General Physics with Calculus (PH 211, Spring 2018, 4 credits)

Instructor: Kathryn Hadley
Office: Wngr 373
Office Hours: Tu, Th from 11:00 - 1:00 or by appointment
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Prerequisites: MTH 111, MTH 112, and MTH 251
Corequisite: MTH 252

Text: *Physics for Scientists and Engineers*, 4th edition, Knight

Additional Items: Access to MasteringPhysics and a ResponseCard NXT hand-held communication device (clicker). The lab manual is a set of pdf files posted on Canvas.

This course is part of the **OSU Baccalaureate Core** and fulfills the requirement for study related to **Physical Science**. The **Baccalaureate Core Student Learning Outcomes** for this category are: 1) recognize and apply concepts and theories of basic physical or biological sciences, 2) apply scientific methodology and demonstrate the ability to draw conclusions based on observation, analysis, and synthesis, and 3) demonstrate connections with other subject areas.

What is Physics? Physics is the study of nature. It is a *living* discipline, not a collection of facts. It is the science of daily existence. One has direct experience with the nature of forces, how things respond to those forces, the conservation of mass, energy, momentum, and some aspects of gravity. The formal study of physics should guide and clarify one's understanding to build a consistent basis of fundamentals that allows one to build models for describing the physical behavior of unfamiliar or complex systems. Physics is about reasoning, making connections, and understanding what will happen in a situation, and why it happens.

In order to do physics in a genuine sense, it is necessary to be able to apply the skills used within the discipline to new situations. When dealing with new situations, mathematical models are used to describe them. Applying these models often requires simplifications or assumptions about the physical situation. It is necessary to become proficient with the use of models, their applicability, when they are not appropriate and why, and to be able to analyze situations multiple ways. One goal is to develop a set of skills and tools that one can use to analyze any basic system, and to understand what the next step would need to be to address a more complex aspect of that system.

Learning Outcomes: By the end of this course, you will be able to:

- understand how to represent and analyze motion for objects that can be modeled as a point
- apply Newton's laws and conservation laws (energy and momentum) to analyze the behavior of physical systems under certain conditions, and to understand when to apply these laws
- make observations of physical systems and find explanations that are consistent with the observations, apply these explanations and established laws to make predictions about the outcomes of experiments, and test the explanations and laws through experimentation
- represent information in multiple ways (diagrams, graphs, words, equations, etc.) and move from one representation to another, use these representations to set up solutions to problems, predict the behaviors of physical systems, and to check the solutions to problems
- use critical thinking skills as described below

Critical thinking is a fundamental part of science and at the heart of physics. In many ways, physics is the discipline of modeling and problem solving. In this course, you will look at new situations and make assumptions about them which allow you to make appropriate simplifications to apply physical models. Critical thinking is being able to:

- analyze an open-ended, new physical system
- consider what assumptions and simplifications can be made
- breakdown the situation into manageable pieces
- apply concepts to analyze each piece and combine them into a solution
- evaluate if the solution makes sense

We will use historical experiments and scientific development, contexts from other disciplines, and modern experiments at the frontiers of our knowledge to develop the ideas in the learning outcomes and for problem solving whenever possible. The learning outcomes and critical thinking will be developed through in class demonstrations, voting questions, peer-to-peer discussions, full-class discussions, in-lecture group work, and lab work. They will be *formatively* assessed through voting questions and lab work, and *summatively* assessed during exams.

Lecture: Lecture meets for one hour, two times per week. The purpose of lecture will be developing conceptual understanding, working on representing phenomenon, practicing problem solving, and building understanding though observations and explanations of phenomena. Lecture is interactive. There will be times in lecture that you are strongly encouraged to talk with other students near you. However, due to the large size of the class it is disruptive if you talk while the instructor is talking. Questions, comments, and interruptions are welcome, but please raise your hand.

Studio: The two-hour studio portion of the class meets weekly. These sessions will primarily be used for giving you the opportunity to develop the emphasized tools and skills, and make sense of the concepts in the course. There will be considerable opportunity to get direct questions addressed. Studio materials will be provided during the studio time, worked on in-class, and turned in before you leave.

Lab: The lab is the appropriate place for you to apply the tools and skills to explore more complex situations. The labs will get increasingly more open-ended, so eventually you will be able to do authentic physics modeling of real situations. Required lab write-ups will be completed during the lab period. The lab packet is posted on Canvas.

