

PHYS 141 – Elementary General Physics I
Syllabus, Spring 2021

Instructor

Dr. Keith Foreman

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Office Hours: Office hours to be held via Zoom. See table below.



Office Hours	Time	Meeting ID	Password
Monday	3:30-4:30pm	916 9343 0386	862492
Tuesday	9:30-10:30am	919 7867 9509	608058
Wednesday	3:30-4:30pm	984 2234 6743	770282
Thursday	9:30-10:30am	972 0223 1380	510778

Or by Appointment

Times and Locations

We will meet each Monday, Wednesday, and Friday virtually, via Zoom, from 2:30 to 3:20pm.

First meeting: Monday, January 25th

Last meeting: Friday, April 30th

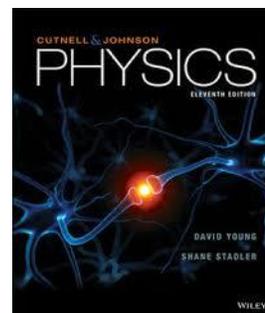
Prerequisites

MATH 102 or higher, or a qualifying score on the Math Placement Exam for MATH 106 or higher.

Text

Cutnell & Johnson, *Physics* (Wiley, 2018, 11th Edition, Volume 1, Chapters 1-17).

You don't actually need to buy a hardcopy version of the text because an electronic version of the text (eBook) is available through Canvas via *WileyPLUS*, to which you are required to subscribe. More information on *WileyPLUS* can be found below.



ACE Certification & Course Objectives

This course has been certified by the [Achievement-Centered Education](#) program at UNL to satisfy Student Learning Objective #4: “Use scientific methods and knowledge to pose questions, frame hypotheses, interpret data, and evaluate whether conclusions about the natural and physical world are reasonable.”



PHYS 141 is the first of two courses in the algebra-based general physics sequence. It is a study of mechanics, heat, and waves. An understanding of algebra, simple geometry, and trigonometry are required. The main focus of this course is on the qualitative and quantitative appraisal of simple physical systems through a comprehensive process of problem solving designed to arrive at a thorough understanding of relationships between systems and their behavior. This process can be separated into four distinct phases. The first phase consists of an inquiry into what the system is and its essential components. The available data (which are given in the statement of the problem, or in diagrams, graphs, or reference tables, or some combination thereof) and the key physical principles and laws governing the system should be identified during this phase. The second phase is to interpret the physical principles and laws and the data in order to develop a plan and define goals for a solution. During this phase, the inferences that can be drawn from the data, the best way to approach the problem, the necessary mathematical relations and methods to solve the problem, and any requisite intermediate information that must be obtained should be identified. This plan is implemented in the third phase through detailed analysis, with careful attention to accurate execution of the mathematical relations representing the underlying physical principles. Critical evaluation of the reasonableness of the solutions and conclusions is the essential fourth and final phase of problem solving. This evaluation includes checking units, recalculating some quantities by a different route, and judging whether the magnitude of the answer is within reasonable physical limits.

The sections “What You Will Do” and “Exams and Grading” below explain how your ability for appraising physical situations will be developed and assessed.

The successful student will develop the critical thinking and problem-solving skills necessary for careers in the life sciences.

What You Will Do

The learning process will involve you actively in online pre-class quizzes, lectures, discussion boards, recitations, and laboratory exercises among other activities. Your responsibility is to come to lectures, recitations, and laboratory sessions ready to participate, having familiarized yourself ahead of time with the material in the textbook which is to be discussed, and to do the online pre-class quizzes and assigned homework.

A few words on each activity:

ONLINE PRE-LECTURE ASSIGNMENTS - (in Canvas via *WileyPLUS*) Pre-lecture assignments are short assignments, either free-response or multiple choice, that will generally be due the mornings of lecture, Monday, Wednesday, and Friday by **1pm**. A pre-lecture assignment will usually be posted on Canvas, with an accompanying Canvas Announcement, after each lecture and due before the subsequent lecture. These assignments help you prepare for lecture, so do these *after* you complete your reading assignment for the upcoming lecture. They also help *me* find out which topics are difficult for the group as a whole and may need more attention, which is why they are due before lecture with enough time to spare for me to look over the results. These questions are also a good source to study for the conceptual portions of exams. The pre-lecture assignments will be completed online in Canvas via *WileyPLUS*.

