

PHYSICS 2A

INSTRUCTOR: Mike Read Email: read@siskiyous.edu

OFFICE: PS-1

Office hours: M-F 12-1 (Feel free to stop by at other times).

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Class Meeting Times: T, Th 8-11 in PS-1

PREREQUISITES: Students in this class are assumed to have fundamental algebra skills equivalent to a passing grade in Math 50 or Math 53.

REQUIRED TEXT: Physics: by Paul Hewitt (The textbook will be supplemented with numerous in class and homework problem sets, computer exercises etc.)

GOALS OF THE COURSE: Physics 2A is the first in a sequence of two algebra based introductory physics courses for health science majors and other interested individuals wishing to fulfill GE science requirements or just learn about the laws of our physical universe. The course covers Mechanics, Fluids and Oscillations and Waves.

The goal of this course is to have you engage in a process central to science: the attempt to explain in detail a broad range of phenomena using a small set of powerful fundamental principles.

The course places considerable emphasis on qualitative physical reasoning as a compliment to quantitative problem solving. We want to avoid having the "physics" get lost in the equations.

Student Learning Outcomes	Methods of Instruction	Methods of Evaluation/Assessment
The student will: 1. Analyze how the laws of physics apply to a broad range of everyday phenomena. COS GE SLO C3, C2	1. Assigned readings, videos, and instructor lead discussions on the laws of physics and their application. In-class individual and small group exercises on applying the laws of physics followed by instructor debriefing. Lab activities on discovering, verifying, and applying the laws of physics.	1. Evaluation of reading assignment quizzes for completeness of the assignment. Evaluation of in-class written assignments for understanding of, and for ability to apply the laws of physics. Evaluation of written lab reports and assignments for understanding of and ability to apply the laws of physics. Evaluation of written homework assignments, quizzes, and exams for understanding of and ability to apply the laws of physics.
2. Use the laws of physics and proportional reasoning strategies	2. Lectures, and in-class	2. Evaluation of homework assignments, quizzes and

<p>to appraise the relative effect of changes to a specified independent variable on changes to a dependent variable for a given physical phenomena. Example: How does doubling the mass of a car effect it's stopping distance? COS GE SLO C2, C4</p> <p>3. Demonstrate proficiency in calculating solutions to numerical problems that require identifying key data, deciding which principle of physics applies, choosing an appropriate formula and problem solving strategy, converting units as required, performing algebraic manipulations & calculations, and deciding if the answer is reasonable. COS GE SLO C4, C2</p> <p>4. Design and execute experiments according to the scientific method. This includes the ability to: (a) determine whether or not a question can be addressed by science,(b) design and execute an experiment using the scientific method (c) record, manipulate and evaluate the experimental data to reach conclusions COS GE SLO C1</p> <p>5. Demonstrate an ability to effectively communicate scientific knowledge, experimental results and analysis</p>	<p>worksheets on proportional reasoning and problem solving strategies.</p> <p>3. Lectures and in-class worksheets on working with and converting units. Instructor worked example problems and small-group problem solving involving identifying key data, deciding which principle of physics applies, choosing an appropriate formula and problem solving strategy, converting units as required, performing algebraic manipulations & calculations, and deciding if the answer is reasonable.</p> <p>4. Lecture, large group discussion and small group activities on the nature of science. Lecture and lab activity on the experimental design process, data recording and manipulation.</p> <p>5. Lecture and instructor examples on how to effectively document problem solutions and experimental results.</p>	<p>exams for ability to choose the applicable physics law and apply proportional reasoning problem solving strategies.</p> <p>3. Evaluation of homework, quiz, and exam problems for ability to identify key data, decide which principle of physics applies, choose an appropriate formula and problem solving strategy, convert units as required, performing algebraic manipulations & calculations, and decide if the answer is reasonable.</p> <p>4. Evaluation of homework assignment for understanding of the nature of science and differentiation between science and non-science. Evaluation of lab activity for experimental design by the scientific method, data recording and manipulation, and drawing conclusions from the data.</p> <p>5. Evaluation of homework assignments, quizzes, exams, and lab reports for appropriate documentation and effective communication. Peer evaluation of selected assignments for effective communication.</p>
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Description of Out-of-Class Assignments.

- Prior to each lecture there is a textbook reading assignment covering the days lecture topic.
- After each lecture there is a written homework assignment designed to reinforce and deepen the understanding of the days learning outcome. Written homework assignments include end-of-chapter exercises and instructor generated worksheets and exercises.
- There are several quizzes and exams throughout the semester which require out-of-class study and preparation.

