**CH 241H - Honors Foundation of Physics I**  
Fall 2020 – CRN 35150

*Updated: October 3, 2020 (this document subject to change)*

| Instructor          | Prof. Ben McMorran  
|                     | mcmorran@uoregon.edu  
|                     | *Please call me “Prof. McMorran” and use “he/him/his” pronouns*  
|                     | Office Hours: Tuesdays 5:00 – 6:30 PM  
|                     | Zoom [link](#) (or connect via Canvas or email)  
| Teaching Assistant  | Shuhao Wi, swu8@uoregon.edu  
|                     | Office Hours Mondays 4:00 – 5:30 PM ([Zoom link](#))  
| Meetings            | TR 1415 - 1545 using Zoom (meeting ID: 917 0620 4807, passcode: 6d256n, Zoom [link](#))  
| Final Exam          | The final exam will be on Tuesday, Dec. 8 at 12:30 PM online  
| Website             | All communication will be made through the course website on Canvas  
|                     | [https://canvas.uoregon.edu/courses/166415](https://canvas.uoregon.edu/courses/166415)  
| Textbook            | *Principles and Practice of Physics (2nd ed.), by Eric Mazur*  
| Mastering Physics   | Students will use an online tutorial and homework tool called *Mastering Physics* that also contains an online version of the textbook. You will need to purchase access to this system (18 weeks access for $69.99), although I believe there is a 2-week trial period. You can access *Mastering Physics* through the “MyLab and Mastering” link on the left of our Canvas site. You can also access it by signing in at [www.pearsonmylabandmastering.com](http://www.pearsonmylabandmastering.com). Our course ID is ’mcmorran91968’.  

**Overview**

In this course, we will discuss and practice introductory physics concepts in Mechanics, the study of motion and its causes. Whereas a conventional course would approach this subject through the introduction of Newton’s Laws, here we will learn the role symmetry plays in nature and the consequence it has for conserved quantities like momentum and energy. Taking advantage of the CHC approach, we will discuss the influences of the scientists that came up with these concepts. In particular, Emmy Noether, an under-recognized, immensely influential contributor to physics, will play a central role in the story. Mathematics provides a structured language necessary for a quantitative understanding nature. A comfortable familiarity with algebra, geometry, and trigonometry is assumed but will also be reviewed. Calculus and vector concepts will be introduced and practiced in the same context that they were developed historically: to model change and directional quantities in physics. This course will also stress a systematic and organized approach to solving in-depth problems.

**Course Objectives**

This is a skill-building course rather than a fact-memorization course. Physics is a very powerful way of thinking that provides new paths to understanding and interacting with the universe. The
process of learning and applying physics is very challenging, but the various cognitive skills you build in this course will serve you well in your life.

The physics learning objectives of this course:

- Understand fundamental concepts underlying mechanics of the universe.
- Learn to build simplified theoretical models of complex physical systems.
- Apply fundamental physics concepts to find solutions to a wide range of problems.
- Learn how to analytically arrive at quantitative answers and interpret those results.
- Develop your ability to communicate technical ideas.
- Develop “numeracy”. Numeracy is the ability to communicate (read and write) using equations and numbers. It is an indispensable skill in modern life.

Solving physics problems (assigned homework at the very least) is the only way to master these skills.

The primary personal development objectives of this course:

- Increase your puzzle-solving skills and “working memory”.
- Learn to extract deep insights through deep contemplation of seemingly mundane things, like simple machines or the positions and movement of everyday objects.
- Develop a tolerance for being confronted with a seemingly intractable problem. Learn to be excited by this instead of intimidated.
- Learn to work effectively in diverse groups.
- Become part of the community of other physicists and scientists at the UO.
- Learn about research being done in the department.
- Learn about what it is like to be a professional scientist.

Course Philosophy

Decades of research on teaching strategies show that it is almost pointless to teach physics to students. Instead, students must actively engage in learning physics. This may seem like a semantic difference, but there is a real and demonstrable benefit to students being actively engaged and taking responsibility for their own learning. This course is designed to encourage you to learn, and one of the most important pieces of that is using class time to grapple with some of the more confusing aspects of the material. This means we will not have time in class to go over some of the more straightforward concepts, and to get the most out of this course you will need to prepare for each day by reading and engaging with the topics before we get to them in class. There will be short asynchronous activities (mostly videos and quizzes) each week along with small group discussions to help you engage the material in a meaningful way.

