PHYS221: Elements of Physics I Spring 2024

"Our goals can only be reached through the vehicle of a plan. There is no other route to success."
- Pablo Picasso

Course & Instructor Information

Instructor: Irene D. Guerinot
Office: 215 Nielsen Bldg. (Physics Bldg.)
E-mail: iguerino@utk.edu *To help me keep track of email messages, please include "PHYS221 Hybrid/Spring 2024: Your name" in the subject line of any email message you sent to me.*
Office Hours: Tuesday & Thursday 9:30am-10:30am EST in person
OR Virtual (Zoom) by appointment https://calendly.com/iguerino

Please don't hesitate to email me with updates, questions, or concerns. I will typically 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.

Lab Teaching Assistants-The lab instructors will announce their office hours on Canvas. There are also in-person tutors available in the Department of Physics tutoring center Physics Tutorial Center (Nielsen 512) to provide personal attention and assistance from experienced physics students, both graduate and undergraduate. You are more than welcome to use tutorial center to get help on learning materials, HW, exams, and so on. For details, please check the link: http://www.phys.utk.edu/physlabs/tutorial-center/index.html

Course Description/Learning Environment/Course Format

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 (Thursdays, 11:20am-12:35pm, room 415, Nielsen Physics Building) and once per week, by section, for 2 hours and 30 minutes in a studio physics classroom (Mondays, Tuesdays, or Wednesdays, room 207 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 16hours 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.

Course 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

This is an intensive online course. Assignments will typically be due twice a week. Each week will have assigned readings, supplementary materials (e.g., recorded lecture), and activities (e.g., weekly discussion, lab reports, and homework assignments-solving problems). Work is expected to be completed on time. Late assignments are not accepted. So, get organized and manage your time wisely.

- 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. You might also want to check out the following: How to be Successful in an Online Course.
- Check your UT email and Canvas site regularly.

Participation in class discussions is expected to be carried on in a professional matter, respecting the instructor and fellow students. Communicate with me if any issues arise. Make sure your technology works and seek help from OIT HelpDesk immediately if you experience technical difficulties.

Course Communication Policy

Netiquette
Please communicate respectfully and clearly with your peers and your instructors on discussion boards, in chats, groups, email, and any other online interactions. Familiarize yourself with UT's Principles of Civility and Community.

Announcements and Email
I will use canvas announcements and email to communicate with the class. Activate your Canvas notification settings and check your UT email regularly (at least once a day) for any communications about the class! I will typically 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.

Virtual and On-Campus Office Hours
You can always schedule to talk to me by arranging a virtual office hour (via zoom - see information above). Email me to schedule a meeting, with the subject line **"PHYS221 Hybrid/Spring 2024: Your Name_Office Hours."**

Required Textbooks & Readings

- Textbook: "College Physics", free, online textbooks by OpenStax.
  - https://openstax.org/details/books/college-physics-2e
- Great resources:
  - https://www.physicsclassroom.com/
  - http://hyperphysics.phy-astr.gsu.edu/hbase/index.html
  - Organic Tutor
  - Khan Academy
- You must have a computer with a webcam, reliable connectivity, and you will need a calculator.

For technical issues, contact the OIT HelpDesk by phone at (865) 974-9900 or at the Walk-in HelpDesk,. For IT and Computing issues, use the online Contact Form. Also: Getting Started with Zoom, Online@UT Canvas, the UT Library, the UT Library's Information for Distance Education, and UT Research Guides and Subject Librarians.

Course Evaluation and Requirements

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)	45%
Homework Assignments (lowest score will be dropped)	25%
Discussions/Participation	10%
Laboratories (lowest **non-zero** score will be dropped)	20%
Extra Credit	~ 10%

Homework assignments:
Assignments cover the material presented in the online material. They may refer you back to a module, to some activity you were asked to complete in a laboratory, or to the workbook. 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. **Most** assignments are due at 11:59 PM on the indicated date. No late assignments will be accepted.

Laboratories:
The Spring 2024 Physics 221 Lab Syllabus on Canvas explains the lab grading policy. You cannot earn a passing grade for the course unless you earn a passing grade for the labs (60% or higher).

Class participation:
Participate in online discussions for class participation credit. Meaningful participation before the due date of the second homework (for the module), 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 25 extra credit questions, distributed over the 12 modules. You can submit this extra credit assignment twice. 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 - 10. **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 – March 19 Formulas: **Formulas 1 (utk.edu)** Study Guide: can be found under the Syllabus Tab (Canvas)
Test 2 – May 9 Formulas*: Formulas 2 (utk.edu) Study Guide: can be found under the Syllabus Tab (Canvas)*

Academic Honesty/Student Conduct
Students are expected to complete their own work. 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.

*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.

