

PHYS 121, Engineering Physics Lab I
Syllabus—Fall 2011

CATALOG DESCRIPTION	PHYS 121 Engineering Physics I Laboratory (0-3-1), fall. Concurrent enrollment in PHYS 120.
ACU MISSION STATEMENT	ACU's mission is to educate students for Christian service and leadership throughout the world.
DEPARTMENTAL VISION STATEMENT	The vision of the ACU Physics Department is to be the premier physics department for the preparation of students for Christian service and leadership throughout the world.
INSTRUCTORS	Dr. Josh Willis, Assistant Professor Email: josh.willis@acu.edu (preferred means of contact) Phone: 674-2527 (office), 672-1646 (home, before 9 PM) Office: 317 Foster Science Building Office Hours: 2–5 PM W, 1–5 PM R Dr. Donald Isenhower, Professor Email: isenhowe@acu.edu Phone: 829-4789 (cell, before 9 PM, no text) Office: 317 Foster Science Building Office Hours: 10–11 AM MW, 1:30–4 PM MT Dr. Mike Sadler, Professor Email: sadler@physics.acu.edu Phone: 674-2189 (office) Office: 320B Foster Science Building Office Hours: 10–11 AM M–F, 3–5 PM M
TEXT	The following text is required: <i>RealTime Physics Module 1: Mechanics</i> by David R. Sokoloff, Ronald K. Thornton, and Priscilla W. Laws.
COURSE DESCRIPTION	Engineering Physics Lab I is designed as an active-learning based experience to help you develop your understanding of mechanics. Each lab meets for three hours each week, and in order to receive credit for the lecture component of the course, you must also receive credit for the lab.
COURSE GOALS	As will be seen from the competencies and measurement standards below, the primary goals of this course are to reinforce through active learning a correct Newtonian intuition for the mechanical world around us, and to reason quantitatively from Newtonian principles. As such, it is a “hands-on” extension of the lecture course, though it may cover slightly different material and <i>will</i> cover material in a different order. In addition to developing and demonstrating the competencies above, we wish to introduce you to at least the following laboratory techniques: 1. Collection of data using the Data Studio® software. 2. Graphing of data 3. Least-squares fitting of linear data

COMPETENCIES
AND ASSESSMENT

Competency	Measurement Instrument	Measurement Standard
The student will be able to reason graphically about basic kinematic quantities (position, velocity, acceleration)	Lab Writeups and Post-tests	1. The student can predict position versus time, velocity versus time, and acceleration versus time graphs from a verbal description of an object's motion. 2. Given any one such graph above, the student can construct the other two. 3. Given such a graph, the student can describe an object's motion.
The student can identify forces acting on objects, how to combine them, and what interaction gives rise to them	Lab Writeups and Post-tests	1. Given common interactions (gravitational, normal, tension, spring) the student can quantitatively predict the resulting force on laboratory objects. 2. The student can correctly combine forces as vectors to arrive at the net force acting on an object. 3. The student can relate the net force on an object to its acceleration through Newton's second law. 4. The student can correctly apply both Newton's second and third law to interacting objects and identify the force pairs that (may) arise with each.
The student will be able to analyze conserved quantities in collision and other interactions, identifying when they are conserved or not, and why or why not	Lab Writeups and Post-tests	1. The student will be able to identify isolated systems 2. The student will be able to apply conservation laws to deduce unknown kinematic quantities from known.

GRADING SCALE Grades will be assigned based on the following scale for your overall average:

A	90-100%	D	60-69%
B	80-89%	F	< 60%
C	70-79%		

We will perform eleven of the twelve labs in your lab book over the course of this semester. Each lab counts equally; none are dropped. Each lab is assigned a letter grade; there is no individual scoring of the activities in the lab. Rather, you will be assessed as follows:

- A All parts of the lab completed, showing care in making hypotheses, summarizing conclusions, and reasoning accurately and concisely.
- B At most one activity not fully completed (but still showing some work). Even if all activities are complete, some explanations may either be too terse to communicate all of your reasoning, or so verbose as to include much irrelevant information. Only minor errors in reasoning from the collected data to support the conclusions given.
- C One activity completely absent or two or more not fully completed. Even if all activities are complete, there may be major gaps in reasoning, or only cursory attempts at tying conclusions to data.
- D At best partial work with major errors in some places, but still at least one activity that shows fairly good work and understanding.
- F Little meaningful work.

You will work in two or three person lab groups, but each person must turn in his or her own lab report, and receives an individual grade (though many labs will have portions where you are to state what your group either predicted or decided).

Some times parts of a lab will be skipped; you will be told this at the beginning of that lab.

PRE-TEST AND POST-TEST

During the first lab period, you will be administered a standardized test on your understanding of mechanics; during the last lab period, you will take two sets of standardized tests to measure your improvement in conceptual understanding of mechanics. It is a condition of our use of these tests that we not identify them by name, nor disclose to you the answers. Together, they comprise 10% of your lab grade, based on the geometric mean of your post-test scores, and normalized improvement from pre-test to post-test, compared to certain thresholds. The cutoffs for these scores cannot be disclosed to you, so try your best on both pre-test and post-test. You will not be told your score on the pre-test prior to taking the post-test. ***If, in the instructor's sole judgment, you have not made a serious attempt at either exam, you will receive no credit for this 10% portion of your lab course grade.***

ATTENDANCE & CONDUCT

The experiential nature of laboratory work means it cannot be adequately “made up” by alternate assignments. Therefore, you must attend each lab. You will only be excused from a lab if you have a valid university approved excuse; that is, where you miss lab because of illness, death in your immediate family, or travel on an ACU sponsored activity. The absence will not be excused until you have provided the instructor documentation in writing. Following university regulation, you will be dropped from the course with a failing grade if you miss more than 20% of the class meetings. ***Note that for lab this occurs when you miss three or more labs, and applies even if some of those absences are excused.*** If you know in advance that you will be away for an excused reason, you may attend a different meeting of lab during that week, but ***only with the instructor's advance approval.*** Aside from this circumstance, labs may not be made up.

Labs begin promptly at the scheduled time. If you come in late ***for any reason whatever*** then you may not be admitted and will therefore receive a zero for that lab. You must turn in your completed lab at the end of the lab period.

ACADEMIC INTEGRITY

As ACU students you are expected to embody honesty in all aspects of your life. Labs by design are collaborative activities, but you must each turn in an individual lab report representing your work. Moreover, falsifying data or other experimental results not only means you have not obtained a key learning activity, but also represents a serious violation of both academic and professional (i.e. scientific) integrity. Any first violation will result in a zero for that week's lab; a second violation will cause you to fail the course. You are also bound by the ACU

academic integrity policy, found in the student guide. The required excerpt from that policy is as follows:

Violations of academic integrity and other forms of cheating, as defined in ACU's Academic Integrity Policy, involve the intention to deceive or mislead or misrepresent, and therefore are a form of lying and represent actions contrary to the behavioral norms that flow from the nature of God. Violations will be addressed as described in the Policy. While the university enforces the Policy, the most powerful motive for integrity and truthfulness comes from one's desire to imitate God's nature in our lives. Every member of the faculty, staff and student body is responsible for protecting the integrity of learning, scholarship and research. The full Policy is available for review at the Provost's office web site (<http://www.acu.edu/campusoffices/provost>) and the following offices: provost, college deans, dean of campus life, director of student judicial affairs, director of residential life education and academic departments.