LECTURE - Lectures will consist of presentations, demonstrations, and problem solving (LOTS of problem solving.) Because our lecture hall has 150 seats, and there about 150 students enrolled in each section, we sadly cannot have lectures in-person since we will be strictly adhering to social distancing guidelines. Thus, the lecture content for this course will be primarily delivered via live Zoom sessions held during our scheduled lecture time (MWF mornings). I may occasionally supplement the Zoom meetings with pre-recorded videos posted on Canvas. Your attendance and participation/engagement at these live, synchronous class sessions is required and will be tracked by Zoom. **Be sure your Zoom name is the same as it appears on Canvas so your attendance can be tracked without issue. You will need to be signed in to Zoom.** You should be able to access the Zoom meetings for lectures through Canvas (click "Zoom" in the menu on the left side of the Canvas webpage) or directly through Zoom itself using the meeting ID and password below.

Lecture Meeting ID: 979 0166 0989

Password: 71025

Lectures are an activity and should not be wasted by passivity: listen—think—discuss—ask questions—and answer questions. Even though our lectures are not in-person this semester, you should be actively engaged in the content by taking notes, making lists of questions to ask me during office hours, and giving serious thought to the multiple-choice concept questions that will be asked during lecture. If we were meeting in person for lecture, these questions would be given using iClickers. Instead, we will use Zoom's built-in polling feature to answer these multiple-choice concept questions in lecture. Students should take these conceptual questions seriously, as some may appear again on other for-credit work. On rare occasions, these concept questions themselves may be given for credit.

RECITATION - The best way to master the physics this course will cover is to *work through* physics problems. To that end, you will attend an informal discussion section that meets once a week, called a recitation. At recitation, you will learn and practice problem solving strategies in the presence of a recitation instructor that can give you immediate feedback and guidance concerning the difficulties encountered in solving problems. No new content will be delivered during recitation, but rather, they will be focused on developing problem-solving skills and the problems assigned during recitation should be thought of as **practice for the exams**. The problems assigned during recitation will be graded and count toward your overall course grade. You are encouraged to ask your recitation instructors for help with any aspect of the course including the homework assignments, but they will not do your homework for you. Within the limits of social distancing requirements, you may work with your peers on these problems during recitation.

There is no online version of recitation. As indicated in MyRed when you signed up for this course, in-person attendance is expected. Students who have tested positive for COVID-19 and/or who are engaging in quarantine in accordance with guidance from the Lincoln-Lancaster County Health Department or their health care professional should not physically attend recitation while ill and/or in quarantine. In this event, you must notify your recitation TA of your absence **prior to your scheduled recitation**. You will still be expected to complete all coursework and fulfill the engagement expectations of the course, and they must adhere to the usual codes of conduct and rules of academic integrity that remain in place.

ONLINE HOMEWORK - Homework is assigned on a per-chapter basis in Canvas via *WileyPLUS* (more on *WileyPLUS* below). Occasionally, homework which requires turned-in, written solutions may also be assigned, which will be posted on Canvas. If you get stuck and need a hint, check the discussion boards on Canvas or post a question to board yourself! You are also always welcome to contact me. Homework assignments will generally be due by midnight several days after lecture on the relevant chapter has concluded. My late policy is very simple: *Late homework will not be accepted except in extreme circumstances. Contact me as soon as possible if you believe you have reason to be granted an extended deadline.* Creative variations of “I forgot” will not be grounds for homework extensions. When a new homework assignment is available, I will always make an announcement on Canvas.

As stated above, the best way to learn physics is to do physics. While searching for the answers to your homework questions online may be tempting, a student that has not truly mastered his or her homework will not perform well on exams. Pure memorization will not be enough to be successful in this course: staring at a solution until you have memorized the steps is *not* the same thing as learning physics. Mastering your homework means being able to do every problem, without giving in to the temptation of looking up a solution, and truly understanding *why* each step was done the way it was done. A student that has mastered the homework will be well prepared for exams.

LABORATORY - Held in Jorgensen Hall, you will attend weekly laboratory sessions (the first week’s lab is entirely online). In these laboratory sessions, you will strengthen your understanding of the physics we learn about in lecture through hands-on physics experiments. You will see, first hand, the relation between physics concepts and real-world, human-based

applications. You will also develop the crucial skill of collecting and analyzing data – to form meaningful conclusions from data sets. The laboratory manual is *Humanized Physics Labs I, 2021*, and will be provided to you by your lab instructor. Each week, you will complete a pre-lab assignment in your Lab's Canvas page to help you prepare for the coming lab, as well as wrap up any questions about the previous week's lab. Your lowest lab score will be dropped from your overall lab grade.

