Southeastern Louisiana University Dual Enrollment Program

Physics 191 Syllabus 2023-2024

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Prerequisites: Mathematics 162, or 165, or 200, or permission of the Department Head

Course Transferability: It is incumbent upon all students and parents to determine the transferability of Dual Enrollment courses to other institutions. For in-state institutions, Southeastern courses can be cross-referenced using the Statewide Articulation Matrix to determine transferability (https://regents.la.gov/articulationandtransfer/). Out-of-state institutions should be consulted to determine transferability.

Course Requirements:

- A rental electronic textbook will be provided for you: College Physics, 5th edition, by Allan Giambattista. The link to register for the textbook will be provided by your instructor.
- You must have a scientific calculator with scientific notation, √, & log (like TI-30IIX) and bring it to every class and test.
- You will need to register on McGraw-Hill Connect (access given by instructor) to obtain access to the online homework assignments which are part of your grade.
- You must login into moodlede.selu.edu and validate this syllabus **and** the course policies to notify that you have received and read this syllabus.

Homework:

- Homework is found online at McGraw-Hill Connect and/or a "hard-copy" of the assignment will be provided on your course MOODLE homepage. You do not need to complete each homework in one sitting. You will have 3 attempts to answer each homework question correctly, and you must complete each homework before the due date.
- These 12 homework assignments are worth 25% of your course grade.

Tests and Final Exam: *(also see Testing Policy)*

- There are 3 tests and 1 final exam, 100 points each:
  Physics 191: **Test 1** – Ch 1 – 3* **Test 2** – Ch 4 – 5* **Test 3** – Ch 6-8* **Final**: Ch 1-8 (Ch 10 parts)
  **unless your teacher has chosen to teach the chapters in a different order than the textbook*
- You will have 75 minutes each for tests, and 120 minutes for the final exam.
- Tests are *typically* composed of 10-15 multiple-choice questions and four to five free response questions. The final exam is composed of seven to nine free response questions. All students will be asked equivalent, but not the same, questions.
- A missed test or final exam must be made up within 2 days (unless prior approval of an extension is granted for extenuating circumstances). Otherwise, you will receive a zero.
- At the end of the course, the lowest test grade will be dropped. (One missed test score can therefore be dropped.)
- The remaining two tests and the final exam are each worth 25% of course grade.

Grading:

- Your 2 best tests, homework average and final exam scores will be averaged to calculate your course grade (each is 25% of your grade).
- You will receive 3 credits if you earn an A (≥90%), B (≥80%), or a C (≥70%). You will receive no college credits if you earn a D (≥60%) or an F (<60%).
- You can withdraw from the course prior to the deadline, receive a "W" grade and no credit.

Testing Policy:

All testing will be done in class, under strict supervision, following guidelines set forth by the Southeastern Louisiana University Physics Department. Students are expected to maintain the highest standards of academic integrity. Behavior that violates these standards is not acceptable. Actions that violate our standards of academic integrity include, but are not limited to, the following: use of unauthorized material, use of any website other than MoodleDE.selu.edu, communication with fellow students and/or other individuals during an examination, attempting to benefit from the work of another student, and any similar behavior that defeats the intent of an examination or other class work. Cheating on examinations and plagiarism are considered very serious offenses and shall be grounds for disciplinary action as outlined in Southeastern Louisiana University's current General Catalog. (http://www.southeastern.edu/resources/policies/policy_detail/acad_integrity.html)

TESTING RULES: Southeastern Louisiana University Physics testing guidelines include, but are not limited to, the following:

