Physics 303: Physical Theory and Techniques
Fall 2024

Instructor: Dr. Anuradha Gupta (you can call me "Dr. Gupta" or "Anuradha")
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Class Hours: TTh 9:30 - 10:45 am
Class Room: Lewis 104
Student Hour: Th 11:00 am- 1:00 pm or by appointment
Zoom: **https://olemiss.zoom.us/j/82655797977** (for online meetings)

Course Description

This course covers fundamental physical models widely applicable to the undergraduate physics curriculum. Emphasis is placed on the development of problem-solving skills using calculus, advanced algebraic concepts, estimation techniques, and computer modeling.

Course Objectives

This course is intended to act as a bridge between the introductory physics sequence (Phys 211/212 or Phys 213/214) and the more formally demanding courses at the 300 and 400 level, which are required for a BS degree in Physics. This course is also meant to be of value to students in adjacent fields who would benefit from exposure to the analytical and computational tools commonly used by physicists.

Course Learning Outcomes

In this course, we will consider physics principles formulated as mathematical problems in differential and integral calculus. By the end of this course, you will be able to:

- Understand the intuitive ideas of the Kinematics, Dynamics, Waves, Sound, Thermodynamics, and Electromagnetic Theory.
- Develop a comprehension of the current basis of upper-level classes in Physics.
- Significantly improve critical thinking, analytical reasoning, and problem-solving skills.
- Effectively communicate scientific ideas in oral and written form.

Prerequisite

Math 262, Physics 212 or 214

Textbook

Fundamentals of Physics, Extended, 12th Edition, David Halliday, Robert Resnick, Jearl Walker
(ISBN: 978-1-119-77351-1)

Other Required Items

Scientific calculator: Any calculator with trigonometric functions, exponential functions, and scientific notation is acceptable. Online calculators are allowed, but should not be used for quizzes and exams. Programmable calculators are not allowed.

Topics Covered

- Motion in Two and Three Dimensions (Ch.4)
- Kinetic Energy and Work (Ch. 7)
- Potential Energy and Conservation of Energy (Ch. 8)
- Rotation (Ch. 10)
- Oscillations (Ch. 15)
- Waves-I, Waves-II (ch. 16, 17)
- Temperature, Heat, and the First Law of Thermodynamics (Ch. 18)
- The Kinetic Theory of Gases (Ch. 19)
- Maxwell's Equations; Magnetism of Matter (Ch. 32)

Grading

Homework	38%
In Class Quizzes	8%
Class Participation	4%
Midterm Exam 1	12%
Midterm Exam 2	12%
Final Exam	26%
Grand Total	100%

Grading Scale

$92\% \leq$ A $\leq 100\%$
$88\% \leq$ A- $\leq 92\%$
$84\% \leq$ B+ $< 88\%$
$80\% \leq$ B $< 84\%$
$76\% \leq$ B- $< 80\%$
$72\% \leq$ C+ $< 76\%$
$68\% \leq$ C $< 72\%$
$64\% \leq$ C- $< 68\%$
$50\% \leq$ D $< 64\%$
F $< 50\%$

Evaluation

Homework

Homework will be due weekly on Fridays at 11:59 pm CT. You are encouraged to work together on homework to teach and learn from each other, however, you should not copy solutions wholesale. Homework must be completed by the deadline for full credit but can be completed after the deadline for partial credit by requesting an extension. Homework help sites such as Chegg can be more of a liability than a resource. Depending on these sites may lead to poor performance on quizzes or exams. Instead, collaborate with your classmates or consult with me to solidify your understanding!

Requirements: You need to upload your clearly written work as a single PDF file on Blackboard. You need to show all your work; the answer alone will not be not worth anything. Your answers must include diagrams, equations, derivations, calculations, and explanations of what you are doing, enough English to be understandable; and encircled final answer/solution. Homework answers should have units and a reasonable number of significant digits. Learning how to write answers to physics problems is one of the main goals of this course.

In Class Quizzes

Short (surprise) quizzes will be given approximately every other week. These quizzes are intended primarily to gauge where your understanding is weakest and help to focus your study topics. Class notes and calculators are allowed during quizzes.

As a warm-up exercise I will give you the first quiz on Sep. 3rd (third class) based on chapters 1 to 3 in the book. So, please start the reading those chapters.

