



COURSE INFORMATION

Elements of Physics I

Course Section: 221013-221016

Course Credit Hours: 4

Faculty Contact Information: Irene Datskou Guerinot

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- 611 Nielsen Bldg. (Physics Bldg.)
- Office Hours: Tuesday 10am-11am & Thursday 12:45pm-1:45pm EST in person **OR** virtual (Zoom) by appointment

Please don't hesitate to email me with updates, questions, or concerns. I will usually respond within 24 hours during the week and 48 hours on the weekend. I will notify you if I will be out of town and if connection issues may delay a response. Typically, it is preferable to use the discussion forums for content related questions and

e-mail for personal matters.

Graduate Teaching Assistant(s)-All instructors will have office/tutoring hours at different times during each week. Students from all sections can attend any instructor's office/tutoring hour.

Lab Sections (Rm. 203):

(12) W 8:25am-11:10am

(13) W 11:30am-2:15pm

(14) W 2:50pm-5:35pm

(15) W 5:45pm-8:30pm

(16) R 8:25am-11:10am

Each student acknowledges and agrees that all (in person and digital) materials and instruction related to this course, including this syllabus, lectures, presentations, and any verbal and written communications, are the sole and exclusive intellectual property of the instructor. Each student agrees not to (or permit anyone else to) record, copy, or transmit any physical or online classes or any related materials without the instructor's prior approval.

COURSE DESCRIPTION

Physics 221 is a 4 credit-hour, introductory physics course with laboratories. Physics 221 is a general education course and a required course in pre-medical, pre-pharmacy, and pre-vet programs. This course is taught in a hybrid format. Students will only meet once per week for one hour and 15 minutes in a large lecture hall (Tuesdays, 8:10 - 9:25, room 415, Nielsen Physics Building) and once per week, by section, for 2 hours and 30 minutes in a studio physics classroom (Wednesdays or Thursdays, room 203 Nielsen Physics Building). The traditional second meeting in the large lecture hall is replaced by online activities that students schedule themselves. Students are expected to complete the online class modules on time. Each module consists of two sets of online class materials that students are required to study, two homework assignments, one laboratory write-up, a class participation discussion forum, and optional extra credit opportunities.

Time Commitment: A hybrid course requires discipline, self-motivation, collaboration, and organization. It also requires the same credit hours of work as a face-to-face course. Although there is greater flexibility for "when" you may complete coursework preparation, there are required due dates (many! - check the syllabus, the modules, and the "at-a-glance" course schedule (Canvas Home Tab).

Class participation (discussion forums) is required and expected. You should expect to spend between 12 and 16 hours per week (more if you need a good math review) working and learning in the course. Please plan your time accordingly.

The class material is divided into 12 modules. For each module students are expected to submit assignments and lab reports online **on time**. For class participation credit students must contribute questions, answers, hints, or comments to a discussion forum. Optional extra credit assignments associated with each module will be assigned often and must also be submitted on time.

Laboratory work seeks to demonstrate the validity of theoretical descriptions and to impart a deeper understanding of physical phenomena and associated concepts. The only acceptable portal for assignment submission will be our Canvas space. **Prerequisites:** MATH 130 or MATH 131 or MATH 132 or MATH 125 or MATH 141 or MATH 151 or MATH 152. Any calculus course is also an appropriate prerequisite.

Student Learning Outcomes

Upon completion of this course the students will be able to:

- describe & understand the difference between scalar & vector quantities.
- explain, verbally & mathematically, one- and two-dimensional motion, making use of the equations of kinematics as well as energy conservation principles.
- identify the cause of basic linear & rotational motions, by describing/determining forces, work & energy, impulse & momentum.
- understand the relationship between force and pressure; how pressure changes with depth; to calculate the buoyant force on objects using Archimedes' principle.
- analyze fluid flow using Bernoulli's equation; understand how Poiseuille's law applies to viscous flow; will be able to distinguish between laminar and turbulent flow.
- identify the various types of thermometers; calculate the amount of thermal expansion of solids and liquids due to a change in temperature; and describe different types of heat transfer mechanism.
- analyze the ideal gas law.
- discuss the first law of thermodynamics is a statement of energy conservation; the variations of the second law of thermodynamics; and the definition of adiabatic, isobaric, isothermal, and isometric processes.
- describe the concept of a reversible engine and the Carnot cycle; calculate maximum possible efficiency of heat engines and maximum coefficient of performance of a heat pump or a refrigerator.
- define changes in entropy and to explain the connection between entropy and disorder.
- analyze simple harmonic motion & its relationship to basic circular motion.
- describe wave motion & determine the properties of waves.
- qualitatively describe sound and water waves; calculate the fundamental and harmonic frequencies of wind instruments, the Doppler shift of sound waves for cases where either the source or the observer is in motion.

