FLORIDA SOUTHWESTERN STATE COLLEGE

School of Pure and Applied Sciences

Physical Science

> *The mission of Florida SouthWestern State College is to provide affordable and exceptional academic, cultural and workforce opportunities in a supportive environment that productively transforms the lives of our students and enhances the economic vitality of the communities we serve.*

Instructor Information

Instructor: Marius Coman, Ph.D.

Office Hours:

See Announcement in canvas
Phone Number: (239)732-3721
Email: Use Canvas' email

Course Information

Course: PHY 2053, COLLEGE PHYSICS I (COLLEGE PHYSICS I)
Section Number: 921
Course Reference Number: 33059
Delivery Method: Live Online
Campus: FSW On-Line

Credit Hours: 4 Credits - 4 Lecture Hours

Course Description: This course is the first in a two-part series intended for non-physics majors, offering an algebra and trigonometry approach to topics such as kinematics, dynamics, energy, momentum, rotational

motion, fluid dynamics, oscillatory motion, and waves. The course fosters analytical and critical thinking skills to promote a scientific understanding of the real world.

Course Location

This course will be delivered live online;

Live online will utilize Zoom to deliver class materials live, every Tuesday and Thursday from 9:00 am to 1:45 pm.

Attendance Option: Hybrid, Online

Prerequisites/Co-requisites

Course Prerequisites: Demonstration of readiness for college-level computation and communication ; and (a grade of "C" or better in (MAC 1140 and MAC 1114) or MAC 1147).

Course Co-requisites: PHY 2053L

Topic Outline

Topic Outline:

- **Systems of measurement, and dimensional analysis**
- **Motion in one, two, and three dimensions**
- **Newton's Laws and their applications**
- **Work, energy, and conservation of energy**

- **Systems of particles, collisions, center of mass, and conservation of linear momentum**
- **Rotational motion and centripetal acceleration**
- **Conservation of angular momentum**
- **Gravity**
- **Static and rotational equilibrium, and elasticity**
- **Fluids, Archimedes' principle, and Bernoulli's equation**
- **Oscillations and waves**

Student Learning Outcomes

General Education Core Course State Standards

In accordance with Florida Statute 1007.25, this course satisfies the General Education core in Distribution Area Natural Science and meets the state outcomes PHY 2053.

Student Learning Outcomes:

- **Students will solve analytical problems describing different types of motion, including translational, rotational, and simple harmonic motion using algebra and trigonometry.**
- **Students will apply Newton's laws, and conservation laws by using algebra and trigonometry to solve analytical problems of mechanics.**
- **Students will identify and analyze relevant information presented in various formats such as graphs, tables, diagrams, and/or mathematical formulations.**
- **Students will solve real world problems using critical thinking skills and knowledge developed from this course.**

All courses at Florida SouthWestern State College contribute to the General Education Program by meeting one or more of the following General Education Competencies:

Communicate clearly in a variety of modes and media.
Research and examine academic and non-academic information, resources, and evidence.

Evaluate and utilize mathematical principles, technology, scientific and quantitative data.
Analyze and create individual and collaborative works of art, literature, and performance.
Think critically about questions to yield meaning and value.
Investigate and engage in the transdisciplinary applications of research, learning, and knowledge.
Visualize and engage the world from different historical, social, religious, and cultural approaches.
Engage meanings of active citizenship in one's community, nation, and the world.

A. General Education Competencies and Course Outcomes

1. Listed here are the course outcomes/objectives assessed in this course which play an integral part in contributing to the student's general education along with the general education competency it supports.

General Education Competency: Evaluate

Course Outcomes or Objectives Supporting the General Education Competency Selected:

- **Examine the principle of dimensional analysis and use it to derive approximate expressions of physical laws.**
- **Identify the SI system on units and analyze the differences between base and derived units.**
- **Interpret the laws of motion and apply them to solve problems in one and two dimensions.**
- **Differentiate between and among the concepts of work, power, energy, and conservation of energy; examine the applications of these concepts, and use them to interpret and explain natural phenomena.**
- **Use the concept of center of mass and use it to analyze the motion of a system of particles.**
- **Describe the law of conservation of momentum, examine its applications, and use it to interpret and explain natural phenomena.**
- **Apply the concepts of momentum and energy and explain collisions.**

