PHYSICS 151 — COLLEGE PHYSICS I

UH MANOA — Fall 2023 Semester

Course Information & Policies

updated: 4 Sept. 2023

Instructor Mr. Michael Nassir, nassir@hawaii.edu
Office: Watanabe Hall Room 426, (808) 956-2922

Lecture Sec. 1 (CRN 71071): MWF 9:30–10:20 a.m.
Sec. 2 (CRN 77198): MWF 10:30–11:20 a.m.
Physical Science Building (PSB or PHYSCI) Room 217 lecture hall
You may attend either lecture hour, EXCEPT for Exams (attend your enrolled section)

Help Hours — Instructor *Schedule updated 9/4:*
Thursdays 2:00–5:00 p.m. in Watanabe Hall Rm. 421 (Physics Library & Study Room)
Meetings at other times by appointment, or call office phone anytime: (808) 956-2922

Help Sessions — Undergraduate Learning Assistants (LAs)
Drop-in Help Sessions for any questions related to PHYS 151!
Schedule & locations on p.8 — see "Getting Help with Physics" section

Class Materials — in Laulima "Resources" Tab/Tool:
- **Lecture slides** will be uploaded as PDFs shortly before each lecture.
- **Tutorials** (Sample Problems) and other handouts will be distributed on paper in lecture AND uploaded as PDFs.
- **Solutions to Tutorial Problems** will only be uploaded as PDFs.

Textbook & Online Homework
Young & Adams, *College Physics*, 11th ed. (2020), Chaps. 1–16 ("vol. 1" of paperback version)
Mastering Physics — online homework system linked to eBook & additional study resources

- All officially enrolled PHYS 151 students will be automatically charged an "IDAP fee" (approx. $62) near the start of the semester, directly to your UH student accounts. This provides access to both the eBook & Mastering Physics, initially through Laulima's "VitalSource for UH Manoa IDAP" tool/tab.
- *You should NOT purchase Mastering Physics access directly from Pearson with a credit card — that method costs much more than the IDAP fee.*
- Students can "opt out" of the IDAP fee by September 12. However, online HW is worth 30% of your final class grade; students who do not have Mastering Physics access will forfeit those points.
- Paper formats of our textbook exist, but they are NOT stocked in the UH Bookstore:
  Looseleaf (unbound & 3-hole-punched) — *usually least-expensive option*
  Paperback (vol. 1 & vol. 2 sold separately)
  Hardcover (full text)
  If you wish, please purchase through a third-party bookseller, or through the Mastering Physics website (cheapest route for "Looseleaf" version), or directly from Pearson:
  https://www.pearson.com/store/p/college-physics/P100002458383
- Young & Adams *College Physics* 11th ed. is currently used by all PHYS 151 & 152 classes at UH Manoa during all terms, including Summer Session.

Scientific Calculator
- Necessary and expected for homework, problem sets & exams!
- Should include scientific notation (power-of-10) notation, trigonometric functions, exponents & logarithms.
- Graphing or programmable calculators are allowed, but NOT necessary.
- ***Smart phones, tablets, computers, or similar devices are NOT permitted during exams.***

PHYS 151 Course Description

This course is the first half of a two-semester introduction to the fundamental concepts, laws, and formulas of physics. PHYS 151 covers mechanics (kinematics, dynamics, gravitation, energy, momentum, rotation, oscillations & waves), and some basic thermodynamics. Lectures and problem-solving will regularly use the mathematical tools of algebra, geometry, trigonometry, and vectors, but *not* calculus.

Prerequisites

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 and ≥10 on Part II).

We expect students to enter PHYS 151 lecture equipped with good facility in geometry, advanced algebra (including exponents & logarithms), and trigonometry. We use these mathematical tools extensively right from the start of PHYS 151 without reviewing them, so if you are not confident about your math skills in those areas, please review them before attempting this course. Please see Chap. 0 of our textbook for a summary of math topics you should be familiar with.