1. Arrive on time for your test. Each test is only available for a certain predetermined amount of time.
2. Your facilitator will provide you with scratch paper. No other paper is allowed.
3. ALL belongings, including cell phones and review materials, must be put away during testing, and should not be near your personal testing area.
4. Absolutely no cell phones are allowed during testing. All cell phones must be turned OFF and put away out of sight. If a cell phone is taken out and/or used during a test, it will result in a charge of academic misconduct and a score of ZERO on the test.
5. No IPODS or other music devices may be used during tests. Use of any such device during a test will result in a charge of academic misconduct and a score of ZERO on the test.
6. No website other than www.moodleDE.selu.edu and no other area of Moodle may be accessed during tests. Accessing any such website during a test will result in a charge of academic misconduct and a score of ZERO on the test.
7. You may not write down any information pertaining to test questions to take with you when you leave the classroom after an exam. All scratch paper will be collected before you are allowed to leave. You may not share any test information with anyone who has not taken the test.
8. All questions or issues during tests should be communicated to the High School DE Course Facilitator and the university Instructor of Record
9. If you are believed to have violated academic integrity, the university Instructor of Record will inform you of the violation and consequences (a ZERO on that assignment for first offense) and you will have an opportunity to appeal. (http://www.southeastern.edu/resources/policies/policy_detail/acad_integrity.html)

Netiquette:

- All course communications, whether posting on a forum or emailing the Instructor, should be professional. Before you submit a post or an email, read it out loud. Check that your tone is friendly and professional and avoid slang and profanity. Check your grammar and spelling. After fixing issues, submit it.
- Respect others' different views and assume others have good intentions in their communications.
- Avoid using all capital letters. It 'reads' as if you are shouting at the reader.
- Before contacting the instructor, check the syllabus and online instructions to see if they have already answered your question. When you do email the professor (from your Southeastern email address), be specific about what you are requesting, and include 'DE Physics' in your subject line and include your w# and school in your email. You will receive a reply to your Southeastern email address within 48 hours.

- If you have technical issues with MoodleDE, contact Southeastern's Technology Services at 985-549-5555. Call and speak slowly and clearly; leave a message if it is after hours. Keep track of the date and time of your call for your records, but you should expect a prompt response. If you have technical issues with the McGraw-Hill Connect app used for homework, visit https://www.mheducation.com/highered/connect

Other Policies:

- All communications with the university Instructor of Record must go through your High School DE Course Facilitator to ensure everyone is informed. Sending an email to both is acceptable; you also can discuss issues with your High School DE Course Facilitator and have them contact the university Instructor of Record.
- If you wish to withdraw from this course, it is your responsibility to complete all school procedures for withdrawing from a course. You cannot be denied the right to withdraw from a dual enrollment course by a school facilitator, coordinator or administrator.
- Students with documented disabilities will be granted special accommodations as per their documentation to ensure equal opportunity for all qualified persons. No accommodations will be granted without documentation. Your High School DE Course Facilitator or Coordinator will submit evidence of an IEP or 504 plan with the Office of Disability Services and we will make accommodations accordingly.
- Appeal and Change of Grade: After a final course grade is recorded in the Records and Registration Office, a change of grade must be approved in sequence by the instructor of record (Dr. Coleman), the instructor's department head, and the academic dean of the College of Science and Technology. In the event of a contested final course grade, a student's written appeal of the grade must be submitted to the instructor within **thirty (30)** calendar days of final grades for the term being due. The grade appeal should also be submitted to Dr.Jeffrey Temple, Assistant Vice President for Academic Programs. For more information about grade appeals, see http://www.southeastern.edu/admin/rec_reg/university_catalogue/index.html

Important Dates to Remember	Fall Only 2023	Year Long 2023-2024	Spring Only 2024
Last day to enroll	August 18, 2023	August 18, 2023	January 19, 2024
Last day to DROP	August 25, 2023	August 25, 2023	January 26, 2024
Last day to confirm rosters	September 1, 2023	September 1, 2023	February 2, 2024
Last day to WITHDRAW	October 27, 2023	March 28, 2024	March 28, 2024
Last day to complete coursework	December 8, 2023	May 10, 2024	May 10, 2024

Disclaimer: This syllabus is subject to change. Any changes will be provided to you. The course description will not change.

Physics 191 Student Learning Goals

Introduction

1. Understand and describe how physics relates to our lives.
2. Write the names and abbreviations for the metric or SI units used in measurements.
3. Write a number in scientific notation.
4. Use conversion factors to change from one unit to another.
5. Use dimensional analysis as a quick check on the validity of equations.
6. Use graphs to help see a pattern in the relationship of physical variables.
7. Understand proportional reasoning to see relationships between quantities and to reason about these relationships.