- **Describe the concept of circular motion and use it to solve problems.**
- **Use the Laws of rotational kinematics to compare linear motion with rotational motion.**
- **Explain the law of gravitation as it relates to natural phenomena; combine this law with the laws of motion to explain planetary orbits.**
- **Analyze the conditions for static and rotational equilibrium and use the concept of torque to explain natural phenomena.**
- **Describe the concepts related to fluid pressure and buoyancy and use Bernoulli's equation to explain natural phenomena.**
- **Explain the properties of oscillations, waves and the Doppler effect; apply these concepts to natural phenomena.**

Academic Integrity Policy

At FSW, we believe in the power of honesty and integrity as the pillars of academic excellence. As part of our college community, it's crucial that you understand the importance of these values in your academic journey. All work submitted by students for credit in this course is required to adhere to FSW's Academic Integrity Policy. This means academic misconduct on coursework is unacceptable, will receive a "0" grade, and may be subject to disciplinary action. FSW faculty may use tools to evaluate coursework for plagiarism and/or artificial intelligence (AI) generated content.

Academic misconduct can include, but is not limited to:

- **Copying information from published or unpublished sources (online or in print) without citing those sources.**
- **Copying someone else's work or allowing someone else to copy yours.**
- **Submitting written work generated by AI as your own without direct authorization from your professor.**
- **Submitting work for credit that has already been submitted for credit in another class, even if you wrote it.**
- **Unethical distribution or use of exam content.**

According to the Academic Policies and Procedures section of the College Catalog, "Those in charge of academic tasks have an obligation to make

known the standards and expectations of acceptable academic conduct. Each student has an obligation to know and understand those standards and expectations." As such, each student should review the policies and procedures outlined in the Academic Integrity Policy and expect that any violation of these policies will be subject to disciplinary action.

Institution Policies

Programs for Students with Disabilities

Florida SouthWestern State College (FSW), in accordance with the Americans with Disabilities Act and the College's guiding principles, offers students with documented disabilities programs to equalize access to the educational process. Students needing to request an accommodation in this class due to a disability, or if academic performance is affected by a disability should contact the Office of ADAptive Services.

Reporting Title IX Violations

In accordance with Title IX and the Violence Against Women Act (VAWA), FSW has established a set of procedures for reporting and investigating Title IX violations. Students who need to report an incident or receive support should contact the Equity Officer at equity@fsw.edu. Additional information and resources can be found on the College's website.

Financial Aid and Attendance Verification

In accordance with Federal Regulations, FSW is responsible for verifying student attendance and engagement in classes before federal financial aid funds are distributed. In order to demonstrate both your attendance and engagement in this class, you will need to complete the attendance verification assignment within the first week of class for every registered class. To complete the assignment, click on the "Attendance Verification" link on the Canvas course menu. Additional information and resources can be found on the College's Financial Aid website.

School Policies - School of Pure and Applied Sciences

Extra Credit: All extra credit opportunities offered in any School of Pure and Applied Science course must be offered equally to all students in the class, and cannot account for more than 5% of the overall course grade.

Course Assessment

This course will be assessed by a combination of class participation, graded homework assignments, module/unit quizzes/exams, and/or a comprehensive final exam.

Requirements for Students

Assignments/Quizzes and classroom tasks

There will be weekly online assignments/quizzes and classroom tasks.

Classroom tasks will be administered each session; they consist of conceptual and/or calculated questions.

Classroom tasks account for 10 % of the grade. There will be no make-ups for classroom tasks. Classroom tasks are due by the end of each session.

Each assignment/quiz will usually cover topics from one chapter.

Assignments/quizzes are due on the due date.

If an assignment/quiz is submitted late, 5 points will be subtracted per day, for up to 2 days.

Exams

There will be three exams including the final, which is a cumulative exam.

Formulas and constants will be allowed/provided.

There are no "Make-ups" for examinations. If you miss an exam due to a documented extenuating circumstance you must contact the professor as soon as possible; however, you will receive zero points for that exam unless you have a substantiated written excuse from a physician, the Dean, or an academic advisor.

The exam dates shown on the schedule are tentative.

All exams will include calculated/numerical questions, multiple choice questions and a few short answer questions, and a request to interpret some drawings/graphs or to construct them.

The final exam is comprehensive/cumulative, proctored using the HonorLock browser.

Tutoring and Support Services

Academic Tutoring

FSW provides professional math, writing, and peer tutoring through its Tutoring Centers located inside the campus libraries and at the Hendry/ Glades Center. In addition to FSW's Tutoring Center, the College also provides all students with access to online tutoring through Brainfuse, accessible through your Canvas course shell. All of these services are available to the student at no additional cost.