In order to follow social distancing restrictions, the laboratory capacities have been reduced. To compensate, more lab sections have been added, but in order to fit these extra lab sections into the schedule, lab time has been reduced to 2 hours (during a pandemic-free semester, the lab time is 3 hours). Because of the reduced lab time, you and your group should prioritize performing your experiment and collecting your data, but may need to perform your data analysis outside of the lab and submit your work via your lab's Canvas page.

There is no online version of laboratory. As indicated in MyRed when you signed up for this course, in-person attendance is expected. Students who have tested positive for COVID-19 and/or who are engaging in quarantine in accordance with guidance from the Lincoln-Lancaster County Health Department or their health care professional should not physically attend lab while ill and/or in quarantine. In this event, you must notify your lab TA of your absence **prior to your scheduled laboratory**. You will still be expected to complete all coursework and fulfill the engagement expectations of the course, and they must adhere to the usual codes of conduct and rules of academic integrity that remain in place.

If you have previously completed PHYS 141, having attended all assigned labs, and you are satisfied with your previous lab grade, you may carry your previous lab grade over to this semester. To do so, fill out the "Re-use Lab Grade Form" found in the Course Documents page on Canvas and bring it to the Lab Manager for approval. Once approved, the Lab Manager will send me your previous lab grade and that grade will be used again this semester.

The pre-lecture assignments, multiple choice lecture questions, laboratory exercises, and homework exercises focus on specific knowledge, basic computational skills, and your grasp of key concepts. Your integrative understanding of physical principles and problem-solving is assessed with the more complex homework problems, recitation problems, and the exams.

General Statement Regarding Attendance

As you will have noticed during your registration, this course does have in-person components, namely the labs, recitations, and exams. *Only* those students with Services for Students with Disabilities (SSD) Accommodations for remote-only status will be excused from in-person attendance (though all course-work must still be completed on time). Otherwise, the [Faculty Senate Policy on Class Attendance](#) remains in effect. However, just like during any other semester, please do not come to class if you are sick. **Students who have tested positive for COVID-19 and/or who are engaging in quarantine in accordance with guidance from the Lincoln-Lancaster County Health Department or their health care professional should not physically attend the in-person components of this course.** These students must notify their recitation and lab TAs of their absence prior to their scheduled recitation/lab sessions but will still be expected to complete all coursework and fulfill the engagement expectations of the

course, and they must adhere to the usual codes of conduct and rules of academic integrity that remain in place.

If directed to engage in a two-week quarantine, as a courtesy to your recitation and lab TAs, please notify them of your absence *each* week to arrange makeup work.

General Policy Regarding Coursework Due Dates

In general, late work is not accepted. If something interferes with your course activities, a key guideline is to **communicate with me prior to due date** of the assignment coursework in question. I will excuse you if I decide the situation justifies doing so. In these cases I may ask from you a note, with your handwritten signature, in which you briefly state the nature of the situation (keep it general, no personal details needed), and list the missed activities that I excused you for. If you have written proof of the circumstances from another source or an official letter from, say, another UNL Department, you may also sign that document and hand it in. Again, please also indicate what you missed. Note that this semester, accommodations will be made for makeup work for students that miss in-person activities due to entering quarantine.

General Policy Regarding Course Content

I invite all of you to join me in actively creating and contributing to a positive, productive, and respectful learning environment. Each student contributes to an environment that shapes the learning process. Any work and/or communication that you are privy to as a member of this course should be treated as the intellectual property of the speaker/creator, and is not to be shared outside of the context of this course.

Students may not make or distribute screen captures, audio/video recordings of, or livestream, any class-related activity, including lectures and presentations, without express prior written consent from me or an approved accommodation from Services for Students with Disabilities (SSD). If you have accommodation to record class-related activities, those recordings may not be shared with any other student, whether in the course or not, or with any other person or on any other platform. Failure to follow this policy on recording or distributing class-related activities may subject you to discipline under the Student Code of Conduct.

Course Website



Canvas with WileyPLUS:

Our primary website for PHYS 141 will be Canvas. The PHYS 141 Canvas website is accessible through my.unl.edu. You may look up your Canvas login via [MyRED](#), UNL's student information system portal. **Be sure to check Canvas often.** Because of the unique nature of this semester, Canvas will be our primary means of communication. I will make many Canvas Announcements throughout the semester regarding course content, due dates, exams, etc.