Textbook: Most students find it helpful to read the textbook before lecture to help understand what occurs during lecture and ask productive questions. Most students also find it helpful to read the textbook after lecture to solidify what they learned during lecture. Think about the questions asked in the book as you go along and make note of what doesn't make sense to you so you can ask about it later. Most importantly, *don't fall behind* because most concepts build on those encountered earlier.

Communication: Communication will be through announcements given in lecture, posted on Canvas, and via email using oregonstate.edu accounts. You are expected to check these daily.

Exams: There will be two midterm exams (100 points each) and one final exam (200 points). The midterm exams are not held at the same time or location as the lecture. The locations will be posted on Canvas. The midterms will be held Wednesday evenings from 8:30 to 9:50 PM. The final will be held on the day and time listed at the end of this document. All exams are closed book and comprehensive, and will include material from readings, labs, lecture, and/or homework. The exams will consist of conceptual questions and write-out problems, including all aspects of problem-solving required for homework: discussing the assumptions and concepts that apply, and evaluating the results. A formula sheet will be provided with each exam. The formula sheets are posted on Canvas.

Bring a photo ID to each exam. **Any official exam conflict must be discussed and arrangements made with the instructor *before* the exam.** Unexcused absence will result in a zero for the exam, including the final. If you believe that an error was made in the grading of an exam question, then bring your complete exam to the instructor *within two weeks* after the exams have been returned. Never make any alterations or additions to the exam itself. This includes the cover page and the back of each page.

Studio: The studio portion of the course is worth 100 points. There will be a range of opportunities to earn points, including randomly collected in-class work, presenting solutions to peers, completing certain activities, and participation. Explanations of points that can be earned within the studio portion of the class will be given during the studio.

Lab: Lab meets for two hours once per week, most weeks of the term. 100 points are earned for **attending and conducting all of the labs**, and obtaining an *average* of at least two-thirds of the possible points for the lab reports over the course of the term. Each group will write one lab report *during* each lab. **You must pass lab in order to pass the course.** There is opportunity to make-up one or two labs during dead week. Any lab scheduling issues should be addressed directly with the lab TAs.

Recitation, PH 221: Recitation is not required, but strongly recommended. It consists of weekly group problem solving sessions. Recitations are taught by experienced TAs who can address individual problems and provide guidance in small group sessions.

Honors Recitation, PH 221H: This course is an opportunity for honors college students to have more in-depth discussions with a senior faculty member about the PH 211 topics.

Formative Assessment Points: *Formative assessment is a self-reflective process that intends to promote student learning*, and as such occurs during the learning process, before graded exams. The ResponseCard NXT system will be used for formative assessment during lecture. One can earn up to 50 points for questions answered during lecture using the ResponseCard NXT system. There will be roughly sixteen lectures during which the ResponseCard NXT system will be used. If one answers all of the questions during a lecture, then one earns 4 points. Therefore, one can miss three lectures and still earn the maximum 50 points. Because formative assessment is a learning tool, you will get full points for participating in all of the questions for that day *regardless of whether you choose the most correct answer*. You can only use one ResponseCard NXT remote during lecture. The use of multiple remotes is strictly forbidden.

The alternative way to obtain formative assessment points is by solving the interactive online tutorial questions posted on Canvas. Contact the instructor for instructions regarding where to find those problems, which ones you can do, and how to submit them. No more than 25 of the 50 formative assessment points may be obtained in this fashion. Each online tutorial is worth 3 points.

Homework: You can earn up to 50 points for homework. Solutions will be posted on Canvas after the due date. For each assignment, a subset of the problems will be collected in lecture to check the aspects of the solutions that cannot be graded by MasteringPhysics. It is therefore imperative that you bring written homework solutions to lecture the day it is due with *your name clearly printed at the top right-hand corner, which assignment it is, and your studio section day and time.* Half of the grade for each homework assignment will come from MasteringPhysics and half from hand-written solutions. The lowest homework grade will be dropped when calculating the total homework score, and each assignment will carry the same weight. There are ten assignments. The best nine will count and each will be worth 5.55 points.