For additional help with this course, you should:

1. **Connect with your Professor in class, during posted office hours, through email, or Canvas Inbox.**
2. **Seek On-Campus Assistance: Each Campus, as well as the Hendry/ Glades Center, has a tutoring center where students can get help with academics. Every student can use these services regardless of the location or type of class (on-campus, online, etc.).**
3. **Request a tutor from FSW's Peer Tutoring Center.**
4. **Log in to Brainfuse in your Canvas course navigation menu for 24/7 online tutoring services.**

Care Services

Care Services provides wellness and mental health support, information, and resources for all FSW students. For more information, please visit the Care Services website.

Library Services

Located on the Charlotte, Collier, and Lee Campuses and the Hendry/ Glades Center, FSW libraries offer a wide array of services, resources, instruction, and facilities to support academic research. Many services are available on-line, including access to librarians for research consultations, eReserves, and reference databases. Visit the Library Services website for additional information.

Proctoring Requirements for Testing with Honorlock

Selected exams and quizzes within this online course will require remote proctoring using a service within Canvas called Honorlock. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account or schedule an appointment in advance. These exams, however, require very specific camera setup requirements and exams will be reviewed by your instructor before any grades are official.

Overall Guidance on How to Take an Exam:

1. **Prepare your environment to meet the requirements as detailed in the exam requirements below.**
2. **You will need Google Chrome and, if this is your first use of the service, to download the Honorlock Chrome Extension. Be sure to remove other proctoring extensions such as ProctorU or Proctorio when taking an exam with Honorlock.**
3. **Log in to your course in Canvas using Google Chrome.**
4. **Navigate to the Honorlock tab in Canvas.**
5. **Read the instructions carefully to ensure you comply with the proctoring requirements, particularly those regarding external camera placement, and authorized materials.**
6. **After you agree Honorlock's Terms of Service and our Exam Taker Privacy Notice policy click the box "Get Started" to begin the Honorlock authentication process, where you will take a picture of yourself and show your ID. During the authentication steps, you may be prompted to complete a room scan. This is a test-taker authentication step in which you will be asked to perform a 360-degree scan of your environment with the computer or webcam to confirm the integrity of the testing environment.**
7. **After the verification process proceed to take your exam in Canvas.**
8. **When you are done use the "Submit" button in Canvas to end the Honorlock session.**
9. **Review HonorPrep Guided Tour.**

Some guides for reference are Honorlock FAQs for Test Takers, Honorlock Knowledge Base, Honorlock Best Practices, Test Taker Privacy Resources, and How to Use Honorlock.

Specific Guidance on How to Take an Exam:

Online testing requirements:

1. **Students must display a valid government-issued ID or an FSW Student ID card.**
2. **Students must have access to an external web camera. (The webcam built into your laptop computer is not acceptable). You have the option of purchasing your own camera or borrowing one from a friend.**
3. **You cannot take the practice proctored quiz or proctored exams without an external camera.**
4. **If you need a camera (or to sign out a laptop) request one here.**

Setting up your workspace:

1. **Find yourself a desk or tabletop to set up your computer (Do not take an exam in your bed).**
2. **Your desk/tabletop must be completely cleared off.**
3. **Nothing should be within two feet of your computer except for your mouse.**
4. **Make sure you have adequate lighting; you should be easily visible (not a dark shadow).**
5. **NO cell phones, smart watches, tablets, headphones, wireless earbuds, or any other electronic device allowed (other than the computer you are using to take the exam).**
6. **NO hats, head coverings, or other items that cover your ears are allowed during exams. Anyone with hair longer than their ears must pull it back for the duration of all exams.**
7. **NO talking, music, or other background sounds. You cannot read the questions out loud during a test! Pretend you are in a room with your classmates. Music and/or TV must not be playing in the background.**

Setting up your external camera:

1. **Your face from a front view must be visible at the start of the exam for identification, after that, the camera should focus on your workspace and will capture you from the side view (see images below).**
2. **Your camera must be set up so that your FACE, HANDS, KEYBOARD, COMPUTER SCREEN, & DESKTOP SURFACE are visible throughout the entire exam.**
3. **If you can't see your face, hands, keyboard, and computer screen, then adjust your camera so that you can. To accommodate this, place your camera off to the side as if it is looking over your shoulder as you take the exam. (see photos below). Your complete working space must be visible at all times.**
4. **You will be able to see yourself in the corner of your screen on your computer.**
5. **Do not have the camera set on Zoom.**

Side view of testing area with 3-4 ft. between computer and student

Computer Requirements:

1. **First, make sure your computer is working well and the battery is fully charged or connected to power.**
2. **If you lose connection, you will not be able to re-enter the exam. Make sure you are located at a place where you have strong internet service.**
3. **Before starting your exam. Clear your cache and make sure you have enough memory for Honorlock to run.**
4. **Close down all other applications running on your computer and switch off all notifications such as messaging etc.**
5. **DO NOT hide your toolbar. It must be visible showing only CHROME as open (example in the pictures below).**
6. **Review Honorlock MSRs (Minimum System Requirements).**

PC- chrome open is underlined in blue. Any other blue lines will indicate other apps are open.