WileyPLUS is the online platform we will use for completing online assignments (pre-class quizzes, homework, etc.). It is through *WileyPLUS* that you'll also be granted access to the electronic version of our textbook and also many other unique features such as video examples, problem-solving tutorials, and demonstrations.

WileyPLUS has been integrated directly into our course's Canvas page. Meaning you will have access to all course material and assignments, including the eTextbook, in Canvas, rather than having to navigate to a third-party website. You will however, need to purchase access to the *WileyPLUS* content on Canvas. To do this, you will need an access code that can be purchased at the Bookstore. Alternatively, you can simply purchase your access the first time you try to access the content on Canvas. Click [HERE](#) to see a video with instructions on how to do so.

Normally, there will be a pre-lecture assignment due the afternoons of lecture (Mondays, Wednesdays, and Fridays) and regular homework assignments due on a per-chapter basis. Whenever new, for-credit work is available on Canvas through *WileyPLUS*, I will always make a Canvas Announcement. Therefore, I suggest you adjust your Canvas account settings such that you receive an email whenever I make an Announcement.

WileyPLUS also has many practice assignments/questions that will be available to you. These would be purely for practice, and would not count toward your grade. In particular, the "Adaptive Practice" questions are useful in identifying the strong and weak points of your comprehension of the course content. The more of these questions you complete, the more accurately it can identify the concepts that need more attention.

Other helpful sites:

There are also several other websites you may find useful throughout the semester. The webpages of [Hypermath](#) may help you with reviewing the relevant mathematics for this course. Other recommended online resources are [Hyperphysics](#) and [Wolfram|Alpha](#). The latter, in particular, offers a wealth of information on a broad range of topics. See what happens if you enter 'iron' (omit quotes), or 'time in Australia', 'sin(3i)', 'steam', '1/4 inch bolt', or 'C major 7th chord'. This "engine" does symbolic calculation as well. Alternatively, simply enter 'sin(x)' to see variety of information on the sine function including plots, identities, derivatives, integrals, and series expansions.

Exams and Grading

Progress in the course as a whole will be assessed with five unit exams.

The dates and times for the exams are as follows:

- | | | |
|----------------|---------------------------------|---|
| Exam 1: | Thursday, Feb. 18 th | 6-7pm |
| Exam 2: | Thursday, Mar. 11 th | 6-7pm |
| Exam 3: | Thursday, Apr. 1 st | 6-7pm |
| Exam 4: | Thursday, Apr. 22 nd | 6-7pm |
| Exam 5: | Monday, May 3 rd | 6-8pm (during our allotted final exam time) |

Exam 5 is held during the regularly scheduled time for our final exam, but it is another unit exam, not a comprehensive final.

The exams will be held in-person. To maintain social distancing procedures, we will spread out among many classrooms, usually in Jorgensen Hall, to take the exams. The specific room in which you will be assigned to take your exam will be communicated to you via Canvas beforehand. Students with SSD accommodations allowing for more time on the exam should contact me immediately, while students with SSD accommodations allowing for remote learning will take their exams in an online proctored format (such as Respondus, for example) and will need a device with a webcam.

You will need a hand-held electronic calculator during the exams. Graphing calculators are acceptable (and recommended), but calculators cannot be shared amongst students during exams. Phones will not be allowed to serve as calculators and the use of a phone during exams is strictly prohibited. Using a phone during an exam will be considered cheating and will result in a score of 0 for that exam. Make-up exams due to absences will only be granted only in the most extreme of circumstances. *If you miss an exam due to an extreme circumstance, such as a serious illness or family emergency, you must contact me at your first opportunity. A doctor's note will be required for absences due to illness before a make-up exam will be granted.* An unexcused absence for an exam will result in a score of 0 for that exam. Grading disputes regarding exams must be brought to my attention with one week after the exams are grading and returned to students.

Grading. Your grade will be derived from the following course activities:

“Attendance”/Engagement* (see note below)	50
Pre-Class Quizzes*	50
Recitation*	100
Laboratory*	150
Homework*	150
Exams (5 exams, 100 pts each)	500
Max. Total Score	1000

*Scores will be weighted out of the indicated number of points (in other words, think of these as percentages: lab is 15% of the overall grade, for example).

