

Physics 5710/3220
Advanced Classical Mechanics I
Fall 2026
Syllabus

Professor Jose Perez
Lecture: MWF 11:15 A.M.-12:05 P.M.
Classroom: Language Building Room 322

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Office Hours: F 3-5 P.M.
or by appointment

Course content: Variational principles and Lagrange's equations, rigid body motion, oscillations, special relativity, Hamilton equations of motion, canonical transformations, Hamilton-Jacobi theory, canonical perturbation theory, classical chaos (if time permits).

Text: *Classical Mechanics*, Third Edition by Goldstein, Poole, and Safko. The course will cover Chapters 1-12. Not all material in the chapters will be covered, and additional material not in the chapters will be covered.

Attendance/Participation: Lectures will be given in person in the Language Building Room 322. Attendance will be taken and counts as 5% of your grade.

Grading: There will be weekly homework assignments and three in-class exams. We will drop the lowest exam grade. There will be a comprehensive final. You will download and upload all homework using Canvas. You will need a scanner to scan and upload completed homework as a PDF. You will also need a cell phone scanner to scan and upload all your exams and the final as PDFs to Canvas during the last 5 minutes of exam time.

Your grade will be based on the points you earn for attendance, exams, homework assignments, and the final. You may also earn extra credit by giving an optional presentation on any course topic that interests you. The percentage values for each category are:

Attendance	5%
Homework:	10%
Exams (each exam counts 25%):	50%
Final:	35%
Presentation (extra credit)	Up to 5%

Tentative Lecture Schedule

Week	Date	Topic	Reading
Introduction to Mechanics			
1	17 Aug	Survey of Elementary Principles Newton's Laws of Motion	Chapter 1
Variational Principles			
2	24	Variational Principles and Lagrange's Equations Advantages of Variational Principle	Chapter 2
Central Forces			
3	31	The Central Force Problem Kepler's Laws	Chapter 3
Rigid Body Motion			
4	7 Sep	Kinematics of Rigid Body Motion Euler Angles	Chapter 4
The Rigid Body Equations of Motion			
5	14	Euler Equations of Motion	Chapter 5
6	21	Exam 1	
Oscillations			
		The Eigenvalue Equation and the Principal Axis Transformation	Chapter 6
Special Relativity			
7	28	Oscillations, continued Special Relativity	Chapters 6,7
Hamilton Equations of Motion			
8	5 Oct	Special Relativity, continued Transformations and the Hamilton Equations of Motion The Principle of Least Action	Chapters 7,8
Canonical Transformations			
9	12	Hamilton's Equations, continued The Equations of Canonical Transformation	Chapters 8,9

Liouville's Theorem			
Hamilton-Jacobi Theory			
10	19	The Hamilton-Jacobi Equation for Hamilton's Principal Function	Chapters 9,10
11	26	Exam 2	
Classical Chaos			
Periodic Motion			Chapter 11
The Logistic Equation			
Canonical Perturbation Theory			
12	2 Nov	Chaos, continued	Chapters 11,12
Time-Dependent Perturbation Theory			
Canonical Perturbation Theory			
13	9	Canonical Perturbation Theory, continued	Chapter 12
14	16	Exam 3	
Adjustment Week			
Any materials not yet covered will be covered			
Thanksgiving			
15	23	Thanksgiving	
-		No Classes	
Presentations			
16	30	Presentations and Review	
Reading Day			
	5 Dec	Final Exam- 10:30 a.m.-12:30 p.m.	

Disability Accommodation: The University of North Texas provides reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodation at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability

Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323.

The University of North Texas is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 – The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

UNT's policy on Academic Dishonesty is found at: <https://vpaa.unt.edu/ss/integrity>.

Unauthorized Aids During Examinations and Assessments

Students may use only those materials and resources that are expressly authorized by the instructor for a particular examination or assessment. Touching, holding, or accessing any unauthorized aid during the examination period constitutes a violation of the Student Code of Conduct, regardless of whether the aid is used.

Any item that may be considered an unauthorized aid must be kept out of view and in a closed container (e.g. zipped backpack, buttoned purse, etc.) during the entirety of the examination or assessment.

Unless specifically authorized in writing by the instructor, prohibited aids include, but are not limited to:

- Mobile phones and smartphones
- Smartwatches and fitness trackers with communication, recording, or internet capabilities
- Tablets, laptops, and other computing devices
- Earbuds, headphones, and other audio devices
- Smart glasses, cameras, recording devices, and wearable technology
- Artificial intelligence (AI) tools, chatbots, and other generative AI technologies
- Notes, textbooks, study guides, formula sheets, or reference materials
- Any other device, material, or resource not expressly permitted by the instructor

Students are responsible for clarifying any questions about permitted materials before the examination begins.

Course Evaluation

The Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT. This short survey will be made available to you on-line at the end of the semester and will provide you with an opportunity to provide feedback to your course instructor. SPOT is an important part of your participation in this class.

After logging in to the my.unt.edu portal, students can access the SPOT survey site by clicking on the SPOT icon. A list of their currently enrolled courses will appear. Students complete each course evaluation independently. During the long terms, the SPOT is open for students to complete two weeks prior to final exams. During the summer terms, the SPOT is open for students to complete six days preceding their final exam.