Mac – Chrome open is indicated by a black dot under the icon.

Room scan checklist:

The room scan is prompted after you have been given permission to open your exam and the timer for your exam starts. When prompted to do a room scan. You will be prompted to complete a room scan at the start of each exam.

1. **You must use an external camera.**
2. **Scan slowly, STOP, and count 5 sec when showing the FRONT SCREEN of your computer and behind your computer.**
3. **Scans must include all the way around the room (360 degrees). So, stop and count 5 seconds at each point.**
4. **The scan must include high and low areas of the room.**
5. **Your work area, where your computer is sitting, must show up clearly,**
6. **The professor MUST see everything that is on your desk.**
7. **If you must have a mouse pad, lift it so I can see that nothing is under it!**
8. **Nothing should be on your desk/tabletop except for your computer, and any other materials authorized by your instructor.**
9. **It is up to you to show us there is NOTHING suspicious in your EXAM environment**
10. **Review Completing a Room Scan Using Honorlock.**

During the Exam:

1. **Do NOT scroll through the entire exam before beginning the test in case you have computer or camera issues.**
2. **If your external camera turns black – immediately contact Honorlock for guidance and reach out to your instructor. Do not continue to take the exam with a black camera or your score will be a zero.**
3. **Do NOT navigate to another tab or window in your browser. This may end your exam and you may not be able to reenter.**
4. **Do NOT leave the view of the webcam. This may end your exam and you may not be able to reenter.**
5. **The Honorlock video will flag you as suspicious for any of the following reasons:**
    - **If you have too much eye movement.**
    - **If there is any outside noise.**

    - **If you are typing excessively.**
    - **If you try to log into a different page on your screen, copy/ paste,**
    - **If you try to change anything on your computer at any time, it will log you out of the exam.**
6. **Only use resources specifically authorized by your instructor for each exam. These should be clearly stated in the test instructions. If you have any questions, reach out to your instructor BEFORE you begin the exam.**
7. **Prior to using any calculators, if permitted, you must display the calculator to the camera, showing both the front and back of the device to verify that no unauthorized information or materials have been added.**

You MUST be able to see your setup in the corner of your screen on your computer during the entire test. If you lose this camera image at any time, immediately stop and ask Honorlock for assistance.

In cases where there are concerns about potential violations of proctoring protocols, the instructor reserves the right to require an oral examination. This oral examination will cover the same content as the original assessment and will be used to verify the student's knowledge and understanding of the material.

Other Testing Location Options:

Students who do not have access to the required technology or testing environment should visit FSW Online Proctoring Information for a list of recommended locations that offer a secure and private setting to take your exam. Each FSW campus has a limited number of laptops available for checking out OR Honorlock-ready computer stations. These resources are available for students to use on a first-come, first-serve basis. Availability is not guaranteed, so plan accordingly.

Need Technical Support? Contact Honorlock 24/7 by:

- **Live Chat on the Honolock support page.**
- **With the exam in Canvas.**

You will receive a zero for the exam if any of the prohibited items are

detected during the exam or the conditions detailed above or in Canvas are not met, including the external camera requirement and the camera placement.

Attendance Policy

- **Attendance in class is your responsibility. As mentioned, part of your grade is derived from participation in classroom's tasks/discussions. Physics is an interesting subject and previous studies showed attendance and interaction have a great impact on understanding the concepts and thus influence the final grade.**
- **If a student has to miss a class for any reason, it is the responsibility of the student to study the covered material, using the companion web site or otherwise. All assignments are due at their assigned times, regardless of absence.**

Grading Policy

Your final grade is calculated as a weighted average; the weight for exams and homework/assignments is specified in the following table:

