Mechanics, Physics 1710, Summer 2026

Lecture Section 001, MTuWTh 11:00 AM–12:50 PM in the Cury 204
Recitation Section 201 TuTh 1:30 PM–2:20 PM in the SAGA 230

Professor: Dr. **Yuri Rostovtsev**
Pronouns: He, him, his
Office: GAB, Room 525I
E-mail: rost@unt.edu
Office Hours: F 10:00 AM - 11:59 AM, by appointment, and any time my door is open

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Course Description
This course provides an introduction to classical mechanics. Topics include kinematics, inertia, acceleration, forces, and Newton's laws of motion, as well as work and energy, linear and angular momentum, and conservation laws. Additional topics include rotational dynamics, oscillatory motion, and, time permitting, an introduction to wave motion. Emphasis is placed on applying these concepts to real-world systems and modern technologies.

Communication: Course materials, announcements, and grades will be available through Canvas. Students are responsible for checking Canvas and their official UNT email regularly for updates related to the course. The instructor may be contacted via email at **rost@unt.edu** or through Canvas messaging. Responses are typically provided within 24 hours on business days. Students are also encouraged to attend scheduled office hours or arrange an appointment as needed. Students are expected to monitor their UNT email and Canvas messages on a regular basis to remain informed about course requirements and announcements.

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

1. **Apply principles of classical mechanics** to analyze and predict the behavior of modern engineering systems, including autonomous vehicles, drones, and robotic platforms.
2. **Model and simulate real-world systems** using differential equations and computational tools, with applications to control systems, vibration analysis, and dynamic stability. Develop and interpret mathematical models of physical systems using algebra and calculus, including solving simple differential equations.
3. **Analyze motion and forces in complex systems** relevant to aerospace technologies, including orbital motion, propulsion, and flight dynamics. Analyze rotational motion and torque in systems such as engines, turbines, and rotating machinery.
4. **Understand oscillations and simple harmonic motion**, with applications to sensors, timing devices, and vibration control in engineering systems.
5. **Use classical mechanics to understand and optimize energy systems**, including engines, turbines, and renewable energy technologies. Critically assess the validity of models and simulations used in modern engineering technologies, identifying limitations and approximations.
6. **Connect theoretical concepts to emerging technologies**, such as robotics, space systems, advanced manufacturing, and real-time physics-based simulations.
7. **Communicate technical results effectively**, both qualitatively and quantitatively, in the context of modern technological applications.

PHYS 1710 supports the following core curriculum learning objectives:

- **Critical Thinking:** Develop skills in creative thinking, analysis, evaluation, and synthesis of information to solve physical problems.
- **Communication:** Effectively develop, interpret, and express ideas through written, oral, and graphical formats.
- **Quantitative Skills:** Apply mathematical methods to analyze data and draw meaningful, informed conclusions.
- **Teamwork:** Collaborate effectively with others, considering diverse perspectives to achieve shared goals.

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.

Tentative Lecture Schedule

Class	Date	Day	Topic
1	18 May	M	Ch 2: Velocity and acceleration, Kinematics in 1D
2	19 May	Tu	Ch 2: Kinematics problem solving, Ch 1: Vectors
3	20 May	W	Ch 1: Dot products and race problems, Ch 3: Projectile motion
4	21 May	Th	Ch 3: Projectile motion, Ch 3: Circular motion **Exam 1 Chapters 1-2**
5	25 May	M	Memorial Day
6	26 May	Tu	Ch 4: Newton's 1st and 2nd laws, Ch 4: Systems and Newton's 3rd law, Ch 5: Friction
8	27 May	W	Ch 5: Applications of Newton's laws
9	28 May	Th	**Exam 2 Chapters 1-4**
10	01 June	M	Ch. 6: Inventing energy, Ch. 6: Work and conservation of energy
11	02 June	Tu	Ch. 7: Applications of energy conservation
12	03 June	W	Ch. 8: Momentum and impulse, Ch. 8: Collisions
13	04 June	Th	**Exam 3 Chapters 5-8**
14	08 June	M	Ch. 9: Rotation of rigid bodies, Ch. 10: Moment of inertia and rotational energy s
15	09 June	Tu	Ch. 10: Conservation of energy with rotation
16	10 June	W	Ch. 10: Angular momentum
17	11 June	Th	Ch. 10: Torque and Newton's 2nd law for rotation **Exam 4 Chapters 9-10**
18	15 June	M	Ch. 10: Torque and slipping, Ch. 13: Universal gravitation
19	16 June	Tu	Ch. 14: Periodic motion
20	17 June	W	Ch. 15: Mechanical waves, Review
21	18 June	Th	**Final Exam, Chapters 1-15**

Cumulative Final Exam – Friday, June 18, 11:00 am – 12:50 pm

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**.** 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 both Canvas and Mastering Physics. Homework is intended to be practice, so there is no penalty for an incorrect answer as long as you arrive at the correct answer.

> **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 four 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.
    - 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.
- 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.

Student Success Guidelines

Active Participation:

Class time is intended to be interactive. Students are encouraged to engage in problem-solving, ask questions, and discuss concepts with peers. Passive listening alone may lead to a false sense of understanding. Working through problems independently or collaboratively will help reinforce key ideas and clarify challenging concepts.

Ask Questions:

Students are encouraged to ask questions at any time, even if the topic has been previously discussed. Asking questions is an important part of the learning process and helps translate concepts into a deeper, more personal understanding.

Use Learning Objectives:

Each unit includes learning objectives and practice problems (with solutions) available on Canvas. These materials are valuable resources for completing homework and preparing for exams. Students should use them to identify and practice the specific skills that will be assessed.

Physics Resource Center:

Students are encouraged to utilize the Physics Resource Center located in Hickory Hall 266, which offers drop-in tutoring Monday through Friday. Tutors are available to assist with course material, homework, and laboratory questions. The center also provides a study space with seating and computers for collaborative or independent work.

Course Grades: Course grades will be calculated as follows

Quizes	5%
Homework	15%
Recitation	15%
Exams (4)	10% each
Final Exam	25%

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 online 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.

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. Some students find ChatGPT or other generative AI tools useful to create additional practice problems when studying for exams or to summarize an example from class or a section of the textbook.

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.