

Syllabus for Physics 260 – Spring 2017

1/16/17

General Physics: Waves, Heat, and Electricity Prof. Ted Einstein – Sections 0201 through 0206

Official Course Description: *General Physics: Vibration, Waves, Heat, Electricity and Magnetism*
Credits: 3 GenEd: DSNL (if taken with PHYS261) Prerequisite: PHYS161 and MATH141.
Corequisite: PHYS261. Credit only granted for: PHYS142, (PHYS260 and PHYS261), or PHYS272.
Second semester of a three-semester calculus-based general physics course. Vibrations, waves, fluids; heat, kinetic theory, and thermodynamics; electrostatics, circuits, and magnetism. PHYS260 and PHYS261 must be taken in the same semester. If purchasing used books, additional software may be required.

Modification of Official Course Description: The course will not cover fluids or magnetism. The course will review vibrations, necessary to understand waves, with the assumption that students already were introduced to the topic in PHYS161. This change is in response to complaints that there was too much material in PHYS260.

Co-requisite: MATH241 (Calculus III: Multivariable). If you do not understand math steps done in class or in the text, please ask the instructor in office hours and/or the TA's in discussion section.

The Team Course Goals: To prepare students for an outstanding successful career in engineering and business based on an understanding of physics and engineering issues: cause and effect based on physics, professional and ethical practices, and an understanding of how physics is relevant to engineering and business practice. The primary way you can help achieve this goal is to ask questions in class, in discussion, and within study groups, which you are strongly encouraged to organize on your own.

Lecture Time: MW 4:00pm - 5:15pm

Lecture Room: PHY 1412, (PHY 1412 means room 1412 of the John S. Toll Physics Building, at the NE corner of the intersection of Campus Dr. and Regents Dr., the Big-M traffic circle)

Instructor: Prof. Ted Einstein

Office: PHY 2310

Phone: 301-405-6147

Email: einstein@umd.edu

Include PHYS260 in the "Subject:" field

Office Hours: After class in the lecture hall or just outside; another time to be announced; or by appointment (best made after class). Different times will be tried based on student requests. During the discussion section is also an excellent time for you to coordinate and receive help from the team.

[Graduate] Teaching Assistants (TA's): TBA

, ??? PSC, ???, 301-405-???, —Office Hour:

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Discussion Section #	Time	Room	TA
0201	Tu 11:00–11:50am	ITV 1100	
0202	W 8:00–8:50am	PHY 0405	
0203	W 9:00–9:50am	PHY 0405	
0204	F 8:00–8:50am	PHY 1204	
0205	Tu 4:00–4:50pm	MTH 0101	
0206	F 9:00–9:50am	PHY 1204	

Undergraduate Teaching Assistant and Grader: TBA soon, hopefully.

Enrollment status: If you successfully enrolled in the class and subsequently get messages suggesting otherwise, please email registrar-help@umd.edu for assistance.

Required Textbook and Mastering Physics: The required textbook for the course is: University Physics, with Modern Physics, 14th edition, with Mastering Physics, by Hugh D. Young (deceased) and Roger A. Freedman (Pearson, 2015). Many of you already have this book from PHYS161. If you do not, and assuming you plan to continue on to PHYS 270 (the third semester of the sequence), it makes most sense to buy the extended edition, with modern physics (ISBN **978-0-321-98258-2/0-321-98258-4**), which includes a Mastering Physics access code, which you will need. Note that for the book alone, the ISBN number is **978032197361/0321973615** and for Mastering Physics alone the ISBN number is **9780321997753/ 0321997751**.

As implied above, you will also need a Mastering Physics access code so you can do the online homework. If you took PHYS161 in the last semester, then you are all set: your Mastering Physics access code from PHYS161 is good for two years. However, if you are a transfer student, took PHYS 161 more than one year ago, or for some other reason do not have an access code, then you will need to get one. Two options are:

- 1) Buy a used book, and buy the Mastering Physics access code at www.masteringphysics.com.
- 2) Buy textbook bundles with Mastering Physics directly from www.mypearsonstore.com.

Only one volume needs to be bundled with Mastering Physics; the others can be purchased unbundled.

The access number is needed to get on-line access to the web-based homework collection system called Mastering Physics. Also, make sure you get the **14th** edition! *Warning:* you really do need to get the book and access number to pass the course.

