

# Physics 709: Advanced Mechanics

## Fall 2023

Professor: Dr. Gavin S. Davies  
([gsdavies@olemiss.edu](mailto:gsdavies@olemiss.edu))

Office: Lewis 222  
Office Hours: by appointment  
or ping me on UM Physics Slack

Class Time: MWF 10:00 am - 10:50 am

Class Location: Lewis 104

Web: Blackboard

**Required Text:** *Classical Mechanics*, Goldstein, Poole & Safko (Third Edition, 2002)

**Suggested Text:** *Theoretical Mechanics of Particles and Continua*, Fetter and Walecka (Dover, 2004)

---

## Course Description

This is a standard core course in the graduate curriculum for Physics. In this course, we will learn advanced methods of analyzing the mechanical properties and dynamics of particles, systems of particles, and extended bodies in translational, bounded (periodic), and rotational motion. Toward the end, we will learn Hamilton's methods in classical mechanics which provide a fluid transition to concepts in quantum mechanics.

## Course Objectives

The significant goals of this course are for students to advance and expand their mathematical tool kit and improve their analytical reasoning. Part of this consists of "applying equations" and "getting the right result", but students will be evaluated on a broader set of skills, including the way they analyze a problem and place it in context, as well as how they write about it. To take full advantage of the lectures, you should **read the relevant sections of the book BOTH before and after the lecture**.

## Assessments

Homework (25%): Typically several problem sets will be assigned out of each chapter. Some of the problems are rather difficult and involved, so it is best to start the problems early so you have time to work them out and/or seek help. Physics is very rarely done alone. I encourage you to form study groups in preparation for homework assignments and tests. However, the homework assignments should be the work of the individual student. If you can not do the homework, you will not do well on the tests!

Midterm Test 1 (25%)

Midterm Test 2 (25%)

There will be two midterm tests, consisting of short answer style and problems to be worked out. Students are permitted a calculator, but I doubt you will use it. To allow more flexibility on time, midterm tests may be given outside of the normal meeting time (probably evenings).

Final Exam (25%) A cumulative final exam will be given on **Friday, December 08 from 8 am - 11 am**. Details on the topics stressed and exam policies will be given later in the semester.

## Grading Scale

- $88\% \leq A \leq 100\%$
- $75\% \leq B < 88\%$
- $65\% \leq C < 75\%$
- $55\% \leq D < 65\%$
- $F < 55\%$

## Policies

### Attendance

Students are expected to attend each lecture unless you have justification. If you must miss a lecture, make contact with me as soon as possible. Absences from tests count as zeros unless they are justified. If you must be absent during a test for a University-sponsored event, you **MUST** discuss this with me before the test date. In the case of an unexpected emergency, you must make contact with me as soon as possible and have documentation.

### Academic Integrity

Every student of the University of Mississippi, by virtue of choosing to be part of the university community agrees to abide by the University of Mississippi Creed and the UM Academic Integrity Policy that covers academic integrity. Please consult the M-Book, Academic Integrity document for details on university policy and the academic creed.

**Cheating is forbidden and will result in a zero grade on the assignment. If a second case of cheating occurs, this will result in an F for the entire course.**

*UM Creed* The University of Mississippi is a community of learning dedicated to nurturing excellence in intellectual inquiry and personal character in an open and diverse environment. As a voluntary member of this community:

- I believe in respect for the dignity of each person
- I believe in fairness and civility
- I believe in personal and professional integrity
- I believe in academic honesty
- I believe in academic freedom
- I believe in good stewardship of our resources
- I pledge to uphold these values and encourage others to follow my example

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.

### Disability Access and Inclusion:

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 the course instructor 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 <https://sds.olemiss.edu/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 our website at <https://sds.olemiss.edu/apply-for-services>. 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](mailto:sds@olemiss.edu).

#### Audio and video recording

Audio and/or video recording of class lectures is not allowed unless explicit permission is given by the instructor. Permission will only be given if the student has a Student Disability Services request. In such cases, recordings may only be used by the student to whom permission is given and all recordings must be deleted at the end of the semester. Recordings may not be distributed online or elsewhere.