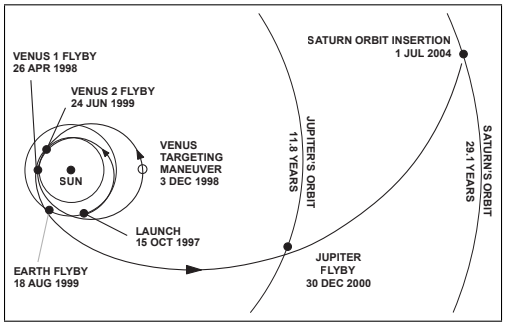
Physics 131: Mechanics
Section 3 (1:10 p.m.)
Lafayette College
Spring 2011



Instructor

Prof. David Nice
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Course Website

We will use moodle, `http://moodle.lafayette.edu`. "PHYS131.03_SP11 Mechanics" should be in your list of current courses. Course handouts, homework assignments, etc., will be distributed in paper form in class and will also be available on the moodle site.

Course Locations and Times

Class: Hugel Science Center 100
Monday, Wednesday, Friday; 1:10-2:00

Lab: Hugel Science Center 123
Various weekly three hours time slots (you should be registered for one)

Office hours

I will have weekly office hours. These are a great time to stop by for questions about course material, homework problems, or anything else related to the class. I will set my schedule of office hours by the end of the first week of the semester. They will be posted on moodle and on my office door. If you wish to meet, but have conflicts with my scheduled office hours, you can always E-mail me to schedule an appointment.

Course overview

The college catalog says it well:

A rigorous introduction to the study of physics for science and engineering majors; a foundation on which an understanding of physics, physical chemistry, or engineering can be built. Kinematics and dynamics with emphasis on conservation laws for linear momentum, angular momentum, and energy. A calculus-based course satisfying degree requirements in all B.S. or A.B. degree programs. Not open to students with credit for Physics 151.

Math corequisite

Math 161 (Calculus I) or equivalent must be taken concurrently (if not taken already).

Other introductory physics courses

Everyone is welcome in Physics 131. However, you should be aware of two other introductory physics sequences (both of which begin in the fall). Pre-med, pre-dental, and pre-vet students may wish to consider Physics 111 and 112, which cover more topics with less depth than sequences which begin with Physics 131. Students with strong previous background in physics may wish to consider the Physics 151 and 152, which proceed at a more rapid pace than sequences which begin with Physics 131.

Other sections of Physics 131

In addition to the 1:10 pm section of Physics 131, there are two other sections of the course this semester; they meet at 8:00 and 9:00 a.m. The three sections are taught by three different professors. The syllabi and course policies are similar but not identical. Those of us teaching the course will work hard to ensure that grading and workload are equitable across all three sections.

If you need to switch sections, you should do so as soon as possible. See one of the Physics 131 instructors. A drop/add form must be filed. Changes should only be made for compelling reasons (e.g., a conflict with another class or other college activity).

Labs

All students from all three sections of Physics 131 do the same weekly labs. Your lab partner and other students in your lab section may be from a different lecture section. Due to limited space, the registrar may have placed you in a lab section other than the one you initially signed up for.

Lab is an essential part of the course. You will work on a variety of experiments which are closely correlated with the material we cover in class. Further information on lab policies is given in the lab manual. Contact the lab instructors if you have questions.

Lab meets starting the first week of classes. You should get a lab notebook before your first lab meeting.

Text

The following texts are required and are available at the college bookstore:

- Young and Freedman, "University Physics with MasteringPhysics," 12^{th} edition.
  ISBN-10: 080532187X, ISBN-13: 9780805321876.
- Physics 131 Lab manual

Make sure you get the twelfth edition. In Physics 131, we will primarily use chapters 1-10, 12, 21, and 23. We will also briefly dip into chapters 15 and 17. Physics 132 and 133 use later chapters of this same text. If Physics 131 is the only introductory physics course you will be taking, you can get chapters 1-20 as a stand-alone book; the publisher calls this "Volume 1." If you have this edition, we will find a way of getting you copies of chapters 21 and 23.

You need to have "MasteringPhysics." This comes bundled with the text, and it gives you an access code for www.masteringphysics.com, which we use for some homework assignments.

While the text will serve as an important resource, classes and, especially, the homework sets will be your primary guide to what you need to know in order to do well in this course. Skim through the assigned sections of the text, but read through the examples carefully. Use the text as a reference as you work homework problems and study for exams.

Course goals and topic coverage

The goal of this course is to teach you to *think like a physicist* and to provide a foundation for further study in physical science and engineering. We will accomplish this by introducing you to a series of topics in kinematics and dynamics.

The list below shows the topics we will cover this semester, along with the corresponding sections of the textbook and an estimate of the number of class sessions we will spend on each topic. This list may change as the semester progresses. Specific topic and text coverage will be given on a weekly basis on the homework assignments.

