

Syllabus for
Physics 138
Spring 2021 Semester
Fundamentals of Physics II:
Electricity, Magnetism, and Optics

Course title	Physics 138 "Fundamentals of Physics: Mechanics and Thermodynamics"
Professor	Soren P. Sorensen
Office	Science and Engineering Research Facility (SERF), room 607
Email	sorensen@utk.edu
Office Hours	Wed 1:30-2:30 PM; Thu 1:00-2:00 PM (Zoom only. ID: 865 386 7051)
Lecture Time	MWF 10:30-11:20 AM
Lecture Location	Physics Nielsen 304 (Face-to-Face)
Lab and Recitation Instructor	Andrew Shore
Recitation Time	Tuesday 5:00-6:00 PM
Recitation Location	Online (Zoom)
Lab Time	Thursday 5:30-7:25 PM
Lab Location	Physics Nielsen 510 (Face-to-Face)
Homework Grader	Andrew Shore
Textbook	Randall D. Knight: "Physics for Scientists and Engineers: A strategic Approach", 4th Edition
"Clicker"	ResponseWare on your cell phone or laptop
VPython	The computational visualization tool, VPython, is an integral part of this course. Instructions can be found on the Canvas web site at /Files/VPython/VPython User Guide.pdf

Text Assignments

Volume II, Electric and Magnetic Interactions

Chapter	Title
22	Electric Charges and Forces
23	The Electric Field
24	Gauss's Law
25	The Electric Potential
26	Potential and Field
27	Current and Resistance
28	Fundamentals of Circuits
29	The Magnetic Field
30	Electromagnetic Induction
31	Electromagnetic Fields and Waves
32	AC Circuits
16	Traveling Waves
17	Superposition
33	Wave Optics
34	Ray Optics
35	Optical Instruments
36	The Special Theory of relativity

Course Description:

- Calculus-based physics of Electromagnetism, Optics, and Waves.
- Satisfies General Education Requirement: (NS)
- (RE) Co-requisite(s): Mathematics 141.
- Recommended Background: High school calculus and physics.
- Comment(s): For physics and engineering physics majors and qualified students from other majors.
- Registration Permission: Consent of department.

Learning objectives:

Students who successfully complete this course will be able to:

1. Understand and apply fundamental concepts of electromagnetism like electric and magnetic fields and forces, Maxwell's equations, electromagnetic waves, electric currents, and electric circuits.
2. Understand and apply the fundamental concepts of wave motion and the various ways to describe light.

Lectures:

The most important way for you to learn the physics contained in this course will be to carefully study the textbook and to try to solve as many problems as possible. *It is assumed that you have studied the material contained in each chapter before the lectures,* so during the lectures we can focus on a few particularly important issues. In particular, we will rely heavily on student participation and student discussions aided by the use of a "clicker" system.

All lectures will be Face-to-Face. However, if you are required, according to UT's COVID-19 rules, to refrain from attending classes in person we will provide online Zoom access. The online access will stop as soon as you are able, according to UT's rules, to attend in-person classes.

Homework:

The homework problems are due Thursday at 5:30 PM following the day we finish each chapter. The homework should be handed in to the Laboratory Teaching Assistant at the

beginning of the labs on Thursdays. The homework will all together count 15% of the total score.

Laboratory:

The laboratory exercises are an important and integral part of this course and have to be completed before a final grade will be assigned. The score assigned by the lab instructor will count 25% of the final score.

Recitations:

Recitations will normally be used to focus on how to solve problems. Your recitation instructor will be your lab instructor. Occasionally, when I must be out of town, a recitation might be swapped with a lecture. You will always be informed about that via email prior to the swap (except in emergencies).

Clickers:

Each student is required to have a Personal Response System (= Clicker system) ready **before the first lecture**. Instructions for how to setup and use such a system can be found at OIT's web site <https://oit.utk.edu/teachingtools/clickers/>. I recommend that you use the mobile device system (laptop, phone, tablet etc.), since this will be free of charge to you. Any technical questions concerning the Personal Response System should be address to the OIT helpdesk.

Each correct answer to a clicker question during a lecture will count 2 points, a wrong answer will count 1 point, and no answer will of course not give any points.

VPython:

The VPython 3-dimensional computational modeling system is an integral part of this course. It will enable you to better visualize the behavior of the many systems we will discuss, and it will also teach you how to solve many problems using numerical techniques that often cannot be solved using analytical (calculus) methods.

Instructions for how to setup and program in VPython can be found on the Physics 138 Canvas website under /Files/VPython/Vpython User Guide.pdf

Exams and Grading:

There will be given 4 tests, three during the semester and one final, comprehensive test at the end of the semester. Each semester test is counting 12.5% of the final score, but the lowest score of the first 3 tests will be discarded. **The final test is mandatory and will count 20% of the final score.** If you miss one of the first three tests for personal or medical reasons it will automatically be counted as your lowest score. **There is no make-up test,** so if you miss more than one of the first 3 tests or the final test you are in deep trouble! If you know that you have potential scheduling conflicts with tests or other parts of the course, please tell as soon as you are aware of this potential conflict, so we together might be able to find a solution.

