Mechanics
Physics 1710
Fall 2025

Lecture Section 001, MWF 9:00–9:50 AM in the Physics Building Room 102
Recitation sections: .201, .202, .203, .204, .205

Professor: Dr. Alex Barr
Pronouns: He, him, his
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Help Hours: M 1:00-3:00pm, Th 10:00-11:00am, by appointment, and any time my door is open

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Welcome! As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. Everyone should feel comfortable being their authentic selves in our class. If you have any questions or concerns, do not hesitate to contact me.

Communication: This is a face-to-face class with no Zoom component. All course materials (handouts, lecture slides, etc.) and announcements will be posted on Canvas. You can contact me via email at alexander.barr@unt.edu or by sending a message in Canvas. In most cases, you can expect to receive a response within 24 hours. You are also always welcome to come by my office during office hours or at other times. You are expected to check your UNT email and Canvas messages at least once a day.

Course Description: This course will cover topics in classical mechanics. You will learn about inertia, acceleration, force, Newton's laws of motion, energy, momentum, angular momentum, conservation laws, rotational and oscillatory motion, and (time permitting) wave motion.

Course Learning Objectives: Upon successful completion of this course, students should be able to:

- Sketch and calculate (add, subtract, multiply, compute magnitudes, angles and components) vectors
- Relate position, velocity, and acceleration of an object at different moments in time using equations and graphs
- Sketch and analyze free body diagrams and apply Newton's laws to make predictions about objects in linear, curved, or rotational motion
- Distinguish between a system and the environment and apply conservation of energy and/or momentum to make predictions about collisions, explosions, and other scenarios with non-constant acceleration
- Translate information between different representations (words, diagrams, equations, graphs) and use units, sign, and order of magnitude to assess the reasonableness of an answer

PHYS-1710 contributes to the following core course learning objectives:

- **Critical Thinking:** Creative thinking, analysis, evaluation, and synthesis of information
- **Communication:** Development, interpretation, and expression of ideas through written, oral, and graphical means
- **Quantitative Skills:** Manipulate and analyze data to reach meaningful, informed conclusions
- **Teamwork:** Consider different points of view and work effectively with others to support a shared purpose or goal

Course Pre-requisites: Students must complete MATH-1710 (Calc I) with a grade of C or better

Textbook and Online Homework System: The recommended textbook is *University Physics,* 15th Edition, by Young and Freedman. Other calculus-based introductory physics textbooks are acceptable including the free **OpenStax University Physics I** online textbook. You are required to obtain access to the Mastering Physics online homework system.

Options available through the UNT bookstore:

- 24-month Mastering Physics access including access to the e-textbook ~ $190
    - This option will cover you for both PHYS-1710 and PHYS-2220 so that you do not need to purchase anything when you take PHYS-2220 (most majors require both 1710 and 222)
- 18-week Mastering Physics access including access to the e-textbook ~ $110
    - This option only covers you for one semester. If you take PHYS-2220 in the future, you will need to purchase a new access code for that course.

Attendance and Participation: You are expected to attend and participate in all lectures and recitations for the section in which you are enrolled if you are healthy**.** Lectures will frequently involve iClicker questions for points. Recitations will frequently involve quizzes or group activities that cannot be made up if you are absent. If you know that you will miss an upcoming class, let the instructor know as soon as possible to see what arrangements can be made.

Homework: All homework will be posted and submitted online using Mastering Physics. Mastering Physics allows 6 submission attempts for each problem. Homework is intended to be practice so there is no penalty for an incorrect answer as long as you arrive at the correct answer in 6 attempts or less. At the end of the semester, everyone's grade will be computed twice: once with homework included and once with homework omitted. Each student will receive whichever grade is higher for them (with homework or without homework).

Late Homework: There is a 5% deduction per day that homework is late. Students can request a 72-hour homework extension using the link on Canvas to avoid the late penalty.

Mastering Physics Instructions: Go to our Canvas page and click Access Pearson on the left-hand side then click the Open Pearson icon. If you do not already have a username and password, you can set that up and enter your access code (from the bookstore). If you do not yet have an access code, you can still create your account and access the homework for two weeks before you are forced to purchase an access code.

Exams: There will be three, unit exams given during class in the lecture classroom at the dates indicated on the schedule at the end of the syllabus. There is a **comprehensive final exam during finals week** in the lecture room. Exam questions will involve both mathematical calculations and conceptual explanations and will be based on material from lectures, recitation, and homework assignments.

