PHYS 138 - Honors: Fundamentals of Physics for Physics Majors II

Instructor:
Dr. Christine Nattrass
Office: SERF 609 or over Zoom with advanced notice
Phone: 974-6211
Email: christine.nattrass@utk.edu

Office hours:
TBA

Teaching assistant: TBA
Grader: TBA

Class times & Locations:
Lecture Nielsen 304 MWF 10:30-11:20
Recitation Nielsen 307 Mondays 2:15 pm - 3:05 pm
Lab Nielsen 510 Mondays 3:15 pm - 5:15 pm.

Zoom: This class will be broadcast and recorded over Zoom. Students may attend over Zoom and students should be prepared to collaborate with classmates over Zoom. The class may move entirely to Zoom if necessary, for example in case the instructor is quarantined or in self-isolation. When in-person attendance is possible, you are encouraged over online attendance and some portions of the in-class lecture may not be recorded as well.

Course Description:
4 credit hours. Calculus-based physics of electricity, magnetism, and optics. May be taught as lecture with lab, integrated lecture and lab, or online with on-campus lab. Check with instructor.
Satisfies General Education Requirement: (NS)
Contact Hour Distribution: 3 hours lecture, 1 hour recitation, and 2 hours lab.
(RE) Corequisite(s): MATH 142.
Comment(s): Alternative to PHYS 136 for physics majors.

Co/Pre-requisites: Previous completion of Calculus II (Math 142, Math 148) or current enrollment in Calculus II. Mathematical proficiency in pre-Calculus and Calculus I is expected. Completion of Phys 135 or 137.

Required text and materials:
University Physics Volume 2 from OpenStax, Print ISBN 193816816X, Digital ISBN 1947172212, www.openstax.org/details/university-physics-volume-2
University Physics Volume 3 from OpenStax, Print ISBN 1938168186, Digital ISBN 1947172220 https://openstax.org/details/university-physics-volume-3
This textbook is free online, but you may buy a printed copy from the link above. Please bring your calculator and a pencil to every class meeting.
Contemporary Introductory Physics Experiments, 2nd Edition by James E. Parks, Hayden-McNeil Publishing, ISBN 978-0-7380-6168-9

Suggested materials:
Schaum's 3,000 Solved Problems in Physics (Schaum's Outlines) ISBN 0071763465, any edition.
Schaum's Outline of Mathematical Handbook of Formulas and Tables 0071795375, any edition.

Students may consider an old edition of another introductory physics text to supplement the required text, which has the same structure as Young & Freedman.

Course Schedule: The course schedule (including reading sections) will be posted on Canvas. Please note that the schedule is subject to change and that any changes will be posted on Canvas.

Campus Syllabus:
The campus syllabus applies to this class. You are encouraged to review the campus syllabus.

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.

Learning outcomes:
After completing this course, students should be able to:

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

Course Structure:
This is a flipped format physics course, meaning the majority of class time will be dedicated to group activities. Students are expected to come prepared, having read all of the required sections from the textbook prior to coming to class. Recorded lectures may be provided.

Students will also engage in computational activities using VPython – no previous computer programming skills are required, since students will work on building their VPython proficiency as the semester progresses.

Please check the Canvas course site regularly for important announcements and updates (announcements will also be emailed to students). It is the students' responsibility to ensure they are receiving email notices and announcements from Canvas.

Communication:
Emails to the instructor should have "Phys 138" in the subject. Students are expected to use their UTK email address for communication regarding the class and are expected to check their email regularly. You are very strongly encouraged not to disable emails from Canvas. Questions of general interest should be directed to the discussion forum, not made via private emails to the instructor. Only questions particular to an individual student should be made via private emails to the instructor. Questions of general interest made via a private email to the instructor may not be answered.

Grade:
The grade is:

- Exams: 40%
- Homework: 30%
- Lab: 20%

- Class participation: 10%_

The grading scale will be:

- 93.00% and above A
- 90.00% - 92.99% A-
- 87.00% - 89.99% B+
- 83.00% - 86.99% B
- 80.00% - 82.99% B-
- 77.00% - 79.99% C+
- 73.00% - 76.99% C
- 70.00% - 72.99% C-
- 67.00% - 69.99% D+
- 63.00% - 66.99% D
- 60.00% - 62.99% D-
- 59.99% and below F

Homework:
There will be three types of homework, reading quizzes, standard homework assignments, and computational homework. Reading quizzes will be administered and graded online through Canvas. These are designed to test your understanding of basic concepts. Standard homework will be turned in on paper and graded by the teaching assistant. Computational homework will be turned in online and graded by the teaching assistant. You are encouraged to study with other students, but every student is expected to understand the work they are submitting. Students are encouraged to seek help during office hours, using the discussion forum, or at the physics department tutorial center, all of which will be held online. Seeking help on Chegg, looking at solutions posted elsewhere, or sharing your solutions with others is considered cheating.

Exams:
Four take-home exams will be given throughout the semester. The last exam will be the final and will be cumulative, with an emphasis on the sections not covered on previous exams. Each exam will be preceded by a review session, with the exam distributed at the end of the class period. The precise rules for exams will be distributed before the exam. The exam dates and times are announced at the beginning of the semester. Students who have a conflict should inform the instructor as soon as reasonably possible.

Class participation:
Students will work in small groups on in-class problems that allow them to apply and implement the material they have read in the textbook. While students work in groups, it is essential that every group member is actively engaged and submits their own work. Work will primarily be graded based on attendance, but some feedback will be given.

Laboratory
The laboratory exercises are an important and integral part of this course and must be completed before a final grade will be assigned. The score assigned by the lab instructor will count 20% 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.

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.