

PHYS 220: ENGINEERING PHYSICS I

- INSTRUCTOR:** Jim Drachenberg, Ph.D. Office: Onstead Science Center 123A
Phone: 325-674-6150 E-mail: jld00a@acu.edu
Office Hours: MTWRF 10:00 – 11:00 AM or by appointment
- LECTURE:** MWF 1:00-1:50 PM in Onstead Science Center 371
LABORATORY: W 2:00 – 4:50 PM in Onstead Science Center 321
TEXTBOOK: *Principles & Practice of Physics* by Eric Mazur
- CALCULATOR INFO:** **Approved calculators include the following:**
Hewlett Packard – HP 33s, HP 35s, and no other
Casio – All FX-115 models. Any Casio calculator must contain FX-115 in its model name.
Texas Instruments – All TI-30X and TI 36X models. Any TI calculator must contain either TI-30X or TI-36X in its model name.
- PAPER INFO:** **Engineering paper:**
ESA engineering paper may be purchased from the department.
- COURSE DESCRIPTION:** Mechanics of particles, rigid bodies, fluids, and wave motion. Concurrent enrollment in PHYS 221 is required. Prerequisite: MATH 185.
- COURSE OBJECTIVES:** By the end of this course, you should be able to
- have an appreciation for how Newton's laws of motion, energy, and momentum conservation laws fit together
 - use vectors in conjunction with Newton's Laws to solve problems involving physical systems
 - identify, understand, and solve problems in situations involving forces
 - identify, understand, and solve problems in situations involving momentum
 - identify and understand the basic mathematics and physics of collisions
 - identify, understand, and solve problems in situations involving 1 and 2-D motion
 - identify, understand, and solve problems in situations involving relative motion
 - identify, understand, and solve problems in situations involving work and energy
 - identify, understand, and solve problems in situations involving circular motion
- GRADE:** Course grades will be based on the following with **approximate weights** as shown.

Exams (3)	15% each for a total of	45%
Participation and Quizzes		15%
Homework		25%
Final Exam		15%

Course letter grades will be assigned using the following **approximate** scale:

A: 90 – 100% B: 80 – 89% C: 70 – 80% D: 60 – 70% F: < 60%

Grades are considered set **two weeks** after the grades have been posted to Canvas. Any objection must be received prior to conclusion of the two-week period, otherwise I will assume you consent to the posted grade.

DROP POLICY: All university policies and deadlines must be followed.

HOMEWORK: Homework will be due every day at the **beginning** of class and should be of professional quality. All handwritten, quantitative homework solutions must be submitted on previously unused engineering paper (see “**PAPER INFO**” above). Each page should be labeled as indicated on the ESA pages; or, if submitted on other engineering paper, must have your name, submission date, course assignment, and page number near the top right of each page. Papers should be folded in half lengthwise with your name written on the outside near the top. Final answers should be underlined or boxed. **Failure to follow these guidelines may result in immediate return of homework with a grade of zero.**

Homework will be graded and returned promptly according to the course homework rubric (supplied to you separately). In general, no credit will be given for a correct answer unless it is accompanied by a complete and correct derivation of how you arrived at the solution (usually including explanation in words). While one point of a particular problem is to find the answer, a major goal of this class is to help you understand how to construct the answers for **many** problems. You are allowed to make corrections for up to 90% of the original maximum assignment score. Corrections must be submitted within 2 class periods of receiving the graded homework and must be 100% correct to receive credit.

In order to assist you in cultivating the discipline of meeting deadlines, **assignments must be submitted on time in order to receive credit.** If you are absent for any reason—including university approved activities—on an assignment due date you must contact me for instructions prior to the date the assignment is due.

COLLABORATION: Collaboration is strongly encouraged! Collaboration is an essential skill in science and engineering and is also highly valued by employers. Social interactions are critical to success, e.g. most good ideas grow out of discussions with colleagues. Essentially all physicists and engineers work in groups. You are encouraged to find partners or teams in which to work. **HOWEVER**, it is critical for you to “own” material. Assistance should be limited to verbal help. **Do not take written information from others.** This will help you think independently after receiving assistance. Excellent performance on homework correlated with poor performance on exams is one indicator you are receiving too much help. In addition to homework collaboration, there will be time for peer discussion during classes: you should listen to your classmates, try to help overcome confusion, ask questions, critique, and generally teach each other. You will learn abundantly in this way!

QUIZZES: There will be quizzes due the evening before most classes during the semester. These will be open-ended questions focusing on the reading. The quizzes will also serve to give you a chance to let me know what was difficult, interesting, or something you would like extra time on in class.

EXAMS: There will be three exams during the semester. Make-up exams may be administered only for university-approved absences (e.g. university-sponsored activity), provided you furnish me with written notification and documentation **prior to the absence.**

The comprehensive final examination will be **Thursday, December 12, from 8 AM – 9:45 AM in Onstead Science Center 371.** **There will be no make-up final exam.**

ATTENDANCE: Daily attendance in class is **essential**. If you are unable to attend, you should notify me by e-mail, phone, or in person **before** class. If so doing is impossible, I expect you to contact me after the absence to offer an explanation. I will take attendance during class and participation will be considered in your final grade assessment at my discretion. Regardless of absence, you are fully responsible for material discussed in class. If absent from a quiz or exam, your grade will be zero unless I grant prior approval.