- **There are no make-up exams.** If you miss one exam for an acceptable reason, your final exam score will be used for your missing exam score. Missing more than one exam may result in a grade of incomplete.
    - **Acceptable absences** for an exam include school-sanctioned events with an accompanying university letter, documented illness, legal or traffic emergency.
    - If you wake up sick, you must email the instructor before the exam to explain your absence. If you do not contact the instructor before the exam, a doctor's note will be required for the absence to be deemed acceptable.
- Questions pertaining to the grading of exams must be directed to the instructor in writing within one week of receiving your graded exam.
- If you have a pre-scheduled commitment that conflicts with one of the exams, contact the instructor as soon as possible.
- **Anyone observed cheating on an exam will automatically fail the course.**

Free Physics Resource Center: Physics tutors are available to provide help throughout the week in **Hickory Hall 266.** This is a free service and does not require any reservations or prior planning - just drop in. There is plenty of seating and computers in so you can go there to work on your homework and have tutors available nearby if you get stuck.

Learning From Mistakes: Learning necessarily involves making mistakes. If you never make mistakes, then you are not being sufficiently challenged. The goal is to make most of your mistakes on the homework and during in-class practice so that you can ask questions and learn from those mistakes before you get to the exam. When you make a mistake on an exam, your goal is still to understand what you did wrong and to learn from that mistake for future exams.

Opportunities to practice and demonstrate your skills:

- iClicker questions
- Homework
- Recitation
- Unit Exam
    - Your unit exam score can replace one recitation score from the corresponding unit
- Final Exam
    - If your final exam score is higher than one or more of your unit exam scores, those unit exam scores will be replaced with a weighted average 0.4*(original exam score) + 0.6*(final exam score)
    - If your final exam score is lower than the average of your three unit exam scores, your final exam score will be replaced with a weighted average 0.4*(final exam score) + 0.6*(average units exam score)

Being Successful in PHYS-1710

Actively participate in class: Class is more than just listening to the instructor – it is an opportunity to practice solving problems, ask questions, and discuss concepts with your neighbors. If all you do is listen to the instructor, you will get a false sense of understanding. You need to attempt problems on your own or with your neighbor so that when the instructor shows the solution you recognize the subtle and confusing parts.

Ask Questions: It is OK to ask a question that has already been answered. Any time you ask a question, it shows that you are thinking and trying to learn. Asking questions is part of how you translate ideas from the instructor or the textbook into a form that makes sense to you.

Utilize the Learning Goals: Each unit has a set of learning goals and practice problems with solutions posted on Canvas. If you are stuck on homework, look for a similar example in the learning goals to use as a guide. When you prepare for an exam, work through the learning goals so that you know the specific skills that will be assessed on the exam.

Utilize the Physics Resource Center: Part of your tuition pays for the drop-in tutoring **available M-F in Hickory Hall 266**. The tutors can help you with questions from class, homework, or lab. There is plenty of seating and computers in the room so you can go there to work on homework and if you get stuck there are tutors available nearby.

Course Grades: Course grades will be calculated as follows

iClicker	3%
Pre-Lectures	5%
Homework	10%
Recitation	10%
Unit Exams (3)	15% each
Final Exam	27%

Exams scores will not be curved. Semester grades will be rounded to the nearest percent: >= 90% = A, 80-89% = B, 70-79% = C, 60-69% = D.

Lab Credit: You must enroll separately in Physics 1730 for laboratory science credit.

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 considered to be an important part of your participation in this class. You will receive an email from "UNT SPOT Course Evaluations" from no-reply@iasystem.org with the survey link. You will have separate SPOT evaluations

for lecture, recitation, and lab. During fall and spring semesters SPOT surveys are open to students to complete two weeks prior to final exams.

Use of AI and Other Technologies: The use of computing tools such as **Desmos** or **WolframAlpha** to help you solve equations or compute integrals on homework is perfectly acceptable and can help you focus on the physics rather than getting bogged down in calculations. Use of ChatGPT or other generative AI tools to solve homework problems is strongly discouraged (this will not prepare you to solve problems on exams). Some students do find it useful to use generative AI to create additional practice problems when studying for exams or to summarize an example from class or a section of the textbook that is unclear.

UNT Policies

Academic Integrity Standards and Consequences: According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

ADA Accommodation Statement: UNT makes 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 a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations 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 ODA website at disability.unt.edu.