Course Structure and Expected Workload

The University of Oregon policy (link) defines 1 credit hour as approximately 30 real hours of student work, both in class and out of class. Thus, a 4-credit course such as this should engage students for about 120 hours over the course of the term, though this may vary from student to student, and week by week. Physics is a difficult subject that requires your steady attention to learn. To do well in this course, you will have to practice solving problems on your own, even beyond just the assigned exercises. If you fall behind, contact me and we can strategize.
Communicating with Me

Confused by the material? Wondering how it relates to your life? Saw something in the news related to class that interested you? Having problems managing your schedule? Please don’t hesitate to contact me! Even in normal times, it is important to stay in touch – and now more than ever. I enjoy talking with students.

Our class will communicate through Canvas. I'll send out class Announcements through Canvas that will automatically forward to your UO email. They can even reach you by text depending on your notification settings (in Canvas, check and adjust your settings under Account > Notifications).

If you have a question or remark, you have a few options. If you think others in the class will have an interest or can answer your question, I encourage you to use the Discussion forum in Class Questions and Answers. You can send me direct messages using the Inbox tool on the left in Canvas (this will send me an email) or you can email me directly at mcmorran@uoregon.edu (please use your '@uoregon.edu' email address). I usually respond to direct messages within one business day, and often faster. You can also call my office phone (541-346-8624) and leave a voice message, though that might take a bit longer for me to respond to.

During synchronous class time in Zoom, you are welcome to unmute your microphone and ask a question or you can also use the Chat feature at the bottom of the Zoom window (sometimes it might take me a while to see it though). I will also usually stay behind a bit after class to answer questions.

I will also hold weekly online Office Hours. I will soon poll the class to decide on a time and post it here.

Schedule

The course schedule is provided as a separate document to facilitate keeping it up to date. The schedule and all assignments will be posted on Canvas.

Grading

You will pass this course if you participate in discussions, make honest attempts at all assignments, and demonstrate improvement in your knowledge and skills. Room is allowed for you to initially fail on certain tasks, if you can then show improvement. Course grades will be based on the following categories. Please see below for more details on course expectations and how assignments will be graded.

- 20% [I] - Class interaction in discussions (online chat and Zoom)
- 20% [HW] - Online homework assignments (MasteringPhysics)
- 20% [R&P] - Written reports and video presentations
- 20% [Q] - Quizzes
- 20% [F] - Final exam

Historically, scores above 90% have earned an A, scores above 80% have earned a B, scores above 70% have earned a C, while scores below ~60% have failed. Each year is slightly different, however, and the exact ranges for this course will be determined after the final exam. The overall course evaluation will possibly be graded on a curve to account for variations in the difficulty of exams, although we will not penalize the class if everyone is doing very well.
Interaction, Participation, and Engagement [I]

Physics is a very social endeavor, like all the natural sciences. There are numerous examples of the ‘lone genius’ portrayed in physics textbooks and perpetuated in the media, but their ideas don’t emerge from a vacuum. To be sure, there are some individuals that have a knack for creativity and cleverness, but the emergence, refinement, and interpretation of their ideas requires numerous conversations with other people that see things in different ways. Modern physics emerges from many meetings between scientists of various backgrounds and motivations. Thus, one of the most important cultural traits within the physics community is the ability to engage in technical conversation in a socially complex environment. This course will involve numerous discussions in order to gain experience in this, as well as to help you learn the material. We will use Zoom for synchronous conversations and Canvas Discussions and other tools for asynchronous communication. In all circumstances, practice respectful dialog.

Online Homework [HW]

The only way to really learn how physics is to practice it. Textbook problems are present exercises to help you organize what you need to learn and practice applying it. Weekly online homework assignments (tutorials and practice problems) through MasteringPhysics provide a way to get quick feedback. These assignments will typically be due Wednesday evenings by 11PM. Late online homework assignments will be accepted but with a penalty. Please make sure you are properly registered with MasteringPhysics before the end of the first week. I believe you have a free 2 week trial, and then you will need to purchase access after that ($69.99 for 18 weeks). You can access it either through the ‘MyLab and Mastering’ link on our Canvas site, or at www.pearsonmylabandmastering.com using our course ID, ‘mcmorran91968’

Here I am primarily grading for engagement, not correctness. The HW grading scheme is designed to allow you to fail and improve while also providing formative assessment. While some minor amount of credit might be removed for wrong answers, you and I should both use this as a diagnostic to shore up your learning, not as a punitive measure. This is practice, and it is OK to be imperfect. The key is to understand your mistakes. If you are concerned about missed points significantly affecting your grade then contact me.

