

## PHYS 312 – Mechanics I

### Instructor:

Dr. Christine Natrass

Office: SERF 609 or over Zoom with advanced notice

Phone: 974-6211

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**Office hours:** 10:00-10:40 Fridays in person, 1-2 Tuesdays on Zoom

**Teaching assistant:** Xiaoming Wang, [xwang184@vols.utk.edu](mailto:xwang184@vols.utk.edu)

### Class times & Locations:

Section 001: Nielsen 306 MWF 9:10-10:00

Section 002: Online asynchronous

**Zoom:** Students may attend over Zoom. Students are encouraged to attend in person and are encouraged to notify the instructor if they will attend over Zoom. Zoom connections may not be available for all class periods.

### Course Description:

Kinematics and dynamics of single particles, systems of particles, and rigid bodies. Oscillations. Central forces. Gravitation. Includes computational methods. Required of all physics majors.

### Prerequisites:

PHYS 311, with a C or better

### Corequisites:

PHYS 201 or MATH 241.

**Required text:** John Taylor, Classical Mechanics (189138922X)

**Course Schedule:** The course schedule (including reading sections) will be posted on Canvas. Please note that the schedule is subject to change and that any changes will be posted on Canvas.

### Campus Syllabus:

The campus syllabus applies to this class. You are encouraged to review the [campus syllabus](#).

### Personal Pronouns:

I will be happy to honor your request to be addressed by a preferred name and gender pronoun. Please advise me of this preference as early as possible in the semester.

### Learning outcomes:

Students who successfully complete this course will be able to:

1. Analyze and solve problems related to non-inertial reference systems.
2. Calculate the center of mass and moment of inertia of 1-, 2-, and 3-dimensional objects. Find principal axes.
3. Analyze and solve problems related to the rotational and translational motion of rigid bodies.
4. Understand the fundamentals of the Lagrangian formalism of Classical Mechanism and be able to use it to solve simple problems.

5. Analyze and solve problems in systems with several degrees of freedom characterized by several different frequencies of oscillations,
6. Understand the fundamentals of the Special Theory of Relativity and be able to solve problems related the motions of systems at speeds close to the velocity of light (EM phenomena are not covered).

**Course Structure:**

This is a flipped format physics course. Students should prepare for class by watching the online lectures, reading the textbook, and completing the pre-homework. Students in the in-person section will work on the homework and computational homework in class, where they can get assistance from their classmates. The pre-homework largely consists of straightforward problems which students are expected to complete on their own, while students may benefit from completing homework assignments with others.

Please check the Canvas course site regularly for important announcements and updates (announcements will also be emailed to students). It is the students' responsibility to ensure they are receiving email notices and announcements from Canvas.

**Communication:**

Emails to the instructor should have "Phys 312" in the subject. Students are expected to use their UTK email address for communication regarding the class and are expected to check their email regularly. You are very strongly encouraged not to disable emails from Canvas. Questions of general interest should be directed to the discussion forum, not made via private emails to the instructor. Only questions particular to an individual student should be made via private emails to the instructor. Questions of general interest made via a private email to the instructor may not be answered.

**Grade:**

The grade is:

- Exams: 40%
- Homework: 50%
- Class Participation: 10%

The grading scale will be:

- 93.00% and above A
- 90.00% - 92.99% A-
- 87.00% - 89.99% B+
- 83.00% - 86.99% B
- 80.00% - 82.99% B-
- 77.00% - 79.99% C+
- 73.00% - 76.99% C
- 70.00% - 72.99% C-
- 67.00% - 69.99% D+
- 63.00% - 66.99% D
- 60.00% - 62.99% D-
- 59.99% and below F

**Homework:**

There will be two types of homework, pre-homework assignments and standard homework assignments. Pre-homework and homework will be turned in on paper and graded by the teaching assistant.

You are encouraged to study with other students, but every student is expected to understand the work they are submitting. Students are encouraged to seek help during office hours, using the discussion forum, or at the physics department tutorial center, all of which will be held online. Seeking help on Chegg, looking at solutions posted elsewhere, or sharing your solutions with others is considered cheating.

