, your notes and laptop. No other materials are permitted. Students are encouraged to review and know the material before the exam. As the exam time is constrained, an unprepared student is not likely to do well.

Grading: Your quantitative grade will be determined by the most favorable of the two metrics for you:

Course Element	Metric 1 (%)	Metric 2 (%)
Laboratory	25	25
Exam 1	10	15
Exam 2	10	15
Final Exam	15	20
Homework	25	15
In-class Quiz and Participation	15	10
Total	100	100

Your letter grade will be obtained from the chart.

%	Grade
90+	A
87-89	A-
83-86	B+
80-82	B
77-79	B-
73-76	C+
70-72	C
67-69	C-
63-66	D+
60-62	D
57-59	D-
<57	

Other information

Group work policy: I encourage students to work together and discuss homework with each other. Such discussions are one of the most effective ways of assimilating the material. The work you turn in must be written up by you and not a copy of your colleagues or another source such as found on the Internet. Any homework assignment that is a direct copy of another person's work without attribution will count as plagiarism and will be dealt with accordingly. If you work in a group, then include a list of your co-workers.

Course Repetition Policy: If you are repeating the course, you may not need to repeat the laboratories. Please refer to the Laboratory policy regarding repeating a course and follow instructions:

<http://www.phys.utk.edu/labs/Lab%20Repeat.pdf>

Class guidance:

- Please join the Zoom meeting on time and be prepared for class.

- Use the Zoom “Raise Hand” feature or post a question in the chat-box.
- Please be respectful of others and share the time in the Zoom meeting.
- Please be patient—this class will be my first time teaching a large class and one online too.
- If you find yourself struggling seek help from me or the TA’s. We are here to help you succeed.

For students with disabilities: If you require course adaptations or accommodations because of a documented disability, please contact the Office of Disability Services at 2227 Dunford Hall (telephone/TTY 865-974-6087; e-mail ods@utk.edu). This will ensure that you are properly registered for services. University Policy forbids me from making special accommodations without a letter from the Office of Disability Services.

Academic honesty and integrity: By taking this course you agree to the following statement: “An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.” Students are expected to perform all work in conformance with the University policies regarding Academic Honesty.

University civility statement: Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity. Civility is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other’s well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: <http://civility.utk.edu/>.