This semester, “attendance” and engagement points come from attending the lectures via the Zoom meetings on MWF mornings and engaging in the lecture by participating in the multiple-choice concept questions via Zoom polls. **In order for your attendance to be tracked correctly, be sure your Zoom username is the same as your name as it appears in Canvas.**

Additional for-credit work may be assigned as well. Letter grades will be assigned after all grades are available (after the last exam, and after the recitation and lab TAs have sent me your grades), but historically, letter grades have usually been assigned as follows:

A+	98 – 100%
A	93 – 98%
A-	90 – 93%
B+	86 – 90%
B	82 – 86%
B-	78 – 82%
C+	74 – 78%
C	70 – 74%
C-	66 – 70%
D+	62 – 66%
D	58 – 62%
D-	54 – 58%
F	0 – 54%

Those opting for the “Pass/No Pass” option will earn a “Pass” if their letter grade would have been a C or better, and “No Pass” otherwise. An incomplete grade (I) will not be granted as a substitute for poor performance.

Note: I may deviate from the above letter grade assignments in justified cases and in response to special circumstances.

Honors Contracting

Honors contracts are not available for this course. Those seeking honors contracts should enroll in PHYS 141H.

Approximate Course Schedule

We will cover about 1 chapter per week, in order, starting with Chapter 1 and omitting Chapter 13. However, rather than sticking to a rigid, inflexible schedule, we will spend more time discussing the important chapters than others. Our textbook does a good job presenting physics the topics found in every general physics introductory course, however, we may skip some sections and pull some content from other sources as we make our course more relevant to the Health and Life Sciences. (I will always tell you the content covered on an exam and I will never test you on content we skip in the book.) Furthermore, I may adjust the pace as needed to find the right balance between student comprehension and quantity of covered content. Nevertheless, the pace may still seem fast for some, so it is imperative that you stay diligent with your studying to not fall behind.

Students with Disabilities

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with

documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the [Services for Students with Disabilities](#) (SSD) office, 117 Louise Pound Hall, 402-472-3787. This semester, students may seek SSD accommodations for remote learning. If you have SSD accommodations for remote learning, please contact me as soon as possible.

Mental Health

College can be stressful at times and maintaining your mental health is very important. Students that are struggling with their mental health are encouraged to contact [Counseling and Psychological Services](#) (402-472-5000). This service has psychologists and licensed mental health counselors who provide programs and services to UNL students.

Academic Dishonesty

All forms of academic dishonesty including cheating, fabrication and falsification, plagiarism, misrepresentation to avoid academic work etc. will be dealt according to the rules of [Disciplinary Procedures of the Student Code of Conduct of UNL](#).

PLEASE NOTE that the use of Chegg (or similar websites) to complete assigned work (including labs and recitations), either in whole or in part, is considered academic dishonesty. Using Chegg (or similar websites) to cheat on an exam will result in a course grade of F.

While you are encouraged to work with classmates on homework, recitation, and lab assignments, **communicating with anyone, online or in person, whether they are enrolled in the course or not, regarding exams and quizzes** is academic dishonesty.

PLEASE NOTE that I reserve the right to conduct interviews or administer oral exams in the event that I suspect a student has cheated.

The Use of Face Coverings

A link to the UNL Face Mask Policy may be found here: <https://covid19.unl.edu/face-covering-policy>

OFFICIAL FACE COVERINGS SYLLABUS STATEMENT

Approved by the Faculty Senate Executive Committee
July 14, 2020

Required Use of Face Coverings for On-Campus Shared Learning Environments*

As of July 17, 2020 and until further notice, all University of Nebraska–Lincoln (UNL) faculty, staff, students, and visitors (including contractors, service providers, and others) are required to use a facial covering at all times when indoors except under specific conditions outlined in the COVID 19 face covering policy found at: <https://covid19.unl.edu/face-covering-policy>. This statement is meant to clarify classroom policies for face coverings:

To protect the health and well-being of the University and wider community, UNL has implemented a policy requiring all people, including students, faculty, and staff, to wear a face covering that covers the mouth and nose while on campus. The classroom is a community, and as

a community, we seek to maintain the health and safety of all members by wearing face coverings when in the classroom. Failure to comply with this policy is interpreted as a disruption of the classroom and may be a violation of UNL's Student Code of Conduct.

