UNIVERSITY OF MISSISSIPPI
Department of Physics and Astronomy
Advanced Mechanics I (Phys. 709) — Prof. Leo C. Stein — Fall 2018

Advanced Mechanics I Syllabus

Class schedule:	Tue/Thu 0800–0915, Lewis Hall room 109
Office hours:	By appointment via email
Course website:	https://duetosymmetry.com/teaching
Professor:	Leo C. Stein
Email:	⟨lcstein@olemiss.edu⟩
Office:	205 Lewis Hall
Phone:	+1 (662) 915-1941 (x1941 on campus)

Texts

- Main text: *Theoretical Mechanics of Particles and Continua*, Fetter and Walecka (Dover, 2004)
- I liked *Analytical Mechanics*, Hand and Finch (Cambridge University Press, 1998)
- Fairly standard texts on this subject:
  - *Classical Mechanics* (3rd Edition) Goldstein, Poole, and Safko
  - *Classical Dynamics of Particles and Systems* Thornton and Marion
  - *Classical Dynamics: A Contemporary Approach* José and Saletan (brings in more modern geometry)
- Useful supplementary notes: *Advanced Mechanics* Lecture Notes by Eric Poisson, available at http://www.physics.uoguelph.ca/poisson/research/mech.pdf

Course goals and learning outcome

This is a standard core course in the graduate curriculum for physics. Methods for modeling classical mechanical physical systems. Key concepts (time permitting): • generalized coordinates • non-inertial coordinates • Lagrangians, the variational principle, and constraints • phase space, Hamiltonians, Poisson brackets • symmetries and Noether's theorem • perturbation theory. Key systems (time permitting): • central force problems and Keplerian dynamics • coupled oscillators • nonlinear oscillators • $SO(3)$ and free body precession of a general rigid body.

Goals: expand the students' mathematical toolkits used for modeling physical systems, and their analytical skills of identifying which tools are appropriate to apply.

Evaluation

Grade type:	Letter grade A–F
Grade ranges:	(subject to change) • A: 88% and up • B: 75–87% • C: 65–74% • D: 55–64% • F: <55%
Grade breakdown:	(subject to change) • 60% Homework • 10% Midterm • 30% Final

Homework, tests, and final exam

Homework assignments will be announced in class, and they must be turned in at the beginning of class on the due date. Late homework will be penalized 20% per day (exceptions and extensions permitted with good cause). Homework must be easy to read: please write down clearly your name and the problem set number, do not use a red pen, write consistently on either one side or both sides of the paper and staple the pages together. The final exam will be open-book and open-notes, and a calculator will be permitted.

Attendence

There is no strict attendance requirement, but you are strongly advised to attend class. If you miss an exam or cannot turn in homework, please inform me beforehand and get a doctor's note if applicable. 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.

Academic Integrity

Violations of the University's policy of academic integrity will result in a failing grade and other disciplinary actions. A student with a documented case of plagiarism or cheating in this course will receive a failing grade for the course and may face disciplinary action by the University, including expulsion.

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 approved through SDS, you must log in to your Rebel Access portal at https://sds.olemiss.edu to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at 662-915-7128 so the office can: 1) determine your eligibility for accommodations, 2) 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.

Other

If a change in the syllabus becomes necessary during the semester, it will be discussed in class and then posted on the course website. The course website will also contain up-to-date information on the class schedule, homework assignments and complementary material.

Tuesday, Nov. 6 is election day. The class on this day may be rescheduled to guarantee that voters can make it to the polls (n.b. for eligible voters, I believe that Friday, Oct. 5 is the last day to register to vote in MS for this year's election).