

Physics 117: Principles of Physics I: Mechanics (Section 2)

Fall 2011

MWF 10:00 - 11:50 AM

Co-requisite: MATH 111 (Calculus I)

Room: CNS 206

Professor: Matthew C. Sullivan
Office: CNS 262 or CNS 278 (lab)
Phone: 274-3964 (office)
email: mcsullivan@ithaca.edu

Office Hours: M,W 2-3 PM, Th 11:00 AM -12:00 PM
and by appointment

Textbook: **Physics for scientists and engineers**, 2nd ed., by Randall Knight (Required.)
You must also purchase MasteringPhysics (included with the book). (Required.)

Clicker: You will need to purchase an Interwrite RF clicker from the bookstore.

Website: <http://www.ithaca.edu/faculty/mcsullivan/PH117/index.htm>

Class Philosophy

Physics 117 will be your introduction (or re-introduction) to mechanics: the study of the motion of objects. We will learn about kinematics, forces, energy, and momentum. We'll be reviewing these concepts while also learning about how to write proper solutions, to solve problems, and to think analytically and critically.

I believe that in order to learn physics you must do physics. Doing physics does not entail listening to me lecture for hours on end. Doing physics is thinking about and applying concepts, problem solving skills, and mathematical tools. This course will require you to be an active participant, which will result in a more enjoyable and rewarding course for you and me. Listening to someone talk about physics might be fun, but doing physics is definitely fun. P.S. (You will have to listen to me talk some of the time, but I reserve these moments to help you better understand the physics.)

The course goals are:

- To acquaint students with calculus-based Newtonian mechanics,
- To help students understand the difference between an exercise and a problem,
- To help students become a better problem solver,
- To introduce students to estimating to obtain meaningful results,
- To introduce students to methods of effectively communicating scientific information.

In addition, this class satisfies General Education credit in the School of Humanities and Sciences, area 2a: Science. In particular, this course satisfies the following General Education goals:

- Students will develop an understanding of some basic scientific principles (Newtonian mechanics),
- Students will develop an understanding of the methods the natural sciences use to study the physical world through the experimental component of this course.

Grading

The grades in this course will be based on the following items:

Reading Quizzes:	5%
Conceptual Questions:	6%
In-class Exercises:	4%
Online Homework:	10%
Written Homework:	5%
Context-rich Problems and Labs (best 9 of 11):	20%
Midterm Exams (best 2 of 3):	30%
Final Exam:	20%

Final grades will be based on the IC grading scale. The grades are explain below:

90-100%	A (–)	Outstanding	<ul style="list-style-type: none">- Firm command of knowledge domain- High level of skill development- Exceptional preparation for later learning
80-89%	B (±)	Exceeds Expectations	<ul style="list-style-type: none">- Good command of knowledge domain- Advanced development of most skills- Has prerequisites for later learning
70-79%	C (±)	Satisfactory Achievement	<ul style="list-style-type: none">- Command of the basic concepts of knowledge- Demonstrated ability to use basic skills- Lacks some prerequisites for later learning
60-69%	D (±)	Below Satisfactory Achievement	<ul style="list-style-type: none">- Lacks knowledge of some fundamental ideas- Some important skills not attained- Deficient in a few of the prerequisites for later learning
59% or below	F	Fail	<ul style="list-style-type: none">- Most of the basic concepts and principles not learned- Most essential skills cannot be demonstrated- Lacks most prerequisites needed for later learning

Reading

Before each class you must complete the reading. This is necessary so that we can move forward from the reading in the book and so that I am not repeating the material in the book during class. To make sure you complete the reading, there will be a short reading quiz before each class that will cover the reading material. The questions will be simple if you have done the reading. Each reading quiz will end with an open question about what you found confusing in the reading. I will often use these questions to guide the class.

Conceptual Questions

Each class I will use the clickers to ask you conceptual questions about the material we are studying. These questions are designed to make you think about the material in new ways and to make new connections. Some of the questions are easy, and usually just one or two will be difficult. For this reason, most of your grade (80%) on these questions comes from participation, and the remaining portion will be based on getting the correct answer.

Every student will be allowed to miss **two** in-class question sessions without penalty. Because of this policy, no make-up questions will be given.

In-class Exercises

In nearly every class, students will be asked to complete in-class exercises. We will do in-class exercises in lieu of a traditional example that I would work out for you. This method works to engage the students in the material, rather than watching me complete an example. It's like acting as opposed to watching TV.

The in-class exercises will also be input using the clickers, and will be graded. Every student will be allowed to miss **two** in-class exercises without penalty. Because of this policy, no make-up exercises will be given.

Homework

Tackling exercises and problems are an essential part of learning physics. This is when you get to practice quantitative problem solving. Homework assignments are assigned weekly.