Final

final grade is calculated as a weighted average	
Item	Weight in %
3 Exams	30
12 Quizzes/Assignments	50
10 Classroom tasks	20

final grade is calculated as a weighted average	
Total:	**100**

Final grade calculation

$$\text{Final Grade} = \overline{\text{Exams}} \cdot \frac{30}{100} + \overline{\text{Tasks}} \cdot \frac{20}{100} + \overline{\text{Quizzes}} \cdot \frac{50}{100}$$

$$\overline{\text{Quizzes}} = \frac{\sum_{j=1}^{12} \text{Quiz}_j}{12}$$

$$\overline{\text{Exams}} = \frac{\text{Exam}_1 + \text{Exam}_2 + \text{Exam}_3}{3}$$

$$\overline{\text{Tasks}} = \frac{\sum_{k=1}^{10} \text{Task}_k}{10}$$

The following range will be used to determine your final course grade:

Range to determine final grade

Grade Percent	Letter Grade
90-100	A
80-89.99	B
70-79.99	C
60-69.99	D
Below 60	F

Withdrawals: It is the student's responsibility to withdraw officially from any class that they cease to attend. Failure to do so will result in the recording of an "F" grade.

(Note: The "incomplete" grade ["I"] should be given only when unusual circumstances warrant. An "incomplete" is not a substitute for a "D," "F," or "W." Refer to the policy on "incomplete grades.)

LATE WORK POLICY:

Inclusive Access - Required Textbook Materials

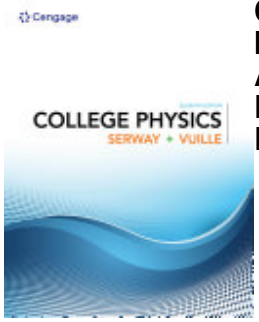
Your enrollment in this course allows you to participate in the FSW/BibliU Inclusive Access program. In partnering with BibliU, FSW's new campus bookstore, you will have access to all required course materials on day one of class at prices unavailable elsewhere.

The required materials for this course are currently available in your course Canvas shell. For help accessing your course materials, visit BibliU's FSW Student Support page.

If you decide you do not want to purchase the course materials provided to you as part of this program, you can opt out of the program in your Canvas course by following the BibliU opt-out instructions. If you are a dual-enrolled student, you are automatically part of the inclusive access program and you should not opt-out.

IMPORTANT! Please note that if you opt-out, you will be responsible for obtaining the required course materials on your own.

Required Course Materials



College Physics
ISBN: 9781337741637
Authors: Raymond A. Serway, Chris Vuille
Publisher: Cengage Learning
Edition: 11

Visit the FSW Bookstore to find any course materials and other resources.

Additional Required Materials for FSW Online Courses

FSW Online courses (including online, live online, blended online, and flex modalities) also require the following materials:

- **External webcam and microphone (to take proctored tests and/or final exams.)**
- **Laptop or desktop computer with an up-to-date operating system (see Semester Start-Up Check-List for details).**
- **Stable high-speed internet**

As scrap paper is not authorized during online exams, it is recommended that students consider the following if authorized for use:

- **Small, lap-sized, dry-erase board**
- **Dry erase marker(s)**

Class Schedule

Tue 12 May 2026
Chapter 1: Units, Trigonometry, and Vectors
Learning Outcomes:
Identify the SI system of units
Specify the references for the three main base quantities of this system.
Analyze the differences between standard/base and derived units
Examine the principle of dimensional analysis
Explain its advantages apply dimensional analysis and unit analysis.
Use it to derive approximate expressions of physical laws.
Learning Objectives; After completing this module, the student will be able to:

Identify the base and the derived physical properties in the SI system
Name the most frequently used prefixes for SI units
Convert between units (length, area, and volume) by using chain-link conversions

Explain how the meter is defined using the speed of light in vacuum

Assessment Chapter 1 Homework

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Tue 12 May 2026 Chapter 2: Motion in One Dimension; Chapter 3: Motion in Two Dimensions

Learning Outcomes:

Define, qualitatively and quantitatively, displacement, velocity and acceleration

Define, compare and contrast scalar and vector quantities.

Separate a 2D motion problem into two 1D problems.

Describe motion in terms of displacement, velocity, acceleration and time.

