PHYSICS 151 — COLLEGE PHYSICS I

UH MANOA — Spring Semester 2015

Course Information & Policies

Lecture

MWF 12:30–1:20 p.m.
Physical Science Building ("PSB" or "PhySci"), Rm. 217

Instructor

Mr. Michael Nassir
E-mail: `nassir@hawaii.edu`
Course Website: *`to be announced`*
Office: Watanabe Hall, Rm. 426, (808) 956-2922 (office hours by appointment)

Problem Sessions:
- Wednesdays 4:30–6:00pm, **Watanabe 420** (*starting Jan. 21*)
- Thursdays 4:30–6:00pm, PSB 217 (*starting Jan. 22*)

Individual Assistance: (more details on p. 4)
- Physics TA tutoring — approx. 20 hrs/week in Watanabe 421 — *starts week of Jan. 20*
- Natural Sciences Learning Emporium Physics tutoring — approx. 20 hrs/week in Bilger Addition 209 — *starts week of Jan. 20*
- Learning Assistance Center tutoring — by appointment in Sinclair Library

Required Materials

TEXTBOOK: Young, Hugh D., *College Physics*, 9th ed. (2012), Vol. 1 only (Chaps. 0–16 only)
- UH Bookstore offers three options, and each of the following is bundled <u>with a *Mastering Physics* access code:</u>
  - full text in hardcover (~$255)
  - full text in "looseleaf" (~$170) *Looseleaf cannot be sold back to UH Bookstore*
  - volume 1 only in paperback (~$168)
- "eText"-only access can be purchased (for 18 months) through *Mastering Physics*

ONLINE HOMEWORK ACCESS: *Mastering Physics* website — requires access code (valid for 18 months) either using Access Kit *OR* via online purchase (~$65 for *MP* only, ~$110 including "eText"):
`http://www.masteringphysics.com`

SCIENTIFIC CALCULATOR with scientific notation, trig functions, exponents, & logarithms — bring to lab & exams (necessary!) and lectures (needed for occasional in-class questions). *Graphing or programmable calculators are allowed, but NOT necessary.* ***Smart phones, tablets, computers, or similar devices are NOT permitted during exams!***

Optional Books

Newman, Forrest, *Student Solutions Manual for Young's College Physics 9th ed.*, (2012) paperback (~$91 new, ~$69 used at UH Bookstore)

Gonick & Huffman, *The Cartoon Guide to Physics* (1990) paperback (~$18 new, ~$10 used at UH Bookstore)

Course Description

This course is the first half of a two-semester introduction to the fundamentals of physics, and will cover mechanics (kinematics, dynamics, gravitation, energy, momentum, rotation), waves, and thermodynamics. Lectures and problem-solving will regularly use the mathematical tools of algebra, geometry, trigonometry, and vectors, but *not* calculus.

Prerequisite: A grade of "C" or better in **MATH 140 (trigonometry & pre-calculus) or MATH 215 or higher**; or instead, a passing score on the Mathematics Department's Math Placement Exam (≥14 on Part I & ≥10 on Part II).

Lab: If you also need to take PHYS 151L lab, it is strongly recommended that you do so concurrently with the lecture; the lab provides a hands-on way of reinforcing and complementing many of the topics presented in lecture. However, concurrent enrollment in PHYS 151L lab is *not* mandatory for all students in PHYS 151 lecture.

PHYS 151 Learning Outcomes — General

At the conclusion of this course, students should be able to:

- Define and use the terminology of mechanics, waves, fluids, and simple thermodynamics.
- Apply the equations and principles of non-calculus-based physics to solve a wide range of problems in mechanics, fluids, and simple thermodynamics.
- Recognize how and where these principles occur in natural phenomena, technological and professional applications, and daily life.

