

PHYS 171: Introductory Physics II and 181: Intro. Physics II (Enhanced)

Wheaton College, Spring 2020

Tuesdays and Thursdays, Science Center 1343

Instructors:

Section A:

9:00 AM – 10:50 AM

John Collins

Science Center 1334

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Office Hours M 1:00 - 4:00 PM

W 12:00 - 2:00 PM

Section B:

11:00 AM – 12:50 PM

Dipankar Maitra

Science Center 1330

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Office Hours: TR 2:00 - 4:00 PM

Both sections:

Tony Houser

Science Center Room 1329

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Course Goals

This class is focused on two overarching goals:

- Expand your repertoire of problem-solving skills, hone your ability to systematically and critically analyze problems in the physical world, and learn to break down and simplify complex problems into solvable pieces.
- Build a foundation of concepts and approaches that you can use to understand the entire physical universe.

Student Objectives

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

- Break down, analyze, categorize, and solve physical problems related to waves and oscillations, electricity and magnetism, and optics.
- Select the right tool from your problem-solving toolbox to address a problem in the simplest and most straightforward way.
- Apply abstract concepts to a hands-on situation, and analyze real-world data in the context of basic physics.

Textbooks:

Physics 171: OpenStax College Physics. It is the same textbook as was used in PHYS 170 in the fall. You can download this textbook for free from <https://openstax.org/details/college-physics> or order a paper copy.

Physics 181: OpenStax University Physics. We will be using volumes I, II, and III at different times during the semester. You can download these texts from <https://openstax.org/details/books/university-physics-volume-x> (x =1, 2, or 3) We have found that the PDF versions are the most reliable.

Online Homework: Some of your homework will be assigned using the Sapling Learning System. You are required to purchase access to this resource. <http://www.saplinglearning.com/ibiscms/course/view.php?id=37614> You may have bought full-year access in the fall semester; if not, you'll have to pay again for the spring term.

OnCourse: Most of the course materials will be available on the OnCourse website. We will post all course documents on this site, including syllabus, course calendar, practice tests, homework solutions, and PRS questions. You will also have access to your individual grades via this site.

Daily class structure: A number of activities will take place inside the classroom: lecture, labs, personal response questions, quizzes, and group problem solving. You should come prepared for any of these activities on any given day.

Collaboration: You will be assigned to work in groups of two, with three groups at each table. Groups will work together on lab exercises and in-class problem solving. Seating will be assigned after the first few classes.

Physics Tutoring and Homework Help: Physics tutoring is available in the Kollett Center. Check their schedule for times.

Grading

Your grade will be figured using the following weighting scheme.

	percent	total %
Midterm Tests (3)	15	45
Written Homework	10	10
Online Homework	10	10
In-class Work	15	15
Final Exam	20	20

Midterm Tests: There will be three midterm tests during the semester. The problems will vary in difficulty but, unlike some of the problems from the text, they will always require a full understanding of the physics, so be prepared.

Each test will be 15% of the final grade. In order to assist you in preparing for the exams, copies of test questions from previous exams will be available, and we will spend time reviewing and solving some of these questions.

The second midterm exam will include a practical component, in which you will be asked to construct, measure, and analyze an electrical circuit.