Learning Objectives; After completing this module, the student will be able to:

Draw two-dimensional and three-dimensional position vectors for a particle, indicating the components along the axes of a coordinate system

On a coordinate system, determine the direction and magnitude of a particle's position vector from its components, and vice versa

Apply the relationship between a particle's displacement vector and its initial and final position vectors

Identify that velocity is a vector quantity and thus has both magnitude and direction and also has components

Draw two-dimensional and three-dimensional velocity vectors for a particle, indicating the components along the axes of the coordinate system

In magnitude-angle and unit-vector notations, relate a particle's initial and final position vectors, the time interval between those positions, and the particle's average velocity vector

Given a particle's position vector as a function of time, determine its (instantaneous) velocity vector

Identify that acceleration is a vector quantity and thus has both magnitude and direction and also has components

Draw two-dimensional velocity/acceleration vectors for a particle,

indicating the components

Given the initial and final velocity vectors of a particle and the time interval between those velocities, determine the average acceleration vector in magnitude-angle

Given a particle's velocity vector as a function of time, on a graph, determine its (instantaneous) acceleration vector

For each dimension of motion, apply the constant-acceleration equations to relate acceleration, velocity, position, and time

On a sketch of the path taken in projectile motion, explain the magnitudes and directions of the velocity and acceleration components during the flight

Given the launch velocity calculate the particle's position, displacement, and velocity at a given instant during the flight

Assessments Chap 2 Chap 3 HW Motion 1 dimensional, 2 dim

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Thu 14 May 2026 Chapter 4: Newton's Laws of Motion

Learning Outcomes:

Interpret and apply Newton's laws of motion to solve problems in one and two dimensions;

Define scalars and vectors, and discriminate between the two.

Use addition, subtraction, and scalar multiplication of vectors.

Resolve vectors into components;

Use Newton's first law of motion to explain, qualitatively, an object's state of rest or uniform motion;

Apply Newton's laws of motion to solve, algebraically, linear motion problems in horizontal, vertical and inclined planes;

Apply Newton's third law of motion to explain, qualitatively, the interaction between two objects;

Learning Objectives; After completing this module, the student will be able to:

Identify that a force is a vector quantity and thus has both magnitude and direction and also components

Given two or more forces acting on the same particle, add the forces as

vectors to get the net force

Identify Newton's first and second laws of motion

Identify inertial reference frames

Sketch a free-body diagram for an object, showing the object as a particle and drawing the forces acting on it as vectors with their tails anchored on the particle

Apply the relationship (Newton's second law) between the net force on an object, the mass of the object, and the acceleration produced by the net force Identify that only external forces on an object can cause the object to accelerate

Determine the magnitude and direction of the gravitational force acting on a body with a given mass, at a location with a given free-fall acceleration Identify that the weight of a body is the magnitude of the net force required to prevent the body from falling freely, as measured from the reference frame of the ground

Identify that a scale gives an object's weight when the measurement is done in an inertial frame but not in an accelerating frame, where it gives an apparent weight

Determine the magnitude and direction of the normal force on an object when the object is pressed or pulled onto a surface

Identify that the force parallel to the surface is a frictional force that appears when the object slides or attempts to slide along the surface

Identify that a tension force is said to pull at both ends of a cord (or a cord-like object) when the cord is taut

Identify Newton's third law of motion and third-law force pairs For an object that moves vertically or on a horizontal or inclined plane, apply Newton's second law to a free-body diagram of the object

For an arrangement where a system of several objects moves rigidly together, draw a free-body diagram and apply Newton's second law for the individual objects

Assessments Chapter 4 Newton’s Laws of Motion

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Tue 19 May 2026 Chapter 5: Energy, 5.1 Work, 5.2: Kinetic Energy and the Work-Energy Theorem , 5.3: Gravitational Potential Energy, 5.4: Spring Potential Energy, 5.5: Systems and Energy Conservation , 5.6: Power, 5.7: Work Done by a Varying Force

Learning Outcomes:

- **Differentiate between and among the concepts of work, power, energy.**
- **Examine the applications of these concepts, and use them to interpret and explain natural phenomena.**
- **Investigate the conservation of energy principle.**

Learning Objectives; After completing this module, the student will be able to:

- **Apply the relationship between a particle's kinetic energy, mass, and speed**
- **Identify that kinetic energy is a scalar quantity**
- **Apply the relationship between a force (magnitude and direction) and the work done on a particle by the force when the particle undergoes a displacement L.O. (7.03, Section 7.2).-->**
- **Calculate work by taking a dot product of the force vector and the displacement vector, in either magnitude-angle or unit-vector notation**
- **If multiple forces act on a particle, calculate the net work done by them**
- **Apply the work–kinetic energy theorem to relate the work done by a force (or the net work done by multiple forces) and the resulting change in kinetic energy**
- **Given a graph of force versus position, calculate the work done by graphically integrating from the initial position to the final position of the object Convert a graph of acceleration versus position to a graph of force versus position**
- **Distinguish a conservative force from a nonconservative force**
- **For a particle moving between two points, identify that the work done by a conservative force does not depend on which path the particle takes**
- **Identify that the mechanical energy of the system is the sum of the kinetic energies and potential energies of those objects**
- **For an isolated system in which only conservative forces act, apply the**

conservation of mechanical energy to relate the initial potential and kinetic energies to the potential and kinetic energies at a later instant

