

PHYS 211H: General Physics I

Instructor: Dr. Evan Rich
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Pronouns: He/Him
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CLASS

Lecture: 11:00 AM - 12:15 PM JH-145 T/Th
Recitation: 11:30-12:20pm JH-145 Wed

Required Resources

- Resources available through Follette Inclusive Access
- University Physics with Modern Physics by Young and Freedman
- Homework: Mastering Physics

STUDENT HOURS

Monday 3-5pm JH 244F
Tuesday 9-10am JH 244F
Wednesday 4-6pm Union
Friday 10-11 AM JH 244F

Or Scheduled Times By Appointment

Email: erich3@unl.edu
[Physics Resource Center](#)

Course Description

Calculus-based course intended for students in engineering and the physical sciences. We will cover Mechanics, fluids, wave motion, and heat. **Prerequisites:** MATH 106 or parallel. One year of either high school physics or algebra-based college physics is expected.

Required Resources

This course's resources are supplied through Follette Inclusive Access program. You can find more details about [Inclusive Access program here](#). Instructions on how to obtain access can be found on Canvas and will be discussed the first day of class. For this class you will need the textbook and an account on Mastering Physics. You will have access to these materials through Follette Inclusive Access program. Instructions on how to obtain access can be found on Canvas. We will also discuss these resources on the first day of class. The textbook is only available in digital copies which unfortunately cannot be separated from mastering physics. If you would like a physical copy, I would recommend used and older editions.

Missed Class Policy and Illness

If you are sick, **do not come to class/recitation**. Be mindful of your fellow classmates and your peers. You will be expected to get the lecture notes from a classmate and discuss with the instructor/GTA on topics you don't understand at Student Hours or at the [Physics Resource Center](#) (see above). If you will miss class/recitation for a sporting event, holiday, or life event please notify the instructor as soon as possible to organize an alternative schedule to make up for missed work if needed.

In recognition that we all have busy lives and unexpected things occur during the term, there will be automatic accommodations for this course. If you are sick or absent, automatic accommodations will be used first before alternative arrangements are made. Please see the automatic accommodations section below for details

Learning Objectives

By the end of this course, you should be able to:

- Explain how forces and energy relate to what we observe in the physical world.
- Apply concepts related to force, energy, and motion to perform calculations and solve problems related to Newtonian Mechanics.
- Understand and appreciate how physicists approach studying the physical world.
- Be able to apply basic physics concepts to a novel situation that the student has not encountered before.
- Be able to work with peers to solve real-world physics problems.

What can you expect from me

I will organize class lectures, activities, and lead discussions within class. I will engage in an exploration of the topics within lecture time. I will be available for questions via student hours to help with homework, discussion on class topics, and clarify hard-to-understand concepts. I will work to create a warm, supportive, and welcoming environment in which to learn physics. I will start and end class promptly and communicate clearly via Canvas, email, and class announcements.

What do I need to succeed in PHYS 211H

Complete all assigned pre-lecture activities before lecture and recitation classes. Be prepared to be active and participate in class. You will get out of this course what you put into this course. Complete all assigned readings, activities, and homework before lecture and recitation classes. Be prepared to be active and participate in class. Ask questions when you do not understand a topic or technique. When you are struggling with a concept or homework, seek help from instructors, classmates, or other resources as noted in the resource section of the syllabus. If you foresee a conflict because of an athletic or personal event, please contact me as soon as you are aware of the conflict. I expect you to check your email daily in case there is course-related correspondence.

Resources Available to You

There are many resources available to help you in this course. I have listed many, but this is not a complete list.

- Student hours are times when I am available to answer your questions, help with homework, and discuss concepts you may need help understanding. I highly encourage you to take advantage of student hours!
- The [Physics Resource Center](#) is run by the Physics and Astronomy Department. Physics TA's will be there to help answer your questions, help on homework, and discuss concepts you may need help understanding. You can find the time's TA's are available using the link above. You can find the Physics Resource Center on the 2nd floor of Jorgenson Hall in the carpeted area (there is a big sign on the wall).
- Your Recitation TA is a great resource. Feel free to ask questions at the end of class or find out when your TA will be at the Physics Resource Center.
- Your fellow students are great resources to help learn the material. I highly encourage you to study together and ask each other questions.
- Your book.

How to contact with the Professor with a question or raise an issue:

Email: My email (erich3@unl.edu) is one of the best ways to contact me. I will check my email multiple times a day (between 8am and 5pm) and is the best way to get ahold of me if there is an issue. I, however, will not be answering homework questions via email. This is because it is difficult to help you with a conceptual question limited to email. Please understand that I will redirect you to visit Student Hours or visit the Physics Resource Center for in-person help.

