PHYS 5321 Mechanics (CRN10987)

CRN: 10987  
Term: Fall 2022  
Prerequisite: PHYS3352 (Analytical Mechanics II)

Lecture  
Lecture hours: TR 9:30 am – 10:50 am  
Location: Classroom Building C303  
Instructor: Prof. Yun-Pil Shim  
Office: PSCI 121A  
E-mail: yshim@utep.edu  
Office hours: Flexible, by appointment

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 required for this course:  
Classical Mechanics by Goldstein, Poole and Safko, 3rd Edition.

Other references (optional):  
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  
Theoretical Mechanics of Particles and Continua by Fetter and Walecka

Communication

The main communication method is the Blackboard announcement and email.  
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.

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.
See the weekly course schedule on the last page for the homework schedule.

**Midterm exam (20%)**
Midterm exam will be on Tuesday, October 11th, 9:30am-10:50pm.
Details about the midterm exam will be announced before the exam.

**Final exam (30%)**
Final exam will be on Tuesday, December 6th, 10:00am-12:45pm.
Details about the final exam will be announced before the exam.
Course Overview and Weekly Schedule

Course overview

Ch. 1 Survey of the Elementary Principles
Ch. 2 Variational Principles and Lagrange’s Equations
Ch. 3 The Two-Body Central Force Problem
Ch. 4 The Kinematics of Rigid Body Motion
Ch. 5 The Rigid Body Equations of Motion
Ch. 6 Small Oscillations
Ch. 7 Special Relativity in Classical Mechanics
Ch. 8 The Hamilton Equations of Motion
Ch. 9 Canonical Transformation
Ch. 10 Hamilton-Jacobi Theory
Ch. 11 Canonical Perturbation Theory
Ch. 12 Introduction to the Lagrangian and Hamiltonian Formulations for Continuous Systems and Fields

Weekly Course Schedule (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Lecture</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week1</td>
<td>Aug 23 &amp; Aug 25</td>
<td>Intro/Chapter 1</td>
<td></td>
</tr>
<tr>
<td>Week2</td>
<td>Aug 30 &amp; Sep 1</td>
<td>Chapter 2</td>
<td>Homework #1</td>
</tr>
<tr>
<td>Week3</td>
<td>Sep 6 &amp; Sep 8</td>
<td>Chapter 2, Chapter 3</td>
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</tr>
<tr>
<td>Week4</td>
<td>Sep 13 &amp; Sep 15</td>
<td>Chapter 3</td>
<td>Homework #2</td>
</tr>
<tr>
<td>Week5</td>
<td>Sep 20 &amp; Sep 22</td>
<td>Chapter 4</td>
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<tr>
<td>Week6</td>
<td>Sep 27 &amp; Sep 29</td>
<td>Chapter 4, Chapter 5</td>
<td>Homework #3</td>
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<tr>
<td>Week7</td>
<td>Oct 4 &amp; Oct 6</td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>Week8</td>
<td>Oct 11 &amp; Oct 13</td>
<td>Midterm Exam, Chapter 6</td>
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</tr>
<tr>
<td>Week9</td>
<td>Oct 18 &amp; Oct 20</td>
<td>Chapter 6</td>
<td>Homework #4</td>
</tr>
<tr>
<td>Week10</td>
<td>Oct 25 &amp; Oct 27</td>
<td>Chapter 8</td>
<td></td>
</tr>
<tr>
<td>Week11</td>
<td>Nov 1 &amp; Nov 3</td>
<td>Chapter 8, Chapter 9</td>
<td>Homework #5</td>
</tr>
<tr>
<td>Week12</td>
<td>Nov 8 &amp; Nov 10</td>
<td>Chapter 9</td>
<td></td>
</tr>
<tr>
<td>Week13</td>
<td>Nov 15 &amp; Nov 17</td>
<td>Chapter 10</td>
<td>Homework #6</td>
</tr>
<tr>
<td>Week14</td>
<td>Nov 22 &amp; Nov 24</td>
<td>Chapter 10, Thanksgiving</td>
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<tr>
<td>Week15</td>
<td>Nov 29 &amp; Dec 1</td>
<td>TBD</td>
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<tr>
<td>Week16</td>
<td>Dec 6</td>
<td>Final Exam</td>
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**Technology Requirements**

Lectures are given person-to-person in the classroom, unless there is a change in the COVID19 situation.

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**

**COVID-19 Precautions:**

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area. For more information about the current rates, testing, and vaccinations, please visit epstrong.org

**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 ones’ 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.