When and where we meet
PHYS 202: CRN 41037
Class: MTWHF 10:00 – 11:50 Willamette 100

Tutorial: MWF 1:00 – 1:50 McKenzie 240A
MWF 1:00 – 1:50 McKenzie 240C (In McKenzie 240A from 8/1-8/5)

Your Teaching Team
Instructor: Dr. Trevor Brunnenmeyer
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GEs
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William Dumas - dumas2@uoregon.edu

We are here to help guide your learning and help you succeed during the course. We are available during office hours to answer questions about this course or provide additional resources. We invite you to come visit us, so we can meet you and learn more about your interests in the course.

A bit about what you’ll learn in this course
PHYS 202 continues your exploration of energy by focusing on how energy transforms and transfers, in particular in the human body and heat engines. We’ll learn how energy is transferred thermally as heat and the effects it has on substances. We’ll then study systems that oscillate and use this to understand harmonic motion, resonance, sound wave, and standing waves. We’ll finish out the class looking at both the wave and ray models of light.

Learning Standards and Assessments
This course will use a standards-based approach to learning. There are 17 Learning Outcomes that you will be assessed on. Each of these Learning Outcomes will be assessed as either “met” or “not yet met”. You will have the opportunity to attempt each Learning Outcome multiple times, with a few various ways to demonstrate that you have met the standard.

Course Learning Goals and Learning Outcomes
Each chapter there is an overall goal for the broad picture concepts and skills that you will be understand by the end of our study of that chapter. These goals have 1 to 3 specific Learning Outcomes, which are specific, demonstrable things you will be able to do to apply the concepts and skills in that chapter. Each Learning Goal should be read with “You will understand” at the beginning. Each Learning Outcome should be read with “You will be able to” at the beginning.
Chapter 11 - Using Energy

Goal: How energy transforms and transfers, and the limits on how efficiently energy can be used. This includes energy involving heat engines, heat pumps, the human body, and power plants and how these situations involve efficiency and the laws of thermodynamics.

Outcome 1: Describe how energy is transformed and transferred in the human body. This includes using the work-energy equation from Chapter 10.

Outcome 2: Set up and solve problems involving heat engines or heat pumps and make quantitative statements about these situations.

Chapter 12 - Thermal Properties of Matter

Goal: How to use the atomic model of matter to explain many properties of matter associated with heat and temperature.

Outcome 3: Set up and solve problems for systems with changes in temperature and/or phase.

Outcome 4: Qualitatively and quantitatively describe how objects transfer heat to other objects or to their environment.

Outcome 5: Set up and solve problems involving gas processes. This includes using pV diagrams, the ideal gas law, and the first law of thermodynamics.

Chapter 13 - Fluids

Goal: The static and dynamic properties of fluids.

Outcome 6: Use Bernoulli’s equation to solve problems for incompressible fluids in pipes that change height and shape/size.

Outcome 7: Use Archimedes’ principle to determine and discuss objects submerged or partially submerged in a fluid.

Chapter 14 - Oscillations

Goal: Systems that oscillate with simple harmonic motion.

Outcome 8: Convert between graphical representations of simple harmonic motion and physical quantities (frequency, angular frequency, period, amplitude) describing the motion.

Outcome 9: Use the principles of mechanics to set up and solve problems involving springs. This includes forces and energy.
Chapter 15 - Traveling Waves and Sound

Goal: The basic properties of traveling waves.

Outcome 10: Qualitatively and quantitatively compare and contrast both transverse and longitudinal waves, particularly waves on a string and sound waves.

Outcome 11: Apply energy and power concepts to waves, including use of the sound intensity level.

Chapter 16 - Superposition and Standing Waves

Goal: How to analyze the phenomena of interference and standing waves using the concept of superposition.

Outcome 12: Calculate and describe wave characteristics for standing waves, in particular standing waves on a string and in a tube. These characteristics include wavelength, frequency, wave mode, beats, fundamental frequency, and harmonics.

Chapter 17 - Wave Optics

Goal: The wave model of light and how to apply it in problems.

Outcome 13: Set up and solve problems involving single slit diffraction, double slit diffraction, and diffraction gratings.