Course Grade:

- Two midterms (100 points each) and the final exam (200 points)
- 100 points for lab. Students who earned prior lab credit are automatically awarded these points. Failing the lab results in failing the course. You must pass the lab in order to pass the course.
- Homework: 50 points.
- Formative Assessment: 50 points.
- Studio: 100 points.
- Total: 700 points

Example. Student X earned 68% on the first midterm, 75% on the second midterm, 70% on the final, 90% of the studio points, 85% of the homework points, 90% of the formative assessment points, and the 100 points for passing the lab. The final grade for student X is

$$[(.68)100 + (.75)100 + (.70)200 + (.90)(100) + (.85)50 + (.90)50 + 100]/700 = 80\%$$

Grade Scale: The grade scale is fixed. There is no curve in this course. You are not competing against each other for a grade. Some classes do better than others.

90 - 100% = A	85 - 89% = A-	82 - 84% = B+	78 - 81% = B
75 - 77% = B-	72 - 74% = C+	68 - 71% = C	65 - 67% = C-
62 - 64% = D+	58 - 61% = D	55 - 57% = D-	0 - 54% = F

Email Policy and Canvas Discussion Forums: There are forums to use for out-of-class discussion on Canvas. Please post any course policy, reading, content, or homework questions on Canvas in these forums. The instructor will respond to the forums daily during weekdays so that everyone can have access to the answers, and you are encouraged to post help for each other as well. If you have a question, then it is likely to be helpful to your classmates as well. Posts from classmates addressing content issues are also welcome. You're encouraged to help each other. Use these forums instead of emailing me directly for homework help unless you have a personal question or concern that will not be appropriate or helpful for everyone.

Calculators: You will need a calculator for lecture, studio, recitation, lab and exams. **Graphing calculators, those with a solver feature and/or graphing window, and laptop or palmtop computers may not be used for exams.** You should have a scientific calculator that has trigonometric, logarithmic and exponential functions. If you want to know whether or not your calculator is acceptable or not for exams, then consult the instructor well before the first exam.

TA Office Hours: The TAs will hold office hours in Wngr 334. A schedule will be posted outside Wngr 334. TA office hours start in the middle of the first week of the term.

Students with Disabilities: Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Academic Integrity: You will be expected to conduct yourself in a professional manner. Academic dishonesty such as plagiarism and cheating will not be tolerated. Therefore, students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

* cheating - use or attempted use of unauthorized materials, information or study aids,
* fabrication - falsification or invention of any information,
* assisting - helping another commit an act of academic dishonesty,
* tampering - altering or interfering with evaluation instruments and documents, or
* plagiarism - representing the words or ideas of another person as one's own.
* using multiple ResponseCard NXT units during a single lecture period

For more information about academic integrity and the University's policies and procedures in this area, please refer to the Student Conduct web site http://oregonstate.edu/studentconduct/

Week	Date	Chapter	Sections Covered	Exam/Homework	Lab
1	Tu 4/3	3	3.1-4		Concepts of Motion
	Studio	3			
	Th 4/5	1	1.1-8		
2	Tu 4/10	1		Homework 1 due (Chapter 3)	Kinematics
	Studio	2	2.1-7		
	Th 4/12	2			
3	Tu 4/17	4	4.1-4	Homework 2 due (Chapters 1, 2)	Projectile Motion
	Studio	4			
	Th 4/19	4			
4	Tu 4/24	Review for Midterm I	Chapters 1, 2, 3, 4	Homework 3 due (Chapter 4)	No Lab
	Studio	5	5.1-7	Midterm I W 8:30-9:50 Chapters 1,2,3,4	
	Th 4/26	5			
5	Tu 5/1	5			Forces and Acceleration
	Studio	6	6.1-4, 6		
	Th 5/3	6		Homework 4 due (Chapter 5)	
6	Tu 5/8	6			Static and Kinetic Friction
	Studio	7	7.1-5		
	Th 5/10	7		Homework 5 due (Chapter 6)	
7	Tu 5/15	7			No Lab
	Studio	11	11.1-5		
	Th 5/17	11		Homework 6 due (Chapter 7)	
8	Tu 5/22	Review for Midterm II	Chapters 5, 6, 7		Momentum and Collisions
	Studio	11		Midterm II W 8:30-9:50 Chapters 5, 6, 7	
	Th 5/24	10	10.1-8	Homework 7 due (Chapter 11)	
9	Tu 5/29	10			Conservation of Energy
	Studio	10			
	Th 5/31	9	9.1-6	Homework 8 due (Chapter 10)	
10	Tu 6/5	9			Lab Make-Up
	Studio	9			
	Th 6/7	Review for Final	Chapters 1-7, 9-11	Homework 9 due (Chapter 9)	
Final Exam	M 6/11		4:00 to 5:50 PM		

Dates are tentative and may be subject to change