HOW TO BE SUCCESSFUL IN THIS COURSE

- There is some math in this course. Quite a bit actually---but that's good.
- This could be a challenging course if you do not keep up with the material.
- Math is never more than simple algebra and calculus---if you find yourself doing a page of calculations, you are way off the path.
- The hardness is conceptual---and with applying logic.
- When confronted with a problem, recognize the concepts needed for a solution, and then you should know or be able to find the right equation (and then do the algebra in usually just a couple lines).
- Do your homework (yourself)!
- Do the homework in groups!
- Make sure you understand both “why” and “why not.”

- Note all the course graded assignments and exams on your **personal calendar**.
- Read (carefully and take notes) the **textbook and other assigned reading material!**
- **Nail the early material!** Every concept builds on the previous, so it is imperative to get the early material down.
- **Don't get behind!** A Physics course is **never** a "crammable" course. We will cover a lot of information in a short amount of time. It is impossible to learn this material right before an exam.
- **Check your UT email and Canvas** site every day. Set Canvas notifications.
- I am trying to convince you NOT to take the seemingly easy path of just trying to memorize a trick for every problem you see.
- I am trying to convince you to understand the general approach---that's the way to prepare to deal with problems you've never seen before.
- Ask for help.

COURSE REQUIREMENTS

Textbook: "University Physics, Volume 1", a free, online textbook by OpenStax College.

<https://openstax.org/details/books/college-physics-2e>. A PDF copy of the book can be downloaded from the OpenStax website.

Great free resources: a) <https://www.physicsclassroom.com/>

b) <http://hyperphysics.phy-astr.gsu.edu/hbase/index.html>

You must have a computer with a webcam, reliable connectivity, and you will need a calculator.

ASSIGNMENTS, ASSESSMENTS, AND EVALUATIONS

The class will be graded on a straight percentage with the following breakdown:

A:>90% A-:87%-89% B+:86% – 83% B:82%-80% B-:79%-77% C+:76%-73% C:72%-70% C-:69%-67% D+:66%-63% D:62%-60% D-:59%-57% F: ≤ 56%

Element	Contribution
Tests (2)	50%
Homework Assignments	20%
Discussions/Participation	10%
Laboratories	20%
Extra Credit (up to 50pts max)	10%



Homework assignments:

Assignments cover the material presented in the course schedule, modules, textbook, and labs. They may refer you back to a module or to some activity you were asked to complete in a laboratory. Assignments are submitted online on Canvas. Assignments are scored by the computer, and you will receive your assignment grade immediately. You can submit the assignments up to three times if you need to improve your score. The highest score counts. The vast majority of assignments are due at 11:59 PM on the indicated date. No late assignments will be accepted.

Laboratories:

There is a module on Canvas dedicated to the expected lab work, lab reports, and lab grading policy. You cannot earn a passing grade for the course, unless you earn a passing grade for the labs.

Class participation/Discussion forums:

Participate in online discussions for class participation credit. Meaningful participation before the due date of the second homework, lab, and extra credit associated with a module gives you 100% class participation credit for this module. Post questions, answers, hints, comments, etc., under one of the suggested topics or start your own topic. What is a meaningful contribution? A meaningful contribution is any contribution that shows that you gave it some thought. Questions, answers to student question, adding additional information to answers, asking for more information about certain aspects, disagreeing with aspects of an answer, correcting statements that you think are inaccurate, commenting on aspects of answers that you like but did not think about before, etc., are all meaningful contributions. You can and should discuss homework and extra credit questions with your classmates, but please do not post the answers directly. Just saying "Yes", "I agree", "I like your answer", etc. before the module's discussion deadline are not meaningful contributions.

Extra credit assignments (optional but highly encouraged!):

You can earn up to 50 points extra credit by answering extra credit questions (three attempts for the highest score). The questions are challenging, but you are encouraged to discuss the assignment with your fellow students in the discussion forum before the submission. Extra credit points are added to your total score from tests, homework assignments, class participation, and laboratories.

Tests:

Tests are 90-minute online exams. Exam 1 questions are about material covered in modules 1 - 6, and exam 2 questions are about material covered in modules 7 - 12. **You will take the tests online using the Chrome browser with the Proctorio plug-in. Make sure you practice ahead of time using the Practice Tests.**

Test 1 – October 17 Formulas: [Formulas 1 \(utk.edu\)](#) Study Guide: can be found under the Syllabus Tab (Canvas)

Test 2 – December 11 Formulas: [Formulas 2 \(utk.edu\)](#) Study Guide: can be found under the Syllabus Tab (Canvas)

Academic Honesty/Student Conduct

Students are expected to complete and submit their own work at all times. Student work completed for a former class or by someone other than the student could result in disciplinary action.