PHYS 151L Lab

If you plan to take PHYS 151L lab, we recommend 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, we do *not* require concurrent enrollment in PHYS 151L lab with PHYS 151 lecture; you can instead take PHYS 151L lab in a future term, or not at all.

Our PHYS 151 lecture and PHYS 151L lab courses are run and graded completely separately. None of the points or assignments for lecture count toward the lab, or vice versa.

The supervising professor for our lab classes is Dr. Philip von Doetinchem. Please see his PHYS Lab master webpage for much more information, including syllabi and contact information for individual lab sections & TAs:

https://www.phys.hawaii.edu/~philipvd/23_fall_intro_labs_uhm.html

• Lab TA names & contact information will appear on the above webpage toward the end of the first week of the semester.

• **Our introductory PHYS Lab classes do NOT meet during the first week of the semester. PHYS 151L Lab classes will begin on Mon. Aug. 28.**

PHYS 151 Learning Outcomes — General

Upon successful completion 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, waves, fluids, and simple thermodynamics.
- Recognize where and how these physical principles apply to natural phenomena, problems and professional settings within other scientific fields, and technology and situations encountered in daily life.

PHYS 151 Learning Outcomes — Detailed

Upon successful completion of this course, students should be able to:

- Describe 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.
- Identify vector vs. scalar quantities; convert two-dimensional vectors between magnitude & direction and Cartesian components; perform scalar multiplication and addition of vectors.
- Describe 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 calculate the dynamics of simple systems of masses.
- Apply Kepler's Laws of Planetary Motion to describe and calculate the properties of simple orbits.
- Describe and calculate various forms of energy, including mechanical work, kinetic energy, and potential energies.
- Explain the Law of Conservation of Energy and its relationship to conservative vs. non-conservative forces.
- Apply Conservation of Energy to calculate kinematic quantities of a system, and identify where it is appropriate to do so.

- Describe the relationship between force and impulse/momentum, and apply it to calculate kinematic quantities of appropriate situations.
- Explain the Law of Conservation of Linear Momentum and its relationship to elastic vs. inelastic collisions.
- Apply Conservation of Momentum to calculate kinematic quantities of a system, and identify where it is appropriate to do so.
- Describe the analogy between rotational and translational kinematic & dynamic quantities, formulas, and conservation laws; apply them separately and in concert to calculate kinematic & dynamic quantities of rotating systems.
- Define density and pressure; apply them and related formulas to calculate physical properties of a variety of fluid-mechanical situations, including hydrostatics, buoyancy, and systems of confined fluid flow (Bernoulli's Equation and Continuity Equation).
- Describe the kinematics and energy conservation of simple harmonic motion, give examples of relevant physical systems, and calculate their kinematic/dynamic properties.
- Explain the nature of waves and the phenomena of wave motion, superposition & interference, reflection, and formation of one-dimensional standing-wave modes.
- State the mathematical relationships that govern wave propagation, superposition, standing-wave modes, beats, and the Doppler Effect, and apply them to calculate related physical quantities.
- Describe the phases/states of matter; explain the kinetic basis of temperature, forms of internal energy, and the primary modes of heat/energy transport.
- Employ mathematical definitions of specific heat capacity and latent heat to quantitatively relate heat to changes in temperature.
- Describe broadly the kinetic theory of gases; apply the Ideal Gas Law (and its related forms) to calculate thermodynamic quantities related to various transformations of a confined gas; find the work performed during isobaric expansion/contraction.
- Describe the broad meaning and implications of the 1st Law of Thermodynamics, and apply it quantitatively to ideal gas transformations.
- Explain the simple model of a heat engine and the quantitative relationship between efficiency, inputs & outputs, and Carnot temperatures.
- Qualitatively and quantitatively define changes in entropy; describe the broad meaning and implications of the 2nd Law of Thermodynamics.

