

## PHYS 2320 Introductory Mechanics (CRN 29172) with Open Educational Resources (OER)

This document last updated: January 17th, 2022

Term: Spring 2022  
Lecture: MW 3:00 pm – 4:20 pm in Liberal Arts Building (LART) 318

Workshops: T 1:30 pm – 2:20 am (CRN 29176) (TA: Daniela Ramirez Chavez)  
R 1:30 pm – 2:20 pm (CRN 29180) (TA: Pedro Medina)

MLC: (Tutor: Carla Irigoyen)

Prerequisites: MATH 1411 may be taken concurrently.  
I do not use capriciously complicated integrals and derivatives in this course. That being said, physics is about finding patterns and relationships in nature, and the most economic and enlightening way of expressing these is with calculus. Once you think about it.

Instructor: Jorge Muñoz  
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Office hours: M 2:00 pm (before class) in PSCI 312C  
and by appointment (<https://jamunoz.youcanbook.me>)

TA: Daniela Ramirez Chavez  
E-mail: dramirezch@miners.utep.edu  
Office hours: R 3:00 - 4:00 pm in PSCI 217C

TA: Pedro Medina Gonzalez  
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Office hours: TR 10:00 am - 11:00 am in PSCI 117

Lab Coordinator: Karla Carmona  
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Miner Learning Center (MLC) Tutor: Carla Irigoyen  
E-mail: cwirigoyena@miners.utep.edu  
Tutoring hours: TBA

### Grading Policy

In-class exams	30 points (3 exams, 15 points each, worst score is dropped)
Homework	14 points (14 sets, 10 probs/set, 3 probs selected randomly to grade, 1 point max. per set)
Workshop	42 points (14 sessions, presentation at the end of each session, 3 points max. per session)
Final	20 points
Participation	Limited to 9 additional points
Total	There are 115 points in this class and I round up.

A: 90+ points  
B: 80-89 points  
C: 70-79 points  
D: 60-69 points  
F: 0-59 points

The maximum number of points you can get is 115, so there will be no curve.

Alternative1 If both the average of your homework score (14 problem sets) and the average of your exam score (3 exams) are equal to or higher than 90%, you will earn an A in the class. Typically about 5 percent of students get an A this way.

Alternative2 If you get 38 or more points in the workshop, you will earn an A in the class, no need to take the final. Typically half of the class gets an A this way.

The distribution of grades in relevant sections of PHYS 2320 that I taught shows that a high proportion of students get an A in the course. This gives you many opportunities to be wrong, a critical part of learning. (The percentages below don't include students who dropped the class, ~ 10%.)

Fall 2018	Fall 2019	Spring 2020	Fall 2021
A: 31% of students	A: 39% of students	A: 73% of students	A: 63%
B: 31%	B: 20%	B: 6%	B: 18%
C: 15%	C: 17%	C: 4%	C: 6%
D: 8%	D: 7%	D: 3%	D: 1%
F: 15%	F: 17%	F: 4%	F: 12%
		S: 9%	
		U: 1%	

Bottom line – this is not going to be an easy class, you will need to put in the time and effort to understand concepts in physics and their applications. My team and I will give you all the support you need, with your effort and ours, you will learn a lot and you will also get a good grade.

### Objectives

In accordance with the UTEP Catalog, in this course you will learn dynamics of particles and rigid bodies using vectors and calculus, conservation of energy and momentum, and kinetic theory. These concepts are foundational in the physical sciences and most branches of engineering and if you are taking this class, chances are you will continue to apply these concepts during the rest of your college career and in your professional career. Putting some effort into this class will pay off.

- 1) You will learn about several physics concepts, how they are connected to each other, and how they are used in the real world. This will happen mostly in lecture.
- 2) You will learn how to setup and solve problems applying concepts and models learned in class. This will happen mostly in the workshop, tutoring sessions, by watching the videos that will be uploaded to Bb, and by doing homework problems.
- 3) You will learn to think scientifically about the world and apply ideas from the class to both experiments and current events. This will happen mostly in lecture and in the lab.