Recommended Textbooks: If you have read a section in Knight a few times and it still does not make sense, you should consult another textbook treating the same material. Fortunately, there are many good, and at times better, physics books, that cover much of the same material as Knight. Early in the semester, you ought to browse several and see which presentation appeals to you.

Current versions of the recommended texts include:

- 1) Physics for Scientists and Engineers, A Strategic Approach, with Mastering Physics, 3rd edition, by Randall D. Knight, Pearson, 2013; ISBN 978-0-321-73608-6/0-321-73608-7
- 2) Physics for Scientists and Engineers by Raymond A. Serway and John W. Jewett, Jr., 9th edition, Cengage Learning, 2013; ISBN 978-1133947271.
- 3) Physics for Scientists and Engineers by Paul A. Tipler and Gene Mosca, 6th edition, W.H. Freeman, 2007; ISBN: 978-0716789642. (earlier Tipler-Jewett edition on reserve)
- 4) Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker, 10th edition, Wiley, 2013; ISBN: 978-1118230725 (Extended).
- 5) Physics: Extended with Modern Physics by Richard Wolfson and Jay M. Pasachoff, Scott, Foresman/Little, Brown, 1990; ISBN: 978-0673398369.
- 6) Physics for Scientists and Engineers with Modern Physics by Douglas C. Giancoli, 4th edition, Addison-Wesley, 2008; ISBN: 978-0131495081, the text for PHYS 141 and 142, so at a somewhat easier level.
- 7) Physics for Science and Engineering by William F. Hornyak and Jerry B. Marion, Saunders, 1983; ISBN: 978-0030628313, highly praised text by two deceased UMD professors, at a somewhat higher level than the class. Hard to find.

These books (or perhaps previous editions) can be found on (2-hour) reserve in the Engineering and Physical Sciences Library (EPSL). There are also earlier editions of these and many other calculus-based physics textbooks printed in the last 20 years that contain much of the same material. They often can be purchased quite inexpensively on the web or at local used book stores or found on the shelves of EPSL. It is well worth your while to find the book that speaks best to you.

About the course: PHYS260 is the second semester of the three-semester PHYS161/260/270 sequence in introductory physics intended for engineering students. The course covers material in a few main areas: Thermodynamics and Heat, Oscillations and Waves, Electrostatics, and DC circuits. In response

to widespread complaints that the course covered too many topics, magnetism and fluids will not be treated. This is a Calculus-based sequence and makes extensive use of material in MATH140/141, as well as MATH241 as the course progresses. We will use some vector calculus, mostly line and surface integrals, but nothing too complicated. The course stresses qualitative understanding of physical phenomena as well as quantitative analysis through problem solving. If you miss a lecture, get notes from a classmate or see Dr. Einstein. Students are responsible for all assigned material, including reading, homework and labs. Students are also responsible for material that is discussed in class but is not in the textbook. In other words, material from any part of the course can appear on a test, quiz, or homework, whether or not it was covered in the lectures. However, it is likely that a few sections of the assigned chapters will be explicitly excluded; these will be announced, and you will then not be responsible for their contents.

PHYS261 is a co-requisite of PHYS260. The PHYS261 Lab meets during the first week of classes to do Experiment 1. This experiment is a tutorial on Excel. While you actually can do this experiment on your own, it has a prelab assignment that must be completed on Expert TA and is due before your lab section meets. See the PHYS261 syllabus on ELMS Canvas for more information on the schedule, Prelab questions, obtaining the Lab Manual on Expert TA, and how you can complete Experiment 1 on your own. PHYS261 is a completely separate course: **Questions about absences, grades, etc., in PHYS261 should be addressed to the instructor in charge of that course!**

Exams: There are three midterm exams and one final exam. All exams are closed book, but a self-prepared paper crib sheet (one side of a $8\frac{1}{2}'' \times 5\frac{1}{2}''$ sheet for the midterms) will be allowed. During exams calculators are allowed, but not any device with phone, photo, web, messaging or text display capabilities during an exam. You are expected to take all the exams. You must take the final exam to pass the course. Students are responsible for all material, including that covered in assigned reading, lectures and homework. Material from any part of the course can appear on an exam or homework, whether or not it was covered in the lectures.