Detailed Course Content

A. Kinematics

1. Understand the concepts of position, velocity and acceleration
2. Use multiple representations of motion
3. Describe motion with vectors
4. Understand the mathematics of position velocity and acceleration for motion along a straight line
5. Use an explicit problem solving strategy for kinematics
6. Understand free-fall motion

B. Vectors

1. Understand the use and basic properties of vectors
2. Decompose a vector into components
3. Add and subtract vectors both graphically and using components

C. Force and Motion

1. Recognize what a force is and is not
2. Identify the forces acting on an object
3. Understand the connection between force and motion
4. Solve static equilibrium problems by applying an explicit strategy
5. Solve dynamic problems by applying a specific strategy

D. Newton's Law of Gravity

1. Understand how mass and weight differ
2. Understand Newton's Law of Gravity
3. Place Newton's discovery of the law of gravity in historical context

E. Two-Dimensional Motion

1. Understand kinematics and dynamics for projectiles
2. Understand kinematics and dynamics for rotational motion
3. Understand circular orbits for satellites and planets
4. Understand fictitious forces

F. Interactions and Conservation laws

1. Identify action/reaction pairs of forces in interacting systems
2. Understand and use the concepts of impulse and momentum
3. Solve problems using the law of conservation of momentum and a specific problem solving strategy
4. Use the law of conservation of angular momentum in simple situations
5. Understand and use the concepts of work, kinetic and potential energy
6. Solve problems using the law of conservation of mechanical energy

G. Fluids

1. Understand pressure in fluids
2. Use Archimedes' principle to understand buoyancy
3. Use an ideal fluid model to investigate how a fluid flows

H. Thermodynamics

1. Work with and convert between different temperature scales
2. Use the ideal gas law
3. Understand ideal gas processes and represent them on a P-V diagram
4. Understand the energy transfer known as heat
5. Use the first law of thermodynamics
6. Use specific heats and heats of transformation in the application of calorimetry
7. Understand how molecular motions and collisions are responsible for macroscopic phenomena such as pressure and heat transfer
8. Establish a connection between temperature, thermal energy, and translational kinetic energy of atoms

ATTENDANCE: Students are expected to attend all classes and to arrive "on-time". Class will begin promptly at 8:00 with a reading quiz. Students who do not arrive on-time may/will lose points from daily activities and reading quizzes.

GRADING POLICY:

ASSIGNED HOMEWORK PROBLEMS : 10%

Homework is due at the start of class. Late homework will not be graded. However, the lowest two homework grades will be dropped to account for excused absences and extenuating circumstances. Approximately two hours of homework can be expected for every class meeting. One of the primary objectives of this class is to develop the student's problem solving abilities. Consequently, homework is considered to be a very important component of this class.

Your homework grade will be based on neatness, documentation, and methodology as well as the accuracy of your solution.

We will use a PLUS , CHECK , MINUS or ZERO grading scale

- A PLUS will be recorded as 10 points and indicates excellent work with respect to neatness, documentation, and methodology as well as the accuracy of your solution.
- A CHECK will be recorded as 7.5 points and indicates generally adequate work. However, either the neatness, documentation, methodology, or accuracy of the solution needs some improvement.
- A MINUS will be recorded as 5 points and indicates generally unacceptable quality of work.
- A ZERO will be recorded as 0 points and indicates little or no effort demonstrated.
- A STAR will be recorded as 15 points and indicates work that is unusually exemplary and goes far beyond my expectations for this particular assignment. This score is rarely assigned and you should be very proud of your efforts.

Due to time limitations, only selected homework problems may be graded.

READING ASSIGNMENTS: 10%

Much of the basic information/knowledge in this class will be obtained from reading the textbook. Most students find reading in the textbook interesting and enjoyable. Class time will be spent doing exercises designed to deepen your understanding of the basic

principles and in developing your ability to apply the basic principles. In order for you to get the most benefit from each class, you will need to come to class prepared by doing the assigned reading. Therefore there will be a reading quiz at the start of each class covering assigned reading questions.

Missed reading quizzes may not be made up, however the lowest two reading quizzes will be dropped to account for excused absences and extenuating circumstances.

LABS/IN-CLASS ASSIGNMENTS: 10%

Missed assignments may not be made up, however the lowest grade will be dropped to account for an excused absence and extenuating circumstances.

QUIZZES: 10% If you know that you will be absent you can schedule to take the quiz in advance with Mr. Read. Make-ups will not be given for missed quizzes without prior approval, however the lowest grade will be dropped to account for an excused absence and extenuating circumstances.

EXAMS: 40%

There will be two exams plus a final. If you know that you will be absent for an exam you can schedule to take the exam in advance with Mr. Read. Make-ups will not be given for missed exams without prior approval. Generally, make-ups will be scheduled before the regular exam date.

Since my primary goal is for you to learn the material, I will offer you an opportunity to learn from your mistakes on exams. You will have an opportunity to rework missed quiz and exam problems for up to 12.5 additional points added to your original score (with the exception that your final score can not exceed 100%). The points added will be calculated by the formula: $12.5 \text{ (correction points/original missed points)}$. For example if your original test score was a 75 and you corrected 20 of the 25 missed points, then your final test score is $75 + 12.5 \text{ (20/25)} = 85$

Make-up credit is at the discretion of the instructor! Since the point of doing the make-up is to learn from your errors, I will not give credit if I believe you are just copying answers from other students. It is OK (and encouraged) to discuss your errors with the instructor or other students, but do not just copy answers without understanding and being able to work the problem on your own!