Assessments Chapter 5 Energy, ,Work Power
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Thu 21 May 2026 Exam 1, 9 AM -10:50 AM proctored using the HonorLock browser
Chapter 6: Momentum and Collisions, 6.1: Momentum and Impulse, 6.2: Conservation of Momentum, 6.3: Collisions
Learning Outcomes:
Define the concept of center of mass and use it to analyze the motion of a system of particles.
Describe the concept of conservation of momentum, examine its applications, and use it to interpret and explain natural phenomena.
Apply the concepts of momentum and energy to explain collisions.

Learning Objectives; After completing this module, the student will be able to:
Given the positions of several particles along an axis or a plane, determine the location of their center of mass
Locate the center of mass of an extended, symmetric object by using the symmetry
For a two-dimensional or three-dimensional extended object with a uniform distribution of mass, determine the center of mass by (a) mentally dividing the object into simple geometric figures, each of which can be replaced by a particle at its center and (b) finding the center of mass of those particles
Apply Newton's second law to a system of particles by relating the net force (of the forces acting on the particles) to the acceleration of the system's center of mass
Identify that momentum is a vector quantity and thus has both magnitude and direction and also components
Calculate the (linear) momentum of a particle as the product of the

particle's mass and velocity
Calculate the change in momentum (magnitude and direction) when a particle changes its speed and direction of travel
Apply the relationship between a particle's momentum and the (net) force acting on the particle
Calculate the momentum of a system of particles as the product of the system's total mass and its center-of-mass velocity
Apply the relationship between a system's center-of-mass momentum and the net force acting on the system
Identify that impulse is a vector quantity and thus has both magnitude and direction and also components
Apply the relationship between impulse and momentum change
Apply the relationship between impulse, average force, and the time interval taken by the impulse
Given a graph of force versus time, calculate the impulse (and thus also the momentum change) by graphical integration
For an isolated system of particles, apply the conservation of linear momenta to relate the initial momenta of the particles to their momenta at a later instant

Assessments Chapter 6 Momentum, Impulse, and Collisions
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Tue 26 May 2026 Chapter 7: Rotational Motion and the Law of Gravity; Angular Speed and Angular Acceleration , 7.2: Rotational Motion Under Constant Angular Acceleration, 7.3: Relations Between Angular and Linear Quantities, 7.4: Centripetal Acceleration, 7.5: Newtonian Gravitation
Learning Outcomes:
Describe the concept of circular motion and use it to solve problems.
Compare and contrast linear motion with rotational motion by applying the laws of rotational kinematics.

Learning Objectives; After completing this module, the student will be able to:
Apply the relationship between angular displacement and the initial and

final angular positions

Apply the relationship between average angular velocity, angular displacement, and the time interval for that displacement

Apply the relationship between average angular acceleration, change in angular velocity, and the time interval for that change

Identify that counterclockwise motion is in the positive direction and clockwise motion is in the negative direction

For constant angular acceleration, apply the relationships between angular position, angular displacement, angular velocity, angular acceleration, and elapsed time (Table 10-1)

For a rigid body rotating about a fixed axis, relate the angular variables of the body (angular position, angular velocity, and angular acceleration) and the linear variables of a particle on the body (position, velocity, and acceleration) at any given radius

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Thu 28 May 2026 Chapter 8: Rotational Equilibrium and Rotational Dynamics

Learning Outcomes:

Define and use the concept of torque to explain natural phenomena;

Learning Objectives; After completing this module, the student will be able to:

Find the rotational inertia of a particle about a point

Calculate the rotational kinetic energy of a body in terms of its rotational inertia and its angular speed

Identify that a torque on a body involves a force and a position vector, which extends from a rotation axis to the point where the force is applied

Calculate the torque by using (a) the angle between the position vector and the force vector, (b) the line of action and the moment arm of the force, and (c) the force component perpendicular to the position vector

Identify that a rotation axis must always be specified to calculate a torque

Identify that smooth rolling can be considered as a combination of pure translation and pure rotation

Apply the relationship between the center-of-mass speed and the angular speed of a body in smooth rolling