Excuses: Missing an exam is not allowed without a valid *documented* (in writing) excuse as defined by the University (medical problem, religious holiday, participation in UMD activities at the request of university authorities, or serious family crisis). If you are going to miss an exam because of a religious holiday or other *predictable* event, you must inform the instructor of this fact **at least one lecture in advance**, so that suitable arrangements can be made; otherwise you will get 0. **If you do miss a midterm for a valid reason (and have given prior notification if the excuse is predictable), your score on the missed midterm will be based on the results of the two midterms that you did take.** (It will be the average of the two unless there is a significant difference in means and/or standard deviations of class scores on the three midterms.) **There will be no make-up midterms.**

Participation in lecture will be evaluated using web-based responses on very short quizzes almost every lecture. Most students have a web-enabled laptop, tablet, or smart-phone, which should be used in lecture for this purpose. If you do not have such a device, please inform the prof quickly.

Homework: Homework will typically be assigned weekly. The homework is designed to take about $1\frac{1}{2}$ hours, no more than 2. If it takes you longer, you should seek help in understanding the material better. **You must submit your answers for the homework problems over the internet using the Mastering Physics web site.** If we get support for an undergraduate TA, you will also be required to turn in a paper copy of one of the problems every week or two, complete with a prose discussion of your reasoning, a diagram, and an algebraic solution, important aspects of problem solving which cannot be monitored with Mastering Physics. This will be due at the START of first class after the homework deadline. Note that the answers to odd-number problems are given at the end of the Appendices, a useful convenience when reviewing for tests.

Since the Mastering Physics software will randomize the numbers each time you make a new attempt on a problem, be careful and remember that other students working on exactly the same problems will

have other numbers! Certainly under these circumstances, but more generally, the best way to do physics problems is first to work out carefully a general solution algebraically and only at the end plug in numbers. This is especially true if the numbers are being randomized each time so everyone has different numbers. For calculating complicated expressions, I strongly recommend using an electronic spreadsheet, such as Excel, rather than a calculator. Note that **you will only be allowed 5 tries at a problem**, so if you have errors on your first two or three submissions, consult with a study-group partner or TA or instructor before using up your last couple chances. For problems with true/false or multiple-choice questions, there is a penalty from wrong answers.

The acceptable excuses for missing a homework deadline are the same as for missing an exam. However, you should be doing the homework before the last day, so having an illness, or a religious holiday or official university event, just on that particular day is not an acceptable excuse. (Note that it is UMD policy that for a medical absence from a single event/day, the student can attest to the illness by himself/herself, except for a “Major Scheduled Graded Event” (i.e., an exam). See the undergraduate catalog (<http://www.umd.edu/catalog/index.cfm/show/content.section/c/27/ss/1584/s/1540>) for details.)

Why You Need to Do the Homework: One of the main ways you can understand physics is by doing the homework. Do not wait until the night before it’s due to start working on your homework. The homework is supposed to be hard, and it counts a lot for your grade. A sure way to do poorly in this course is not doing the homework or not giving yourself enough time to work on it. In addition to doing the assigned problems, you should work through some unassigned problems, ideally in tandem with your study group. A key to success in this course is to do lots of problems.

Getting started in electronic homework submission: To turn in your homework, you need to go to: <http://www.masteringphysics.com/>

The site is best accessed with an up-to-date browser. If you have problems check the system requirements—most common problems in the past were due to pop-up blockers, the use of out of date JAVA or an out of date browser. Especially if you have not used Mastering Physics before, you should log on and try the practice homework set (Set 0) before attempting any of the real homework sets.

Registering and Gaining Access to Mastering Physics: In order to turn in your homework, you will need to register at the Mastering Physics website <http://www.masteringphysics.com/>. See the last page for detailed instructions: To register, you need two things: an access number and the course ID. The Course ID is: **PHYS260TEINSTEINSPR17**. Your access number will be the same one you used last semester for PHYS 161. If you do not have an access number, then you can get one pre-packaged with a new copy of the textbook if you order it “with Mastering Physics” or by buying an access number at www.mypearsonstore.com.

Students with Disabilities: Accommodations will be provided to enable students with documented disabilities to participate fully in the course. Please discuss any needs with the instructor at the beginning of the semester so that appropriate arrangements can be made. *Students who are registered with DSS, and who are planning to take examinations at DSS facilities, are required to give the instructor the pertinent authorization forms in editable electronic format at least two lectures (one week) prior to each exam date.*

Discussion Sections: You must attend your discussion section, and you must go to the section to which you have been assigned. Your TA will cover material (homework and exams) that may not be covered elsewhere. There will be a quiz almost every session. Please come prepared so you can ask questions, i.e., read the assigned chapter and work on the homework problems. Remember, the TA is there to explain things and give help when you are stuck, not to dole out answers. Also, don’t forget that your TA is also a student, in this case a graduate student, and also has to take classes, do homework and teach other sections. TA’s are still learning, are very busy, and are not highly paid for all their effort. Please be respectful and understanding and expect that they treat you with the same respect and understanding.