Topic	Text Sections	Approximate number of class sessions
Introduction		1
Units; velocity; vectors	1.3-1.4, 1.7-1.9, 2.1, 3.1, 3.5	3
Velocity and acceleration	2.2-2.3	1
Motion with constant acceleration	2.4-2.5	2
Motion in more than one dimension	3.2-3.3	1
Newton's laws	4.1-4.5, 5.1-5.3	5
Circular motion	3.4, 5.4, 12.1-12.2, 12.4	2
Energy, dot product, springs	1.10, 6.1-6.3, 7.1-7.2	3
Power, Intensity	6.4, 15.5	1
Thermal radiation, Earth temperature	17.3, 17.7	2
Momentum	8.1-8.4	2
Center of mass	8.5	1
Rotational Motion	9.1-9.5, 10.1-10.7	6
Electric field	21.1-21.7	4
Electric potential	23.1-23.5	5

Outcomes

After completing this course, you will be able to understand, identify, and apply the fundamental principles of physics in a variety of physical situations. You will be able to use both qualitative reasoning and quantitative problem-solving skills in applying those principles. Among other things, you will be able to:

- Model static and dynamic physical situations using qualitative and quantitative models.
- Use and manipulate vector equations for solving physical problems.
- Perform detailed kinematic calculations in situations such as free-fall or circular motion.
- Use calculus concepts in describing motion.
- Use conservation laws for scalar and vector quantities.
- Solve physical problems involving multiple equations.
- Understand and use the relations between sources, fields, and potentials.

Homework

There will be weekly homework assignments. They are the heart of this course. You don't learn physics by reading about it, or by hearing lectures about it, or by watching someone else do it. You learn it by doing it yourself: doing real experiments in lab and doing real calculations in homework.

Homework papers are due on Thursdays at 5:00 pm in a bin in the hallway near my office door. Late homework papers will be accepted for 50% credit from Thursday at 5:00 pm through Monday at 5:00 pm.

Portions of the assignments will be done using the MasteringPhysics on-line system. Details will given in more detail on the first assignment. The on-line problems will be due at the same time as the paper assignments. Late on-line work will be accepted for up to 48 hours, with a sliding scale proportional to the time the paper is late (e.g., 12 hours late is 25% off).

There is no assignment due the first week of classes.

If you cannot complete an assignment due to illness, family emergency, or similarly compelling reason, please contact me. (Also see the section on "Dean's excuse policy" in the Student Handbook.)

You are *strongly* encouraged to work with other students on the homework. Try the problems yourself. When you get stuck, talk to someone else about them. Physics is hard. You won't get all the problems on your own. Working in groups is a powerful way to learn. It is also more fun.

I will have extensive office hours. Please come and visit if you are having difficulty on homework. I am happy to help. Often there will be other students there with questions similar to yours. I expect that most of you will take advantage of office hours sooner or later during the semester.

Exams

There will be three in-class hour exams. They will be given on Fridays: February 18, March 11, and April 15.

There will be a three hour final exam during finals week covering all material in the course. The final exam will be scheduled by the registrar.

All exams will be closed book, with equation sheets provided. Copies of the equation sheets will be available in advance. Exam questions will resemble homework problems. Each hour exam will be on the material covered in the preceding weeks of class (i.e., since the previous hour exam).

Grading

There must be grades. Your grade will be based on:

Homework	15%
Lab	15%
Hour Exam #1	15%
Hour Exam #2	15%
Hour Exam #3	15%
Final Exam	25%

Class participation, effort level, etc., may be factored into your final grade after your score is calculated using the above percentages. This will be most important if you are on the borderline between two grades.

Memorization

Knowledge of terminology and notation is an important part of a scientific education. For this course, you are required to memorize the metric prefixes listed below and to know how to use them. They will be tested on hour exam #1 and may be used in subsequent exams.

Selected Metric prefixes

Prefix	Abbreviation	Multiplier	Prefix	Abbreviation	Multiplier
tera	T	10^{12}	centi	c	10^{-2}
giga	G	10^{9}	milli	m	10^{-3}
mega	M	10^{6}	micro	μ	10^{-6}
kilo	k	10^{3}	nano	n	10^{-9}

The computer industry uses prefixes to represent multiples of 1024 (e.g., 1 kbyte = 1024 bytes), but in Physics 131 we will always interpret them to represent factors of 1000 (1 kbyte = 1000 bytes).

Intellectual honesty

You are expected to abide by the principles of intellectual honesty outlined in the Lafayette Student Handbook (available from http://studentlife.lafayette.edu).

Learning is a collaborative process. Discussion and collaboration on homework in this course is very strongly encouraged. "Collaboration" does not mean "copying." You must understand and individually write out your answer to each problem.

Exams must be done on your own, using only materials specifically allowed.

Accommodation

Following Lafayette College policy and equal access laws, I am available to discuss academic accommodations that you may require as a student with a disability. Requests for academic accommodations should be made during the first two weeks of the semester, except for unusual circumstances. Students must register with the Office of the Dean of the College for disability verification and for determination of reasonable academic accommodations.

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.

What to call me

Please, let's all use first names. Call me David.

Whom we root for in the Superbowl

We prefer to root for the Philadelphia Eagles, but that isn't a choice this year. So we root for our second favorite team, the Green Bay Packers.

Welcome aboard

I love teaching introductory physics. I hope you are happy to be here. The material can be difficult but we will get through it and it will be rewarding. The course will be challenging but it will also be fun. Welcome aboard!