All exercise assignments are due at 9:00 AM on Wednesday mornings. Exercises are completed online using [masteringphysics.com](https://www.masteringphysics.com). To enroll in the course, the class key is "MCSULLIVANPH117F10". These assignments allow you to practice solving quantitative exercises in preparation for working on in-depth problems in Friday's class session. The advantage of using an online service is that you get immediate feedback if your answer is wrong and you get 5 attempts at getting the right answer with no penalty. You can even ask for hints!

There are three types of online problems: tutorials, exercises, and problems. Tutorials take you back through difficult sections of the book. Hints are available for tutorials, and you get a bonus for not using the hints! Exercises are simple problems that only focus on one topic. Think of exercises like drills in sports, where you practice the same skill over and over so that you can easily do it in a game. Finally, problems combine two or more topics and are longer and more complicated.

In addition to the online homework, there will be one to three written homework problems (see the course website for an example of an exercise solution). These written homework problems will usually be written solutions to the same problems you completed online. The online system will grade the problem for the correct answer, I am grading the written homework to make sure you have completed the steps required. This will train you to think like scientists. Note: Each student gets the same questions, but the online service generates different numbers for each student. It is essential that you write the question down with all of the numbers at the start of your written solution (otherwise I won't know what numbers you were given).

Occasionally, I will assign a written exercise that is separate from the online homework. These will be given out in class and posted on the course website.

Regarding homework, I encourage you to work together when trying to understand a problem, but the work you hand in must be your own. I suggest you work out the problem in groups, then write your solution up neatly at home. This will reinforce the problem, and will make it clear if there are any gaps in your understanding.

I will return the written homework a week after it is collected.

Context-Rich Problems and Labs

You will solve context-rich problems or conduct open-ended lab experiments as part of a group every Friday. These problems are challenging and will help you learn how to solve "real-world" problems. The labs are open-ended, that is, I ask for a result and give you the equipment but I don't tell you how to experimentally achieve that result. Both labs and problems will require critical and analytical thinking.

To help you become a better problem solver and communicator of scientific information, I use a detailed grading rubrics to grade these in-depth problems and labs. See the course website for the rubrics. I will also post solutions to the context-rich problems after class every Friday giving you an

opportunity to see how I solve such problems. I will also post my own lab reports, so you can see how I conducted the lab.

We will return the Context-Rich Problems and labs a week after they are collected.

Exams

This course has three midterm exams and one comprehensive final exam. The exams will contain both conceptual and mathematical problems. The midterms will be held in class in CNS 206 on the Fridays noted in the schedule. **There are no make-up exams, no early or late exams.** You have been given early enough notice to accommodate them into your schedule. I will count your two best scores out of three midterm exams. Every student must take the final exam which is comprehensive.

We will return the exams within 10 days after the exam is scheduled.

Getting Help

If you are falling behind in class and do not feel comfortable with the material, *do not wait* to seek help! It is the nature of this course that each new topic builds on what we have learned before. If you start to get lost and don't do anything about it, it will be very easy to fall behind.

- **During Class:**

Don't be afraid to ask questions during class. If you're confused, it's likely that other students are confused. Also, feel free to ask questions at the beginning of class, so that I can clarify anything that's causing you trouble.

- **Office Hours:**

Instructor office hours are like free one-on-one tutoring. I am eager to help you understand the course material and basic math techniques, to discuss homework problems, past midterms, or anything else you want to talk about. I hold regular office hours, and I am also willing to make appointments if those office hours are not convenient for you. You can come to my office hours or see Kelley D. Sullivan, the instructor for the other section of Physics 117.

- **Tutoring Sessions:**

The Physics Department provides FREE tutoring sessions with enthusiastic and knowledgeable Ithaca College physics majors every **Monday through Thursday**, 5 - 8 PM in CNS 206.

- **Extra Credit:**

Extra credit will be offered to all students who attend four Physics seminars. Physics seminars are held on alternate Tuesdays at 12:10 PM in CNS 204. For each seminar you attend, please write three sentences to hand in: 1) A summary of the talk, 2) something interesting, and 3) something you learned.

Please take advantage of these resources!

Attendance

Students are required to attend all scheduled class and laboratory meetings.

If you miss class due to your religious beliefs you are excused from class on that day. I will work with you to provide you with an equivalent opportunity to make up any examination, study or work requirement which the you may have missed. I suggest that you notify me at least one week before any anticipated absence so that proper arrangements may be made to make up any missed work or examination. Any such work is to be completed within a reasonable timeframe, (as determined by me).

If you miss class due to a family or individual health emergency, or to a required appearance in a court of law, you are excused from class on that day. You or a family member/legal guardian may report the absence to the Office of Student Affairs and Campus Life, which will notify the students deans office, as well as residential life if the student lives on campus. The deans office will disseminate the information to the appropriate faculty. Follow-up by the student with his or her professors is imperative. You may need to consider a leave of absence, medical leave of absence, selected course withdrawals, etc., if they have missed a significant portion of class work.