A note on collaborative homework discussion:  Discussing physics problems with others is a very good way to discover conceptual difficulties, and it can be a powerful tool for improving your understanding of the subject, but it can also be self-defeating if not done right. You get fit by exercising, not watching other people exercise! I’ve known many students who can recognize a correct solution when they see it, and then incorrectly conclude that they understand physics. Physics requires being able to assemble conceptual tools and apply them to a problem. My advice: when confronted with a hard problem, iteratively consult your textbook, example problems, and then explore your way to an answer by yourself before discussing it with other people, and never simply copy the solution that others arrived at. This is crucial to training your brain to solve physics problems. Please note that while discussing homework problems with other students is encouraged, copying the work of others and claiming it as your own is academic misconduct and will be treated as such. This includes copying solutions to problems found online. There is very little benefit and considerable risk to not fully engaging with the homework material.
Homework is your chance to practice and to self-assess whether you are understanding the material in this course. Skipping this work will almost certainly impact your final grade.

A note on deadlines: I want to allow some flexibility to make accommodations during these busy times and unusual circumstances, but also have learned the importance of providing a sturdy framework for your learning. Turning in late work is better than not doing it at all, but staying on top of the assignments and getting your work done on time is a key to improving your understanding of physics (and achieving a good grade in this course).

Reports and Presentations [R&P]
Whereas online homework is designed to give you context to learn physics and practice problem-solving, it is also important to be able to organize and communicate your analysis. Each week, you will prepare written reports and/or explainer videos of your solution to additional homework projects. These will be posted to Canvas and reviewed by others in class. The evaluation rubric stresses that these reports and presentations should teach one’s classmates how to solve problems: they should each include a figure, a description of the strategy, and comments on possible pitfalls. This gives a framework for metacognition to reflect on what is challenging about the material.

Quizzes [Q]
Weekly quizzes are designed to provide a low-stakes, low-stress evaluation. They will be conducted online.

Final Exam [F]
The final exam is set for 12:30 Tuesday, December 8th and will be held online. It is likely that the exam will require a live video feed of yourself during the exam, so ensure you have a device and internet connection capable of this. These dates will not change, so please arrange your schedules to accommodate these times. In case of serious conflicts, please contact us as far in advance as possible so that we can work out a solution together.

Academic Integrity
All students are expected to complete assignments in a manner consistent with academic integrity. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. The University Student Conduct Code (https://dos.uoregon.edu/conduct) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students’ obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at researchguides.uoregon.edu/citing-plagiarism.

I have taught this class for several years, interacted with lots of different students under various circumstances, and I have three bits of advice. (1) Cheating is really bad, easily detected (I have lots of clever ways), and rarely worth it (it turns out to be much easier and more effective to just do the work and study), (2) It is OK to get behind or feel unprepared - as soon as you realize this,
contact me and I’ll help. (3) Physicists have developed special methods to "cheat" (really, shortcut) their way to a solution, and I encourage these special methods and will even show you how.

**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, uoae@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. This is part of being a scientist.

**Our Duty to Report**

As instructors of this course, we are Student-Directed Employees. As such, if you disclose sensitive information to us, we will respond to you with respect and kindness. We will listen to you and will be sensitive to your needs and desires. We will not judge you. We will support you. We will direct students who disclose sexual harassment or sexual violence to resources that can help and will only report the information shared to the university administration when the student requests that the information be reported. As Student-Directed Employees, we can offer privacy because we are not required to report certain information to the university. However, we cannot be bound by confidentiality in the same way that a counselor or attorney is. Unless someone is in imminent risk of serious harm or is a minor, we will keep your disclosure private. Please note the differences between confidential and private. For more information on reporting obligations of employees and specific details about confidentiality of information, visit titleix.uoregon.edu
Discrimination and Harassment Resources

Additional help and resources for any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment are available at safe.uoregon.edu or by calling the UO’s 24-hour hotline 541-346-7244 [SAFE] or the non-confidential Title IX Coordinator at 541-346-8136.

Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216.