Force

1. Describe force in terms of an interaction between two objects.
2. Understand and articulate that all forces are described by vectors (have magnitude and direction)
3. Be able to resolve a vector into components.
4. Describe how to add vectors both graphically and algebraically.
5. Understand and be able to use the fact that any object of interest that interacts with several other objects will have a net force that is the vector sum of the individual forces.
6. Represent forces in diagrams (Free Body Diagrams) and/or mathematically using appropriately labeled vectors with magnitude, direction, and units during the analysis of a physical problem.
7. Analyze scenarios and make claims (develop arguments, justify assertions) about the forces exerted on an object by other objects for different types of forces or components of forces.
8. Use Newton's first law of motion to understand that in situations where the net force which acts on an object is zero, the object's velocity does not change.
9. Describe and use Newton's third law of motion regarding the interaction of two objects. Specifically, be able to identify action-reaction pairs.
10. Use Newton's Universal Law of Gravitation to find the force exerted on one object with mass by another object of mass.
11. Distinguish between the concepts of mass and weight and be able to perform calculations involving mass and weight.
12. Understand the origin and be able to diagram and develop mathematical equations relating common forces acting between objects (Weight, Normal force, Friction force (static and kinetic), Tension).
13. Know how to calculate the frictional force given the coefficient of friction and calculated normal force and how to calculate the coefficient of friction given the frictional force and the Normal force

Acceleration and Newton's Second Law of Motion

1. Understand the meaning of net force; use this understanding to relate the values of individual forces to the value of the net force.
2. State Newton's second law of motion; be able to express it in equation form, and to use it to solve for acceleration, mass, or net force if knowledge of two of these three variables are known.
3. Use Newton's second law equation as a guide to thinking about the relationship between force, mass, and acceleration.
4. Use free-body diagrams and the Newton's second law equation to determine the acceleration of an object.
5. Be able to draw free-body diagrams and use them to formulate a Newton's second law equation to determine the value of an individual force that acts upon an object
6. Predict the direction and magnitude of the acceleration caused by a known net force.
7. Be able to construct *a-t* graphs from *v-t* graphs. Use the acceleration to solve for an unknown force given the objects mass.
8. Understand the graphical relationships between displacement and velocity and velocity and acceleration.
9. Know the SI units of force, mass, acceleration, and velocity.

10. Understand that in applying Newton's second law, it is often necessary to treat the x and y components of the forces and acceleration separately.
11. Apply Newton's second law to solve "apparent weight" problems.
12. Apply the principles of Newton's Second Law of Motion by formulating mathematical equations and solving problems involving and using Atwood Machines.
13. Apply the principles of Newton's Second Law of Motion by formulating mathematical equations and solving problems involving objects on incline planes.
14. Apply the relationship between a particle's position, velocity, and acceleration as measured from two reference frames that move relative to each other at constant velocity and along a single axis.

Motion with Constant Acceleration

1. Know the kinematic equations used during constant acceleration problems.
2. Identify which equations of motion are to be used to solve for unknowns.
3. Determine the instantaneous velocity of an object in two ways: determining the slope of the tangent to an *x vs t* graph at a given point or by using one (or more than one) of the kinematic equations.
4. Determine the displacement of an object in two ways: finding the area under a *v vs t* curve or by using one (or more than one) of the kinematic equations.
5. Determine the acceleration of an object in two ways: finding the slope of a *v vs t* graph or by using one (or more than one) of the kinematic equations.
6. Given a *x vs t* graph, be able to: describe the motion of the object (starting position, direction of motion, velocity; draw the corresponding v vs t graph; draw the corresponding a vs t graph; determine the instantaneous velocity of the object at a given time
7. Given a *v vs t* graph, be able to: describe the motion of the object (direction of motion, acceleration); draw the corresponding x vs t graph; draw the corresponding a vs t graph; draw a motion map for the object (including v and a vectors); determine the acceleration
8. Using that the net force determines the acceleration and the acceleration determines how the velocity and position change, apply Newton's laws with constant acceleration kinematics to the motion of specific situations (Atwood machines, modified Atwood machines, blocks on a ramp, etc…)
9. Use the kinematic equations to analyze free fall motion
10. Describe how the values of the position, velocity, and acceleration change during free fall.
11. Solve for the position, velocity, and acceleration as functions of time when an object is in free fall.
12. Describe the horizontal and vertical motion of an object under free fall.
13. Draw a force diagram for an object undergoing parabolic motion.
14. Given information about the initial velocity and height of a projectile, determine: the time of flight; the point where the projectile lands; velocity at impact
15. Explain what effect the mass of a projectile has on its time of flight