Outcome 14: Set up and solve thin-film interference problems. Be able to qualitatively describe when constructive and destructive interference occur.

Chapter 18 - Ray Optics

Goal: Understand and apply the ray model of light.

Outcome 15: Use Snell’s law of refraction to describe light as it goes from one material to another material, including the condition for total internal reflection.

Outcome 16: Use ray diagrams to qualitatively locate and describe images formed by lenses and mirrors.

Outcome 17: Use the thin-lens equation to quantitatively locate and describe images formed by lenses and mirrors.

Chapter 19 - Optical Instruments

There are no specific Learning Goals or Outcomes, but we will apply what we’ve learned in Chapter 18 to optical instruments.
How you know you’re learning
There are several ways that you will be able to check your learning throughout the term. Some of these will be formative assessments (things that let you and me assess where you’re at while you are learning) and some will be summative assessments (things that let me assess where you’re at at the end of your learning).

Formative Assessments:
There will be a few types of formative assessments. There will be questions during prelectures, clicker questions during class, in class activities and problems, and homework problems. None of these will be graded or count towards demonstrating proficiency.

Summative Assessments:
There will be several ways that you can demonstrate proficiency on the learning outcomes, however you only need to demonstrate proficiency in one way to count for it to count.

In Class Exams
This is the most traditional assessment we will use. At each exam we will have problems for each of the Learning Outcomes that we have covered so far. You will be allowed to attempt problems for any Learning Outcome you would like. You are responsible for knowing which Learning Outcomes you still need to demonstrate proficiency in to know which problems to attempt.

For the exams, you will be allowed to bring one 8.5 by 11 sheet of paper for handwritten notes.
You are free to choose what is on your equation sheet.
You are also allowed to bring a calculator to the exams. You should be able to do everything with a scientific calculator, but you are allowed to bring a graphing calculator if you wish. (I know that you can enter formulae and other information into a graphing calculator. Since this is beyond using a formula sheet, I will consider this cheating.)

Take Home Problems
These problems will be similar style to the in-class exams, but more in depth/longer since you have more time and space to work on them. You are expected to work on these problems by yourself. Use of resources like the textbook or the internet are fine, but talking to your classmates or posting the problems to help sites (including, but not limited to, Chegg, Discord, WhatsApp) is not. If you use resources other than the textbook, you should include a citation. The citation doesn’t need to follow any particular format, but should be detailed enough that someone could easily find the source you used.
You can submit one take home problem each week.

Video Explainer
You can make a short video explainer for a problem that you attempted in an In Class Exam but did not sufficiently demonstrate proficiency. This should be a 5–7-minute video where you set up and solve the problem. You should explain the
problem and show your work in a way that one of your classmates would be able to understand the solution. You can submit a video explainer for one problem in the second, third, and fourth week of the course.

Project
This is the least rigid and well-defined way that you can demonstrate proficiency. You can demonstrate proficiency for up to two Learning Outcomes this way. This could either be two separate projects or one project that incorporates both. The goal behind this assessment is that you do something creative that connects the Physics that we are doing with something in the broader world that you care about. I have listed some possible ideas below, but you should feel free to think of other ways you would like to do this. Before you go too far on any project, make sure to talk with me to make sure that it’s something that will be feasible and likely to demonstrate proficiency.

Some Ideas:
• Problem from your major: Write a detailed problem connecting our class to another class you have taken. Present it either as an easy to follow write up or make a video explainer.
• Hands on project: Build something that demonstrates the physics. Turn in a write up that explains what it is, how it works, and include pictures.
• Panel of memes: Make several memes and write up how it connects to the learning outcome. (I would expect the write up to be fairly detailed for something like this)
• Art piece: Knit, paint, sew, or use another art form to represent or show the learning outcome. Include a write up to explain the learning outcome and how the art piece connects.

How will you be graded?
Your final grade will be determined by the number of Learning Outcomes that you demonstrate proficiency in.