Calculate the kinetic energy of a body in smooth rolling as the sum of the translational kinetic energy of the center of mass and the rotational kinetic energy around the center of mass

Apply the relationship between the center-of-mass acceleration and the angular acceleration

For smooth rolling of an object up or down a ramp, apply the relationship between the object's acceleration, its rotational inertia, and the angle of the ramp

Identify that torque is a vector quantity

Identify that the point about which a torque is calculated must always be specified

Calculate the torque due to a force on a particle by taking the cross product of the particle's position vector and the force vector, in either unit-vector notation or magnitude-angle notation

Use the right-hand rule for cross products to find the direction of a torque vector

Identify that angular momentum is a vector quantity

Identify that the fixed point about which an angular momentum is calculated must always be specified

Calculate the angular momentum of a particle by taking the cross product of the particle's position vector and its momentum vector, in either unit-vector notation or magnitude-angle notation

Use the right-hand rule for cross products to find the direction of an angular momentum vector

Apply Newton's second law in angular form to relate the torque acting on a particle to the resulting rate of change of the particle's angular momentum, all relative to a specified point

When no external net torque acts on a system along a specified axis, apply the conservation of angular momentum to relate the initial angular momentum value along that axis to the value at a later instant

Assessments Chapter 7: Rotational Motion, Chap 8

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Tue 02 Jun 2026, Thu 04 Jun 2026 Chapter 9: Solids and Fluids, 9.2: Density and Pressure, 9.3: The Deformation of Solids, 9.4: Variation of Pressure with Depth, 9.5: Pressure Measurements, 9.6: Buoyant Forces and Archimedes' Principle

Learning Outcomes:

- **Describe the concepts related to fluid pressure and buoyancy;**
- **Use Bernoulli's equation to explain natural phenomena;**
- **Identify and differentiate between and among the law of conservation of energy, Pascal's law, Bernoulli's principle and the Coanda effect**

Learning Objectives; After completing this module, the student will be able to:

- **Relate density to mass and volume**
- **Apply the relationship between hydrostatic pressure, force, and the surface area over which that force acts**
- **Apply the relationship between the hydrostatic pressure, fluid density, and the height above or below a reference level**
- **Distinguish between total pressure (absolute pressure) and gauge pressure**
- **Identify Pascal's principle**
- **For a hydraulic lift, apply the relationship between the input area and displacement and the output area and displacement**
- **Describe Archimedes' principle**
- **Apply the relationship between the buoyant force on a body and the mass of the fluid displaced by the body**
- **Distinguish between apparent weight and actual weight**
- **Apply the equation of continuity to relate the cross-sectional area and flow speed at one point in a tube to those quantities at a different point**
- **Identify and calculate volume flow rate**
- **Identify the fluid pressure as being a type of energy density**
- **Identify that Bernoulli's equation is a statement of the conservation of energy**

Assessments Chapter 9 Fluids, assignment

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Tue 09 Jun 2026, Exam 2 9AM - 10:50 AM using the HonorLock web browser

Chapter 13: Vibrations and Waves;

Thu 11 Jun 2026 Chapter 14: Sound, 14.1: Producing a Sound Wave, 14.2: Characteristics of Sound Waves, 14.3: The Speed of Sound, 14.4: Energy and Intensity of Sound Waves, The Doppler Effect, 14.7: Interference of Sound Waves

Learning Outcomes:

Explain the properties of oscillations, waves and the Doppler Effect;

Apply the concepts of oscillations and waves to explaining influences on natural phenomena.

Assessments Ch. 13 Vibrations and Waves, Ch. 14 Sound

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Tuesday, June 16th, Final Exam, Cumulative 10:00 AM - 11:50 AM; Proctored in HonorLock

Any other information or class procedures or policies

Only those persons enrolled in a class, will be permitted to attend the class.

Students who cannot afford an external camera can take exams in a testing room found on each campus. The location and hours of operation of those rooms are available here https://www.fsw.edu/online/testing.

Sharing of video recordings is restricted only to enrolled students.

TECHNICAL DIFFICULTIES: Students who experience technical difficulties must contact the professor immediately and attach a screenshot of the issue. If technical problems continue with students' personal computers, it is their responsibility to contact technical support and/or use the computers available on Florida SouthWestern State College campuses to complete the assignments.

This Syllabus is subject to reasonable changes at the discretion of the professor. From time to time, this syllabus may need to be amended for pedagogical reasons, and the instructor will notify students via announcements or email of any changes, additions, and/or deletions to the syllabus.