Grades: Your total numerical score for the course will be computed by summing your scores on the final exam, the three midterms, the homework, the lab, and participation, with the following weights:

Final exam	25%
Three midterm exams (18% each)	54%
Homework	10%
Quizzes & Participation (lecture and discussion)	11%

You must take the Final exam in order to pass PHYS260. Scores on one homework assignment, one in-lecture quiz, and one discussion-section quiz will be dropped. The course is graded on a curve, with a B– average. Thus, there are slightly more C’s than A’s, about 8/5 as many B’s as A’s, and about half as many D’s and F’s (combined) as C’s. This distribution is common in offerings of PHYS260 over the years. The means (μ) and standard deviations (σ) on each component will be provided, so you can judge your position. If the distribution is “normal,” usually the case for a large group, then the A/B boundary is about $\mu + (11/16) \sigma$ and the B/C boundary is about $\mu - (3/8) \sigma$. At the end of the semester, the components are combined into a composite, cumulative score, which takes into account the above weightings and is the primary determinant of your course grade. Depending on performance on the various components, the formula for the composite can change modestly. In Spring 2016 (when slightly different weightings were used), the formula for this composite was sum of all midterms and 105% of the final, plus 60% of the homework total (problems by MasteringPhysics and, with a different weighting, those done on paper), plus 49% of the totals of discussion and lecture quizzes. **Beware of total scores and imputed grades generated by ELMS; they are misleading in many cases, but sadly cannot be overridden.** E.g., for discussion quizzes, adjustments may be made to take into account differing performances in the 6 sections.

University Closure: In the event of a University Closure, the schedule will need to be revised modestly. If there are multiple days of closure, lectures may be given by internet with accompanying detailed reading assignments.

Academic Honesty: You are permitted—in fact *very strongly encouraged*—to get together in small groups to discuss the homework problems and course material in general. However, do not use these discussions as an excuse to copy someone else's solution to the homework or to let someone else copy your solution. Both are cheating! You should first to work through the problems on your own and arrive at a definite answer. With this preparation you can then discuss with others and see if you have missed something. All work you submit must be your own and should reflect your own understanding. Academic dishonesty, including copying homework, Googling for solutions on the web, or cheating on an exam, is a very serious offense which may result in suspension or expulsion from the University. Don't even think about doing it. Details on the policy can be found at www.testudo.umd.edu/soc/dishonesty.html.

Help with understanding the material: Physics and engineering are cumulative: the knowledge learned at each stage builds upon previous knowledge. If you find that you are falling behind, *seek help early*, rather than waiting until just before an exam. Help can be obtained by:

- Attending your discussion section and forming a study group
- Visiting the [Slawsky Clinic](#), 10 am to 3 pm, M-F, Room PHY 1214 (301-405-5984)
- Going to the office hours of your instructor and your TA
- Using the [Learning Assistance Service](#) (2201 Shoemaker Bldg., 301-314-7693), which helps students with time-management, reading, note-taking, and exam-preparation skills.

If you find that you are having more general academic problems, or are having trouble figuring out what you want to do, you should stop by Room 1120 Physics and talk to Tom [Woycheck-]Gleason, the Physics Associate Director of Student Services. Tom graduated from Maryland and also used to be an advisor in Letters and Science (undeclared majors). He is now the advisor for Physics majors, but he knows all the University rules and is a great person to talk to because of his perspective on Physics and other programs at the University.

MasteringPhysics®

Dear Student:

In this course you will be using MasteringPhysics®, an online tutorial and homework program that accompanies your textbook. *If you have joined a MasteringPhysics course before and can still log in:*

Save time by following the guide for joining another course by following the guide for joining another course (available from www.masteringphysics.com > Tours & Training > Getting Started) instead of this page.