Course Grades

Weighting of Assignments & Exams

Each student's **overall course percentage (OCP)** will be computed as follows:

Top 3 of 4 Midterm Exam percentages — weighted 15% each
Final Exam percentage — weighted 25%
Online Homework percentage — weighted 30%

How to calculate OCP and course letter grade:

- Convert all raw point-scores into percentages:
  - Midterm 1 Exam percentage = (points earned) / (points possible)
  - Midterm 2 Exam percentage = (points earned) / (points possible)
  - Midterm 3 Exam percentage = (points earned) / (points possible)
  - Midterm 4 Exam percentage = (points earned) / (points possible)
  - Final Exam percentage = (points earned) / (points possible)
  - Total Online HW percentage = (total points earned) / (total points possible)
- Discard one lowest Midterm Exam percentage.
- Calculate overall course percentage (OCP):
  - OCP = (best Midterm percentage)×(0.15) + (second-best Midterm percentage) ×(0.15) + (third-best Midterm percentage)×(0.15) + (Final Exam percentage)×(0.25) + (Total Online HW percentage)×(0.3)
- Convert OCP to corresponding letter grade according to table below.

Final Letter-Grades

OCP cutoffs for final letter-grades:

93.0% A+	75.0% B+	60.0% C+	47.0% D+
85.0% A	70.0% B	55.0% C	43.0% D
80.0% A–	65.0% B–	50.0% C–	40.0% D–

"Curving": As final letter grades are assigned at the end of the semester, **OCP cutoffs for some letter-grades might be lowered at the instructor's discretion** (thereby improving the final letter-grades), but they will not be raised.

Rounding: OCPs will be **rounded to the nearest 0.1%** before assigning letter grades. Examples:

OCP = 79.96% rounds to 80.0% ⟶ A–
OCP = 79.93% rounds to 79.9% ⟶ B+

Exceptions to this rounding rule will <u>not</u> be granted, so please do not request them.

Exams

• **Attend your officially registered class section on all Exam dates,** unless otherwise arranged with the instructor.

• All exams will have **entirely multiple-choice questions**, scored via Scantron forms (bubble sheets).

• Some **sample problems** will be provided before most exams. The sample questions will be similar to, but NOT identical to, your actual exam problems. The sample questions may not cover all of the topics of your actual exam.

Midterm Exams

• **Four Midterm Exams** will test you on material from every few weeks of the course.
• Each Midterm Exam will be worth the **same weight** toward your overall course percentage and final letter grade.
• **ONE lowest Midterm Exam score (percentage) will be automatically dropped** for each student.
• **NO EARLY or MAKE-UP MIDTERM EXAMS ARE AVAILABLE.** If you miss a Midterm Exam, that score of zero is eligible to become your one dropped Midterm score.

Final Exam

• A **Final Exam** will cumulatively test all previous course material, although it will emphasize newest material from the last few weeks of the course.

Exam Dates & Topics

Midterm #1	**Mon. Sept. 18**	**Lectures #1–9** ≈ *assigned sections of Chaps. 1–2*
Midterm #2	**Mon. Oct. 9**	**Lectures #10–15** ≈ *assigned sections of Chaps. 3–5*
Midterm #3	**Mon. Oct. 30**	**Lectures #16–24** ≈ *assigned sections of Chaps. 6–8*
Midterm #4	**Mon. Nov. 20**	**Lectures #25–30** ≈ *assigned sections of Chaps. 9–10, 13*
Final Exam	**Mon. Dec. 11, 9:45–11:45am for Lecture Sec. 2 (MWF 10:30am class)**	
	Fri. Dec. 15, 9:45–11:45am for Lecture Sec. 1 (MWF 9:30am class)	
	Cumulative review, with emphasis on Lectures #31–40 ≈ *assigned sections of Chaps. 11–12, 14–16*	

Exam Note-Sheets

– You are allowed to bring **ONE sheet of handwritten notes** to Midterms #1 & #2.
– You are allowed to bring **TWO sheets of handwritten notes** to Midterms #3 & #4 and the Final Exam.
– Computer printouts of handwritten notes from your computer tablet are allowed ONLY if you wrote the notes yourself. Such printouts must clearly appear to be handwritten when inspected by your instructor, otherwise they will be confiscated (and you will be penalized).
– NO photocopies are allowed.
– Pages can be no larger than 8.5×11 inches (standard U.S. Letter size).
– You can use BOTH sides of each sheet.
– You can retain your note-sheets after each exam, to build upon for later exams.
– *Advice:* Do NOT let these note-sheets become a substitute for learning formulas and practicing problems! (Graduate-school exams like the MCAT do NOT allow open notes — you must memorize your formulas.)