PHYS 151 Learning Outcomes — Detailed

At the conclusion of this course, students should be able to:

- Understand the instantaneous and average relationships among position, velocity, and acceleration; construct and interpret graphs of all three; and calculate all three for the special case of constant acceleration.
- Recognize vector vs. scalar quantities; convert two-dimensional vectors from magnitude & direction to coordinates; perform scalar multiplication and addition of vectors.
- Understand the nature of force and the meaning and implications of Newton's Three Laws of Motion.
- Apply Newton's 2nd Law to calculate the dynamics of systems for the special case of constant net force (including static equilibrium), including systems with ideal springs, contact friction, inclined planes, cables/pulleys, and uniform circular motion.
- Apply Newton's Law of Universal Gravitation to simple systems of masses.
- Apply Kepler's Laws of Planetary Motion to describe and calculate the properties of simple orbits.
- Understand and be able to calculate various forms of energy, including mechanical work, kinetic energy, and potential energies.
- Understand the meaning of Conservation of Energy and its relationship to conservative vs. non-conservative forces, and apply Conservation of Energy to determine kinematic properties of appropriate systems.
- Understand the relationship between force and impulse/momentum, and apply it to determine kinematic properties of appropriate systems.
- Understand the meaning of Conservation of Linear Momentum and its relationship to elastic vs. inelastic collisions, and apply Conservation of Momentum to determine kinematic properties of appropriate systems.
- Understand the analogy between rotational and translational kinematic & dynamic quantities, formulas, and conservation laws, and apply them to determine kinematic properties of rotating systems.
- Understand the definitions of density and pressure, and apply them (and related laws) to a variety of fluid-mechanical situations, including hydrostatics, buoyancy, and systems of confined fluid flow.
- Describe the kinematics and energy conservation of simple harmonic motion and similar systems.
- Understand the nature and simple equations of wave motion, superposition & interference, and formation of one-dimensional standing-wave modes.
- Understand the phases/states of matter, the kinetic basis of temperature, and the primary modes of heat/energy transport; use specific heat capacity and latent heat to quantitatively relate heat to temperature.
- Understand the basic kinetic theory of gases; apply the ideal gas law to various transformations of a confined gas; and find the work performed during isobaric expansion/contraction.
- Understand the 1st Law of Thermodynamics in general, and apply it quantitatively to ideal gas transformations.
- Qualitatively and quantitatively define changes in entropy; describe the meaning of the 2nd Law of Thermodynamics; understand the model of a heat engine and calculate its efficiency.

Grading & Course Work

• **Final grades** will be computed on a **curve** (to be decided), based on your **overall course percentage** relative to the other students in the class. Your overall course percentage will be computed as follows:

Homework (Paper + Online)	**30%**
Midterm Exams #1 & #2	**17.5% each**
Final Exam	**35%**

After each major exam, I will circulate grade sheets (listed by your "roster numbers," not names) displaying all of your scores, and I will provide a histogram showing the relative scores of everyone in the class. I urge you to double-check your scores on my grade sheets, as well as the score tallies on your individual papers. While I apologize in advance for any errors, they may well happen with such a large class — please help me to correct them. Final exam scores and final grades will be posted online (and grades will appear in MyUH) shortly after the term ends.

• **Paper Homework** sheets will usually be due on **Fridays** in lecture (with frequent exceptions due to holidays or exams), and will be graded either by our class grader or by me; please see me outside of class with any questions about grading. **Late paper homework** will ***NOT*** be accepted *for any reason* **after solutions** for that assignment have been distributed online, usually shortly after the due date. All paper homework assignments will be worth the same number of points, and your **TWO lowest paper homework scores** will be **dropped**.

• **Online *Mastering Physics* Homework** will usually be due on **Mondays** at the start of lecture, and will be graded automatically on the *Mastering Physics* website. Your scores likewise will be reported to me automatically. **Late online homework** is allowed at a penalty of –10% per day (prorated by fraction of a day). The late penalty is applied only to specific late problems (not to entire assignments); any problems completed before the due time are worth full credit. Details on how to log in at **http://www.masteringphysics.com** will be provided on a separate page.

• Two **Midterm Exams** will test you on material from each month of the course. Roughly one-third of the **Final Exam** will cumulatively review all of this midterm material, while two-thirds of the final exam will test new material from the last month of the course. The two midterm exams will be 50 minutes long (given during regular class periods):

Midterm #1	Friday, **February 20**	Chaps. 1–5	
Midterm #2	Friday, **April 10**	Chaps. 6–10	
Final Exam	Monday, **May 11, 12:00–2:00 p.m.**		Chaps. 11-16 & cumulative review

You are allowed to bring 1 sheet of **handwritten notes** (no printouts or photocopies) to the first and second midterms, and 2 sheets to the final exam. However, do NOT let your "cheat sheet" become a substitute for learning formulas and practicing problems! (Graduate school exams, like the MCAT or GRE, do NOT allow open notes — you must memorize your formulas.) You will be allowed to retain your "cheat sheets" after each exam to build upon for later exams. *You must take all midterms and the final exam to avoid a failing grade in the course.*

• **Reading assignments** will be assigned on handouts and on course webpages. The listed reading assignments are the specific sections of the text that will be covered in lecture and that you will be responsible to know for exams. Short tutorials with interactive applets and audio & video clips are available through the "Study Area" inside *Mastering Physics*.