Before or after class: Short clarifying questions are best right before and after class. I will commonly ask you to repeat the question via email so I don't forget and have a record of the question.

One-on-one In-person meeting: I do have a limited capacity for one-on-one meetings in my office. These in-person meetings are great for those with missing assignments, conversations about how you are doing in the course, and accommodations. **These in-person meetings are not for homework help.** I apologize but I do not have the capacity for individual homework meetings for a class of this size, thank you for understanding. Please visit my student hours and the physics resource center for homework help. You can make in-person meetings using the website Calendly: <https://calendly.com/erich3>

Grades

Your final grade will be determined by:

- 10% Community Engagement
- 10% Group Work in Recitation Section
- 15% Homework
- 10% Quizzes
- 10% Project
- 45% Exams

Grades for individual assignments will be posted in the Canvas gradebook. It is good practice to check the gradebook regularly to monitor your progress and to verify accuracy. I will compute your final grades at the end of the term. If you are curious, you can use the weighted percentages above. Below is the percentage breakdown for letter grades. I reserve the right to scale the percentages down, but never up.

A+ > 97% > A > 93% > A- > 90% > B+ > 87% > B > 83% > B- > 80% > C+ > 77% > C > 73% > C- > 70% > D+ > 67% > D > 63% > D- > 60% > F

Course Components

Outside of Class

Your work outside of class will be to engage with a topic's information for the first time, and practice what you have learned from class through homework. Be prepared to spend 10-12 hours on outside-of-class work a week. If you feel that you are spending an excessive amount of time working on outside-of-class work, you should consider campus resources to help maximize the efficiency of your time. I would be happy to have a conversation with you on how best to study in physics courses.

Discussion on Readings

Before every class, you will be expected to make a pre-class discussion post to your assigned discussion group on Canvas. This must be posted at least two hours prior to the start of class. The post must include a paragraph summary of the main topic you learned from that day's reading/video, and a question(s) you have about the reading. Once you have made your post, you can then see peers posts. I encourage you to comment and discuss each other's thoughts and help answer your peer's questions.

When making your pre-class discussion posts and replies, you should practice being part of a community and engage in a growth mindset. There is always more to learn on any topic, thus statements like "I understood the reading fully" or "I have no questions on this topic" are not appropriate discussion post statements and will not receive credit. There is always more to learn on every topic. Inappropriate statements, comments, and questions will not be tolerated. Poor group behaviors can result in a loss of points for a given assignment, and if continued you may be removed from the group and loss of all discussion points for the course. If you feel that a discussion group member is not acting appropriately, please do not hesitate to contact Professor Rich (erich3@unl.edu).

Discussion posts will be graded on completion and will be part of the Community Engagement portion of your final grade.

Lecture

Work inside of lecture time is designed to solidify and practice difficult concepts covered in the course. The lecture will not cover all information for that given topic and will assume that this is not the first time you have seen the information. The lecture will consist of: a discussion on the overview of the course, example problems of difficult-to-understand concepts, and clicker questions for you to practice your knowledge. Problems tackled in the lecture may be more conceptual where numerical solutions will be practiced in homework and recitation sections. Participation and attendance in lecture is graded by participation and will be part of the Community Engagement grade.

Recitation sections

Recitation sections will be designed for you to practice difficult-to-comprehend concepts in a group setting. The lecturer may give a very short (1-5 min) review of the current topic and the majority of the rest of the recitation will be dedicated to the group work. The work will typically be in the form of a guided worksheet or word problems. You will be expected to work in groups to tackle the problems. The work will be graded based on completion and group participation, and will be part of the Group Work in Recitation Section portion of your final grade.

Homework

Practice is an important part of mastery of physics and it is important for you to apply course material to physics questions with increasing difficulty. Homework will make up one way in which you practice solving physics problems (the other being group work recitation sections). **Homework will be due every Monday at 11:59 PM.**

Homework questions will be assigned once a week and be completed via MasteringPhysics. The questions will be graded based on accuracy. Late work will be accepted up to 24 hours after the initial due date without penalty. We all have life events that arise during the term. Thus the lowest homework grade of the term will be dropped. Please talk with the instructor if accommodations need to be made. You are encouraged to talk with others in class, speak to me during student hours, and visit the physics table for help with solving the physics homework problems. However, homework should be your own work. **Use of Chegg and other cheating websites will not be tolerated.** See Academic Dishonesty for further details.