Students shall not:

- Cheat.
- Plagiarize.
- Collaborate with others on an assignment unless the student is assigned by the instructor to complete group work.
- Allow another student to access your Canvas account using your NetID.

If you need course adaptations or accommodations, please let me know how I can help you. If you have a documented disability, please contact Student Disability Services (SDS). This will ensure that you are properly registered for the services provided by SDS.

[Student Disability Services](#)

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*Please note: The instructor reserves the right to revise, alter or amend this syllabus as necessary. Students will be notified in writing/email of any such changes.

UTK FALL 2023 PHYS221 – Sect.13-16 – HYBRID Lect. T 8:10am-9:25am (Nielsen rm 415) **Tentative - Subject to change** This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. However, the professor reserves the right to modify, supplement and make changes as the course needs arise. Each week, you will be expected to read the course material **before** the Tuesday class. These full class meetings on Tuesday are not formal lectures, but a discussion of concepts that students are expected to start working on outside of class. Please, see me early on if you have any difficulty.

Week	Module	Online material <i>(Links can also be found under the Modules Tab where you can also find module summaries with additional examples)</i>	Textbook Chapters <i>(Links can be found under the Modules Tab)</i>	Homework Assignments (A & H), Lab Reports, Discussion, and Extra Credit (EC) Assignments <i>(Links to assignments can be found under the Assignments tab OR the Course Summary under the Syllabus Tab)</i>	Due Date <i>(11:59pm for most) (Canvas is the ONLY acceptable portal for assignment submission)</i>
1	1	Introduction Position and displacement Speed, velocity, and acceleration	2.1, 2.2 2.3 - 2.8	A1	31-Aug
				H1, Lab 1, Discussion 1, EC1	1-Sep
29-Aug		First Day of "In Person" Meeting			
2	2	Newton's 1st and 2nd Laws of Motion Weight, Newton's 3rd law	4.1, 4.2 4.3, 4.4	A2	6-Sep
				H2, Lab 2, Discussion 2, EC2	8-Sep
3	3	Projectile motion, Hooke's law Friction, drag, circular motion	3.1 - 3.5 5.1, 5.2	A3	13-Sep
				H3, Lab 3, Discussion 3, EC3	15-Sep
4	4	Work, kinetic and potential energy Conservation of energy, power	7.1 - 7.3 7.4 - 7.8	A4	20-Sep
				H4, Lab 4, Discussion 4, EC4	22-Sep
5	5	Momentum and impulse Conservation of momentum	8.1-8.2 8.3 - 8.7	A5	27-Feb
				H5, Lab 5, Discussion 5, EC5	29-Sep
6	6	Rotational kinematics and dynamics Rotational energy and angular momentum	10.1 - 10.3 10.4, 10.5	A6	4-Oct
				H6, Lab 6, Discussion 6, EC6	6-Oct
7	Test 1	Review – Tuesday Oct. 17 8:10am-9:25am Test 1 – ONLINE Proctorio – Tuesday Oct. 17 10am-11:30pm / 90 minutes			
8	7	Static fluids, pressure and buoyancy Pumps, surface tension	11.1 - 11.6 11.7 - 11.9	A7	25-Oct
				H7, Lab 7, Discussion 7, EC7	27-Oct
9	8	Fluid dynamics, ideal fluids Fluid dynamics, viscous fluids	12.1 - 12.3 12.4 - 12.6	A8	1-Nov
				H8, Lab 8, Discussion 8, EC8	3-Nov
10	9	Temperature and heat Thermal properties of matter	13.1 - 13.3 14.1 - 14.7	A9	8-Nov
				H9, Lab 9, Discussion 9, EC9	10- Nov
11	10	The laws of thermodynamics Devices, entropy	15.1, 15.2 15.3 - 15.7	A10	15- Nov
				H10, Lab 10, Discussion 10, EC10	17- Nov
12	11	Oscillations Mechanical waves	16.1 - 16.5 16.7 - 16.11	A11	21- Nov
				H11, Lab 11, Discussion 11, EC11	27- Nov
13	12	Sound waves The Doppler effect	17.1 - 17.3 17.4, 17.5	A12	1-Dec
				H12, Lab 12, Discussion 12, EC12	4-Dec
14 Dec. 11		Review Dec. 4 Final - Test 2 ONLINE Proctorio Dec. 11 8:30am-11:30pm / 90 minutes			