Scantron Bubble Sheets

– Your instructor will provide you with Scantron bubble-sheets for your multiple-choice answers — you do not need to purchase or bring your own Scantron sheets.
– Please **bring your own favorite No.2/HB (or softer) pencils and eraser**. Extra No.2 pencils will also be available in class on exam days. Do NOT use pen to fill in Scantron bubbles!

Scientific Calculator

– Please **bring your own scientific calculator with trigonometric & exponential functions to every exam.**
– Graphing capability is allowed, but not needed or expected.
– Internet access is not allowed. If your calculator has this capability, you must disable it during our exams.
– ***Phones, tables, computers, or similar devices are NOT allowed during exams.***

Online Homework in Mastering Physics

• **HW assignment numbers will match Lecture numbers & Tutorial numbers** that cover the same topics.

• **Assignments will be due most Tuesdays and Fridays at 11:55 pm HST, starting in Week #2 of the semester.**

• Assignments vary widely in length and point-values. Sometimes, **two assignments may be due on the same date**.

• Each assignment will usually be posted roughly a week before it is due. Please check Mastering Physics regularly for new assignments and due dates.

Points

– Point values for each problem are based on its difficulty, number of parts, time required, and importance. For multi-part problems, Mastering Physics divides the problem's total points evenly between the parts.
– Homework points (and time required) vary widely from assignment to assignment, typically in the range of 20–60 points.
– Online HW points will be simply added together to form a grand total for the entire semester, in the range of 800–1200 total points. Individual points weigh equally in your Online HW Total. (Percentage scores for individual assignments do not matter.) This grand total will be divided by the total possible HW points to calculate your Online HW Percentage.

Penalties

This should match the Grading Policy that can be viewed in Mastering Physics:

Lateness: Minus 20% per day past the due date/time, **decreasing gradually to zero credit at 5.0 days**. This penalty is prorated for fractions of day (i.e., 2 hours late ⇒ –1.7% penalty). This penalty is applied ONLY to individual late problems, not to the entire assignment score.

Wrong Answers – Multiple-Choice Questions: Fractional penalty for every wrong answer, decreasing to zero credit when only one choice remains.

Wrong Answers – Free-Response Questions (numerical entry, etc.): No penalty for first 10 wrong attempts, then question is forfeit (no credit).

Deadline Extensions

• Online HW assignments are normally available for several days before and after each deadline, and the penalty for any late problems is very slow-acting. It applies narrowly to individual late problems, not entire assignments. This late policy automatically accommodates most lateness caused by short-term personal extenuating circumstances: short-term personal emergencies, short-term illnesses, broken computers, internet outages, etc. — if you complete your remaining late problems soon afterward, they will still be worth very substantial credit. Therefore, **requests for HW extensions due to short-term personal circumstances will be DENIED.**

• Online HW can be completed anywhere that you have regular computer & internet access. Therefore, **requests for HW extensions due to most travel will be DENIED**.

• If you have an extenuating personal circumstance that makes you **unable to use a computer or internet for longer than one week** (e.g., incapacitating illness or injury, or mandatory travel to a remote location), you may request an extension for the portion of our online HW assignments that are affected. Please send your instructor **complete details, including exactly what you are requesting** (affected HW assignments, and your proposed new deadline), **plus supporting documentation:** doctor's note, military orders, police report, etc.

Extra-Credit Questions

Some assignments contain one or two problems worth a small amount of **extra credit**, and those problems are labeled as such in Mastering Physics. Those specific assignments therefore have a maximum possible score >100%.

Optional Non-Credit Assignments

Any Mastering Physics assignments that are labeled "NOT FOR CREDIT" are for optional practice. They are NOT worth any points toward your Online HW point-total.