Quizzes

There will be 10 quizzes, one each week we do not have an exam. The quizzes will give you and me a sense of how well you grasp the material. The quizzes are cumulative to the extent that material builds in the course but will focus on material since the previous quiz. All quizzes will be at the end of lecture on Tuesdays. See schedule below for details. Your lowest quiz score will automatically be dropped. See the accommodations section for further details. There will not be a quiz on the Tuesday after an exam.

Exams

There will be 4 unit exams. All assessments are closed book and closed notes. I will provide you with a list of equations you may use and a list of constants. A copy of these materials will be posted on Canvas. I strongly encourage you to practice using the equation sheets when working on quizzes and homework. You can find when the exams are scheduled at the end of the syllabus. The last unit exam will be in place of a cumulative final exam.

Project

To have mastery of a topic, you must be able to teach someone about that subject. Thus, you will complete a project in which you will teach a member of the public about a physics topic you have learned. How you present this material to the public is up to you! It could be a video, a website, a podcast, a live event (such as a certain partial solar eclipse on April 8th). Project proposals are due February 29th, and the project is due May 2nd.

Automatic Class Accommodations:

- I will drop your lowest Homework grade. This is done automatically.
- I will drop your lowest Quiz grade. This is done automatically.
- I will drop 3 of your lowest in-class participation grades. This is done automatically.
- I will drop 3 of your lowest in-class participation grades. This is done automatically.
- I will drop your lowest recitation group-work grade. This is done automatically.
- I will drop your lowest exam grade. This is done automatically.

Course Policies and Procedures

University course policies and procedures can be found here: <https://go.unl.edu/coursepolicies>

Academic Dishonesty

All forms of academic dishonesty including cheating, fabrication and falsification, plagiarism, misrepresentation to avoid academic work etc. will be dealt according to the rules of [Disciplinary Procedures of the Student Code of Conduct of UNL](#).

PLEASE NOTE that the use of **Chegg** (or similar websites) to complete assigned work (including but not limited to homework, labs and recitations), either in whole or in part, is considered academic dishonesty. Using Chegg (or similar websites) to cheat may result in a course grade of F and reported to the Office of Student Conduct & Community Standards.

You are encouraged to work with classmates on homework, recitation, and lab assignments. However, communicating with anyone besides the instructor, online or in person, whether they are enrolled in the course or not, regarding exams and quizzes is academic dishonesty. The instructor reserves the right to conduct interviews or administer oral exams in the event that I suspect a student has cheated.

Disability Accommodations

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience barriers based on your disability (including mental health, chronic or temporary medical conditions), please let your instructor know immediately so that you can discuss options privately. To establish reasonable accommodations, your instructor may request that you register with Services for Students with Disabilities. If you are eligible for services and register with the office, make arrangements with your instructor as soon as possible to discuss your accommodations so they can be implemented in a timely manner. SSD is located in 117 Louise Pound Hall and can be reached at 402-472-3787.

If you are a student on the UNO campus, you may register for accommodations at the Accessibility Services Center, which is located at 104 H&K Building and can be reached by calling 402-554-2872.

ACE Information

Physics 211H is an Achievement-Centered Education (ACE) course satisfying Student Learning Objective 4 (SLO 4):

Use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.

Physics 211H is an calculus-based physics course offered by the Dept. of Physics and Astronomy. The course is designed to teach students the knowledge and methods of physics, which is the foundational science underlying the human understanding of the physical, natural, and technological universe. Physics 211H focuses on the topics of mechanics, and fundamental principles of physics such as forces and conservation of energy and momentum. The learning objectives are embedded in the course as follows.

(i) the ACE Outcome(s) for which the course is certified

Student Learning Objective 4 (SLO 4): Use scientific methods and knowledge of the natural and physical world to address problems through inquiry, interpretation, analysis, and the making of inferences from data, to determine whether conclusions or solutions are reasonable.

(ii) the opportunities the course will give students to acquire the knowledge or skills necessary to achieve the Learning Outcome(s)

Mathematics and Statistics

The course makes extensive use of mathematical analysis as a central and essential component of estimation, problem solving, and evaluation of solutions. The mathematical methods most used are algebra, trigonometry, vectors, unit analysis, numerical computation, and calculus.