Solving Physics Problems

• You will need a **calculator** with **scientific functions** (trigonometric & exponential/logarithmic functions, and power-of-10 notation) for homework AND EXAMS. (Graphing calculators are not necessary.)

• On all assignments and exams that call for free-response answers, you must **SHOW YOUR WORK**. Writing only the correct final answer without showing your steps is *not* acceptable and will result in little or no credit. It is a central notion in science to show your method along with your results, so that others can follow your reasoning and can question any steps or assumptions. Also, clear and complete explanations will only help you later when you review your own work and study for exams. It is never possible to "show too much work," but it is easy not to show enough!

Always display your major mathematical steps from your initial formula(s) to your final answer, and annotate your reasoning with sketches and verbal explanations where appropriate. Mathematical steps should read sequentially and logically. Final answers must include **UNITS** and use an appropriate number of **SIGNIFICANT FIGURES**, and sometimes should be written in **SCIENTIFIC NOTATION**. To receive full credit, your answers to **free-response problems** MUST contain the following:

1. **initial formula**, followed by major algebraic rearrangement steps (if necessary)
2. **substitution** ("plugging in" known values), followed by major calculation steps (if necessary)
3. **final answer**, underlined or boxed, with proper **units**, **sci. notation** (if needed), & **significant figures**
4. additional **diagrams** or **comments**, as needed to define quantities (…a picture is worth 10^3 words!)

• **Organization** and **neatness** matter! Both will result naturally if you follow the above format. Disorganized or illegible work will be penalized.

• Please do NOT use **red ink** on any assignments or exams — we reserve that color for grading.

Collaboration

Working in pairs or groups is common in science, and indeed is encouraged: teamwork can help you to make more efficient measurements and to catch errors, and explaining something to another person is a great way to learn it yourself. However, if you are working with a classmate while completing a physics assignment (or while making measurements in lab), there are a few guidelines to follow:

(1) You are strongly encouraged **first to attempt each homework problem YOURSELF, individually** (or, in lab, to make some of your lab measurements yourself). That way, you will get the educational value and the experience that comes from working the problem (or using the equipment) and "seeing for yourself." Then, after you have tried first on your own, you can compare your answer (or lab results) to others' work as a "sanity check."

On homework: If you are stuck on a homework problem, you should seek just enough help to get unstuck. It is unwise to let someone simply feed you the entire solution, since you lose the educational value of working through the problem on your own. If necessary, try changing the numerical values in the problem and attempting it again by yourself, to ensure that you understand completely how to do the problem if you were to encounter it again on your own… say, on an exam.

In lab: If your results differ from other students' results by only a bit, then *you should keep your own results* — most scientific measurements vary slightly due to "random error" (this will be discussed in lab), so you should *not* change yours to match your classmates' results exactly. After all, how do you know which result is "correct," yours or your classmates'? Record what *you* see or measure. (If your results differ *wildly*, then it is appropriate to try to figure out "what went wrong." Small variations, however, are common and are a natural part of the random error inherent in making measurements.)

(2) All free-response solutions on all submitted assignments should ultimately be **in your own words**, reflecting ***your own understanding*** of the problems. You should plug numbers into your calculator and attempt (or re-attempt) all calculations *yourself*, even if you receive assistance from others along the way.

Any passages or calculations that are **directly copied or plagiarized** from another student (or portions lifted from any other uncited source) will be given a score of **zero**. Again, your submitted work should reflect *your own understanding* of the problems.

In lab: If you make measurements together with a lab partner, make a note in your lab report of who your lab partner was for any particular experiment. Then, be sure that your calculations and the written passages of your lab reports are ***in your own words***, even if your initial data or measurements are identical to your partner's.

(3) During **in-class exams**, **NO collaboration** of any sort is allowed; exams must be *entirely your own work*. Exams copied from another student, even partially, will be given a score of **zero**. Cases of cheating or plagiarism may be referred to the Office of Judicial Affairs for disciplinary review.