### Textbook

This course uses **Open Educational Resources (OER)**. The required textbook is *Mechanics*, by Ben Crowell, which is distributed under a Creative Commons 3.0 license. This license allows you to download it, copy it, and use in this class free of charge. <http://www.lightandmatter.com/mechanics/>

### Lecture Notes

My lecture notes largely follow the structure of *Physics for Scientists & Engineers: A Strategic Approach* 4th Edition by Randall Knight, so this book is optional to acquire. I post my lecture notes to Blackboard, so the content will be available to you even if you don't have the book.

### Homework

There will be 14 problem sets during the semester, each consisting of 10 problems. The problem sets will be posted on Blackboard on Tuesdays and are due the following Tuesday before the end of the day (refer to the calendar below for the dates, in particular with the intrusion of Spring Break). You ought to upload your homework to Bb for us to grade it as a PDF document. IF IT IS NOT A PDF DOCUMENT, IT WILL NOT BE GRADED.

The problems come from Knight, Crowell, and sometimes I invent my own problems. This semester, some “textbook” problems will be replaced by more realistic problems that will let you see in action the concepts you are learning. Physics being physics, the concepts are exactly the same in every textbook and at the introductory level, the contents are also largely the same. I encouraged to discuss the problems with peers, TAs, professor, tutors, etc. but the final write-up has to be yours.

It is unfeasible to meaningfully grade 500 problems every week. So your TAs will each randomly pick three problems to grade. The scheme is 0 points for no work, 0.2 points for work but incorrect answer, and 0.3 points for correct answer and work backing it up. An additional 0.1 points will be awarded if all three problems were at least attempted. This way, the maximum number of points you can get in a given problem set is 1.

**Your best bet for help with homework problems is to go to the Miner Learning Center**, ask Carla Irigoyen (the tutor assigned to our course) to help you, and don’t “leave” until your homework is finished several hours later. It is advantageous if you have already thought about the problems. During the Fall 2019 semester, one student spent 57.75 hours at the MLC, and about 10 more students spent between 10 and 30 hours and they did really well in the class. Some of these students initially struggled with the material, but they all got an A. The MLC is great.

### **Videos**

We have developed our own **Open Educational Resources (OER)**. Video solutions to most homework problems are available on YouTube: <https://youtube.com/playlist?list=PLUJ1I5ZOAgMIKpng9o2nF5eJwWde5sTks>

Our solutions are pedagogical, insightful, and similar or identical to your homework problems. In class it is difficult to actually work out a significant number of problems on the board, but the videos have been well received by the students. You can fast-forward or stop it and watch it when you have time. If you have questions, put them in the comments or send me an email.

Let me know if you want to record the solution to a problem of your choosing. If you share it with the class you will get 5 participation points.

### **Exams**

There will be 3 exams scheduled during lecture time: on February 16th (kinematics), March 23rd (dynamics), and April 27th (work and energy). The exams are designed by you, the students. I provide the structure for the exam (number of problems, difficulty, topics) and you provide the contents (which problems, concepts, etc. to test with the proviso that problems will not be identical to those in the homework). Everybody has a bad day, so the worst score will be dropped. Since there are no makeups, there are no makeups. Although the material tested on the exams is not rigorously cumulative, new concepts in physics are built on previous ones.

Exams will be during class time in LART 318.

### **Workshop**

We are trying out something new this semester. The problems you will be working on this semester during the workshop will be related to your homework and the concepts that we will be covering, but they will also be related to a research program at UTEP. We will group the students into teams of about 5 and the members of the team will work during the week on some problems assigned by the different faculty. During the workshop you can finish up your work or just record. The product that we will grade every week is a short presentation, no more than 10 minutes, in which every member of the team has to participate, explaining your results .

The workshop will be one session per week in person (either in PSCI 314 for the Tuesday session or in LART 205 for the Thursday session). We will use Microsoft Teams to record your mini-presentations. To avoid freeloaders, you will be able to anonymously report students who do not pull their own weight .

### **Final**

The final is on DATE and TIME TBA in LART 318 and it is cumulative.

## Lab

The lab is independent of the class, but there is synergism. Karla Carmona is the Lab Coordinator.

