

Physics 401: Introduction to Physics I

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Overview of the Course

This course has two main goals:

- **Build Models of the physical world**, developing your understanding of how knowledge about the physical world is constructed.
- **Use these models**, developing your ability to apply your constructed knowledge of the physical world to understand particular physical phenomena.

In this course we will construct knowledge about the physical world by building models. Models have many representations (data tables, diagrams, graphs, words, and equations); they are both conceptual and mathematical. Model building will happen in lab (usually before any lecture on the topic) to allow you to construct that knowledge as a scientist would. In other portions of the course (lecture, homework) you will practice applying those models to physical phenomena, including biological phenomena.

Models will be applied/deployed in many ways: to give a strong scientific argument to support or refute a point of view, to estimate values, to decide what physics is important in a given situation, to calculate and check values. In all of these uses, more than memory is required; you must understand what story the model is telling. Therefore we will also spend time “unpacking” the model to find out what it is telling us.

The topics that we cover in this course are motion (position, velocity, acceleration), forces, torque, momentum, energy, materials, and fluids.

This course is **not** intended for engineers or physical science majors, for whom Physics 407 is more appropriate. Please consult your academic advisor if you are not sure which course is required/best for you.

Although this course has the course number 401, this is NOT usually considered an “easy course”. Don’t be fooled by the number. Most students will find this course quite challenging.

Rooms

The lectures are in DeMeritt 112; the labs are in DeMeritt 338. The Physics Department Office (where you add and drop this class or a lab) is in DeMeritt 237. The Physics Library is just across the hall from the Lecture Hall.

Lab Teaching Assistants (TA’s)

Information on lab TA’s will be posted on Blackboard in the “course info” section as soon as it becomes available.

Office hours

These will be posted on Blackboard on the “course info” page by the beginning of the second week of class. It may be necessary to adjust the office hours during the semester. All updates will be posted on Blackboard.

Course Text

I very highly recommend that you get one of the text books *and actually read it!* To encourage you to do so, at least one of these alternatives is free.

The recommended, but *not* mandatory, text for this course is *College Physics: A strategic approach* by Knight, Jones and Field (Addison Wesley, 2014; 3rd edition or 2010; 2nd edition), available at both bookstores, online stores, and online as an e-book (at MasteringPhysics.com). The 2nd edition will be available second-hand. There are many variations available of this book, each with a different ISBN code. This course will cover the first 16 chapters, or Volume 1. The follow up course, Physics 402, will cover the next chapters, so if you will also take 402, you may want to buy the full book. Some bundled versions of the text come with workbooks; these workbooks are NOT required. You will also find a number of additional textbooks on the same topic from other authors in the Physics library.

An alternative free book can be found online at OpenStax College:

(<https://openstaxcollege.org/textbooks/college-physics>)

Here you can get a free web based version, a free PDF, or an inexpensive printed version of an algebra based college physics book. This book uses a slightly different approach to the material. It will not have the same problems in the back, and will not always have a one to one corresponding section with the material in the main textbook, but it does form a good low-cost alternative.

MasteringPhysics Access

In order to get credit for homework, you will also need to purchase access to *MasteringPhysics*, which is an on-line homework service. If you intend to purchase a new textbook, it is cheaper to buy a bundle that includes *MasteringPhysics* access as well. Make sure you get version 3. However, you can also purchase the MP access as stand alone on the web site (<http://www.masteringphysics.com/>). You need to select the correct book: *College Physics: A strategic approach* by Knight, Jones and Field (Addison Wesley, 2014; 3rd edition). Detailed instructions for signing up for MP are on Black Board; the course ID is **MHOLTROP401FALL2014**.

Prerequisites

Knowledge of high school algebra, geometry, and trigonometry is essential, something similar to what is taught in Math 418 at UNH. We will often review mathematical tools as we need them and link the mathematics to the physical and biological concepts. Some homework sets may have a math remediation problem or two assigned to help you brush up on anything you may have forgotten. There will also be optional homework assignments to help you practice math.

Course Requirements and Grading

Below is a very quick overview of the grading. The total number of points possible is 100+2%.

Numerical to letter grade conversion will be: 80% is a B-, 83% a B, 87% a B+ and so on to 93% and higher for an A. However, I will not follow this conversion slavishly, since sometimes an exam will be harder than expected, dropping everyone unfairly down, or something else goes awry that throws off the scale. Usually, the grades are pretty close to the stated percentages. You can check your grades with Black Board throughout the semester.

Graded assignment (frequency)	Points out of 100	Notes	Make-ups
Lab (most weeks)	20	You must attend all labs in order to pass the course.	Contact your TA. Make-up same week is best, or during makeup weeks.
Homework (weekly)	20		By special request.
Quizzes	15	Lowest Quiz score dropped.	Only in exceptional circumstances.
Exams and Quizzes	45	Each exam 15%.	Only in exceptional circumstances.
Concept questions in class	2% extra credit	a.k.a. clicker questions	None
PLTL		Peer Led Team Learning	None

Expectations:

Do **NOT** expect this course to be easy and take little time simply because it has a 401 number. You should expect to spend at least 5-7 hours *of focused time* each week outside of class on homework, reading and studying. If your mathematics background is weak or rusty, expect to spend more time reviewing mathematics (perhaps another 1-2 hours a week). To some students the material in this course is more challenging and so it takes longer to absorb, in which case it may require considerably more time studying.