Class Participation

Class participation will include group discussions, solving problems on the whiteboard, and group problem-solving work. You may sometimes be asked to explain a certain physics concept to your classmates. You are expected to take part in all these activities regularly and failing to do so will result in less than 4% grades in "Class Participation".

Exams

There will be two mid-term exams and a comprehensive final, as shown on the schedule below. All exams will be closed-book written exams. Each exam will have two parts: multiple-choice (or short answer) and free-response problems. The dates of the midterm exams and final will not change unless class is canceled for unforeseen reasons (weather, emergency, etc.). The chapters covered on each exam may change if needed. No make-up exams will be given unless arrangements are made in advance. If you miss an exam or the final without making prior arrangements, you will receive a zero.

Examination Dates

Exam dates and topics are subject to change. The final exam date is fixed and cannot be changed.

- Midterm Exam 1: 09/24
- Midterm Exam 2: 10/29
- Final Exam: Thursday, December 12, 8:00 - 11:00 am

Important Dates

Please see the UM academic calendar (https://registrar.olemiss.edu/fall-2024/).

Course Policies

Attendance Policy

The activities we do during class are essential to your learning in this course, so you should make every effort to attend all class meetings and to arrive to class on time. I recognize, however, that illness, personal emergencies, university obligations, religious observances, and other circumstances may sometimes cause you to be late to class or prevent your attendance entirely. I have the following policy for the attendance: **If a student is absent for more than 3 classes without prior notice during the semester, the final calculated grade will be reduced by a letter grade** when final grades are assigned. If you anticipate problems with your attendance, please contact me so we can make a plan to support your learning.

Please be aware that the university requires students to attend the first meeting of every course for which they are registered, unless they obtain prior departmental approval. Without such approval, a student who is absent from the first class meeting may be dropped from that class. The university also requires instructors to verify the attendance of each student during the first two weeks of the term.

Use of Generative Artificial Intelligence

Generative AI refers to artificial intelligence technologies, like ChatGPT or other tools, that can draw on a large corpus of training data to create new written, visual, or audio content. In this course, we will be developing skills that are important to practice physics on our own. Because the use of generative AI may inhibit the development of those skills, I ask that you refrain from employing AI tools in this course. Using such tools for any purposes, or attempting to pass off AI-generated work as your own, will violate our academic integrity policy.

If you are unsure about whether or not a specific tool makes use of AI or is permitted for use on assignments in this course, please contact me. Given how fast these tools are changing, it is perfectly okay to ask what use is acceptable and what use is not.

Technology in the Classroom

Laptops and cell phones can be effective learning aids but can also distract you and your classmates from the task at hand. At some points in class, we may make use of these technologies as learning resources, and at some points, I may request that you put them away to give the class activity your undivided attention. I encourage you to take responsibility for your use of personal devices and to employ them in ways most likely to enhance your own learning. If inappropriate use of technology becomes a persistent problem, I may ask you to refrain from using these devices in class for the duration of the semester or speak with me individually to resolve the issue.

Disability Access and Inclusion Policy

The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact me as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are registered with SDS, you must log in to your Rebel Access portal at rebel-access-portal to request approved accommodations. If you are NOT registered with SDS, you must complete the process to become registered. To begin that process, please visit apply-for-services website. SDS will:

1. Complete a comprehensive review to determine your eligibility for accommodations,
2. If approved, disseminate to your instructors a Faculty Notification Letter,
3. Facilitate the removal of barriers, and
4. Ensure you have equal access to the same opportunities for success that are available to all students.

If you have questions, contact SDS at 662-915-7128 or sds@olemiss.edu.

Academic Integrity and Honesty

According to institutional policy, '[t]he University is conducted on a basis of common honesty. Dishonesty, cheating, or plagiarism, or knowingly furnishing false information to the University are regarded as particularly serious offenses.' We share a responsibility to maintain academic integrity in our work and will follow the procedures outlined in the Academic Conduct and Discipline Policy and the M Book for any instance of academic misconduct.

All materials distributed electronically and in hard copy in this class are protected under intellectual copyright. Any attempt to upload these documents onto the Internet (or to distribute them by some other means) or to profit from the distribution (by Internet or other means) of these documents constitutes theft and will be in violation of intellectual property law and the UM Academic Conduct Code unless expressly permitted for by the instructor. Accessing such materials for your own use is also in violation of the UM Academic Conduct Code. Additionally, the distribution of your own class notes via the Internet or other means, or access of such materials, is strongly discouraged except for occasional loaning of notes to students concurrently enrolled in the class.