EFFECTIVE TERM: Summer 2019

Course Identification

COURSE ID: PHYS 2AG

Student Learning Outcomes

COURSE TITLE (FULL): General Physics

COURSE TITLE (SHORT): General Physics

COURSE DIVISION: Natural Sciences Division

COURSE DEPARTMENT: Physics and Engineering Department

COURSE SUBJECT: Physics

DISCIPLINE: Physics/Astronomy

TAXONOMY OF PROGRAMS (TOP) CODE: 190200 Physics, General

CROSS LISTED COURSE:

Course Attributes

CREDIT STATUS: D Credit – Degree Applicable

TRANSFER STATUS: A Transferable to both UC and CSU

COURSE BASIC SKILLS STATUS: Not a Basic Skills Course

STUDENT ACCOUNTABILITY MODEL (SAM) CODE: E - Non-Occupational

COURSE CLASSIFICATION STATUS: A Liberal Arts and Sciences

FUNDING AGENCY CATEGORY: Not Applicable

COURSE PROGRAM STATUS: 1 - Program Applicable

REPEATABILITY: Non-repeatable Credit (equates to 0 repeats)

GRADING METHOD: Letter Grade Only

CREDIT BY EXAM: Not Allowed

WORK EXPERIENCE: Not part of co-op work experience education program

Course Workload Values

Faculty Contact Hours	Lecture	Laboratory	Activity	Total
Minimum Contact Hours	54	54		108
Maximum Contact Hours				
Minimum Out of Class Hours	108			108
Maximum Out of Class Hours				
Total Minimum Student Learning Hours	162.00	54.00		216.00
Total Maximum Student Learning Hours				

Unit Value	Lecture	Laboratory	Activity	Total
Minimum Units	3	1		4
Maximum Units				

To Be Arranged (TBA) Hours	Lecture	Laboratory	Activity	Total
Minimum To Be Arranged (TBA) Hours				
Maximum To Be Arranged (TBA) Hours				
Scheduled Hours				

METHODS OF INSTRUCTION

- [ ] Lecture
- [ ] Laboratory
- [x] Lecture and Laboratory
- [ ] Open Entry/Exit
- [ ] Independent Studies
- [ ] Work Experience
- [ ] Other To Be Arranged (TBA)

Class Size : 24

Requisites

Prerequisite MATH 150 Trigonometry

Course Outline with Information

CATALOG DESCRIPTION

The basic principles of physics. Includes theory, applications, laboratory, and problem solving in mechanics, heat, fluids, and wave motion.

SCHEDULE DESCRIPTION

Basic principles of physics. Mechanics, heat, fluids, and wave motion. Includes laboratory.

MEASURABLE OBJECTIVES

1. Employ the scientific method in performing experiments in the areas of mechanics, fluids, and thermodynamics.
2. Select and accurately use the best tool to measure a variety of quantities such as length, time, mass, and temperature.
3. Analyze and evaluate measured data for accuracy and consistency.
4. Construct relationships between physical quantities in the areas of mechanics, fluids, and thermodynamics using experimental results.
5. Perform data manipulation and analysis using the proper software and clearly communicate the results of measurements and of subsequent data analysis.
6. Integrate diverse physics principles and apply them to problem solving in mechanics, fluids, and thermodynamics.

LECTURE TOPICAL OUTLINE

- Displacement and distance
- Velocity and speed
- Acceleration
- Two-dimensional motion
- Newton's Laws of motion
- Free body diagrams
- Work, energy, impulse, and momentum
- Rotational kinematics and dynamics
- Harmonic oscillators and waves
- Sound
- Fluid statics
- Heat and temperature
- Latent heat
- Final exam

LAB TOPICAL OUTLINE

- Measure the position, velocity of an object moving at constant velocity and perform graphical analysis
- Measure the position, velocity and acceleration of an object moving with constant acceleration and perform graphical analysis
- Measure the position, velocity and acceleration of an object moving in two dimensions and perform graphical analysis
- Measure the forces acting on an object and observe the relationship between net force and acceleration
- Determine the total work done on an object by measurements of kinematic or force quantities or both
- Measure the relationship between initial and final energy in a system and observe how this is affected by the total work done
- Make measurements of an object in rotational equilibrium and observe the effect of a zero net torque
- Measure an object undergoing rotational acceleration and observe the relationship between that acceleration and the net torque
- Make measurements of the kinematic, force, work energy, or all three quantities of an object undergoing simple harmonic motion for example either a pendulum or a spring
- Make measurements of the frequency, wavelength, speed, or all three of a mechanical wave and observer the relationship between these quantities
- Make measurements of the effect of buoyancy on an object
- Measure how changing thermal energy in a system affects that system including both changes in temperature and changes in phase
- Final exam

METHODS OF EVALUATION

Category 1.Substantial written assignments for this course include:

- Weekly lab reports (1-8 pages) consisting of a series of paragraph-long critical analyses of physics lab activities, including explaining procedures, recording observations and synthesis of theory with experimental results
- Explanations and interpretation of graphs, diagrams and physical phenomena in terms of concepts and physical laws (A few sentences to a paragraph)

If the course is degree applicable, substantial written assignments in this course are inappropriate because:

Category 2. Computational or non-computational problems solving demonstrations

- Computational and conceptual problem solving involving mechanics, heat, fluids, and wave motion

Category 3. Skills Demonstrations

- Use of lab apparatus to measure properties of physical systems
- Recording, graphing, and interpreting data and observations from physical systems

Category 4. Objective examinations

- Multiple-choice questions in which students choose among various possible answers to questions in mechanics, heat, fluids, and wave motion
- Completion exercises in which students complete sentences involving concepts in mechanics, heat, fluids, and wave motion.
- Short-answer questions involving concepts mechanics, heat, fluids, and wave motion or explaining observations from their lab activities
- Problem solving, in which students are required to calculate various quantities given various other physical quantities for problems in mechanics, heat, fluids, and wave motion

SAMPLE ASSIGNMENTS

1. A paintball player on level ground shoots a paint ball at an angle of 25 degrees above the horizontal. The paintball is 1.5 m above the ground as it leaves the paint gun with a speed of 12 m/s. Quantitatively describe everything you can about the motion of the paintball.
2. A 0.075 kg toy airplane is tied to the ceiling with a string. When the airplane's motor is started the plane moves with a constant speed of 1.21 m/s in a horizontal circle of radius 0.44. Find the angle the string makes with the vertical, and the tension in the string.
3. A railroad boxcar of mass 12,000 Kg is initially rolling with a speed of 0.3 m/s down an incline of 1.0 degree in a railroad yard. There is a frictional force of 2200 N on the car. How far will it travel along the track before stopping?
4. A 5.00 m long ladder, weighing 200N, rests against a smooth vertical wall with a base on a horizontal rough floor, a distance of 1.30 m away from the wall. The center of mass of the ladder is 2.5 m from its base, and the coefficient of static friction between the ladder and the floor is 0.2. How far up the ladder, measured along the ladder, can a 600 N person climb before the ladder begins to slip?
5. The good ship Lollipop, mass 40,000 kg, is exploring the Peanut Cluster when it comes to the planet BonBon. Previous surveys have indicated that BonBon has a mass of 5 x 10^24 kg and a radius of 7000 km. Captain Shirley decides that she wants the Lollipop to make one circular orbit of BonBon every 14 hours. a. Draw a free body diagram showing the forces acting on Lollipop while it is in orbit. b. Calculate how far above the planet's surface Lollipop will have to be.
6. Use work-energy considerations to find the final speed of a block of mass 5.0 kg, initially moving at 3.0 m/s, that is pushed by a force of 12 N at an angle of 35º below the horizontal for 20.0 meters on a frictionless surface.
7. A turntable is spinning at a rate of 33 revolutions per minute. Find the minimum coefficient of static friction that will let a penny located 10.0 cm from the axis of the turntable stay on the surface of the turntable.
8. A 2.00 kg cart is hung from a spring. The spring stretches 5.00 cm. The spring is now mounted horizontally on a wall so that the cart can roll back and forth on a floor. The spring is pulled back 4.0 cm to the right and released. a) What will be the period of the oscillation? b) What will be the speed of the cart when t=0.500 seconds? c) What is the maximum acceleration that will be experienced by the cart?
9. You place a 300-W travel immersion heater into a cup that holds 245 grams of water at 24ºC. The heat entering the cup is negligible compared to the heat entering the water. (a) What is the temperature of the water in the cup after 180 seconds? (b) What is the temperature of the water in the cup after 360 seconds? (c) How much water remains in the cup after 360 seconds?
10. Luigi suspends a 12-kg lantern between his store and a telephone pole. The cable attached to his store makes a 40º angle with the wall. The cable to the telephone pole is horizontal. Calculate the two tensions in the two cables.
11. Bobby loses hold of his snow saucer, which starts to slide down a 55-m long, 11º slope. The coefficient of kinetic friction between the saucer and the snow is 0.081. (a) What will be the acceleration of the saucer? (b) How long will it take for the saucer to get to the bottom of the hill?
12. You are given a heavy metal disk, which can rotate along its central axis with a negligible amount of friction in its bearings. Design and carry out an experiment to determine the moment of inertia of the disk. Explain clearly how your measurements lead to the desired result.