Getting Help

• **Regularly-scheduled problem sessions** (solving homework problems, answering questions, etc.) will be held every Wednesday & Thursday afternoon. Thursday's session is mostly a repeat of Wednesday's session. See p. 1 for location & times.

• The **Physics Learning Center in Watanabe 421** is open whenever Watanabe Hall is open, for all students to use to study (alone or together) on physics homework. There are tables, sofas, blackboards, etc., available for your use.

All Physics lab TAs schedule their two weekly office hours in Watanabe 421 as **tutoring hours** — FREE help with any physics homework problems or other physics questions (although lab TAs will give first priority to their own students with lab-related questions). Go to Wat 421 and check the posted schedule for tutoring times.

• The **Natural Sciences Learning Emporium** in Bilger Addition 209 is open M–F, approx. 8am–5:30pm, for all students to seek help with lower-division math or science classes, or just to use the group study tables to work together. Schedules of tutors for physics and all other subjects are posted on the door to BilA 209 and online:
http://www.hawaii.edu/natsci/learningemporium.php

• The **Learning Assistance Center** in Sinclair Library offers free, one-on-one tutoring for PHYS 151 & 152 and many other large math & science courses. Appointments are made online, at least 24 hours in advance:
http://manoa.hawaii.edu/learning/tutoring.html

• You may also drop by to see me in **my office, Watanabe 426**, during afternoons at times other than the regularly scheduled help sessions. I suggest that you call first (956-2922) to make sure that I am in. Please forgive me if I happen to be busy and ask you to return at another time. You may also make an appointment with me if you wish. For questions about physics problems & concepts, please first try to attend my problem sessions or use one of the above tutoring resources.

• The Department of Physics & Astronomy Office (Watanabe 416) maintains a list of grad students and others who are available for hire as **private tutors** — please stop by Wat 416 and ask the Department secretary for a copy of the list.

Extra Handouts

Extra copies of all handouts from the two or three previous lectures will be brought to every lecture and problem session. Most handouts will be available sometime after lecture as PDF files, and you will be given links for downloading them via the course webpage or via e-mail announcements.

Graded Papers

Graded papers will be circulated in lecture once they are graded. Any papers that are not picked up in lecture will be left in the **wooden cubby boxes outside the rear of our lecture hall, PSB 217**. Look for "PHYS 151 Spring 2015," and find the box for your roster number. Please leave the boxes tidy and organized for your classmates' benefit! Mahalo.

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Get Started with Pearson's MasteringPhysics

First, make sure you have these 3 things...

- **Your E-mail address & UH ID number**
- **PHYS 151 Course ID:**
  UHMPHYS151SPR15
- **PHYS 152 Course ID:**
  UHMPHYS152SPR15

Access code or credit card: The required access code comes either with your book or by itself at your bookstore. Alternatively, you can buy instant access with a credit card or PayPal account during registration.

Next, get registered!

1. Go to **www.masteringphysics.com**. Under the large **Register Now** section on the right side of the page, click the **Student** button.
2. Read the onscreen instructions and select your location. Next, check off whether or not you have a **Course ID**. If you have a **Course ID** code provided by your instructor, type it in and Click **Go**. If your course does not require an ID, Click on that radio button next to it and Click **Next**. Check with your professor to be sure.
3. You will now need to enter your **Access Code** that may have been included with your textbook or student access card available from your campus bookstore.
4. If you don't have an access code, select your textbook (correct title, author, and edition) and whether you want an eText.
5. You'll then be asked to **Accept** the License Agreement before moving on. After this, either **Create** a new Pearson username/password, or, if you've already registered for another Pearson product (i.e. MyMathLab), enter that username/password. If you have an **Access Code**, enter it on the bottom of the page.
6. On the next page, fill out the appropriate information fields then click **Next**. If you entered an **Access Code**, you will be brought to a page from which you can access your product. If not, enter your payment information so that you can **Purchase Access**, after which you'll be granted access.
7. You are now registered! Now, it's time to enroll in your course. Click **Log In Now**. Once signed in you can: enter your **Course ID** (same as Step #2) and your **Student ID** (if prompted to do so). That's it!

Need help?

Visit www.masteringphysics.com for:

- Helpful videos
- Frequently Asked Questions
- Set Up Your Computer

Or visit our 24/7 Technical Support site at http://247pearsoned.custhelp.com