

# PHYS 170: Introductory Physics I and 180: Intro. Physics I (Enhanced)

Wheaton College, Fall 2014

Tuesdays and Thursdays, Science Center 1343



## Instructors:

Section A: 9:00 AM - 10:50 AM  John Collins Science Center 1334 x3976 <a href="mailto:collins@wheatonma.edu">jcollins@wheatonma.edu</a>  Office hours TR 2-4 pm	Section B: 11:00 AM - 12:50 PM  Jason Goodman Science Center 1332 x5626 <a href="mailto:goodman_jason@wheatonma.edu">goodman_jason@wheatonma.edu</a>  Office hours MW 2-5 pm	Section C: 2:00 PM - 3:50 PM  Dipankar Maitra Science Center 1330 x5697 <a href="mailto:maitra_dipankar@wheatoncollege.edu">maitra_dipankar@wheatoncollege.edu</a>  Office hours MW 10a-12
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### All sections:

**Tony Houser**

Science Center Room 1329

[houser\\_anthony@wheatonma.edu](mailto:houser_anthony@wheatonma.edu)

## **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 force and motion.
- 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.

Textbook: *Principles of Physics: A Calculus-Based Text*, 5<sup>th</sup> Edition, by Serway & Jewett, published by Brooks/Cole. The textbook will be the source of readings and some homework assignments throughout the semester.

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. Therefore, seating will become assigned after the first few classes.

## Grading

Your grade will be figured using the following weighting scheme.

	percent	total %
Midterm Tests (3)	15	45
Homework	20	20
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.

Homework: Homework problems will come from two sources:

**The Sapling Learning System** is an online homework site. Unlike traditional pen-and-paper problems, Sapling problems give you immediate feedback and hints as you work through the problems. You will be assigned roughly eight problems a week using this system. A semester subscription to the Sapling system for this course costs \$40, and is required.

*Create an Online Account:*

1. Go to <http://saplinglearning.com> and click on "US Higher Ed" at the top right.
- 2a. If you already have a Sapling Learning account, log in and skip to step 3.
- 2b. If you have a Facebook account, you can use it to quickly create a Sapling Learning account. Click "Create an Account", then "Create my account through Facebook". You will be prompted to log into Facebook if you aren't already. Choose a username and password, then click "Link Account". You can then skip to step 3.
- 2c. Otherwise, click "Create an Account". Supply the requested information and click "Create My Account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.
3. Find your course in the list (you may need to expand the subject and term categories) and click the link.
4. If your course requires a key code, you will be prompted to enter it.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up or throughout the term, if you have any technical problems or grading issues, send an email to [support@saplinglearning.com](mailto:support@saplinglearning.com) explaining the issue. The Sapling Learning support team is almost always faster and better able to resolve issues than your instructor.

**Handwritten homework problems** are designed to let you write up problem solutions in a form similar to what you'll experience in a test. You will be assigned roughly written problems a week: these will be assessed by human graders. Since we have different graders for each problem, you must write up solutions to each problem on a separate sheet of paper.

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 practice for the exams.

Class Participation and Laboratory Exercises: Class participation includes in-class labs, problem solving, PRS 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 expected, and is worth 15% of your grade.

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

### **Grading Scale**

You will not be graded on a curve. Your test grades will be scaled according to the table below. This absolute scale is designed, in part, to encourage you to work together. Please help one another inside and outside of class!

Grade	+		-
A		>92	88 - 92
B	85 - 88	81 - 85	77 - 81
C	72 - 77	67 - 72	63 - 67
D	60 - 63	55 - 60	50 - 55
F	< 50		

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

PHYSICS 180: The Physics 180 (Enhanced Introductory Physics I) 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 recommend that PHYS 180 students have taken, or be enrolled in Calculus I or equivalent. We will have an extra meeting for one hour every week. In this hour, we will discuss topics that are not part of Phys 170. 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, but will not be at the traditional morning or afternoon time. Instead, all three sections will meet simultaneously for the exam, on an evening during exam week (exact date and time to be announced soon.) Exams will only be rescheduled according to the college's "3 in a row" policy (see <http://wheatoncollege.edu/registrar/students/prescheduled-exams/>)

Homework: Homework is due on the assigned date. Late assignments will receive a grade penalty. The lowest two grades will be dropped.