Tutorials (Sample Problems), Textbook Readings & Additional Practice Problems

• **Tutorials (Sample Problems)** will be distributed on paper in lecture AND posted online as PDFs in Laulima's Resources tool/tab. Full worked **Solutions** for each Tutorial will also be posted in Laulima's Resources.
- Some Tutorial questions will be used as examples in each lecture; remaining questions are for optional practice on your own.
- Tutorial problems are NOT for credit and do NOT need to be turned in.
- **Tutorial numbers correlate with Lecture numbers & Online HW numbers** that cover the same topics.

• **Textbook reading assignments (section numbers)** are listed in the attached course calendar, and are also repeated near the start of each tutorial sheet. These are the sections of our text that will be covered in lecture, and which you will be responsible to know for exams. Lectures will highlight most of the important formulas, concepts, and vocabulary, and show a few examples of their applications. Our textbook is valuable because it contains additional worked example problems beyond those of our lectures and tutorials.

• **How to use our textbook:** I recommend using our textbook like a reference manual or cookbook, instead of reading it start-to-finish like a novel. Suggested method:
- Skim the relevant textbook sections in advance of their related lecture, then go back and review more carefully after lecture.
- When first skimming a section to orient yourself to a topic, skip long text passages or mathematical derivations. Instead, pay most attention to headers, **highlighted or boxed formulas**, important-looking diagrams & tables, and the gist of any worked examples.
- **End-of-chapter summaries** are extremely useful one-page distillations of the essential formulas and topics — often, those are all you need to refer to when working on homework problems.

• **eBook:** There are several ways to access the eBook:

Via Laulima PHYS 151 webpage:
– Click the "VitalSource for UH Manoa IDAP" tool/tab
– When you see the image of our textbook, click on green "Read Now" button

Via Mastering Physics:
– Click the "Pearson eText" tab along the left-hand side of our MP course page
OR:
– Follow the "Study Area" tab along the left-hand side of our course page
OR:
– Hyperlinks that open relevant portions of the eBook are located throughout MP homework problems and study resources.

• **"Pearson+" Videos in Mastering Physics:**
– Click the "Pearson eText" tab along the left-hand side of our MP course page
– Under "Study with Pearson+ Channels", click on "Explore Channels".
Several dozen teaching videos on various physics topics are accessible for you to watch. If you select our university & course number, or select our textbook (Young & Adams *College Physics* 11th ed., with image of sailboat), the videos will be correlated to the chapters in our textbook. Short review quizzes are available between the videos.

• **"Study Area" in Mastering Physics:** Click on the "Study Area" tab along the left-hand side of our course page. After it launches, you will see links to the eBook, Videos, Chapter quizzes, online Physics simulations, and more. I encourage you to explore this and use it to enhance each of our topics.

• **End-of-Chapter Problems:** Solving physics problems is a skill learned through repeated practice, similar to a sport or musical instrument. To truly gain proficiency, **I recommend that you attempt as many additional end-of-chapter problems as your time permits.** Short answers to all odd-numbered end-of-chapter problems are located in the textbook Appendix (also called "Backmatter" in the eBook table of contents).

Getting Help with Physics

The following resources are all free-of-charge to current UH Manoa students:

• **PHYS 151 Undergraduate Learning Assistants (LAs): — *Starting week #2 of semester***
~20 hours/week of drop-in Help Sessions for assistance with homework questions, lecture material, or anything else related to PHYS 151!

PHYS 151 LA Help Sessions Weekly Schedule *(updated Mon. 9/4):*
Mon. 11:30am–1:30pm in Watanabe Hall 415 — Kat & Clark
Mon. 2:30–4:30pm in Sakamaki Hall C-201 — Gage & Will

Tues. 1:30–5:30pm in Watanabe Hall 113 — Kian, Clark & Callan

Wed. 11:30am–1:30pm in Watanabe Hall 415 — Kat & Clark
Wed. 2:30–4:30pm in Sakamaki Hall C-101 — Gage & Will

Thurs. 3:00–5:30pm in Sakamaki Hall C-101 — Kian, Callan & Lucia

Fri. 11:30am–1:30pm in Watanabe Hall 415 — Kat, Callan & Lucia
Fri. 2:30–4:30pm in Sakamaki Hall C-201 — Gage & Will

Our LAs have also created a Discord server for Fall 2023 PHYS 151 — see class e-mail/Announcements for the link to join, or contact our head LA (Kat Lavarez) for more information.

