Physics 151: Accelerated Physics I: Mechanics and Thermodynamics
Professor: Hoffman
Spring 2018

Month	Date	Topic	Reading	Work Due
Jan.	22	Introduction	Ch. 1:1-6	
	24	Review of Kinematics	Ch. 1:7-9, 2:1-6	
	26	2D & 3D Motion	Ch. 3:1-5	HW 1
	29	Newton's Laws	Ch. 4, 5:1-2	
	31	Friction and Drag Forces	Ch. 5:3	
Feb.	2	Uniform Circular Motion	Ch. 5:4-5	HW 2
	5	Work	Ch. 6:1-2	
	7	Energy and Power	Ch. 6:3-4	
	9	Potential Energy	Ch. 7:1-3	HW 3
	12	Conservation of Energy	Ch. 7:4-5	
	14	Review	Chs. 1-7	
	16	**Hour Exam 1**	Chs. 1-7	
	19	Momentum	Ch. 8:1-3	
	21	Collisions	Ch. 8:4	
	23	Rocket Motion	Ch. 8:5-6	HW 4
	26	Rotational Motion	Ch. 9:1-3	
	28	Rotational Inertia & Energy	Ch. 9:4-6	
Mar.	2	Torque	Ch. 10:1-3	HW 5
	5	Angular Momentum	Ch. 10:4-7	

	7	Gravitational Force & Energy	Ch. 13:1-3	
	9	Orbits	Ch. 13:4-6	HW 6
	12-16	*Spring Break*		
	19	Black Holes	Ch. 13:7-8	
	21	Review	Chs. 8-10,13	
	23	**Hour Exam 2**	Chs. 8-10,13	
	26	Simple Harmonic Motion	Ch. 14:1-3	
	28	Pendula	Ch. 14:4-6	
	30	Damped & Driven Oscillations	Ch. 14:7-8	HW 7
Apr.	2	Mechanical Waves	Ch. 15:1-5	
	4	Superposition	Ch. 15:6-8	
	6	Sound Waves	Ch. 16:1-3	HW 8
	9	Resonance	Ch. 16:4-6	
	11	Beats & Doppler Effect	Ch. 16:7-9	
	13	Temperature & Heat	Ch. 17:1-7	HW 9
	16	Kinetic Theory	Ch. 18:1-6	
	18	Review	Chs. 14-16	
	20	**Hour Exam 3**	Chs. 14-18	
	23	First Law of Thermodynamics	Ch. 19:1-4	
	25	Ideal Gas Processes	Ch. 19:5-8	
	27	Second Law of Thermodynamics	Ch. 20:1-5	HW 10
	30	Entropy	Ch. 20:6-7	
May	2	Applications	Ch. 20:8	
	4	Final Review		HW 11
		Final Exam (cumulative)	Scheduled by Registrar	

Texts:

- Young and Freedman, *University Physics with Modern Physics, 14th Ed.*, with

MasteringPhysics. If you did not purchase *MasteringPhysics* with the text, you can buy it online at http://www.MasteringPhysics.com/.
- *Physics 151 Laboratory Manual*

Description:

- This course is an accelerated calculus-based introduction to the foundations of classical mechanics, intended for students majoring in science or engineering. Our emphasis will be on identifying, understanding, and applying the fundamental principles, especially conservation laws.

Student Learning Outcomes: After completing this course, a student should be able

- to understand that the goal of physics is to comprehend phenomena in the physical world;
- to demonstrate the ability to formulate a testable hypothesis based upon acquired physical data;
- to collect and analyze experimental data relevant to testing a hypothesis;
- to evaluate whether the evidence supports, refutes, or leads to the revision of the hypothesis;
- to create, interpret, and critically evaluate graphs, tables and models of physical data;
- to understand scientific uncertainty and how it is reduced with additional data acquisition and hypothesis testing;
- to distinguish between scientifically testable ideas and opinion.
- to understand, identify, and apply the fundamental principles of physics in a variety of physical situations;
- to use both qualitative reasoning and quantitative problem-solving skills in applying those principles;
- to apply Newton's laws, principles of waves and thermodynamics to appropriate mechanical situations; and
- to engage in the process of doing physics, including such tasks as developing and testing models, interpreting experimental data, solving problems, and communicating results.

Prerequisites:

- You must have credit for Math 161; you must be enrolled in Math 162 unless you already have credit for that course.

Office Hours:

- Office hours will be posted on my online schedule. Please feel free to call or email with your questions also.