What You Need:

- ✓ **A valid email address**
- ✓ **A student access code**
(Comes in the Student Access Code Card/Kit that may have been packaged with your new textbook or that may be available separately in your school's bookstore. Otherwise, you can purchase access online at www.masteringphysics.com.)
- ✓ **The ZIP or other postal code for your school:** _____
- ✓ **A Course ID: PHYS260TEINSTEINSPR17** (Provided by your instructor)

1. Register

- Go to www.masteringphysics.com and click **Students** under **Register**.
- To register using the student access code inside the MasteringPhysics Student Access Code Card/Kit, select **Yes, I have an access code**. Click **Continue**.

—OR— *Purchase access online:* Select **No, I need to purchase access online now**. Select your textbook, whether you want access to the eText, and click **Continue**. Follow the on-screen instructions to purchase access using a credit card. The purchase path includes registration, but the process is a bit different from the steps printed here.

- **License Agreement and Privacy Policy:** Click **I Accept** to indicate that you have read and agree to the license agreement and privacy policy.
- Select the appropriate option under “Do you have a Pearson Education account?” Continue to give the requested information until you complete the process. The **Confirmation & Summary** page confirms your registration. This information will also be emailed to you for your records. You can either click **Log In Now** or return to www.masteringphysics.com later.

2. Log In

- Go to www.masteringphysics.com.
- Enter your Login Name and Password that you specified during registration and click **Log In**.

3. Join Your Instructor's Online Course and/or Open Self-Study Resources

Upon first login, you'll be asked to do one or more of the following:

- **Join a Course** by entering the **MasteringPhysics Course ID** provided by your instructor. If you don't have a Course ID now, you can return to join the MasteringPhysics course later. When you join a course, you may also be asked for a Student ID (follow on-screen instructions).
- **Explore the Study Area** or **Launch Your eText**, if these resources are available for your textbook.

To Access MasteringPhysics Again Later

Simply go to www.masteringphysics.com, enter your Login Name and Password, and click **Log In**.

After you have joined a course: You can open any assignments from the **Assignments Due Soon** area or from the **Assignments** page. For self-study, click **eText** or **Study Area**, if these options are available.

Support

Access Customer Support at www.masteringphysics.com/support, where you will find:

- System Requirements
- Answers to Frequently Asked Questions
- Registration Tips & Tricks video
- Additional contact information for Customer Support, including Live Chat

LEC	DATE	TOPIC, keyword	Y&F Ch.
01	Jan. 25	Course Goals, Highlights of Pressure, Temperature	17
02	Jan. 30	Temperature, Phase Changes	17
03	Feb. 1	Ideal Gas Processes	18
04	Feb. 6	Work, Heat, 1st Law	18
05	Feb. 8	Specific Heat, Heat Transfer, Adiabatic	19
06	Feb. 13	Kinetic Theory, Mean Free Path, RMS Speed	19
07	Feb. 15	Equipartition, Entropy, 2nd Law, Irreversible	20
08	Feb. 20	Heat Engines & Refrigerators, Review	20
09	Feb. 22	<i>MIDTERM EXAM 1 (ch. 17-20)</i>	
10	Feb. 27	Highlights of Oscillatory Motion, etc.	14
	Mar. 1	Wave Motion	15
11	Mar. 6	Superposition, Standing Waves	16
12	Mar. 8	Interference, Beats	16
13	Mar. 13	Static Electricity	21
14	Mar. 15	Electric Fields from Charge Distrib'n	21
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15	Mar. 27	Capacitors, Motion in E Fields	21,22
16	Mar. 29	Flux, Gauss's Law	22
17	Apr. 3	Applications of Gauss; Screening; Review	22;13.3
18	Apr. 5	<i>MIDTERM EXAM 2 (ch. 14,15,21,22)</i>	
	Apr. 10	Electric Potential Energy, Pt. Charge	23
19	Apr. 12	Potential in Capacitor & From Multiple Charges	23
20	Apr. 17	Field from Potential, Kirchhoff Loop Law	24
21	Apr. 19	Capacitors and Dielectrics	24
22	Apr. 24	Electric Current, Current Density, Conservation	25
23	Apr. 26	Resistivity, Resistance, Ohm's Law	25
24	May 1	DC Circuits, Kirchhoff's Laws, Series & Parallel Resistors	26
	May 3	<i>MIDTERM EXAM 3 (ch. 23-26)</i>	
25	May 8	Parallel Resistors, R & RC Circuits	26
26	May 10	Review	
	May 15	<i>FINAL EXAM (COMMON) 6:30-8:30 pm</i>	