Physics 161 - General Physics I
Block 4, 2017-18

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Textbook: Six Ideas that Shaped Physics, Thomas A. Moore, McGraw-Hill (2017). Units C and N

Other supplies you will need: (1) a good scientific calculator, (2) a pencil, or blue or black pen for quizzes and exams (3) a notebook for taking class and reading notes and for working problems.

Schedule: You should normally plan to spend from 9 – 11 am and from 1 – 3 pm in class every day. We will spend class time discussing new material, working problems, observing physical phenomena, and taking quizzes and exams. We will cover two chapters of the textbooks almost every day. You will have reading and problem solving homework almost every day. Every day, there will be a quiz on the homework (discussed below) and in the morning before 9:30 am I will be available to help you make sure you understand how to solve the homework problems.

Course Objectives: This course supports the Educational Priorities and Outcomes of Cornell College with emphases on knowledge, reasoning, and communication. By doing the work in this class, I expect that students will:

- Develop and demonstrate conceptual understanding of physical models of phenomena including:
  - Conservation of linear momentum, angular momentum, and energy
  - Relationship between net force, acceleration, velocity, and position
  - Relationship between net torque, angular acceleration, angular speed, and angle
- Strengthen quantitative reasoning skills and computational abilities
- Learn to describe and justify the logic of important equations
- Deepen understanding of the connection between observation, measurement, and theory
- Display understanding through writing and oral presentations

Learning Physics: The best way to learn physics is to practice it by doing homework problems. In order to do the homework problems, you should complete the assigned reading (before or after class, as indicated) and come to class to discuss and practice the material in the chapter. You should not expect to come away from class with a set of notes from which to study. Instead, you should take notes on the assigned reading. In class, I will ask you to think about the ideas from the chapter. You will summarize the ideas, work short exercises, and discuss examples with your classmates. I will demonstrate problem solving techniques. Class time should strengthen your understanding of the material and prepare you for the work of doing homework problems. I will take attendance during class.

Understanding Physics: You must try to understand when different equations apply and how to use them. Memorizing equations is helpful, but not sufficient. If you can reason easily, but find memorizing challenging, work on memorizing the equations. If you can memorize easily, but find reasoning challenging, pay special attention to the reasoning skills that are needed for problem solving. Please come talk to me if

you are finding the material challenging.

Keeping up with the material: The ideas in a physics class build on each other, so you must understand the material we have already covered in order to understand any new material. Therefore, it is imperative that you study every day and that you work on all of your homework problems every night. You should schedule at least 4 hours a day outside of class for studying. You should keep one sheet in your notebook with all of the equations that we have used so far, along with definitions of the variables and a description of when the equation applies. Each day after class, you should review the concepts from the day, and make notes for yourself about ideas that you want to remember.

Math: Math 121 is a prerequisite for this class. I expect that you have strong algebra and trigonometry skills, and that you understand how to take derivatives and integrals. If you are uncertain of your math abilities, or you need to brush up on some skills, please take advantage of the Quantitative Reasoning Studio on the first floor of Cole Library. You may speak with Jessica Johaningmeier, Quantitative Reasoning Consultant, during the day, or a student tutor in the evenings. See http://www.cornellcollege.edu/library/ctl/qr/ for hours. Please let me know if you need additional support.

Students with disabilities: Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see https://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml

Academic Honesty: Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Compass, our student handbook, under the heading "Academic Policies – Honesty in Academic Work.

Assignments

Homework Problems:

There are homework problems assigned for every chapter. There are several types of problem for every chapter – Basic Skills, Modeling, Derivations, and Rich-Context. The Basic Skills problems "B" ask you to use the equations in the text in a very straightforward way. They are "warm-up" or "practice" problems. I will assign Basic problems for each chapter. The other homework problems will be selected from the other types, these problems ("M'', "D" and "R") ask you to *put ideas together* to apply the equations in the text. I encourage you to discuss the homework problems with your classmates. Most of the time, you will not turn problem solutions into me - but do not get lazy and not work on them! I will answer your questions during morning class before 9:30 am. If you have not worked on the problems, you won't know what questions you have. Reading a problem solution someone else has written or watching someone else solve a problem is not the same as working on it yourself. That's like trying to learn to play a piano piece by watching someone else play! I will post solutions to the problems on Moodle after class.

Homework Problem Quizzes or Presentations: (100 points total)
Almost every morning I will give the class a single problem from each chapter's homework ("B" and "M" problems) assignment to write up. You will be able to use your notes, but not the textbook, to write up the solution for me. You must have all of the information you need to solve the problem in your notebook. Your solutions to the quiz questions must be neat and clear, must respond to all parts of the question, and must use units properly in order to get full credit.
At my discretion, I will ask students to present problems by writing the solution on the chalk board as an alternative to a quiz. I will randomly select students who will present each problem. You will be evaluated on your presentation of the solution.
I will allow you one undocumented absence from a quiz for sickness or an emergency. You must notify me of the reason for your absence by e-mail the day of the absence. Any further absences from quizzes will require some documentation - a note from a health care provider, for instance. If you are present for all of the quizzes, I will drop your lowest quiz score.

