

PHYS 5321 Mechanics (CRN 10985)

This document last updated: August 23rd, 2021

Term: Fall 2021
Lecture: TR 9:30 am – 10:50 am in Undergraduate Learning Center (UGLC) 338

Prerequisites: One year of upper-division mechanics

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Office hours: TR 11:00 am – 11:45 am, and by appointment (<https://jamunoz.youcanbook.me>)

Grading Policy

Take-home exams	40 points (3 exams, 20 points each, worst score is dropped)
Homework	28 points (14 problem sets, 2 points each)
Take-home final	40 points
Participation	Limited to 12 additional points (5 points for leading a study session, 2 for attending a study session, 10 points for attending at least 25 out of 29 lectures)
Total	120 points (so there will be no curve)

A: [90-120] points B: [80-90) points C: [70-79) points D: [60-69) points F: [0-59) points

Alternative1 If you get at least 51 points on the 3 exams, you get an A in the class.
Alternative2 If you get at least 22 points from the homework, you get an A in the class.

Textbooks

Required: Classical Mechanics by Goldstein, Poole and Safko, 3rd Edition. (HG)
Canonical advanced mechanics book. It is impossible to cover everything in 1 semester, we will cherry-pick.

Optional: No-Nonsense Classical Mechanics: A Student-Friendly Introduction.
Does not cover as much as what we will cover in the course, but what it does cover, it covers it in a straightforward way, makes sure that you see the big picture, understand the algorithms, with a focus on problem-solving.

Optional: Classical Dynamics of Particles and Systems by Thornton and Marion, 5th Edition.
This is the book used in the upper-division mechanics course at UTEP and is pretty good. It covers about half of what we will cover in this course, albeit less rigorously. Good reference for this course.

Optional: Mechanics by Landau and Lifshitz, 3rd Edition.
This book is not suitable as a textbook because, as I once heard, no sentence is superfluous. That being said, check out the book during the semester, and definitely read this book after taking this class or maybe a year later to ensure things have sunk in. You will be impressed by both the physics and the exposition.

Lectures and lecture notes

My lectures notes will follow HG, but with a decent number of (hopefully interesting) diversions. I will upload my lecture notes to Bb in case you find them useful. I will record my lectures and these will also be uploaded to Bb.

Homework

There will be 14 problem sets during the semester which will be posted on Bb on Tuesdays and are due the following Tuesday before the end of the day. You should scan your solutions and upload them to Bb. There are

120 possible points in this class, so late homework is not accepted. Do turn in your homework even if you did not finish all the problems. Problems will come from HG, others might come from my own inspiration. Solutions will be posted after each problem set is due.

Take-home exams

There will be 3 take-home exams with a 5-hour time limit, although the time limit is negotiable. The exams will be posted on Bb and will be available for about 1 week, you are free to take the exam at any time during that week. I will request input from students regarding which problems should be on the exams with the proviso that problems will not be identical to those suggested and I reserve the right to include any problems I want.

Everybody has a bad day, sometimes even a bad year, so the worst score will be dropped. Although the material tested on the exams is not rigorously cumulative, new concepts in physics are built on previous ones.

Participation

Before each exam, I will request volunteers to hold student-lead review sessions (5 participation points), and if you attend a student-led review session, you get 2 participation points. These can be online or in person.

Collaboration

Discussing the problems with peers, tutors, etc. after attempting to solve them on your own is highly encouraged, in fact it is almost essential in this class, but the work you turn in must be your own.

Take-home final exam

The final will be available on Bb during finals week. It will have a 6-hour time limit and will be cumulative. It is due on December 12th end-of-day, but you are encouraged to submit it earlier than that.

Rough schedule (this is on the ambitious side, emphasizes chaos and perturbation theory over rigid body)

Week	Lecture Dates	Notes	Topics
1	Aug. 24, 26		Survey of Elementary principles
2	Aug. 31, Sept. 2	HW1 due Aug. 31	Variational Principles and Lagrange's Eq.
3	Sept. 7, 9	HW2 due Sept. 7	Variational Principles and Lagrange's Eq.
4	Sept. 14, 16	HW3 due Sept. 14	Central Force Problem
5	Sept. 21, 23	HW4 due Sept. 21	Central Force Problem
1st exam due Sept. 26 end-of-day			
6	Sept. 28, 30	HW5 due Sept. 28	Kinematics of Rigid Body Motion
7	Oct. 5, 7	HW6 due Oct. 5	Rigid Body Equations of Motion
8	Oct. 12, 14	HW7 due Oct. 12	Oscillations
9	Oct. 19, 21	HW8 due Oct. 19	Hamilton Equations of Motion
2nd exam due Oct. 24 end-of-day			
10	Oct. 26, 28	HW9 due Oct. 26	Hamilton Equations of Motion
Withdrawal deadline Oct. 29			
11	Nov. 2, 4	HW10 due Nov. 2	Canonical Transformations
12	Nov. 9, 11	HW11 due Nov. 9	Hamilton-Jacobi Theory
13	Nov. 16, 18	HW12 due Nov. 16	Classical Chaos
3rd exam due Nov. 21 end-of-day			
14	Nov. 23	HW13 due Nov. 23	Classical Chaos
15	Nov. 30, Dec. 2	HW14 due Nov. 30	Canonical Perturbation Theory
16		Final exam due Dec. 12 end-of-day	

Lecture assignments and in-class discussion

There will be a lecture assignment on Bb before each lecture. Before starting each lecture, in the classroom, there will be a question for you to discuss in groups of three, usually related to the lecture assignment. You will turn in a written record your group's conclusion at the end, and I will use these to keep track of attendance for participation points.

Missed exams and other eventualities

Since the worse score is dropped, there are no make ups for exams. If you experience a situation that affects your long-term performance in the class, let me know and show appropriate documentation.

Mentoring

Feel free to approach me for mentoring about your career, research ideas or opportunities, letters of recommendation, etc. I work for you and I like to do a good job, take advantage of that.

Students with Disabilities

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at <https://www.utep.edu/student-affairs/cass/>. Accommodations might include but are not limited to note takers, readers, or extended time on exams and assignments. Please take care of this as soon as possible and before the first exam.