

**2008GULF COAST STATE COLLEGE  
DIVISION OF NATURAL SCIENCES**

**PHY 2048 - University Physics I, 4 credit hours—Spring 2024**

**Section:** 10348

**Instructor:** Clifford Harris, Ph.D Physics

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**Office:** Natural Sciences A 118, 850-769-1551 ext 2865

**Office Hours:** The instructor is available for short periods in the room both before class and after. Longer discussions should take place during 10 weekly office hours.

**Administrative Assistant:** Kathy Bleday, [kbleday@gulfcoast.edu](mailto:kbleday@gulfcoast.edu) 850-872-3851

**Natural Sciences Division Chair:** Fledia Ellis, [fellis@gulfcoast.edu](mailto:fellis@gulfcoast.edu) 850-872-3848

**Late Registration Drop/Add deadline: Jan. 11**

**Withdrawal deadline to receive a “W”: Mar. 6**

**Course Description:** Course Description 4 credits. A study of mechanics and simple harmonic motion at the calculus level with engineering applications.

**Prerequisite:** MAC 2311, PHY 1023

**Corequisite:** PHY 2048L, MAC 2312

**Course Materials:**

**Textbook:** Physics for Scientists and Engineers, Fourth Edition, 2008, by Douglas C. Giancoli, Publisher: Pearson

**Textbook Options:** The textbook is available in the bookstore. The other option is to purchase the textbook from elsewhere. It is required to have a copy of the textbook. The three options below include both.

ISBN-13: 978-0132275590

ISBN-10: 0132275597

This course is a 4-credit course, which means that in addition to the scheduled meeting times, students are expected to do **at least 8 hours** of course-related work outside of class **each week** during the semester. This includes time spent completing assigned readings, doing homework, and studying for tests and examinations.

**In-Class Content Delivery:** In-class instruction is by lecture, supplemented with white-board figures and PowerPoint-style presentations. Lectures may consist of presentations, worked example problems, group activities, and individual assessments. There are both presenter and hands-on demonstrations and exhibits. Lectures will occur in the designated classroom during the scheduled class time and will include periodic assessments that contribute to the final grade. Office hours will be in the office. Exams will be taken in-person on campus.

**Broad Goals of the Course:**

1. gaining factual knowledge in physics (terminology, classifications, methods, trends)
2. learning fundamental principles, relationships, generalizations, and theories
3. learning to apply course material (to improve thinking, problem solving, and decision making)

**Attendance and Participation:** Your full presence at all class meetings is expected. You may withdraw yourself from this class up to the withdrawal deadline (Academic Calendar); to do so, you must submit a withdrawal form

to the Office of Admissions and Records. If you do not submit a withdrawal by this date, you will receive a letter grade (not a "W").

**Canvas:** Students should be familiar with the college Learning Management System (LMS) Canvas. Course evaluations will be conducted via Canvas.

**Email/Voicemail:** The instructor will **NOT** email you everything you missed in class if you did not attend that day. Any high priority/urgent message sent will be returned as soon as possible during the regular workweek. Emails will be replied to within a week. Voicemail messages may be responded to via email.

**Evaluation:** Regular exams will count for 60% of the final grade. The lowest regular exam score will be dropped. There will be no make-up exams - not even if you scored low on a previous exam and you want to drop that one. The comprehensive final exam is worth 30% of the final grade and homework projects count 10%.

Letter grades: Grading will be on a percentage system:

90-100 = A    80-89 = B    70-79 = C    60-69 = D    below 60 = F

**Exams:** Exams may be made up of any of the following types of questions: True-False, multiple choice, short answer, essay, and problems. However, a significant portion of the graded material will consist of problems. In order to obtain full credit on exam problems, you will need to "show your work". This means that you should clearly draw and label any necessary diagrams and solve problems algebraically before replacing variables with values. Your instructor must be able to follow the steps in your solution. Partial credit for a problem may be assigned even though the final answer is not entirely correct. A correct final answer without the solution method will receive little or no credit. Exams are cumulative; your instructor encourages you to use exams as a learning tool.

**Homework beyond the reading: You must keep an approved homework notebook. Your homework will be graded at the time of the section exams - bring your homework to class on test days.** Homework problems will be chosen to illustrate physics principles, to help you enhance your problem-solving skills and to prepare you for the exams. Feel free to explore unassigned problems.

**Student Absences for Participation in Official University Events.** Students at Gulf Coast have the opportunity to participate in many extracurricular activities that either contribute to the quality of their college experience or promote their post-graduation goals. At times, students' participation requires them to be absent from regularly scheduled class. Students are responsible for all work missed. According to the Student Handbook, **"It is the student's responsibility to notify his/her instructor or supervisor in advance and identify what tasks or assignments must be made-up before missing class or work hours."** If notice is not provided in a timely manner, accommodations may not be provided.

**Students with Religious Obligations:** We will make every effort to accommodate students with religious obligations for any part of this course. However, students should notify the instructor at the beginning of the semester of the requirements.