Policies

There are lots of policies due to the size of the class. Bottom line: politeness, integrity, common sense, and a reasonable amount of work will get us all through. We try to be reasonable with these policies and ask you for your cooperation. We outline the policies here.

A. Graded work

i. Labs

- Description:** The lab is essential to this course, because in lab we develop the models that we will be using during the other parts of the class. (Some weeks lab will include problem solving.) You will often do labs on a topic BEFORE we lecture on a topic so that you will build your knowledge first hand. **To prepare for lab you only need to bring your curiosity and powers of observation.**
- Lab Petition:** If you took this course before and passed the lab portion of the course, you can petition out of the lab. Go to the physics office to ask for a lab petition, and let them know what semester you took the course. They will verify your grade. You need to check back within a week to verify that you do indeed have credit for this lab.
- Make-up labs** **If you miss a lab, you must make it up in order to pass the course.** Either make-up the lab in another lab section that week (this is the best option) or during the next makeup week. See Procedures section for details.
- Limits on number of labs during make-up weeks:** These penalties are imposed because the lab is an essential part of the class, and is most useful

at the scheduled time. As such, you cannot make-up more than two labs in any make-up week.

ii. Homework

- a. Description: Homework will be done on *MasteringPhysics* (MP). Homework problems give you practice working with ideas from lab and lecture, and are critical preparation for quizzes and exams. **Working together is encouraged, but you should be able at the end of the day to do the problems yourselves.** If you cannot do the homework problems, you won't be able to do the exam problems.
- b. Self defeating behavior: It is remarkably easy these days to find fully worked out problems on the web. It is also easy to get answers from other students or have other schemes to get the answers. Don't! Such cheating does not help you to learn. There is no easy substitute for learning to think your way through the problems, and you will need this practice to do well on the exams.
- c. Due date and lateness: Homework is assigned weekly and is due 6 AM Monday morning each week. Late homework will not be accepted.

iii. Quizzes:

- a. Description: We will have several in-class quizzes focused on problem solving throughout the term. Quizzes will be similar to problems done in class or on homework. The goal of these quizzes is to help you familiarize yourself with what we expect before an actual exam.
- b. Details: The quiz is during class time, and will take about half the class. See the schedule for dates.
- c. Make-ups: Because this is during class time, we will not allow make-ups except for exceptional circumstances, please see below for details on "exceptional circumstances." To accommodate some flexibility, the lowest quiz score will be dropped.

iv. Exams:

- a. Description: Exams will focus on model building and problem solving. All exams are cumulative in the sense that you need to be able to apply the models that we develop at any time. The problems will all be similar to problems we have done in class or for homework, including conceptual, numerical and estimation questions. The final exam will simply count the same as the other two exams.
- b. Details: Exams are during common exam time (12:40PM-2PM) on Thursdays; see schedule for dates.
- c. Makeup Exams: There are no make-ups, except for extremely exceptional circumstances. See the Procedures section for details.

- v. Cheating: Collaboration is important for your learning, but mindless copying, plagiarizing, giving clickers to others, etc. will not be tolerated. Neither will it be tolerated for you to try to get advance knowledge on a quiz or test. If you have any doubts about what cheating means, please refer to the Student Handbook. **Do not act under the impression that cheating is ever "minor". A violation of the academic honor code will likely ensure your immediate failure of the course and possible further action.**

- vi. Re-grade requests: If you believe we have made a significant error in human-graded work proceed as follows:

- a. Labs: Speak with your TA by the next lab after you got your graded work back.
- b. Exams: Speak with me at a mutually convenient time.

- vii. Grade records: You will be able to check your grades on BlackBoard; if you notice an error in the recorded grade please bring your original graded work to Michelle Waltz in Dem 237 within 2 weeks of the grades showing up on BlackBoard; she will make a copy and correct the BB grade. **You have only 2 weeks to get a grade corrected. Still, you should always keep ALL graded work until the end of the semester. Without your graded work, we cannot change your grade. We cannot change your grade after 2 weeks.**

B. In class

- i. Lecture etiquette: There are over 100 of us in the room. The challenge is to use our time efficiently and keep background noise to a minimum. Please keep extraneous noise (coming in late, leaving early, talking to your neighbor) to a minimum. If your body is here, your mind should be too: **please turn off cell phones**, iPods, iPads, laptops and other electronic devices. Please do not begin to pack up until the instructor has dismissed the class. For our part, we promise to begin and end on time.
- ii. Clickers: Bring your clicker to every lecture, but **do not send it with anyone else or you will both fail the course**. Technical difficulties are handled by the bookstore, i>Clicker or Academic Technology (see the instruction sheet on BlackBoard for more details). You should have your clicker registered and in class by September 8th. Check BlackBoard for clicker registration information. We have made the "clicker points" 2% extra credit, so that if you forget your clicker on occasion or you choose not to buy one, your grade does not suffer. **There is no makeup credit for clickers.**

C. Communication

- i. Email: Emails are a good way to communicate. However, please understand that it sometimes takes a few days for me to respond. Also, if it is a complicated request or suggestion, it is better to talk to me in person so I can ask for clarification. Emails should all include your full name and your section so that we may better help you.
- ii. BlackBoard: You need to make sure you have access to BlackBoard, and that the email address listed for you is one that you check regularly. Some essential documents and information are available only on the course BlackBoard site.