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.

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.

Topic	Tuesday	Thursday	Due Dates
Chapter 1 Introduction and Vectors	8/26 Syllabus, etc. Units, Conversion Estimation Coordinate systems	8/28 Scalars, Vector Addition, Vector Components <b>Boston Harbor Lab</b>	Chapter 1 Homework 9/2
Chapter 2 Kinematics: Motion in 1 dimension	9/2 Velocity Equations of one dimensional motion <b>Motion LAB</b>	9/4 Acceleration, Free Fall, Kinematics <b>Do-it-yourself Kinematics LAB</b>	Chapter 2 Homework 9/9
Chapter 3 Kinematics: Motion in 2 dimensions	9/9 Two-dimensional Motion Projectile Motion	9/11 Circular motion General 2-d motion	Chapter 3 Homework 9/16
Chapter 4 Newton's Laws of Motion  TEST 1	9/16 Intro to Forces Newton's 3 Laws of Motion <b>Newton's 2nd Law LAB</b> <b>Newton's 3rd Law LAB</b>	9/18 <b>TEST 1</b> Covers chapters 1, 2, 3	
Chapter 4 Newton's Laws of Motion	9/23 Intro to Forces Newton's 3 Laws of Motion <b>Tension LAB</b>	9/25 Problem Solving Strategies Springs <b>Springs LAB</b>	Chapter 4 Homework 9/30

Topic	Tuesday	Thursday	Due Dates
Chapter 5 More Applications of Newton's Laws	9/30 Friction <b>Friction LAB</b>	10/2 Circular Motion Gravitation	Chapter 5 Homework 10/7
Chapter 6 Energy of a System	10/7 Work The Scalar (Dot) Product Kinetic Energy	10/9 Potential Energy <b>Energy Lab</b>	
Chapter 6 Energy of a System	10/14 <b>OCTOBER BREAK</b>	10/16 More Energy Problems Gravitational Energy	Chapter 6 Homework 10/21
Chapter 7 Conservation of Energy	10/21 Work-Energy Theorem Isolated and Nonisolated Systems	10/23 Nonconservative Forces Power <b>Water Balloon Lab</b>	Chapter 7 Homework 10/28
TEST 2 Chapter 8 Momentum and Collisions	10/28 Momentum Elastic and Inelastic Collisions <b>Collisions LAB</b>	10/30 <b>TEST 2</b>	

Topic	Tuesday	Thursday	Due Dates
Chapter 8 Momentum and Collisions	11/4 Isolated and Nonisolated Systems Impulse	11/6 Momentum Conservation in 2-d Center of Mass <b>Rocket LAB</b>	Chapter 8 Homework 11/11
Chapter 10 Rotational Motion	11/11 Rotational Motion: Kinematics Rotational Kinetic Energy Moment of Inertia	11/13 Torque and the Vector (Cross) Product <b>Moment of Inertia LAB</b>	Chapter 10 Homework 11/18
Chapter 10 Rotational Motion	11/18 Angular Momentum Precession	11/20 Temperature The Kinetic Theory of Gases	
Chapter 15 Temperature and the Kinetic Theory of Gases	11/25 <b>TEST 3</b>	11/27 <b>THANKSGIVING</b>	Chapter 15 Homework 12/2
Chapter 16 Energy in Thermal Processes: The First Law of Thermodynamics	12/2 Heat and Internal Energy Work in Thermodynamic Processes	12/4 The First Law of Thermodynamics Adiabatic Processes The Ideal Gas Law	Chapter 16 Homework <u>FRI</u> 12/5

**FINAL EXAM: DECEMBER 12, 6 - 9 PM**