TEXTBOOK 1	
Title:	Physics, Vol 1
Author(s):	James Walker
Date:	2017
Online Education Resource:	

TEXTBOOK 2	
Title:	LabModules for Physics 2AG
Author(s):	Mt. SAC Physics Department
Date:	2017
Online Education Resource:	

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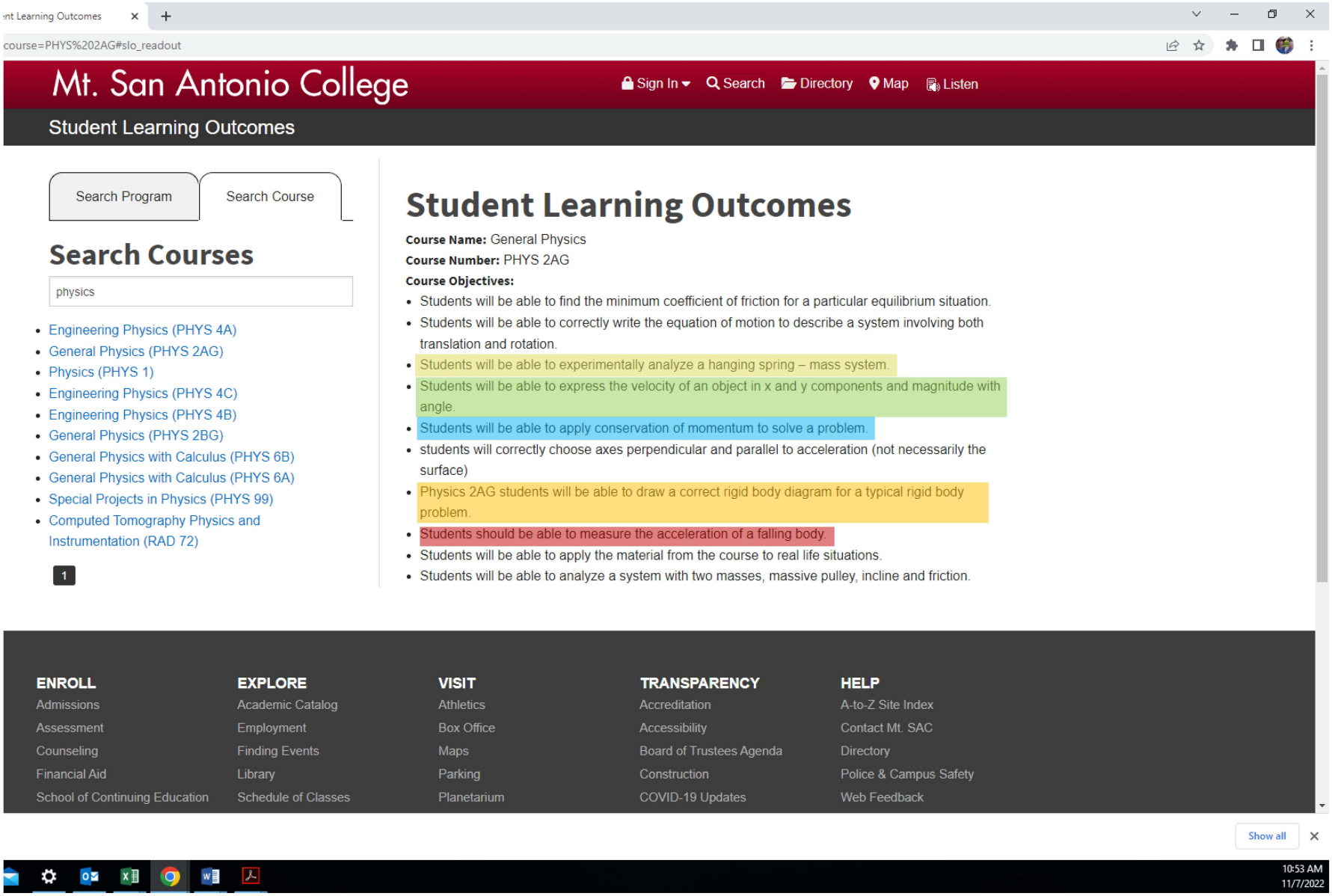
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physics
Engineering Physics (PHYS 4A)
General Physics (PHYS 2AG)
Physics (PHYS 1)
Engineering Physics (PHYS 4C)
Engineering Physics (PHYS 4B)
General Physics (PHYS 2BG)
General Physics with Calculus (PHYS 6B)
General Physics with Calculus (PHYS 6A)
Special Projects in Physics (PHYS 99)
Computed Tomography Physics and Instrumentation (RAD 72)
1
Student Learning Outcomes
Course Name: General Physics
Course Number: PHYS 2AG
Course Objectives:
Students will be able to find the minimum coefficient of friction for a particular equilibrium situation.
Students will be able to correctly write the equation of motion to describe a system involving both translation and rotation.
Students will be able to experimentally analyze a hanging spring – mass system.
Students will be able to express the velocity of an object in x and y components and magnitude with angle.
Students will be able to apply conservation of momentum to solve a problem.
students will correctly choose axes perpendicular and parallel to acceleration (not necessarily the surface)
Physics 2AG students will be able to draw a correct rigid body diagram for a typical rigid body problem.
Students should be able to measure the acceleration of a falling body.
Students will be able to apply the material from the course to real life situations.
Students will be able to analyze a system with two masses, massive pulley, incline and friction.
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