Circular Motion

1. Distinguish between the concepts of speed and velocity and use these concepts to describe the motion of objects in a circle.
2. Recognize that objects moving in circles have an acceleration and explain the cause of this acceleration.
3. Describe the magnitude and direction of the acceleration and net force vector of an object moving in a circle at a constant speed.
4. Explain the reason that objects moving in circles have a tendency to move tangent to the circle.
5. Identify the forces which act centripetally in order to cause an object to move in circular motion.
6. Utilize Newton's laws to analyze the motion of an object moving in a horizontal and vertical circle and to determine the values of the acceleration, net force and individual forces.
7. Identify the variables effecting the orbital speed of a satellite and discuss the dependence of orbital speed upon these variables.
8. Identify the variables effecting the acceleration and net force acting upon an orbiting satellite and discuss the dependence of the acceleration and F_{net} upon these variables.
9. Identify and describe each of Kepler's three laws of planetary motion.

10. Use Kepler's 3rd Law to make calculations regarding the radius, velocity and period of orbits of planets and satellites.
11. Distinguish between the weight of an object and the sensations of weightlessness experienced by an object and to explain the cause of these sensations. Specifically, explain the concept of artificial gravity.
12. Be able to extend the uniform circular motion to the situation when the angular velocity changes with time.

Conservation of Energy

1. Define work and identify its units.
2. Describe the conditions under which positive and negative work are done and to use the work equation to calculate the amount of work done
3. Recognize and identify modes of energy transfer: working, heating, radiating.
4. Understand the concept of kinetic energy and be able to make predictions about the changes in kinetic energy of an object based on considerations of the direction of the net force on the object as the object moves.
5. Determine the change in kinetic energy of an object given the forces on the object and the displacement of the object.
6. Understand the concept of potential energy and be able to determine the potential energy of a system.
7. Distinguish between mechanical and non-mechanical energy, to describe the relationship between mechanical energy and work, and to relate the total mechanical energy to the amounts of kinetic energy and potential energy.
8. Analyze a physical situation and identify whether the total mechanical energy of an object is increasing, decreasing or remaining constant.
9. Be able to categorize forces as being conservative or non-conservative and explain the significance and difference.
10. Apply the principles of energy conservation to a variety of physical situations.
11. Be able to analyze to the kinetic and/or the potential energy of an object at a given location.
12. Apply the work-energy relationship to various physical situations.
13. Use Hooke's Law to analyze elastic energy systems.
14. Determine the quantity of energy transferred between the various forms (kinetic, elastic potential, gravitational potential, and internal energy) during an interaction.
15. Understand the definition of power: Calculate the power required to maintain the motion of a body with constant acceleration (e.g., to move a body along a level surface, to raise a body at a constant rate, or to overcome friction for a body that is moving at a constant speed); calculate the work performed by a force that supplies constant power, or the average power supplied by a force that performs a specified amount of work; Prove that the relation P = F • v follows from the definition of work, and apply this relation in analyzing particle motion.

Linear Momentum

1. Define momentum; distinguish between momentum and velocity and recognize the units of momentum and the vector nature of momentum.
2. Distinguish between elastic and inelastic collisions.
3. Explain the meaning of the law of momentum conservation and to describe when the law does and does not apply to a collision.
4. Be able to use momentum conservation to determine the final momentum or the initial momentum of an object involved in a collision.
5. Use conservation principles to solve problems involving elastic and inelastic collisions for initial velocity, final velocity or mass, given the other values.
6. Apply linear momentum conservation to determine the final velocity when two bodies that are moving along the same line, or at right angles, collide and stick together, and calculate how much kinetic energy is lost in such a situation.