Critical Thinking

The course emphasizes the development of mature appraisal and problem-solving techniques, which involve critical thinking at three key stages. First, in setting up the analysis, students must learn to identify the essential physical principles and to which part of the system or process they apply. Second, in developing the solution, the students must identify useful and valid assumptions about how the system should behave and relate this to the mathematical representation of the solution. Third, the students must evaluate and test the solution for reasonableness and accuracy. This is particularly important when they are working with phenomena, such as the behavior of subatomic particles, that are not part of everyday experience, or the validity of assumptions and approximations, such as the neglect of friction when its effects have insignificant influence on the outcome. Even in the case of everyday experience, the must learn to challenge their own, frequently flawed, preexisting conceptions.

Problem Solving

Problem solving is by far the main activity in the course. Therefore, most of the effort in the course is focused on the process and tools for solving problems involving physical systems.

(iii) the graded assignments which the instructor(s) will use to assess the student' achievement of the Outcome(s).

Student abilities for appraising physical situations is assessed in several ways. The course grade is based on a cumulative score that is derived from the following components, which are all graded

and weighted according to the breakdown given in the syllabus. For each lecture assessment activities include student responses to (i) pre-class discussions, (ii) in-class exercises, and (iii) follow-up homework exercises and problems. For the weekly laboratory sessions, students are assessed based on vi) lab-preparation quizzes and vii) a report of the results, analysis, and conclusions drawn from the laboratory results. Progress in the course as a whole are assessed with (viii) unit midterm exams. The concept questions, and some of the homework exercises focus on specific knowledge, basic computational skills, and grasp of key concepts. The students' integrative understanding of physical principles and problem-solving is assessed with the more complex homework problems, in-class exercises, and the exams.

Schedule

Dates of the exam and quizzes will not change.

I will endeavor to keep to the content schedule however stay tuned to Canvas and announcements for changes as we progress through the course.

Week	Tuesday	Thursday	Recitation Section
1	January 23rd Topic: Introduction Read: Ch 1:4-5,7-10 Recommend Ch 1:1-3,6 Watch: What is Physics	January 25th Topic: 1D Kinematics Ch. 2:1-3	Introductions and Math Review
2	January 30th Topic: 1D Kinematics: motion with const acceleration Read: Ch 2:4-6 Quiz	February 1st Topic: Vectors and 2D kinematics, projectiles Ch 3:1-3 Physics Primer Due	Kinematics
3	February 6th Topic: Newton's Laws Read Ch 4:1-6 Quiz	February 8th Topic: Application of Newton's Laws, simple machines Read Ch 5:1-3	Projectile Motion
4	February 13th Topic: Relative and Circular Motion Read: Ch 3:4-5 Quiz	February 15th Exam #1	Newton's Laws
5	February 20th Topic: Application of Newtons Laws, Circular Motion, friction Read: Ch 5:4-5	February 22nd Topic: Work and Kinetic Energy 1D Read: Ch 6:1-2	Application/ Circular Motion
6	February 27th Topic: Work and kinetic energy, 2D and variable force Read: Ch 6:3-4 Quiz	February 29th Topic: Potential energy and conservation of energy Read Ch 7:1-2 Project Proposals Due	Work/Kinetic Energy
7	March 5th Topic: Potential energy and conservative forces Read: Ch 7: 3-5 Quiz	March 7th Topic: Momentum, impulse, momentum conservation Read: Ch 8:1-3	Potential Energy

8	March 12th Spring Break No Classes	March 14 th Spring Break No Classes	Spring Break No Classes
9	March 19th Topic: Momentum Collisions, center-of-mass frame Ch 8:4-5 Quiz	March 21st Exam #2	Momentum
10	March 26th Topic: Rotational Motion Kinematics Read Ch 9:1-3	March 28th Topic: Rotation with energy, moment of inertia Read Ch 9:4-6	Conservation of Momentum
11	April 2nd Topic: Rotation with dynamics, torque Ch 10:1-3 Quiz	April 4th Topic: Rotation with angular momentum Ch 10:5	Rotational Motion
12	April 9th TBD	April 11th Topic: Equilibrium statics Ch 11:1-3	Torque
13	April 16th Topic: Gravitation Ch 13:1-4 Quiz	April 18th Exam #3	Precession
14	April 23rd Topic: Simple harmonic motion Ch 14:1-4	April 25th Topic: Simple and physical pendula Ch 14:5-6	Equilibrium
15	April 30th Topic: Harmonic waves and the wave equation Ch 15:1-4 Quiz	May 2nd Topic: Superposition and standing waves Ch 15 6-8 Projects Due	Pendula
16	May 7th Review Quiz	May 9th Review	Standing Waves

Finals	Exam #4 will be 3:30 to 5:30 p.m. Tuesday, May 14		
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