• **Physics Lab TAs in Watanabe 421 — *Starting week #2 of semester***
Our Physics Lab TAs (mostly graduate students in Physics) hold ~30 hours/week of drop-in office hours in Watanabe Hall Rm. 421 (Physics Library & Study Center). Look for someone with a metal "Physics TA/Tutor" nameplate on the table near them.

Although lab TAs *must give first priority to students with lab-related questions*, they can also assist with lecture homework problems or other physics questions as time permits. Scroll halfway down this page for a master schedule of all TA names/days/hours:
https://www.phys.hawaii.edu/~philipvd/23_fall_intro_labs_uhm.html

• **College of Natural Sciences Learning Emporium in Bilger Addition 209 — *Starting week #2 of semester***
The CNS Learning Emporium is open daily for drop-in assistance with lower-division math & science classes. The latest tutoring schedules for Physics and other STEM subjects are posted online:
https://natsci.manoa.hawaii.edu/learningemporium/

• **Learning Assistance Center**, in Sinclair Library and online, offers free one-on-one tutoring by appointment for physics and many other introductory math & science courses. Make an appointment online at least 24 hours in advance:
https://manoa.hawaii.edu/undergrad/Learning/tutoring-by-appt/

• **Housing Success Center** in Hale Aloha dorms is open Sunday–Thursday, 6:00–9:00pm, for free walk-in assistance for physics and other introductory math & science courses. Check their online schedule of tutors & subjects:
https://manoa.hawaii.edu/undergrad/Learning/walk-in-tutoring/

• **Online Learning Academy (OLA)** is open Sunday 5:00–8:00pm & Monday–Thursday 6:00–9:00pm. Free Zoom-based tutoring is available for grades 6-12 & college-level physics, math, chemistry and biology:
http://manoa.hawaii.edu/ola/math-science-college/

Solving Physics Problems & "Showing Your Work"

This semester, you will NOT be asked to submit detailed work for Online HW or Exams. However, the following is general good practice for solving physics problems, so please follow it whenever possible:

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 work will help you later as 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!

- Write out all **major mathematical steps** from your **initial formula(s)** to **your final answer.** (Minor algebraic steps and arithmetic calculations can be omitted.) Your lines of mathematical work should read **sequentially and logically**.
- Accompany your math with **sketches**, **diagrams**, and **short written phrases or comments,** where appropriate. Whenever you introduce a new quantity, like an angle or length, create a simple, neat diagram that clearly shows what the variable represents!
- All numerical values should include **units**.
- Very large and very small values should be written in **scientific (power-of-10) notation**.
- Final numerical answers should be **fully calculated and simplified**, then expressed as a decimal value rounded to an appropriate number of **significant figures**. It is rarely appropriate to leave your final answer to a physics problem as a fraction, square-root, or other un-rounded value, or in any un-simplified algebraic form.

In summary, "showing your work" should include:

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!)

Finally, **organization and neatness matter**! Both should result naturally if you follow the above steps. Disorganized or illegible work can lead to both mathematical and conceptual errors.

PHYS 151 Fall 2023 Calendar of Topics & Textbook Sections

Version: 20 Aug 2023

• This is an intended schedule of topics, but actual subject matter covered by each date may lag behind. In that case, **exams will only include material actually covered in lecture before each exam date. Relevant topics will be confirmed before each exam.**

• For each section/topic listed below in regular type, you will be expected to know and understand the major formulas, concepts, and terminology, and how to apply them correctly to basic and intermediate-level problems.

• For sections/topics listed in *[[brackets]]*, you only need to familiarize yourself *qualitatively* with the concepts and terminology. For these sections, you do NOT need to learn any specific formulas, nor will you be asked to solve any numerical problems for those topics.

