

PHYSICS 0091: Conceptual Physics

Spring 2020

Lecture: Mon/Fri 8:30-9:50AM

Thaw Hall 104

Recitation: **Required** with TA

Office Hours: Wed 4:00PM-5:00PM

Contact Information:

Instructor: Melanie L. Good

Office: 113D Old Engineering Hall

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Prerequisites: MATH 0020 or any MATH greater than or equal to MATH 0031 or SAT Math Score (620 or greater) or ACT Math Score (27 or greater)

Textbook: *Conceptual Physics, 12th edition* by Hewitt ISBN 9780321909107

Other Required Materials: Scientific Calculator (in addition to phone or device apps, you need a separate stand-alone calculator)

Course Description: This course presents the conceptual basis of introductory classical physics. As such, this course covers the same general topics as PHYS 0110. The emphasis of this course, however, is on a clear understanding of the underlying principles of physics, with a reduced emphasis on mathematics than would be used in PHYS 0110. This course is intended for non-science majors and for students from the School of Health and Rehabilitation Sciences. The mathematical level of this course will not be adequate for those students who plan to apply to Medical School. It could be used for those students as a preparatory course prior to tackling the more mathematically rigorous PHYS 0110 or PHYS 0174. In that case credit would not be given for both this course and either PHYS 0110 or 0174.

Topics to be covered include:

- Chapter 1: About Science
- Chapter 2: Newton's First Law of Motion: Inertia
- Chapter 3: Linear Motion
- Chapter 4: Newton's Second Law of Motion: Force and Acceleration
- Chapter 5: Newton's Third Law of Motion: Action and Reaction

- Chapter 6: Momentum
- Chapter 7: Energy
- Chapter 8: Rotational Motion
- Chapter 9: Gravity
- Chapter 10: Projectile and Stellite Motion
- Chapter 12: Solids
- Chapter 13: Liquids
- Chapter 14: Gasses and Plasmas
- Chapter 15: Temperature, Heat, and Expansion
- Chapter 16: Heat Transfer
- Chapter 17: Change of Phase
- Chapter 19: Vibrations and Waves
- Chapter 20: Sound
- Chapter 21: Musical Sounds

Course Objectives:

The department has clearly-defined Learning Goals for the course, listed below:

1. Develop logical reasoning skills, explain or predict diverse phenomena in everyday experience, and become independent thinkers.
2. Demonstrate conceptual understanding of the concepts, principles and laws of physics covered in this course.
3. Describe a physical situation, as necessary, using multiple representations such as written conceptual statements, mathematical equations, diagrams, and graphs, and be able to translate from one representation to another.
4. Perform a conceptual analysis of a problem and identify physical principles required for its solution.
5. Translate physical principles to formulate necessary mathematical statements required to solve a problem.
6. The course is aimed for non-science majors and for students from the School of Health and Rehabilitation Sciences. It will not be adequate for those students who plan to apply to Medical School, but it could be used to achieve an excellent preparation prior to tackling the more mathematically rigorous PHYS 0110 or 0174.

Structure of Class: Research has shown that student learning is optimized when students are actively engaged in their learning, so this course will make use of evidence-based approaches to facilitate active engagement. In order to gain the most benefit from these approaches, you will need to be an equal partner in the learning process, which will involve in-class discussions, group problem-solving, and coming to class prepared to engage with the content (for example, reading relevant material prior to lecture). Being equal partners in the learning process means that I will arrive to class prepared to serve and support you in your learning through interactive demonstrations, thought-provoking discussion questions, and carefully designed activities. I will also listen intently to any difficulties you encounter, be sensitive to the diversity of backgrounds of my students, and be accessible to you during my office hours and via email.

My hope is that by the end of the semester, you will view the subject of physics as interesting and understandable when we work effectively towards unraveling its mysteries.

Grading Scheme:

- 15% Recitation work
- 15% Homework
- 5% Notebook
- 10% In-class activities
- 15 % Exam 1
- 15 % Exam 2
- 25% Final Exam

Important Dates:

- Jan. 17 Add/Drop Ends
- Jan. 20 MLK Day–No Class
- Feb. 10 Exam 1
- March 6 Withdrawal Deadline
- March 9-13 Spring Recess
- March 23 Exam 2
- April 22, 2-3:50PM**

Tentative Schedule:

Week	Mon	Fri
1	Jan. 6 (Ch1)	10 (Ch1,2)
2	13 (Ch2)	17 (Ch3)
3	20 X	24 (Ch4) [HW 1&2 Due]
4	27 (Ch5)	30 (Ch6) [HW 3 Due]
5	Feb. 3 (Ch6,7)	7 (Ch7) [HW 4 Due]
6	10 (Exam 1)	14 (Ch19)
7	17 (Ch19)	21 (Ch20) [HW 5 Due]
8	24 (Ch20)	28 (Ch21) [HW 6 Due]
9	Mar. 2 (Ch8)	6 (Ch9) [HW 7 Due]
10	9 X	13 X
11	16 (Ch9)	20 (Ch10)
12	23 (Exam 2)	27 (Ch12)
13	30 (Ch13) [HW 8 Due]	Apr. 3 (Ch13,14)
14	6 (Ch14,15)	10 (Ch15) [HW 9 Due]
15	13 (Ch16)	17 (Ch17) [HW 10 Due]
16	Final Exam: Wednesday, April 22, 2-3:50PM	

X = No Class

Ch1, Ch2, etc. = Chapter 1, Chapter 2, etc.

Recitation:

During recitation, you will work in groups on activities and/or tutorials. You may also ask questions about content you are learning. Recitations serve to reinforce what is being taught in lecture.

Homework:

Homework will be due at the beginning of class during which the deadline is stated. Partial credit will be awarded at the discretion of the instructor and/or TA.

Notebook:

Simply downloading and reading PowerPoints from lecture is insufficient for optimal learning. Keeping a notebook is essential. You should be writing notes during each and every lecture, and sometimes this is appropriate in recitations too. During the recitation in the week preceding each exam, your notebook will be checked for completeness.

In-class Activities:

We will make extensive use of clickers for conceptual discussion questions, and as a means of responding to group problem-solving activities and demonstration predictions. Clicker questions will be formatted as multiple choice questions; however, you will receive 80% credit simply for participating in the clicker response. Should you get the correct answer, then you will receive 100% credit for that question. You do not have to give the same response as the other members of your discussion group—your clicker responses are confidential and individual. Discussions among your classmates helps you think about what you believe the answer might be, but ultimately you are free to take a dissenting position from your peers.

In addition to clickers, group work will be essential in both lecture and recitation class time. Collaborating through group work helps allow you to co-construct knowledge with your peers and tackle problems together. Emphasis on the concepts as presented in this course will help avoid the temptation to superficially “plug and chug” an answer without deeper understanding. The deeper understanding you gain will help you see connections to problems that utilize the same underlying principles, even if they superficially appear dissimilar, and that kind of transfer skill will allow you to solve problems better on exams. Finally, authoring your own problem together as a group will help you think critically about the material you are learning, and will allow you to understand the problem-solving process from a different angle, which can benefit your learning.

Exams:

Exams may include multiple choice and/or open-ended questions. There will be no make-up midterm examinations under any circumstance (sorry, no exceptions), unless your situation qualifies as a true medical or family emergency, in which case you may be permitted to take a make-up exam through the testing center. For each exam, you will be allowed to prepare in advance and use during the exam one 8.5” x 11” sheet of handwritten or typed formulas and diagrams. The very act of creating such a summary sheet should help you to organize concepts in your mind.

Attendance:

Your attendance is absolutely crucial for obtaining a good grade. If you must miss class for health-related reasons, you should notify me in advance of your absence. If you must miss class for an emergency, please notify me as soon as you possibly can. Whether or not you are excused from in-class assignments will be at my discretion. Generally-speaking, if you have been absent more than three times, I will request a doctor’s note to justify excusing any further absences. If an absence is unexcused, you will not receive credit for in-class graded activities. If an absence is excused, the activities will be excused from your grade, but there will not be time in the schedule to afford makeups of those activities. Therefore, you will be responsible for ensuring that you understand the material, concepts, and problems that have been covered in class, as

you will still be expected to utilize this understanding on exams and/or recitation work. Feel free to ask members of your group to share any information they have about what you missed, including any group work problems that were worked out. Even if you do not receive credit for them, it will be good for you to know what was done in class.

Honor Code:

Students are expected to uphold the University's standard of conduct relating to academic honesty. Students assume full responsibility for the content and integrity of the academic work they submit. Students shall be guilty of violating the honor code if they:

1. represent the work of others as their own
2. use or obtain unauthorized assistance in any academic work
3. give unauthorized assistance to other students
4. modify, without instructor approval, an examination, paper, record, or report for the purpose of obtaining additional credit
5. misrepresent the content of submitted work

Any student violating the honor code is subject to receive a failing grade for the course and will be reported to the Vice President of Academic Affairs.

Disability Services:

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 to schedule an appointment. The Disability Resources and Services office is located at 140 William Pitt Union, and is open Monday-Friday from 8:30AM to 5:00PM.