7. Analyze collisions of particles in one or two dimensions to determine unknown masses or velocities, and calculate how much kinetic energy is lost in a collision.
8. Analyze situations in which two bodies are pushed apart by a spring or other agency, and calculate how much energy is released in such a process.
9. Define impulse; distinguish between impulse and force.
10. Determine the impulse acting on an object given an *F vs t* graph and/or given the change in momentum.
11. Determine the force acting on an object, given its change in momentum.
12. Compute before- and after-collision momentum values for a system of objects and determine if momentum is conserved.
13. Understand the motion of the center of mass of a system; identify by inspection the center of mass of a body that has a point of symmetry.
14. Locate the center of mass of a system consisting of two or more bodies.
15. Understand the relationship between center of mass and the linear momentum (i.e. it is equal to the product of the total mass of the system and the velocity of the center of mass).

Torque and Angular Momentum

1. Be able to calculate the magnitude and sense of the torque associated with a given force.
2. State the conditions for translational and rotational equilibrium of a rigid body and apply these conditions in analyzing the equilibrium of a rigid body under the combined influence of a number of coplanar forces applied at different locations.
3. Develop a qualitative understanding of rotational inertia in order to determine by inspection which of a set of symmetric bodies of equal mass has the greatest rotational inertia.
4. Be able to determine by what factor a body's rotational inertia changes if its dimensions are changed by some factor.
5. Understand the dynamics of fixed axis rotation to determine the angular acceleration with which a rigid body is accelerated about a fixed axis when subjected to a specified external torque or force.
6. Be able to apply conservation of energy to problems of fixed axis rotation.
7. Analyze problems involving strings and massive pulleys.
8. Understand the motion of a rigid body so as to write down, justify, and apply the relation between linear and angular velocity, or between linear and angular acceleration, for a body of circular cross section that rolls without slipping along a fixed plane, and determine the velocity and acceleration of an arbitrary point on such a body.
9. Apply the equations of translational and rotational motion simultaneously in analyzing rolling with slipping.
10. Calculate the total kinetic energy of a body that is undergoing both translational and rotational motion, and apply energy conservation in analyzing such motion.
11. Understand angular momentum conservation. Recognize the conditions under which the law of conservation is applicable and relate this law to one and two particle systems such as satellite orbits.
12. State the relation between net external torque and angular momentum, and identify situations in which angular momentum is conserved.
13. Analyze problems in which the moment of inertia of a body is changed as it rotates freely about a fixed axis.

Oscillations/S.H.M.

1. Understand the kinematics of simple harmonic motion: sketch and/or identify a graph of displacement as a function of time, and determine from such a graph the amplitude, period, and frequency of the motion.
2. Write down an appropriate expression for displacement of the form $A\sin(\omega t)$ or $A\cos(\omega t)$ to describe the motion.
3. Identify points in the motion where the velocity is zero or achieves its maximum positive or negative value.
4. State qualitatively the relation between acceleration and displacement.

5. Identify points in the motion where the acceleration is zero or achieves its greatest positive or negative value. State the relationship between acceleration and displacement.
6. State and apply the relation between frequency and period.
7. State how the total energy of an oscillating system depends on the amplitude of the motion, sketch or identify a graph of kinetic or potential energy as a function of time, and identify points in the motion where this energy is all potential or all kinetic.
8. Apply knowledge of simple harmonic motion to the case of a mass on a spring to derive the expression for the period of oscillation of a mass on a spring.
9. Apply the expression for the period of oscillation of a mass on a spring.
10. Apply knowledge of simple harmonic motion to the case of a pendulum to derive the expression for the period of a simple pendulum.
11. Apply the expression for the period of a simple pendulum.
12. State what approximation must be made in deriving the expression for the period.