<table>
<thead>
<tr>
<th>Course Grade</th>
<th>Standards Met</th>
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<tbody>
<tr>
<td>A</td>
<td>13 - 17</td>
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<tr>
<td>B</td>
<td>9 - 12</td>
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<td>C</td>
<td>5 - 8</td>
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<td>D</td>
<td>1 - 4</td>
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<td>F</td>
<td>0</td>
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Note: This range includes + and - grades. The bottom end of the range corresponds to a - grade and the upper end to a + grade. For example, 9 standards met would be a B- and 12 standards a B+. 
What supplies will you need?
College Physics eText w/Mod Mast.Physics. 4th Ed Knight, Jones, Field. ISBN: 9780134665535
• iClicker2 ISBN: 9781498603041
• Scientific calculator (has sine cosine functions and exponent, square root functions)

A few things to help you succeed in this course
As with any skill you develop, in order to learn Physics you have to practice doing Physics. Part of this practice is to actively participate during class. You should participate in many forms during class. These forms include (but aren’t limited to): working through a posed question, discussing a question, sharing your answer with your peers.

While much of your learning will occur during class, you should also plan to spend a decent amount of time out of class on this course each week. (By UO policy, this works out to around 18 hours each week.) This time should be divided between the prelectures, completing homework sets, reading the book, and reviewing the concepts that we have discussed. While all of these things can be completed on your own, I always recommend collaborating with other people. This can be forming a study group with your peers or reaching out to your teaching team in office hours. Always remember that you are not in this alone.

What you’ll be doing to support your learning
An approximate timeline for the course follows. I will try to stay within a day or so of the schedule, but if there are topics that we need more or less time on that I originally thought, I will adapt as we go.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Assessments</th>
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| 7/18 | Course Introduction  
       | Chapter 11.1 and 11.2 | |
| 7/19 | Chapter 11.3, 11.4, 11.5, 11.6, 11.7 | |
| 7/20 | Chapter 12.1, 12.2, 12.3 | LO 1 |
| 7/21 | Chapter 12.4, 12.5, 12.6, 12.7, 12.8 | |
| 7/22 | Chapter 13.1, 13.2 | LO 2-5 |
| 7/25 | Chapter 13.3-13.6 | |
| 7/26 | Chapter 14.1-14.4 | |
| 7/27 | Chapter 14.5-14.7 | LO 7 |
| 7/28 | Chapter 15.1-15.4 | |
| 7/29 | Chapter 15.5-15.6 | LO 6, 8, 9 |
| 8/1  | Chapter 15.7, 16.1-16.4 | |
| 8/2  | Chapter 16.6-16.7 | |
| 8/3  | Chapter 17.1-17.3 | LO 10 |
| 8/4  | Chapter 17.4-17.6 | |
| 8/5  | Chapter 17 | LO 11, 12, 13 |
| 8/8  | | |
| 8/9  | Chapter 18 | |
| 8/10 | Chapter 18 | LO 14 |
| 8/11 | Chapter 19 | |
| 8/12 | | LO 15 - 17 |
A Final Note:
My goal is to share with you the joys of Physics. In doing so, we’re likely to hit some roadblocks. I hope that you’ll be open and honest with me in order to improve the course and our learning community. If you ever have any questions about why I have structured things in the way that I have, or any other questions about the course, please feel free to ask. I will try to be as transparent as possible.

A Final Disclaimer:
There may be small changes that I need to make to this syllabus. Please have patience if and when they happen. I will try to communicate the changes and reasons behind them when they happen.
Campus resources to support your learning

**Tutoring and Learning Center (TLC)** Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, tlc@uoregon.edu

**Counseling Center** Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center (541)346-3227

**Accessible Education Center** The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoaec@uoregon.edu

**Center for Multicultural Academic Excellence (CMAE)** mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu

**Inclusiveness**
Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

**Academic Integrity**
All students are expected to complete assignments in a manner consistent with academic integrity. Students must produce their own work and properly acknowledge and document all sources (ideas, quotations, paraphrases). Students can find more complete information about the University of Oregon’s Policy on Academic Dishonesty in the University of Oregon Student Handbook.

**Duty to Report**
UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. As an instructor, one of my responsibilities is to help create a safe learning environment for my students and for the campus as a whole. As a member of the university community, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment, sexual violence or discrimination to a confidential employee who does not have this
reporting responsibility, you can find a list of those individuals here https://safe.uoregon.edu/services