FINAL: 20%

The instructor will guarantee the following course letter grades for the following averages:

A=100-90

B=89-80

C=79-70

D=69-60

The FW grade will be given at the discretion of the instructor in cases of extreme extenuating circumstances. The usual extenuating circumstance would be cases of verified illness or accidents which cause the student to drop out of school.

STUDY GROUPS AND COLLABORATIVE WORK

Scientists and engineers normally work in groups and social interactions are critical to their work. Most good ideas grow out of discussions with colleagues. *In this course, I want you to work with others as much as possible.* Study together, ask each other questions, help each

other to clear up confusion, critique each other's homework. Teach each other! Teaching is the best way to learn! From my experience, students that participate in study groups generally do much better in the course than students who do not.

Because I feel that study groups are so beneficial, I am offering the following incentive to those students who will attend the official study group: **One additional homework grade, will be dropped for every three official study group sessions attended. Alternatively (for students who would benefit more), 1 homework "extra credit" point will be earned for each study group attended.**

WITHDRAWAL: Any student withdrawing must do so through official channels (don't just stop coming to class). Otherwise you could receive an F for the course. Please see the college catalog pg 36 for information on withdrawal. Also please refer to the COS academic calendar for the last day to drop without a penalty

INCOMPLETES: The COS policy for granting incomplete is in the college catalog.

EARLY FINALS: The final is scheduled for Tuesday 12/16 at 8:00. Early finals will be allowed only in cases of unforeseen emergency. An early final will not be granted for cases of Christmas jobs, plane reservations, etc.

ACADEMIC DISHONESTY

I assume that all students will pursue their studies with integrity and honesty; however, all students should know that incidents of academic dishonesty are taken very seriously. It is vitally important to your academic success that you know what constitutes academic dishonesty.

What is Academic Dishonesty?

The two most common kinds of academic dishonesty are cheating and plagiarism. Cheating is the act of obtaining or attempting to obtain credit for academic work through the use of dishonest, deceptive or fraudulent means. Plagiarism is representing the work of someone else as your own and submitting it for any purpose.

It is your responsibility to know what constitutes academic dishonesty. If you are unclear about a specific situation, speak to your instructor. The following list identifies some of the activities defined as academic dishonesty:

Cheating

1. Copying, in part or in whole, from someone else's test.
2. Altering or interfering with grading.
3. Using or consulting, during an examination, any sources, consulting with others, use of electronics equipment including cell phones and PDAs, or use of materials not authorized by the instructor; or
4. Committing other acts which defraud or misrepresent.

Plagiarism

Incorporating the ideas, words, sentences, paragraphs or parts of another person's writings without giving appropriate credit, and representing the product as your own;

Other Specific Examples of Academic Dishonesty

1. Purposely allowing another student to copy from your paper during a test;
2. Giving your homework, term paper or other academic work to another student to plagiarize;
3. Having another person submit any work in your name;
4. Lying to an instructor or college official to improve your grade;
5. Altering a graded work after it has been returned, then submitting the work for re-grading;
6. Stealing tests;
7. Forging signatures on drop/add cards or other college documents; or
8. Collaboration without permission of instructor.

Consequences of Academic Dishonesty

Academic sanctions may be applied in cases of academic dishonesty. Depending on the seriousness of the infraction, you may:

1. Receive a failing grade on the test, paper or exam.
2. Have your course grade lowered.
3. Receive an **F** in the course.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

The learning services Office (Eddy Hall 1) can provide resources/information to accommodate students with special needs.

SUPPORT HOUR REQUIREMENT

This course includes a support hour. The support hour provides students with professional assistance, supplemental instruction and remediation opportunities to help improve student success. Supervised support is offered for reading, writing, math, information technology, computer competency, and other skills outside of discipline specific content. During the semester, students will complete a variety of tasks related to this course that will necessitate the services available through the support hour. These tasks will include:

1. We will be using computers extensively in class for analysis, simulation, data collection & analysis, video analysis, modeling, etc. You may need to complete some of this work outside of class. You may also wish to review some of these exercises on your own to prepare for quizzes and exams.
2. You can expect some homework assignments which require the use of MS Word, Excell, and other computer simulation and analysis programs in the physics lab.

3. There are many excellent resources on the Web related to learning/topics in this course. These may serve as an excellent supplement to your text and other course materials to complete assignments and prepare for exams.
4. It is suggested you utilize email (in addition to telephone) for communication with your instructor and other students. My email is: read@siskiyous.edu
5. It is suggested that you discuss written assignments with Writing Lab staff before turning them in.