In Case of Inclement Weather or Other Catastrophe:

- If I am unable to make it to class, I will leave a message on my voicemail (610-330-5211) and send email if that is possible.

Your Responsibilities:

- **Reading**: It is crucial that you read the assigned material *before* the relevant lecture. Your text is a critical resource for this class -- it is our source of definitions, facts, ideas, explanations, derivations and worked examples. I do not intend to spend class time simply repeating the text. Instead, class time will be used to *discuss* those ideas, answer questions, observe demonstrations, work additional examples, and practice applying those ideas to various physical situations. See the daily syllabus for the assigned readings each day.

- **Ask questions**: If you are confused, it is important that you stop me and try to sort it out rather than fall behind. *Please* interrupt my lecture whenever anything isn't clear. Remember that if you are confused, there are almost certainly many others in the class who are confused as well, and they would welcome your question.

- **Homework problems**: A full understanding of how to apply the mathematical formalisms comes only with much practise. Therefore homework problems are a crucial, probably the most crucial, part of this course. Assignments will be made weekly, with all problems due on paper each Friday. The assignment of problems will be made to the course Moodle site, moodle.lafayette.edu. It is essential to read the relevant sections of the text and review lecture notes thoroughly *before* you start to think about the homework problems. Feel free to discuss the problems with one another or (especially) with your instructor, but the paper you submit should represent your own understanding of the problems, written up independently after all discussions are complete. Group solutions are not acceptable. Papers that appear to have been copied from one another or from a published or internet source will be treated as academic dishonesty.

  Homework is due at the start of class. **Late papers will normally not be accepted**, since I will be posting solutions to the course Moodle site right after class. Written work must be legible. One homework score (normally the lowest) will be dropped in computing your final grade.

- **Academic Honesty**: Working with others is often a helpful way to learn physics. I encourage you to collaborate with each other on homework, but remember that unless specifically directed otherwise, all work you turn in should be your own. Please read the department's Academic Honesty policy for the rules regarding collaboration. Feel free to ask if you have any questions about this policy.

  There are a variety of resources available to help you in your study of

physics. These include my office hours, tutoring through ATTIC, and working with classmates. Some students also find it useful to consult other texts, friends, and even a variety of on-line forums. In all cases, though, the principles of academic honesty apply: All collaborators must be acknowledged (apart from your instructor), and all work you turn in must be your own.

- **Laboratory**: The laboratory is an essential part of the course. You must complete all of the assigned experiments. Details will be provided by your lab instructor.

- **Exams**: There will be three in-class exams as indicated on the syllabus. An equation sheet will be provided by your instructor for each exam. A copy will be provided to you in advance so that you can familiarize yourself with it.
  The idea is that you will use your study time to focus on the fundamental ideas and to practice solving problems rather than to memorize complicated formulae. However, you will do best if you know the material well enough to have in mind the formula you need before you look for it on the equation sheet; use the sheet just to remember where the factors of 2 and π belong. The goal of the course is to understand and be able to use the basic physics principles, rather than to memorize how to solve specific types of problems. Accordingly, exam problems will **not** be identical to any particular homework problems, but they will be based on the same principles and can be solved using similar strategies. Practise on the homework problems will be essential in developing the skills and solid understanding of the principles needed to do well on the exams.

  To reinforce this emphasis on understanding, the tests may include short answer questions that stress the underlying principles, somewhat similar in spirit to the questions at the end of each chapter.

  There will be a comprehensive final exam at a time to be arranged by the registrar. Please do not make travel plans that may conflict with the final exam unless they are absolutely unavoidable. Please bring any conflicts with the time of the final exam to the attention of your instructor as soon as possible.

  The final exam will be the same for all sections. The best strategy for preparing for the final exam is to keep up with the course day-by-day and to be sure that you understand every homework problem thoroughly when you hand it in.

- **Attendance**: Regular class attendance is expected. Too often, erratic attendance and poor performance seem to go together. You are responsible for all material discussed in class along with the reading assigned on the syllabus. Class participation will be considered in your final grade if

warranted.

A good rule of thumb is that you should spend approximately two hours outside of class for each hour in class for any college course. This means that you should allow an average of six hours per week studying for physics.

Registrar's Mandatory Privacy Statement:

- Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Federal Credit Hour Compliance Statement:

- The student work in this course is in full compliance with the federal definition of a four credit hour course.

Your grade will be based on:

- Homework: 25% total
- Labs: 20% total
- Hour exams: 35% total
- Final exam: 20%

This page is maintained by Lyle Hoffman