SPRING 2024 PHYS221 – Sect.1-7 – HYBRID Lect. R 11:20am-12:35pm (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** Thursday's 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** *(Links can also be found under the Modules Tab where you can also find module summaries with additional examples)*	**Textbook Chapters** *(Links can be found under the Modules Tab)*	**Homework Assignments (A & H), Lab Reports, Discussion, and Extra Credit (EC) Assignments** *(Links to assignments can be found under the Assignments tab OR the Course Summary under the Syllabus Tab)*	**Due Date** (11:59pm for **most**) *(Canvas is the ONLY acceptable portal for assignment submission)*
1	1	Introduction Position and displacement Speed, velocity, and acceleration	 2.1, 2.2 2.3 - 2.8	 A1 H1, Lab 1, Discussion 1, EC1	 29-Jan 31-Jan
2	2	Newton's 1st and 2nd Laws of Motion Weight, Newton's 3rd law	4.1, 4.2 4.3, 4.4	A2 H2, Lab 2, Discussion 2, EC2	5-Feb 7-Feb
3	3	Projectile motion, Hooke's law Friction, drag, circular motion	3.1 - 3.5 5.1, 5.2	A3 H3, Lab 3, Discussion 3, EC3	12-Feb 14-Feb
4	4	Work, kinetic and potential energy Conservation of energy, power	7.1 - 7.3 7.4 - 7.8	A4 H4, Lab 4, Discussion 4, EC4	19-Feb 21-Feb
5	5	Momentum and impulse Conservation of momentum	8.1-8.2 8.3 - 8.7	A5 H5, Lab 5, Discussion 5, EC5	26-Feb 28-Feb
6	6	Rotational kinematics and dynamics Rotational energy and angular momentum	10.1 - 10.3 10.4, 10.5	A6 H6, Lab 6, Discussion 6, EC6	4-Mar 6-Mar
SPRING BREAK - MARCH 11 - MARCH 15 NO CLASSES					
7	Test 1	**Review - TBD** **Test 1 - ONLINE Proctorio - Tuesday Mar. 19 7:00am-11:30pm / 90 minutes**			
8	7	Static fluids, pressure and buoyancy Pumps, surface tension Hybrid/narrated lecture / no school on Thursday 3/28/24	11.1 - 11.6 11.7 - 11.9	A7 H7, Lab 7, Discussion 7, EC7	25-Mar 27-Mar
9	8	Fluid dynamics, ideal fluids Fluid dynamics, viscous fluids	12.1 - 12.3 12.4 - 12.6	A8 H8, Lab 8, Discussion 8, EC8	1-Apr 3-Apr
10	9	Temperature and heat Thermal properties of matter	13.1 - 13.3 14.1 - 14.7	A9 H9, Lab 9, Discussion 9, EC9	8-Apr 10-Apr
11	10	The laws of thermodynamics Devices, entropy	15.1, 15.2 15.3 - 15.7	A10 H10, Lab 10, Discussion 10, EC10	15-Apr 17-Apr
12	11	Oscillations Mechanical waves	16.1 - 16.5 16.7 - 16.11	A11 H11, Lab 11, Discussion 11, EC11	22-Apr 24-Apr
13	12	Sound waves The Doppler effect	17.1 - 17.3 17.4, 17.5	A12 H12, Lab 12, Discussion 12, EC12	29-Apr 1-May
		Review TBD Final - Test 2 ONLINE Proctorio 7:00am-11:30pm / 90 minutes			

Open Records Act
This course adheres to the University's policy regarding the use and release of student records that are governed by Public Law 93-380, the Family Educational Rights and Privacy Act and the Tennessee Public Records Act, which charges the University and its employees with protecting the confidentiality of the educational records or its prospective, current and former students. One way this affects you is that the professor cannot share or discuss grades via email.

Students with Disabilities
Students with documented disabilities should notify the instructor immediately to discuss requests for special provisions. Students who have a disability that requires accommodations should make an appointment with the Office of Disability Services, 2227 Dunford Hall, (974-6087) to discuss specific needs and get official documentation of the disability.

College of Arts & Sciences Diversity Statement
"The College of Arts and Sciences at the University of Tennessee believes in the value of diversity…. We are committed to creating a vibrant multicultural, multi-ethnic community where diverse students, faculty, and staff are recruited and retained and where diversity scholarship is respected…"

UT ODS Disability Statement
"Any student who feels he or she may need accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 100 Dunford Hall to document their eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities."

University Civility Statement
Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability, and courteousness. Civility enhances academic freedom and integrity and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: http://civility.utk.edu/.

Academic Integrity
"An essential feature of Tennessee, Knoxville, is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student at the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

Academic Dishonesty
This course adheres to the university's Academic Standards of Conduct and Honor Statement, as presented in the student handbook Hilltopics. All students are expected to be honorable and to observe standards of conduct appropriate to a community of students and scholars. All work in this course should be **the original work of the student**. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course, dismissal from the program and dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. Scholastic dishonesty includes **plagiarism**, which according to Webster is: "to take (ideas, writings, etc.) from (another) and pass them off as one's own." Therefore, handing in work that contains material written by someone else, whether it is a current or former student, or a secondary source and presenting it as your own efforts is a clear example of plagiarism.

Please review the Campus Syllabus for information that is common across all courses at UT.