**Accessibility Statement:** Gulf Coast State College supports an inclusive learning environment for all students. If there are aspects of the instruction or design of this course that hinder your full participation, reasonable accommodations can be arranged. Prior to receiving accommodations, you must register with Student Accessibility Resources. Appropriate academic accommodations will be determined based on the documented needs of the student. For information regarding the registration process email [sar@gulfcoast.edu](mailto:sar@gulfcoast.edu) or call (850) 747-3243.

**Academic Integrity Policy:** 1. Honest participation in academic endeavors fosters an environment in which optimal learning can take place and is consistent with the college's mission. Academic misconduct is destructive to the spirit of an educational environment and therefore will not be tolerated.

The following definitions will apply:

- "Cheating" includes but is not limited to use of any unauthorized assistance in taking quizzes, tests or examinations; dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; the acquisition without permission of tests or other academic materials belonging to a member of the College's faculty.
  - "Plagiarism" includes, but is not limited to, the use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.
- c. The term "academic misconduct" includes any or all forms of cheating and plagiarism. In addition, academic misconduct may include the following:
- Destroying, damaging, or stealing another person's work or work materials including, but not limited to, lab experiments, computer programs/files, term papers, projects, or copy of an examination.
  - Theft, damage, or misuse of library resources; removing uncharged material from the library; defacing or damaging library materials; intentionally displacing or hoarding library materials within the library for one's unauthorized private use, or any other abuse of reserved materials.
  - Theft, damage, or misuse of computer resources including, but not limited to, computer accounts codes, passwords, or facilities; damaging computer equipment or interfering with the operation of any computer system in the college.
2. Individual instructors or programs may provide students with additional academic integrity policy statements at the start of a semester.
  3. Sanctions for incidences of academic misconduct, depending on the severity of the incidence and/or its repetition, may range from receiving an F grade (or zero) for the test, assignment, or activity to failure of the course, to suspension, or dismissal from the program or the college.
  4. An instructor who believes that an incidence of academic misconduct has occurred will discuss it immediately with the student. If, in the judgment of the instructor, the student has committed an act of academic misconduct, or if the student admits that there has been misconduct, the instructor will assess the appropriate penalty.
  5. Instances of admitted or proven academic misconduct should be reported in writing to the Dean of Student Life. The purpose of this reporting is to track individuals who have repeated incidences. The Vice President of Academic Affairs reserves the right to pursue disciplinary action against a student if deemed necessary.
  6. Students who think they have been treated unfairly may invoke the Student Academic Grievance Procedure.

**Assessments:** Homework, regular exams (8) and a Final Exam.

**HB233 statement:** In accordance with federal and state privacy laws, students may record class lectures for their own personal educational use, in connection with a complaint to the college, or as evidence in internal or external legal proceedings. Students may not publish or upload the recordings or any components thereof without the knowledge and written permission of the faculty member. Failure to obtain permission to publish could lead to the students' having to pay damages, attorney fees, and court costs. For more information about what can be recorded, please see the guidelines in the current Student Handbook on the Gulf Coast State College website.