DRESS CODE: Please follow the student guide. **If you aren't sure, don't wear it.** I reserve the right to ask you to remove hats at any time, e.g. during exams.

ELECTRONICS: No cell phones, laptops, iPods, or other electronic devices are allowed in class unless we are using them corporately. **If I determine your electronic device is disturbing the class or distracting you or others, you will be dismissed.** If such distractions become a pattern, I will not hesitate from further action, including expulsion from the course.

**ACADEMIC
INTEGRITY:**

DO. NOT. CHEAT.

I expect you to report cheating if you witness it. **Failure to report academic dishonesty is considered academic dishonesty, at my discretion.**

Required University statement:

*"Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failing to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submitting papers or projects obtained from another source (e.g., research service or club paper file) as one's own, 3) Falsifying information orally or in writing, and 4) Receiving, giving, or using unauthorized aid on an examination or quiz. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link:
<http://www.acu.edu/academics/provost/policies/index.html>."*

For exams and quizzes, I will give specific instructions concerning authorized resources. Do not discuss quizzes or exams with anyone who has yet to take them. You are **strongly encouraged** and **welcomed** to consult me for assistance on homework. However, assignments submitted in your name must reflect your original work. **Copying the work of students past or present is a violation of the Academic Integrity Policy and will lead to disciplinary action including but not limited to loss of credit, course grade reduction, and automatic course failure.**

ACU MISSION: To educate students for Christian service and leadership throughout the world.

DISCLAIMER: To the best of my knowledge, this syllabus is currently complete and correct. If I determine it is in the best interest of the class, I reserve the right to modified this syllabus, at any time.

COURSE SCHEDULE: The following tentative course schedule based on the textbook material indicates textbook chapters and exam dates, all of which are subject to change.

DATE	TOPICS COVERED
08/26	Chapter 1.1-1.5: Foundations
08/28	Chapter 1.6-1.9: Foundations
08/30	Chapter 1.6-1.9: Foundations
09/02	Chapter 2.1-2.4: Motion in One Dimension
09/04	Chapter 2.5-2.9: Motion in One Dimension
09/06	Chapter 2.5-2.9: Motion in One Dimension
09/09	Chapter 3.1-3.4: Acceleration
09/11	Chapter 3.5-3.8: Acceleration
09/13	Chapter 3.5-3.8: Acceleration
09/16	Chapter 4.1-4.4: Momentum
09/18	Chapter 4.5-4.8: Momentum
09/20	Exam 1
09/23	Chapter 5.1-5.3: Energy
09/25	Chapter 5.4-5.8: Energy
09/27	Chapter 5.4-5.8: Energy
09/30	Chapter 6.1-6.4: Principle of Relativity
10/02	Chapter 6.5-6.8: Principle of Relativity
10/04	Chapter 6.5-6.8: Principle of Relativity
10/07	Chapter 7.1-7.6: Interactions
10/09	Chapter 7.7-7.10: Interactions
10/11	Chapter 7.7-7.10: Interactions
10/14	Chapter 8.1-8.6: Force
10/16	Exam 2
10/18	Chapter 8.7-8.12: Force
10/21	Chapter 9.1-9.4: Work
10/23	Chapter 9.5-9.8: Work
10/25	Fall Break (no class)
10/28	Chapter 10.1-10.5: Motion in a Plane
10/30	Chapter 10.6-10.10: Motion in a Plane
11/01	Chapter 10.6-10.10: Motion in a Plane
11/04	Chapter 11.1-11.3: Motion in a Circle
11/06	Chapter 11.4-11.6: Motion in a Circle
11/08	Chapter 11.4-11.6: Motion in a Circle
11/11	Chapter 12.1-12.4: Torque
11/13	Chapter 12.5-12.8: Torque
11/15	Chapter 12.5-12.8: Torque
11/18	Chapter 13.1-13.4: Gravity
11/20	Chapter 13.5-13.8: Gravity
11/22	Chapter 13.5-13.8: Gravity
11/25	Exam 3
11/27	Thanksgiving Break (no class)
11/29	Thanksgiving Break (no class)
12/02	Chapter 14.1-14.4: Special Relativity
12/04	Chapter 14.5-14.8: Special Relativity
12/06	Chapter 14.5-14.8: Special Relativity
12/12	Final Exam, 8:00-9:45 AM

LABORATORY SCHEDULE:	08/28	Laboratory Introduction
	09/04	Laboratory 1—One-dimensional Motion
	09/11	Laboratory 2—One-dimensional Acceleration
	09/18	No Laboratory
	09/25	Laboratory 3—Momentum
	10/02	Laboratory 4—Galilean Relativity
	10/09	Laboratory 5—Interactions and Potential Energy
	10/16	No Laboratory
	10/23	Laboratory 6—Forces and Equilibrium
	10/30	Laboratory 7—Forces and 2-D Motion
	11/06	Laboratory 8—Angular momentum
	11/13	Laboratory 9— Rotational Inertia
	11/20	Laboratory 10—Torque
	11/27	Thanksgiving Break (No Laboratory)
	12/04	Laboratory 11—ACU Core Assessment Exam
	12/11	No Laboratory (End of Semester)