Challenge Problems: (10 points when you are at 90-100% of the total grade)
"R" and "D" problems are challenge problems (24 problems in total), in order to get an A or an A-, (1) you must get in the 90-100% range of Total Course Points, and, in addition, (2) you must get at least 80% for Challenge Problems. I will assign one Challenge Problem (usually Rich Context) almost every chapter. You should work on these problems *if and only if* you feel you have mastered all of the assigned homework problems. You can earn up to 240 points by working on these problems. These problems must *each be turned in at the beginning of the afternoon class on a separate sheet of paper* and must be written and explained clearly. Scores from Challenge Problems will not be included in your grade if you do not have 90-100 % of the other class points. (Challenge Problems are not "extra credit".)

Exams and Grades
There will be two midterm exams and one final exam:

Exam 1	Tuesday, December 5	9 am – 11 am	100 pts
Exam 2	Wednesday, December 13	9 am – 11 am	100 pts
Final Exam	Wednesday, December 20	9 am – 12 N	150 pts

Total Course Points: 450 pts (350 tests and 100 quiz/presentation)

Grades will be assigned approximately as follows:

A-, A	90-100% + 80% of challenge problems		
B+	85-100%	C	65-70%
B	80-85%	C-	60-65%
B-	75-80%	D+	55-60%
C+	70-75%	D	50-55%

15th day drop: I will sign a Drop/Add form for a 15th day drop only according to the rules laid out in the Course Catalog, which states that the instructor should agree to sign the form if and only if the student (a) has complied fully with the instructor's attendance policy, (b) has taken all the tests and turned in all the papers or projects that were due by the 15th day, and (c) has made, in the opinion of the instructor, a determined effort to learn the material, complete the work, and participate in the class.

Tentative Schedule:

Date	Text Material	Topics	Problems
Day 1 – Mon	C1 C3	Units and Dimensions Vectors	B1, B5, B6, B7, M5, M7, M10 B3, B4, B8, M1, M3, D1, R3
Day 2 – Tue	C2 C4	Interactions Systems and Frames	B3, B4, B7, B13, M2, M3, M4, R3 B1, B3, B7, M4, M7, R1
Day 3 – Wed	N1.1-2 C5	Newton's 2nd law Momentum	B1, B2 B3, B7, B8, B9, M2, M3, M6, M7, D1, R1
Day 4 – Thur	C8	Energy	B2, B3, B6, B9, M1, M3, M5, M6, M11, R1
Day 5 – Fri	C9 C10	Potential Energy Work	B1, B2, B4, B8, B9, B10, M4, M7, R4 B2, B6, B7, M3, M4, M7, R2
Day 6 – Mon	C14 Review	Collisions	B2, B4, B6, B9, M1, M2, M5, M7, M11, R1
Day 7 – Tue	**Exam 1** C12	 Thermal Energy	 B2, B5, B6, B8, M2, M6, M9, R1
Day 8 – Wed	C13 C11	Internal Energy Rotational Energy Angular	B3, B5, B6, B9, M4, M8, M10, R2 B1, B3, B6, M1, M4, M7, R2
Day 9 – Thur	C6 C7	Momentum Angular Momentum	B2, B4, B6, B9, M2, M3, R2 B2, B6, B7, B9, B11, M2, M6, R2
Day 10 – Fri	N2 N4	Forces from Motion Statics	B2, B3, B4, B5, B9, M2, M3, M7, R1 B2, B3, B5, B7, M3, M4, M6, M7, M9, R2
Day 11 – Mon	N1.3-5 N5	Newton's laws Constraint Motion	B6, B9, B11, B12, M2, M8
Day 12 – Tue	N6 Review	Coupled objects	B2, B4, B5, B7, M1, M4, M10, M11
Day 13 – Wed	**Exam 2**	Days 7-12	
Day 14 – Thur	N7 N8	Circular motion Noninertial frames	B1, B3, B4, M2, M4, M5, M7, R2 B2, B4, B7, B8, M2, M5, M6, M8, R1
Day 15 – Fri	N3 N9	Motion from Forces Projectile motion	B2, B3, B4, B5, M2, M4, R2 B2, B3, B6, B8, M3, M5, M7, M8, R2
Day 16 – Mon	N10 N11	Oscillations Kepler's laws	B2, B4, B6, B7, M3, M5, M6, M9, R1 B3, B5, B7, B9, M1, M2, M6, M7, R1
Day 17 – Tue	N12	Orbits	B1, B3, B4, M1, M5, M6, R1
Day 18 – Wed	**Final**	Day 1-17	