**Learning Objectives - understanding and familiarity sufficient to solve problems involving the following:**

## **CHAPTER1: INTRODUCTION, MEASUREMENT, ESTIMATING**

### **1-1 The Nature of Science**

### **1-2 Models, Theories, and Laws**

### **1-3 Measurement and Uncertainty; Significant Figures**

### **1-4 Units, Standards, and the SI System**

### **1-5 Converting Units**

### **1-6 Order of Magnitude: Rapid Estimating**

### **\*1-7 Dimensions and Dimensional Analysis**

## **PART 1: MECHANICS**

## **CHAPTER 2: DESCRIBING MOTION: KINEMATICS IN ONE DIMENSION**

### **2-1 Reference Frames and Displacement**

### **2-2 Average Velocity**

### **2-3 Instantaneous Velocity**

### **2-4 Acceleration**

### **2-5 Motion at Constant Acceleration**

### **2-6 Solving Problems**

### **2-7 Freely Falling Objects**

### **\*2-8 Variable Acceleration; Integral Calculus**

## **CHAPTER 3: KINEMATICS IN TWO OR THREE DIMENSIONS; VECTORS**

### **3-1 Vectors and Scalars**

### **3-2 Addition of Vectors-Graphical Methods**

### **3-3 Subtraction of Vectors, and Multiplication of a Vector by a Scalar**

### **3-4 Adding Vectors by Components**

### **3-5 Unit Vectors**

### **3-6 Vector Kinematics**

### **3-7 Projectile Motion**

### **3-8 Solving Problems Involving Projectile Motion**

### **3-9 Relative Velocity**

## **CHAPTER 4: DYNAMICS: NEWTON'S LAWS OF MOTION**

### **4-1 Force**

### **4-2 Newton's First Law of Motion**

### **4-3 Mass**

### **4-4 Newton's Second Law of Motion**

### **4-5 Newton's Third Law of Motion**

### **4-6 Weight-the Force of Gravity; and the Normal Force**

### **4-7 Solving Problems with Newton's Laws: Free-Body Diagrams**

## **CHAPTER 5: USING NEWTON'S LAWS: FRICTION, CIRCULAR MOTION, DRAG FORCES**

### **5-1 Applications of Newton's Laws Involving Friction**

### **5-2 Uniform Circular Motion-Kinematics**

### **5-3 Dynamics of Uniform Circular Motion**

### **5-4 Highway Curves: Banked and Unbanked**

### **\*5-5 Nonuniform Circular Motion**

### **\*5-6 Velocity-Dependent Forces: Drag and Terminal Velocity**

## **CHAPTER 6: GRAVITATION AND NEWTON'S SYNTHESIS**

### **6-1 Newton's Law of Universal Gravitation**

### **6-2 Vector Form of Newton's Law of Universal Gravitation**

### **6-3 Gravity Near the Earth's Surface; Geophysical Applications**

### **6-4 Satellites and "Weightlessness"**

### **6-5 Kepler's Laws and Newton's Synthesis**

### **\*6-6 Gravitational Field**

### **6-7 Types of Forces in Nature**

## **CHAPTER 7: WORK AND ENERGY**

### **7-1 Work Done by a Constant Force**

### **7-2 Scalar Product of Two Vectors**

### **7-3 Work Done by a Varying Force**

### **7-4 Kinetic Energy and the Work-Energy Principle**

## **CHAPTER 8: CONSERVATION OF ENERGY**

## **8-1 Conservative and Nonconservative Forces**

## **8-2 Potential Energy**

## **8-3 Mechanical Energy and Its Conservation**

## **8-4 Problem Solving Using Conservation of Mechanical Energy**

## **8-5 The Law of Conservation of Energy**

## **8-6 Energy Conservation with Dissipative Forces: Solving Problems**

## **8-7 Gravitational Potential Energy and Escape Velocity**

## **8-8 Power**

## **\*8-9 Potential Energy Diagrams; Stable and Unstable Equilibrium**

# **CHAPTER 9: LINEAR MOMENTUM**

## **9-1 Momentum and Its Relation to Force**

## **9-2 Conservation of Momentum**

## **9-3 Collisions and Impulse**

## **9-4 Conservation of Energy and Momentum in Collisions**

## **9-5 Elastic Collisions in One Dimension**

## **9-6 Inelastic Collisions**

## **9-7 Collisions in Two or Three Dimensions**

## **9-8 Center of Mass (CM)**

## **9-9 Center of Mass and Translational Motion**

## **\*9-10 Systems of Variable Mass; Rocket Propulsion**

# **CHAPTER 10: ROTATIONAL MOTION**

## **10-1 Angular Quantities**

## **10-2 Vector Nature of Angular Quantities**

## **10-3 Constant Angular Acceleration**

## **10-4 Torque**

## **10-5 Rotational Dynamics; Torque and Rotational Inertia**

## **10-6 Solving Problems in Rotational Dynamics**

## **10-7 Determining Moments of Inertia**

## **10-8 Rotational Kinetic Energy**

## **10-9 Rotational Plus Translational Motion; Rolling**

# **CHAPTER 11: ANGULAR MOMENTUM; GENERAL ROTATION**

## **11-1 Angular Momentum-Object Rotating About a Fixed Axis**

## **11-2 Vector Cross Product; Torque as a Vector**

**11-3 Angular Momentum of a Particle**

**11-4 Angular Momentum and Torque for a System of Particles; General Motion**

**11-5 Angular Momentum and Torque for a Rigid Object**

**11-6 Conservation of Angular Momentum**

## **CHAPTER 12: STATIC EQUILIBRIUM; ELASTICITY AND FRACTURE**

**12-1 The Conditions for Equilibrium**

**12-2 Solving Statics Problems**

**12-3 Stability and Balance**

**12-4 Elasticity; Stress and Strain**

**12-5 Fracture**

**\*12-6 Trusses and Bridges**

## **CHAPTER 13: FLUIDS**

**13-1 Phases of Matter**

**13-2 Density and Specific Gravity**

**13-3 Pressure in Fluids**

**13-4 Atmospheric Pressure and Gauge Pressure**

**13-5 Pascal's Principle**

**13-6 Measurement of Pressure; Gauges and the Barometer**

**13-7 Buoyancy and Archimedes' Principle**

**13-8 Fluids in Motion; Flow Rate and the Equation of Continuity**

**13-9 Bernoulli's Equation**

**13-10 Applications of Bernoulli's Principle: Torricelli, Airplanes, Baseballs, TIA**

## **CHAPTER 14: OSCILLATIONS**

**14-1 Oscillations of a Spring**

**14-2 Simple Harmonic Motion**

**14-3 Energy in the Simple Harmonic Oscillator**

**14-4 Simple Harmonic Motion Related to Uniform Circular Motion**

**14-5 The Simple Pendulum**

**\*14-6 The Physical Pendulum and the Torsion Pendulum**

**14-7 Damped Harmonic Motion**

**14-8 Forced Oscillations; Resonance**