## Participation

It takes time to get good at physics, and time is in short supply for everybody. Before each exam, I will request volunteers to hold student-lead review sessions (5 participation points), and if you attend a student-led review session, you get 2 extra points. The reviews will be on Microsoft Teams and/or in person. Leads and participants have in the past found this enjoyable and useful, even if online. You can also get 5 participation points for recordings of problem solving that is made available to the whole class.

## Attendance

Attending lecture is encouraged but not required. The lecture will be in person and on Teams. I value your time and I will try to provide new perspectives and intuition on physics and its role in technology, society, etc. You are paying for this. Attending the workshop has a more direct impact on your grade, so it is highly recommended that you attend.

## Collaboration

Discussing the problems with peers, tutors, etc. after attempting to solve them on your own is encouraged, but the work you turn in has to be your own.

## Winning strategy

The class is structured so that if you put in the effort, you will learn a lot and pass with a good grade. During the lecture, I will put things in perspective for you (this is the education part). The other part of the class (training) involves the homework. The workshop is a bit of both. You are free to collaborate on the homework and you should take advantage of the resources available to you (tutoring, office hours, Bb videos, dark web, etc.) Ask questions during the lecture and during the workshop. If you take your homework seriously, you will do great on the exams. This is your class and your opinion matters, talk to me. Finally, try to enjoy the class. Understanding and exploitation of physical phenomena has revolutionized our way of life in the past few centuries, but what really attracts me to physics is that it tells us the most about the origin and the fate of the Universe.

Week	Lecture Dates	Notes	Topics
1	Jan. 19		Concepts of motion
2	Jan. 24, 26	HW1 due Jan. 25	Kinematics in 1-D
3	Jan 31, Feb. 2	HW2 due Feb. 1	Vectors and coordinate systems
4	Feb. 7, 9	HW3 due Feb. 8	Kinematics in 2-D
5	Feb. 14, 16	HW4 due Feb. 15 1st exam Feb. 16	
6	Feb. 21, 23	HW5 due Feb. 22	Force and motion
7	Feb. 28, March 3	HW6 due March 1	Dynamics – motion along a line
8	March 7, 9 March 14 – 18	HW7 due March 8 Spring Break	Newton's third law
9	March 21, 23	HW8 due March 22 2nd exam March 23	Dynamics – motion in a plane
10	March 28, 30	HW9 due March 29 Withdrawal deadline April 1, a.k.a. Drop Day	Work and kinetic energy
11	April 4, 6	HW10 due April 5	Interactions and potential energy
12	April 11, 13	HW11 due April 12	Impulse and momentum
13	April 18, 20	HW12 due April 19	Oscillations
14	April 25, 27	HW13 due April 26 3rd exam April 27	Rotation of a rigid body I
15	May 2, 4	HW14 due May 3	Rotation of a rigid body II
16	N/A	Final exam TBA	

**Missed exams and other eventualities**

Since the worse score is dropped, there are no make ups for exams. If you experience a situation that affects your long-term performance in the class (several weeks), let me know, we will arrange something. You should talk to me as soon as you realize. Talking to me 1 day before I have to turn in final grades will not help you.

**Mentoring**

Feel free to approach me for mentoring about your career, research ideas or opportunities, letters of recommendation, etc. I work for you and I like to do a good job, take advantage of that. Also take advantage of your peers. These people go along with you in life.

**Blackboard**

All the homework problems, slides, exam solutions, etc. will be uploaded to Bb. My lectures are not slide-based, but I use the slides to guide the lecture and the slides do cover the material you should learn. You can also check your grades for the different components of the class.

Know the difference between a score, a percentage, and a grade. Please ask about it if you don't currently know the difference.

**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](mailto: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/>. 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.

**Academic dishonesty**

Science is incompatible with cheating, and will not be tolerated. I have sent students to the Office of Student Conduct and Conflict Resolution for the more serious offenses and I do it to protect our learning environment. When cheating becomes widespread, students become discouraged from studying, working on homework problems, etc. because they don't want to earn a lower grade than someone who cheated. And who would? There are enough points in the class to be wrong and make mistakes and learn and still get an A. Just don't cheat. I mean it.