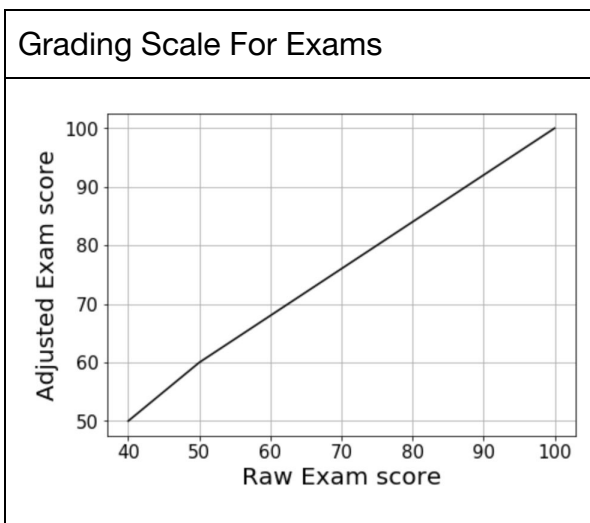
Homework: Weekly homework will consist of some problems from the textbook, some problems from the Sapling Online Learning system, and a few problems that are similar to problems that will appear on the exams. The assigned problems will vary in difficulty and style, from conceptual problems that can be solved with words, to simple mathematical and reasoning exercises, to more difficult problems that require significant planning. We suggest that you try to solve these problems on your own the first time around. For problems that you find difficult to solve, we encourage you to discuss them and work them out with other students in the class. Of course you may always come see us in our offices for additional help. To do well in the course it is absolutely essential that you understand and become proficient at problem solving. Homework is only worth 20% of your grade, but it is essential to practice for the exams.

Class Participation and Laboratory Exercises: Class participation includes in-class labs, problem solving, clicker questions, and class discussions. Most lab exercises are done in-class, and are designed to develop your conceptual understanding of the topics presented in class. Lab write-ups will be handed in during the class, unless otherwise specified. The learning process requires your dedication and involvement; it is not just the instructor lecturing to you. Your active participation in class is required (not just your physical presence!).

Final Exam: The 3-hour final exam will be cumulative, and will account for 20% of your final grade. The exam will be closed-book and closed-notes.

Grading Scale

You will not be graded on a curve. Your test grades will be scaled according to the figure below-left. The final letter grade will be calculated based on the table below-right. Also see the sample grade calculation at the end of the syllabus. The absolute scale is designed, in part, to encourage you to work together. Please help one another inside and outside of class!



Grading Scale For Final Letter Grade

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

PHYSICS 181: The Physics 181 (Enhanced Introductory Physics II) is recommended for those students who have the intention of majoring in physics, and is also recommended for those who want to pursue careers in engineering. We will have an extra meeting for one hour every week. In this hour, we will discuss topics that are not part of Phys 171. This will normally involve topics involving more advanced mathematics. Extra homework will be assigned. This work will constitute 10% of your grade. The weighting assigned to the other components of your grade (see table above) will be reduced accordingly.

Policies

Missed Exams: Any exam that you miss without a legitimate excuse cannot be made up, and you will receive a zero grade.

Attendance: Notice that 15% of your grade is from work done in class. Thus, attendance is required and will be monitored. You are allowed two unexcused absences. If you must miss a class, please inform the instructor via email.

Final Exam Date: The final exam will be prescheduled, and will occur on an evening during exam week. See the schedule below for final date/time.

Homework: Homework is due on the assigned date. Assignments will be graded on a scale of 0 through 5. Late assignments will receive a grade penalty. You may miss 2 assignments in the semester. If you don't miss any, the lowest two grades will be dropped. Your homework grades will be posted to onCourse.

Athletics: College policy dictates that team practice is not a legitimate excuse for missing a class. If you foresee any regular season game conflicting with a

class or a laboratory, let us know as soon as possible.

Accommodations: Wheaton is committed to ensuring equitable access to programs and services and to prohibit discrimination in the recruitment, admission, and education of students with disabilities. Individuals with disabilities requiring accommodations or information on accessibility should contact Autumn Grant, Associate Director for Accessibility Services at the Filene Center for Academic Advising and Career Services, accessibility@wheatoncollege.edu, or (508) 286-8215.

Time Commitment: Past surveys have shown that students in this course need to work for an average of six to seven hours per week outside of the classroom. This may vary significantly from one person to the next, so do not be surprised if you find that it takes ten hours per week to learn the material well. If you find that even ten hours per week is not enough, then you should seek assistance by meeting us during office hours or through tutoring.