DATE	EVENT	READ: Young & Adams, *College Physics*, 11th ed.
M Aug 21	Lecture #1	Intro to PHYS 151 *[[§1.1–1.2: Intro to Physical Laws & Models]]* Chap. 0: Math Review *(self-review, not in lecture)* §0.1–0.2: Powers-of-10 & Scientific Notation
W Aug 23	Lecture #2	§1.3–1.4: SI/Metric Units & Prefixes; Unit Conversions §1.5: Uncertainty & Significant Figures *[[§1.6: Estimates & Orders of Magnitude]]*
F Aug 25	Lecture #3	§2.1–2.2: Position & Displacement, Speed & Velocity
M Aug 28	Lecture #4	§2.1–2.2: Graphing Position & Velocity
W Aug 30	Lecture #5	§2.3: Acceleration; Graphing Acceleration
(F Sept 1)	Lecture#6 **video**	*Manoa campus closure for football game* §2.4–2.5: Kinematics with Constant Acceleration
(M Sept 4)	HOLIDAY	*Labor Day*
W Sept 6	Lecture #7	§2.6: Freefall
F Sept 8	Lecture #8	§1.7–1.8: Vectors vs. Scalars, Vector Notation, Vector Components
M Sept 11	Lecture #9	§1.7–1.8: Vector Arithmetic: Scalar Multiplication, Addition/Subtraction
W Sept 13	Lecture #10	§2.7, 3.5: Relative Velocity, Adding Velocities in 1-D & 2-D §3.1–3.2: 2-D Kinematics
F Sept 15	Lecture #11	§3.3: Projectile Motion
M Sept 18	**MIDTERM #1**	**Lectures #1–9** ≈ *assigned sections of Chaps. 1–2*
W Sept 20	Lecture #12	§4.1–4.6: Common Forces, Newton's Laws of Motion, Free-body Diagrams
F Sept 22 & M Sept 25	Lecture #13	§5.1–5.2: Applying Newton's 2nd Law: 1-D & 2-D Dynamics & Equilibrium
W Sept 27	Lecture #14	§5.4 & 11.2: Elastic Force: Ideal Springs & Hooke's Law *[[§11.1: Stress & Strain; Elasticity vs. Plasticity]]* §5.3: Force of Surface Friction (Kinetic & Static) *[[§5.3: Fluid Drag]]*
F Sept 29	Lecture #15	§5.2–5.3: Applying Newton's 2nd Law: Inclines *not in textbook*: Simple Machines & Mechanical Advantage §5.5: Four Fundamental Forces of Nature
M Oct 2	Lecture #16	§11.2: Period, Frequency & Angular Frequency §3.4, 6.1: Uniform Circular Motion, Centripetal Acceleration & Force *[[§6.2: Motion in a Vertical Circle]]*
W Oct 4	Lecture #17	§6.3: Newton's Law of Universal Gravitation §6.4: Weight & Surface Gravity
F Oct 6	Lecture #18	§6.5: Orbits *not in textbook:* Kepler's Laws of Planetary Motion
M Oct 9	**MIDTERM #2**	**Lectures #10–15** ≈ *assigned sections of Chaps. 3–5*
W Oct 11	Lecture #19	§7.1–7.3: Energy, Work, Work-Energy Theorem §7.8: Power
F Oct 13	Lecture #20 & Lecture #21	§7.5: Gravitational Potential Energy §7.4–7.5: Elastic Potential Energy §7.7: Conservative vs. Non-conservative Forces §7.6: Conservation of Energy
M Oct 16	Lecture #22	§8.1, 8.5: Momentum & Impulse
W Oct 18	Lecture #23	§8.2: Conservation of Momentum §8.3–8.4: Elastic vs. Inelastic 1-D Collisions *[[§8.8: Rocket Propulsion]]*