**Exams:**

Four exams will be given throughout the semester. The last exam will be the final and will be cumulative, with an emphasis on the sections not covered on previous exams. Online students will need to arrange a time to have the exam proctored. The precise rules for exams will be distributed before the exam. The exam dates and times are announced at the beginning of the semester. Students who have a conflict should inform the instructor as soon as reasonably possible.

**Class participation:**

Students will complete online Canvas quizzes to confirm their attendance. A passcode will be distributed at the beginning of the class. Students should bring some kind of device to complete the quiz.



THE UNIVERSITY OF  
**TENNESSEE**  
KNOXVILLE

Dear Student,

The purpose of this **Campus Syllabus** is to provide you with important information that applies to all UTK courses. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high-quality learning experience. I want to wish you the best for a successful and productive semester.

–Dr. John Zomchick, Provost and Senior Vice Chancellor

### **ACADEMIC INTEGRITY**

Each student is responsible for their personal integrity in academic life and for adhering to UT's Honor Statement. The Honor Statement reads: "An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

### **YOUR ROLE IN IMPROVING THE COURSE THROUGH ASSESSMENT**

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester you may be requested to assess aspects of this course, either during class or at the completion of the class, and through the TNVoice course evaluation. Please take the few moments needed to respond to these requests as they are used by instructors, department heads, deans and others to improve the quality of your UT learning experience.

### **STUDENTS WITH DISABILITIES** – <http://sds.utk.edu>

The University of Tennessee, Knoxville, is committed to providing an inclusive learning environment for all students. If you anticipate or experience a barrier in this course due to a chronic health condition, a learning, hearing, neurological, mental health, vision, physical, or other kind of disability, or a temporary injury, you are encouraged to contact [Student Disability Services](#) (SDS) at 865-974-6087 or [sds@utk.edu](mailto:sds@utk.edu). An SDS Coordinator will meet with you to develop a plan to ensure you have equitable access to this course. If you are already registered with SDS, please contact your instructor to discuss implementing accommodations included in your course access letter.

### **ACCESSIBILITY POLICY AND TRAINING** – <http://accessibility.utk.edu>

The University of Tennessee, Knoxville, provides reasonable accommodations for individual students with disabilities through its office of [Student Disability Services](#). The university is also committed to making information and materials accessible, when possible. Resources and assistance to support these efforts can be found at <http://accessibility.utk.edu/>.

### **WELLNESS** – <http://wellness.utk.edu/> and <http://counselingcenter.utk.edu/>

The [Center for Health Education and Wellness](#) empowers all Volunteers to thrive by cultivating personal and community well-being. The Center can answer questions about general wellness, substance use, sexual health, healthy relationships, and sexual assault prevention. The [Student Counseling Center](#) is the university's primary facility for personal counseling, psychotherapy, and psychological outreach and consultation services.

[The Student Health Center](#) has a wide range of clinics and services. Their goal is to provide quality healthcare and assist you in maintaining a healthy lifestyle to support your success as a student. To schedule an appointment, call 865-974-5080. To report a health-related absence visit <https://studentlife.utk.edu/caring-for-all-vols/absence/>.

Any student who has difficulty affording hygiene products, groceries, or accessing sufficient food to eat every day is urged to contact [Basic Needs](#) for support. The Big Orange Pantry, located on the 3rd floor of the Student Union, is a free resource for all students, faculty, and staff, no matter how great or small their need is. Students who need emergency financial assistance can also request funding from the [Student Emergency Fund](#).

Students who are experiencing non-academic difficulty or distress and need assistance should call 974-HELP or [submit an online referral](#). The 974-HELP team specializes in aligning resources and support to students experiencing mental health distress.

**EMERGENCY ALERT SYSTEM** – <http://safety.utk.edu/>

The University of Tennessee, Knoxville, is committed to providing a safe environment for learning and working. When you are alerted to an emergency, please take appropriate action. Learn more about what to do in an emergency and sign up for UT Alerts. Check the emergency posters near exits and elevators for building specific information. In the event of an emergency, course schedules and assignments may be subject to change. If changes to graded activities are required, reasonable adjustments will be made, and you will be responsible for meeting revised deadlines.