PHYS 5321 Mechanics (CRN10423)

CRN: 10423  
Term: Fall 2023  
Prerequisite: PHYS3352 (Analytical Mechanics II)

Lecture
   Lecture hours: MW 10:30 am – 11:50 am
   Location: Physical Science Building (PSCI) 222A
Instructor: Prof. Yun-Pil Shim
Office: PSCI 121A
E-mail: yshim@utep.edu
Office hours: Flexible, by appointment. Email me to schedule.

Course Description

In this course, you will learn basic concepts of classical mechanics from the perspective of variational principles. Lagrangian formalism, Hamilton equations of motion, and canonical transformations will be presented. Applications in solving classical mechanics problems (central force problem, rigid body dynamics, oscillations) and connection to quantum mechanics will be discussed.

Textbook

Textbook is strongly recommended for this course:  
Classical Mechanics by Goldstein, Poole and Safko, 3rd Edition.

Other references (optional):
   Theoretical Mechanics of Particles and Continua by Fetter and Walecka
   Classical Dynamics of Particles and Systems by Thornton and Marion
   Mechanics by Landau and Lifshitz
   Mathematical Methods of Classical Mechanics by Ar’nold
   The Variational Principles of Mechanics by Lanczos

Grade

Grading Policy:
   Attendance: 10%
   Mid-term exam: 20%
   Final exam: 30%
   Homework: 40%

The final grade will be determined by your score and the overall performance of the class.
If your final score is
   90 or above: your grade will be A
   80 or above and below 90: your grade will be B or better
   70 or above and below 80: your grade will be C or better
   60 or above and below 70: your grade will be D or better
Homework (40%)
Homework will be posted on Blackboard.
Some homework problems will be chosen from the textbook.
Feel free to discuss with others, but you should turn in your own work.
Scan your work and upload it on Blackboard by the due date.

Midterm exam (20%)
Midterm exam will be on Wednesday, October 18th, 10:30am-11:50am.
Details about the midterm exam will be announced before the exam.

Final exam (30%)
Final exam will be on Friday, December 15th, 10:00am-12:45pm.
Details about the final exam will be announced before the exam.
## Course Overview and Weekly Schedule

### Course overview
Corresponding chapters of the text book are indicated.

- Topic 1. Overview of Classical Mechanics – Elementary Principles (Ch 1)
- Topic 2. Coordinate Systems (Ch 4)
- Topic 3. Variational Principles and Lagrangian Dynamics (Ch 2)
- Topic 4. The Central Force Problem (Ch 3)
- Topic 5. Rigid Body Motions (Ch 5)
- Topic 6. Oscillations (Ch 6)
- Topic 7. Hamiltonian Dynamics and Canonical Transformations (Ch 8 & Ch 9)
- Topic 8. Special Relativity (Ch 7)

### Weekly Course Schedule (subject to change)

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<th>Week</th>
<th>Dates</th>
<th>Lecture</th>
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<td>Week1</td>
<td>Aug 28 &amp; Aug 30</td>
<td>Intro/Topic 1</td>
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<td>Sep 4 &amp; Sep 7</td>
<td>Labor Day, Topic 1</td>
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<tr>
<td>Week3</td>
<td>Sep 11 &amp; Sep 13</td>
<td>Topic 2</td>
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<td>Week4</td>
<td>Sep 18 &amp; Sep 20</td>
<td>Topic 2</td>
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<td>Week5</td>
<td>Sep 25 &amp; Sep 27</td>
<td>Topic 3</td>
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<tr>
<td>Week6</td>
<td>Oct 2 &amp; Oct 4</td>
<td>Topic 3</td>
<td>Homework #3</td>
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<tr>
<td>Week7</td>
<td>Oct 9 &amp; Oct 11</td>
<td>Topic 4</td>
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<td>Week8</td>
<td>Oct 16 &amp; Oct 18</td>
<td>Topic 4, <strong>Midterm Exam</strong></td>
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<td>Week9</td>
<td>Oct 23 &amp; Oct 25</td>
<td>Topic 5</td>
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<td>Week10</td>
<td>Oct 30 &amp; Nov 1</td>
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<td>Week13</td>
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<td>Topic 7</td>
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<td>Week14</td>
<td>Nov 27 &amp; Nov 29</td>
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<td>Week16</td>
<td>Dec 15</td>
<td><strong>Final Exam</strong></td>
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**Communication**

The main communication method is email and the Blackboard announcement. When you email me, include the following: your name and UTEP ID, the course name and CRN. **Do NOT use the Course Messages in Blackboard. I am not checking it.**

**Technology Requirements**

Lectures are given person-to-person in the classroom. Some lectures may be online/pre-recording if necessary.

Course communication will be via email and Blackboard. Ensure your UTEP email account is working. Check the Blackboard for announcements.

When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

**IMPORTANT:** If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP Help Desk ([https://www.utep.edu/technologysupport/](https://www.utep.edu/technologysupport/)) as they are trained specifically in assisting with the technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

**Course Policies**

**Illness Precautions:**
Please stay home if you have symptoms of a communicable illness. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations.

**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/](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.

**Scholastic Integrity:**
Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as one's own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.