Individuals who have health or medical reasons for not wearing face coverings should work with the Office of Services for Students with Disabilities (for students) or the Office of Faculty/Staff Disability Services (for faculty and staff) to establish accommodations to address the health concern. Students who prefer not to wear a face covering should work with their advisor to arrange a fully online course schedule that does not require their presence on campus.

Students in the classroom:

1. If a student is not properly wearing a face covering, the instructor will remind the student of the policy and ask them to comply with it.
2. If the student will not comply with the face covering policy, the instructor will ask the student to leave the classroom, and the student may only return when they are properly wearing a face covering.
3. If the student refuses to properly wear a face covering or leave the classroom, the instructor will dismiss the class and will report the student to Student Conduct & Community Standards for misconduct, where the student will be subject to disciplinary action.

Instructors in the classroom:

1. If an instructor is not properly wearing a face covering, students will remind the instructor of the policy and ask them to comply with it.
2. If an instructor will not properly wear a face covering, students may leave the classroom and should report the misconduct to the department chair or via the TIPS system for disciplinary action through faculty governance processes.

*Courses that have been granted an exception to the Face Covering Policy for pedagogical reasons are excluded. Exceptions to the Face Covering Policy are only granted after an approved health safety plan is developed

FAQ

Q: If I have a question, what is the best way to contact you?

A: I try to be as available as possible to students, and hold many office hours each week, so please come to office hours! I also try to respond as quickly as possible to student email, so feel free to email through Canvas. If you have a question about a specific physics problem, it is probably best to see me during office hours, as physics can sometimes be difficult to discuss via email.

Q: I could not login to a course webpage (e.g. Canvas/*WileyPLUS*), and now I lost credit. How can I avoid this?

A: Your problem is that you have waited too long. It is your own responsibility to visit course webpages on time. All material will be posted early enough to guarantee availability. Do not wait until the last moment to start assignments on Canvas/*WileyPLUS*, but rather be early (and safe).

Q: How to I prepare for the exams?

A: Master your homework. See the homework section above for a discussion on what is meant by this. Once you have truly understood the physics behind the homework questions (which is

distinctly different than memorizing the solution), you can test yourself to see if you're prepared for an exam by selecting random problems from the end-of-chapter problems in the text. The answers to the odd-numbered problems are in the back of the text. If you can solve these without resorting to looking up a solution online, you are prepared for the exams. Furthermore, there are many practice problems available through *WileyPLUS*. These are a great resource to use for risk-free problem solving, use them!

Q: Any tips for effective study and working on problems?

A: This course may be tough for some of you, and easier for others, but past experience suggests that most students will fall into the former category. This depends a lot on your (academic) background, your personal interests, the amount of time you can make available, and other factors that vary from person to person. Given these factors, every student will, over time, develop a unique, personal study style. Let me give you some general advice here:

- If you really cannot solve a problem, contact me! Get my help anytime you feel you need it. I can always give you a useful hint.
- The text provides short answers to a large number of odd-numbered problems. I highly recommend that you do some of these extra problems – it is one of the best ways to learn physics.
- Check your answers. Do you feel they could be OK? Not ridiculously large or small? Are the units OK? If you're asked to calculate a vector, do you have all three components: magnitude, direction, and unit? Carefully check each step in your reasoning. **THINK ABOUT WHAT YOU ARE THINKING:** Is your chain of reasoning correct or could you be making silent assumptions that could be false? You should be able to justify every single step you take to get your answer.

Finally: study, study, study. Make the material your own. The embedded concept questions in the lecture videos and the textbook's "Conceptual Examples" and "Check Your Understanding" questions will be helpful for you to find out where you have breakdowns in your conceptual understanding of the material.

It is absolutely crucial that at some point during your preparation for exams, that you attempt to solve physics problems for which you have not already seen the solution. Many times, I have discussions with students that do poorly on the exams to find out that they studied by only reviewing problems for which step-by-step solutions were already available. **It is easy to convince yourself that you understand the physics of a problem when you can immediately turn to a solution, but memorizing the steps shown in an answer key is *not* the same thing as learning physics.** The *only* way to test your preparedness for an exam is by attempting to solve problems for which you do not have immediate access to the solutions. The end-of-chapter problems from the text are excellent problems to test yourself with, and the answers to the odd-numbered problems are in the back of the textbook.

Including everything (reading assignments, pre-class quizzes, lectures, recitation problems, homework, laboratory) 10 to 15 hours per week *minimum* is what most of you will need to invest to earn a good grade.