F Oct 20	Lecture #24	§8.6-8.7*:* Center of Mass, Velocity of CM
M Oct 23 & W Oct 25	Lecture #25	§9.1–9.3: Rotational Kinematics §9.4: Moment of Inertia, Rotational Kinetic Energy §9.5: Rolling Objects
F Oct 27	Lecture #26	§10.1: Torque §10.2: Rotational Dynamics §10.3: Rotational Work §10.6: Static Equilibrium & Stability, Mechanical Advantage of Levers
M Oct 30	**MIDTERM #3**	**Lectures #16–24** ≈ *assigned sections of Chaps. 6–8*
W Nov 1	Lecture #27	§10.4–10.5: Angular Momentum; Conservation of Ang. Mom. §10.7: Vector Nature of Angular Quantities *[[§10.7: Gyroscopes & Precession]]*
F Nov 3	Lecture #28	§13.1: Density §13.2: Pressure, Pascal's Principle, Hydrostatic Pressure Increase with Depth
M Nov 6	Lecture #29	§13.3: Archimedes' Principle & Buoyancy
W Nov 8	Lecture #30	§13.5: Flowing Fluids: Continuity Equation §13.6–13.8: Flowing Fluids: Bernoulli's Equation & Principle
(F Nov 10)	HOLIDAY	*Veterans Day*
M Nov 13	Lecture #31	§11.2–11.4: Simple Harmonic Motion & Energy Conservation
W Nov 15	Lecture #32	§11.5: Simple Pendulums *[[§11.6: Damped Oscillations, Driven Oscillations, Resonance]]*
F Nov 17	Lecture #33	§12.1, 12.3: Mechanical Waves & Wave Speeds §12.2: Continuous Waves *[[§12.4: Mathematical Description of Continuous Waves]]* §12.9, 12.13–12.14: Sound Waves & Hearing §12.5: Reflection & Transmission
M Nov 20	**MIDTERM #4**	**Lectures #25–30** ≈ *assigned sections of Chaps. 9–10, 13*
W Nov 22	Lecture #34	§12.5: Principle of Superposition §12.8: Constructive & Destructive Interference §12.11: Beats §12.6: Transverse Standing-Wave Modes (Normal Modes) on a String
(F Nov 24)	HOLIDAY	*Thanksgiving — Non-Instructional Day*
M Nov 27	Lecture #35	§12.7: Longitudinal Standing-Wave Modes (Normal Modes) in Air Columns §12.12: Doppler Effect & Shock Fronts §12.10: Wave Energy & Intensity, Decibel Scale of Loudness
W Nov 29	Lecture #36	§14.1–14.2: Temperature *[[§16.8: Absolute Zero]]* §14.3: Thermal Expansion of Solids & Liquids §14.4: Heat; Heat Capacity & Specific Heat
F Dec 1	Lecture #37	§14.1–14.2: Thermal Equilibrium §14.7: Heat/Energy Transfer Methods: Conduction, Convection, Radiation §15.2: *PT* Phase Diagrams §14.5–14.6: Latent Heat & Phase Transitions
M Dec 4	Lecture #38	§15.1–15.2: Equations of State, Ideal Gas Law §15.3–15.4: Kinetic Theory of Gases, Maxwell-Boltzmann Distributions
W Dec 6	Lecture #39	§15.5: 1st Law of Thermodynamics §15.5: Work Done by/on a Gas, *PV* Diagrams §15.6–15.7: Constant-Value & Adiabatic Thermodynamic Processes
also W Dec 6	Lecture #40	§16.1–16.2: Reversible Processes & Heat Engines *[[§16.3–16.4: Combustion Engines & Refrigerators]]* *[[§16.9: Efficiencies of Real-World Processes]]* §16.5–16.6: 2nd Law of Thermodynamics, Carnot Engines §16.7: Entropy
M Dec 11 **F Dec 15** **9:45-11:45a**	**FINAL EXAM**	**9:45-11:45am: Mon Dec 11** (Sec. 2 Lecture) **OR Fri Dec 15** (Sec. 1 Lecture) **Cumulative, with emphasis on Lectures #31–40** ≈ *assigned sections of Chaps. 11–12, 14–16*