Academic Honesty

Please familiarize yourself with the Ithaca College Student Code of Conduct; specifically the Standards of Academic Conduct (http://www.ithaca.edu/attorney/policies/vol17/Volume_7-70104.htm). I hold all students to these standards. I do not tolerate cheating or plagiarism of any kind. I will forward all academic conduct cases to the academic judicial review board. It is their job to handle these issues.

I do encourage students to work with each other because this is a great way to learn physics, but in the end the work you hand in must be your own. A successful strategy is to discuss approaches to a solution with other students or professors, but then go off on your own to write up the final solution. This way your solution will be in your voice and not a copy of another students solution.

Other notes:

- I do not hold office hours on the day of an exam.
- The half hour before class is my time to prepare for class. I am usually busy during this time and it is hard for me to answer questions. Please take advantage of my open door policy, but try to avoid asking me involved questions the half hour before class.
- In compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, reasonable accommodation will be provided to students with documented disabilities on a case-by-case basis. Students must register with the Office of Academic Support Services and provide appropriate documentation to the College before any academic adjustment will be provided.
- Requests for regrading of exams must be in writing and must specify exactly why additional credit is warranted. No requests for changing an exam grade will be accepted more than 48 hours after an exam is returned.
- I will send out occasional emails to the entire class to their *Ithaca College* email addresses, so you must check them regularly.
- Final grades are FINAL – no work may be handed in for additional credit after the final exam.

Last revised on August 17, 2011.

Course Outline:

Below is a rough outline of the course. There will be modifications to this outline depending on how fast we cover the material.

Week	Class Day	Reading	Topic	Homework	CRP/Lab
1	Aug 31 Sept 2	Ch. 1.1-1.8	Introduction 1-D motion, velocity, acceleration		
2	Sept 5 Sept 7 Sept 9	No Class Ch. 3.1-3.4,2.1,2.2 No reading	Labor Day Vector Review and 1D kinematics Acceleration; what is a "problem?"	Homework 1	CRP 1
3	Sept 12 Sept 14 Sept 16	Ch. 2.3-2.7 Ch. 4.1-4.3 No reading	1D kinematics 2D kinematics 1D kinematics	Homework 2	CRP 2
4	Sept 19 Sept 21 Sept 23	Ch. 5.1-5.7 No reading No reading	Forces Newton's Laws Projectiles	Homework 3	Lab 1
5	Sept 26 Sept 28 Sept 30	Ch. 6.1-6.3 Ch. 6.4-6.6 Review Ch. 1-5	Newton's Second Law Using Newton's Laws Midterm Exam I in class	Homework 4	
6	Oct 3 Oct 5 Oct 7	Ch. 7.1-7.3 Ch. 7.4,7.5 No reading	Newton's Third Law Ropes and Pulleys Forces and Kinematics	Homework 5	CRP 3
7	Oct 10 Oct 12 Oct 14	Ch. 4.5-4.7, Ch. 8.1,8.2 Ch. 8.3-8.6 No reading	Uniform Circular Motion Centripetal acceleration Atwood machine	Homework 6	Lab 2
8	Oct 17 Oct 19 Oct 21	Ch. 9.1-9.3 No reading No class	Momentum and Impulse Forces and Friction Fall Break		CRP 4
9	Oct 24 Oct 26 Oct 28	Ch. 9.4-9.6 No reading No reading	Collisions Collisions Collisions	Homework 7	Lab 3
10	Oct 31 Nov 2 Nov 4	Ch. 10.1-10.3 Ch. 10.4-10.7 Review Ch. 6-9	Energy Energy Midterm Exam II in class	Homework 8	
11	Nov 7 Nov 9 Nov 11	No reading Ch. 11.1-11.3 No reading	Energy Work and energy Energy and Kinematics	Homework 9	CRP 5
12	Nov 14 Nov 16 Nov 18	Ch. 11.4-11.9 Ch. 12.1-12.3 No reading	Work and potential energy Moment of inertia Conservation of energy	Homework 10	Lab 4
XX	Nov 21-25		Thanksgiving Break		

13	Nov 28 Nov 30 Dec 2	Ch. 12.4,12.5 Ch. 8.7, 12.6 No reading	Moment of inertia, torque Rotational dynamics Torque and $\vec{\alpha}$	Homework 11	CRP 6
14	Dec 5 Dec 7 Dec 9	Ch. 12.7,12.9,12.10 No reading Review Ch. 10-12	Ropes & pulleys, rolling, cross products Moment of Inertia Midterm Exam III in class	Homework 12	Lab 5
15	Dec 12 Dec 14 Dec 16	Ch. 13.1-13.3 Ch. 13.4-13.6 No reading	Law of Gravity Little g and Big G Final Review	Homework 13	

Final exam time is:

Tuesday December 20, 10:30 AM - 1:00 PM, CNS 206.