Sample calculation of your grade:

Item	Student score	Weight
Sapling Ave: 95%	95%	10%
Written HW Ave:	85%	10%
In Class:	14/15	15%
Test 1:	73/100	15%
Test 2:	80/100	15%
Test 3:	90/100	15%
Final Exam:	78/100	20%

=> Weighted average of 3 tests + final: $((73 \cdot .15 + 80 \cdot .15 + 90 \cdot .15) + 78 \cdot 0.2) / .65 = 80.1$

=> Scaled grade on all tests: = 84.08/100 (refer to 'Grading Scale for Exams' on page 3)

=> Final score/100 = $84.08 \cdot 0.65 + 9.5(\text{sapling}) + 8.5(\text{written HW}) + 14 = 86.65$

=> Final Letter Grade: B (refer to "Grading Scale for Final Letter Grade" on page 3)

Topics	Tuesday	Thursday	Notes
Chapter 16 Oscillations and Waves 16.1-16.3		1/23 Syllabus, etc. Simple Harmonic Motion (SHM) LAB: SHM	
Chapter 16 Oscillations and Waves 16.3 - 16.5 16.8-16.9	1/28 Energy in SHM, Energy LAB Pendulum Motion	1/30 Resonance Wave Equations Basic definitions	Chap. 16 Homework – part 1 Due 2/4
Chapter 16 Waves 16.9 Chapter 17 Applications to Sound Waves 17.1-17.3	2/4 Superposition, Waves on a string	2/6 Doppler Effect	Chap. 16 Homework – part 2 Due 2/11
Chapter 17 Applications to Sound Waves 17.4	2/11 Sound waves, Musical instruments	2/13 LAB: Resonance in a tube	Chap. 17 Homework Due 2/18 Study for test on 2/20
Chapter 18 Electric Charge and Electric Fields 18.1-18.4	2/18 Intro to Electricity - Electric Force and Electric Fields	2/20 TEST 1	

<p>Chapter 18 Electric Fields / Chapter 19 Electric Potential 18.3-18.4 19.1.-19.7</p>	<p>2/25 Electric Fields (cont'd) Electric Potential</p>	<p>2/27 Electricity LAB 1: Electric Potential Capacitors</p>	<p>Chap. 19 Homework Due 3/3</p>
<p>Chapter 20 Current, Voltage, Ohm's Law</p> <p>Chapter 21 DC Circuits 20.1-20.4 21.1-21.2</p>	<p>3/3 Electricity LAB 2: Circuits</p>	<p>3/5 Electricity LAB 3: Resistors</p>	<p>Chap. 20 Homework Due 3/24</p>
<p>SPRING BREAK</p>	<p>3/10</p>	<p>3/12</p>	

<p>Chapter 21 DC Circuits 21.1-21.4</p> <p>Chapter 22 Magnetism 22.1-22.5</p>	<p>3/24 Circuits</p>	<p>3/26 Circuits (continued)</p>	<p>Chap. 21 Homework Due Friday 4/2</p>
<p>Chapter 22 Magnetic Forces and Magnetic Fields</p> <p>22.6-22.9</p>	<p>3/31 Circuits (continued)</p>	<p>Magnetic forces on charged particles: Right-hand rule</p>	<p>Study for test on 4/7</p>
<p>Chapter 23 Faraday's Law and Inductance 23.1-23.3</p>	<p>4/7 TEST 2</p>	<p>4/9 Torque on a current loop, Biot-Savart Law</p>	<p>Chap. 22 Homework Due 4/14</p>
<p>Chapter 23 Inductance 23.5-23.9</p>	<p>4/14 Faraday's Law Lenz's Law</p>	<p>4/16 Inductance</p>	<p>Chap. 23 Homework Due 4/21</p>
<p>Chapter 25 Geometric Optics</p> <p>25.1-25.5</p>	<p>4/21 Law of Reflection Law of Refraction</p>	<p>4/23 Total Internal Reflection Dispersion</p>	

Chapter 25 Image formation by Mirrors and Lenses 21.5-25.6	4/28 Image Formation: Mirrors and Lenses	4/30 Image Formation (continued)	Chap. 25 Homework Due 5/1
FINAL EXAM WEEK: Test 3 Topics: Magnetism and Optics			