Emergency Notification & Procedures: UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Sexual Assault Prevention: UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex and therefore prohibit sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking, and/or sexual assault, there are campus resources available to provide support and assistance. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565- 2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

TAMS Students: The Texas Academy of Mathematics and Science (TAMS) administration has made the followings statement and has asked us to include it in our syllabus for members of the Academy:

Class attendance and participation is required. Students must be alert, attentive, energetic, and eager to learn. Students who exhibit disruptive behavior or show disrespect to a teacher in the classroom are subject to severe disciplinary sanctions. The Academy does not authorize absences from class. Students must report all absences to the Academic Office within 36 hours of the absence by completing a form in the Academic Office. A student will be assessed 5 disciplinary points for each class absence, unless the absence can be justified. Faculty will also be reporting absences to the Academic Office. A student will be assessed 15 disciplinary points for failure to report an absence that is reported by a faculty member.

If you are a TAMS student and if you are absent for any reason, you are required to file an absence report with the TAMS Academic Office in Marquis Hall 134.

Tentative Lecture Schedule

Class	Date	Day	Topic	What's Due
1	18 Aug	M	Ch 2: Velocity and acceleration	----------
2	20 Aug	W	Ch 2: Kinematics in 1D	Pre-Lecture 1
3	22 Aug	F	Ch 2: Kinematics problem solving	----------
4	25 Aug	M	Ch 1: Vectors	Pre-Lecture 2
5	27 Aug	W	Ch 1: Dot products and race problems	HW 1
6	29 Aug	F	Ch 3: Projectile motion	----------
X	**1 Sep**	**M**	**NO CLASS (Labor Day)**	----------
8	3 Sep	W	Ch 3: Projectile motion	Pre-Lecture 3 & HW 2
9	5 Sep	F	Ch 3: Circular motion	----------
10	8 Sep	M	Ch 4: Newton's 1st and 2nd laws	Pre-Lecture 4
11	10 Sep	W	Ch 4: Newton's 1st and 2nd laws	HW 3
12	12 Sep	F	Ch 4: Systems and Newton's 3rd law	----------
13	15 Sep	M	Ch 5: Friction	Pre-Lecture 5
14	17 Sep	W	Ch 5: Applications of Newton's laws	HW 4 (last HW for Exam 1)
15	**19 Sep**	**F**	**Exam 1 Chapters 1-4; Unit 1 Learning Goals**	----------
16	22 Sep	M	Ch 5: Applications of Newton's laws	Pre-Lecture 6
17	24 Sep	W	Ch. 6: Inventing energy	HW 5
18	26 Sep	F	Ch. 6: Work and conservation of energy	----------
19	29 Sep	M	Ch. 7: Applications of energy conservation	Pre-Lecture 7
20	1 Oct	W	Ch. 7: Applications of energy conservation	HW 6
21	3 Oct	F	Ch. 8: Momentum and impulse	----------
22	6 Oct	M	Ch. 8: Collisions	Pre-Lecture 8
23	8 Oct	W	Ch. 8: Collisions and explosions	HW 7
24	10 Oct	F	Ch. 8: Multi-stage problems	----------
25	13 Oct	M	Ch. 9: Rotation of rigid bodies	Pre-Lecture 9
26	15 Oct	W	Unit 2 review	HW 8 (last HW for Exam 2)
27	**17 Oct**	**F**	**Exam 2 Chapters 5-8; Unit 2 Learning Goals**	----------
28	20 Oct	M	Ch. 10: Moment of inertia and rotation energy	----------
29	22 Oct	W	Ch. 10: Conservation of energy with rotation	HW 9
30	24 Oct	F	Ch. 10: Angular momentum	----------
31	27 Oct	M	Ch. 10: Angular momentum	Pre-Lecture 10
32	29 Oct	W	Ch. 10: Torque and Newton's 2nd law for rotation	HW 10

33	31 Oct	F	Ch. 10: Torque and slipping	----------
34	3 Nov	M	Ch. 11: Static equilibrium	Pre-Lecture 11
35	5 Nov	W	Ch. 11: Young's modulus	HW 11 (last HW for Exam 3)
36	7 Nov	F	Unit 3 Review	----------
37	10 Nov	M	Ch. 13: Universal gravitation	Pre-Lecture 12
38	12 Nov	W	Ch. 13: Universal gravitation	----------
39	**14 Nov**	**F**	**Exam 3 Chapters 9-11 and 13; Unit 3 Learning Goals**	----------
40	17 Nov	M	Ch. 14: Periodic motion	Pre-Lecture 13
41	19 Nov	W	Ch. 14: Periodic motion	HW 12
42	21 Nov	F	Ch. 15: Mechanical waves	----------
X	**24-8 Nov**	**M-F**	**NO CLASS (Fall Break)**	----------
43	1 Dec	M	Review	----------
44	3 Dec	W	Review	HW 13
45	**5 Dec**	**F**	**NO CLASS (Reading Day)**	----------

Cumulative Final Exam – Wednesday December 10, 8:00 – 10:00 am