- D. Peer Led Team Learning (PLTL). These are optional groups of about 6-8 students **who work together on model application/problem solving**. The discussion is facilitated by a student who did well in the course last year or is a physics major. It is also possible that a TA leads the sessions (which would make it a "coaching session"). This is an excellent way for you to get extra help in the course and it is very highly recommended. Please note that once you commit to a PLTL team, you need to honor that commitment and come to your PLTL group meeting every week. The facilitator will take attendance.

- E. Everyday challenges: We are very aware that life happens (computers fail you, illness, your car gets sick, you need to help a friend etc.) and may negatively affect your ability to do your work. Some flexibility is built into the course: drop lowest homework score and quiz score, clickers are extra credit. In return we ask that you not ask for grade adjustments or excused work for minor concerns. This way we can focus the bulk of our effort on things that matter the most for everyone (writing clear lectures, fair tests, and useful homework). (For really big things interfering with your work, please see "exceptional circumstances" below)

- F. Exceptional circumstances: On rare occasions there will be significant life events that prevent people from fulfilling their academic responsibilities for an extended period (a cold or having three exams in a week does **not** qualify; major medical or family crises do; a wedding is not a family crisis). If you find yourself in a qualifying situation please contact me and meet with me as soon as possible.

- G. Accommodations: If you are a student with a documented disability who will require accommodations in this course, please register with Disability Services for Students in the Memorial Union Building, Room 118 (862-2607) for assistance in developing a plan to address your academic needs.
- H. Inclement Weather: It may happen that the weather makes traveling very dangerous from your home and yet the University does not cancel classes. This is especially true for people who have to drive a fair distance. **If you feel it is too dangerous to come to UNH, please do not come!** If you miss a lecture, see a classmate to get notes and see BB for a copy of the lecture; if you miss a lab, you can make it up (preferably that week) but be sure to e-mail the TA of the make-up section;

Procedures

A. Exams:

- i. Details: Exams are during common exam time (12:40PM-2PM) on Tuesdays; see schedule for dates. The exams will be given in separate classrooms. **YOU MUST GO TO YOUR ASSIGNED ROOM**, or you will lose 5% on your exam. (This is because it is possible to run out of tests or seats if several people show up to the wrong room.) Bring a calculator, pencil and watch (some of the rooms have no clock). Do **not** bring a smart phone, iPad/iPod, or any computer device with a network connection. Beginning a few weeks before the exam, I will begin to post information such as rooms, and chapters/lectures/homework/labs to review for exam.
- ii. Makeup Exams:
 - a. Who can take a Makeup: **Makeup exams are for those students who can document exceptional circumstances or who are ill.** Contact me **before** the exam if at all possible.
 - b. Some students have classes or labs during common exam time (Thursday 12:40-2PM). It is UNH policy that students who have common exams and classes during the same common exam time **must be excused from the class without any penalty (see UNH Student Rights and Responsibilities)**. Ask your TA or professor if you can be excused for the exam. If you feel uncomfortable with this, talk to me and I can help. If you have a lab at this time, ask your TA if you can reschedule for another time that week. If you cannot reschedule or be excused, please see Michelle Waltz at least a week before the exam (see documentation section below).
 - c. Documentation: You will need to provide documentation (doctor's note, court summons, etc.) before the scheduled exam date, in order to take a make-up exam.

B. Make-up labs **If you miss a lab, you must make it up in order to pass the course.**

- i. Option 1: The best way is to make it up that same week by attending another lab (see lists of lab times on BB). This is best so that you have the ideas you need for the homework and exams and so you can follow the lecture with more understanding. The procedure is to email your TA to let them know what's happening, and email the other TA to let them know that you'd like to come to their lab. If you don't hear back in time, show up anyway as there is likely to be room.
- ii. Option 2: There are two lab makeup weeks during the semester (see the syllabus). Email your TA by Friday at 8am the week before makeup week. Include in your email which lab(s) you missed and all the lab times (see BB) that you can make. We need to know all the lab times so that hopefully we can create a group to do the same lab AND we can make the best use of TA time. **THIS DEADLINE FOR MAKEUP REQUEST IS A REAL DEADLINE** so that we can schedule labs for the makeup week. Failure to comply with the deadline will result in a loss of 5% on your lab. (Sorry to be

harsh, but we need your help to make this a manageable process.) Then look for an email back within about 48 hours that will let you know when your makeup lab is scheduled.

In closing: This syllabus is a guideline, not a contract. We reserve the right to make changes to the syllabus during the course of the semester.