Summary of weights for scores in the different components of the course	
<i>Final exam</i>	20%
<i>The 2 best of the 3 first tests (12.5% each)</i>	25%
<i>Labs</i>	25%
<i>Homework (each chapter counts equally much)</i>	15%
<i>Personal Response System (Clicker)</i>	15%

A "curve" might be used to transform your final score into the final grade. You are welcome to discuss and/or complain about the grading of a given assignment up to a week after it has been returned to you. After a week the score will not be changed.

Exam Schedule		
Test no.	Date & Time	Main content
1	Friday, 2/19, 10:30-11:20 AM	Chapters 22-26
2	Friday, 3/19, 10:30-11:20 AM	Chapters 27-30
3	Friday, 4/16, 10:30-11:20 AM	Chapters 16-17, 31-33
Final	Monday, 5/3, 3:30 PM – 6:00 PM	Chapters 22-36

During tests you are required to bring a pencil and a pocket calculator, and you are allowed 1 or 2 pieces of paper (letter size) with notes and formulas written by yourself. For tests #1 and #2 you will be allowed to bring ONE piece of paper and for test #3 and the final test you may bring TWO pieces of paper. *In particular, no laptops, cell phones, or other means of communication are permitted unless specifically required by the teacher for solving VPython related problems.* You will receive a handout containing information on Physical Constants, Units, selected tables of physical properties, and selected mathematical formulas.

Course Material:

This course consists of several components: lectures, laboratories, homework problems, and the textbook. The material you will be expected to learn and will be tested on during the exams will be taught to you as part of all these course components. In particular, I will stress the importance of carefully working (not just reading) your way through all the parts of the textbook indicated above under "text assignments". The lectures will NOT just repeat the material in the textbook, but will be used to discuss the course material in a variety of ways, some of them following the text book and some of them discussing topics not covered in the textbook, or discussing them in a different manner.

Attendance:

You will not be required to attend class (lab attendance is required), but I have not yet had a student that was able to pass this course without attending nearly all the lectures! Furthermore, if an announcement is made in class and you are not present, it will be your responsibility to be aware of the content of the announcement.

Email:

You are required to have an official UT email address (name@utk.edu or name@tennessee.edu) and read your email on a daily basis, since some of the needed information for this class, that cannot be transmitted to you during the lectures or on this web site, will be given to you via email. In particular, issues like cancellation of classes or last-minute changes in assignments. Please remember, that if you are using an existing non-UT email account (Google, Yahoo, etc.) it is your own responsibility to re-route your UT email to your preferred account.

Honor Code, Collaboration and Plagiarism:

As a student in this class, you are highly encouraged to interact with other students concerning understanding of physics, in general, or homework problems. However, this interaction must be at a level where it increases your general knowledge of physics and of different ways to approach a particular homework problem. It can never cross the level to actual plagiarism. If I judge you have copied other sources (online or other students) or you have aided others in plagiarizing your work, you will receive a 0 (zero) score on the particular assignment or test and your final grade will be reduced by a letter grade (A- will be B- etc.). A second offense will lead to a grade of F for the course and a report to the Dean of Students.

Personal Pronouns:

I will be happy to honor your request to be addressed by a preferred name and gender pronoun. Please advise me of this preference as early as possible in the semester.

Disabled Students:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Disability Services at 865-974-6087 in Hoskins Library to coordinate reasonable accommodations for students with documented disabilities.

University Civility Statement

All interactions in this course will follow the 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 and 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.”

University rules regarding masks and social distancing

Students are required to wear face masks at all times and maintain social distancing (6 feet between individuals in traditional classrooms, or, in instructional laboratories and similar settings, only a few minutes in closer proximity when absolutely necessary to achieve learning objectives). Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher than normal temperature will be excused from class and should stay at home.

Instructors have the right to ask those who are not complying with these requirements to leave class in the interest of everyone's health and safety. In the event that a student refuses to comply with these requirements, the instructor has the right to cancel class.

Additionally, following other simple practices will promote good health in and out of the classroom, such as frequent and thorough hand washing, wiping down desks and seats with disinfectant wipes whenever possible, not sharing personal items such as pens and cell phones, and avoiding crowded hallways and other enclosed spaces.

The Volunteer Creed reminds us that we bear the torch in order to give light to others. As Volunteers, we commit to caring for one another and for the members of the communities in which we live, work, and learn. This semester, the University asks that we all demonstrate the Volunteer spirit by following these and other health guidelines and requirements.