

University of Houston-Downtown

Course Prefix, Number, and Title: PHYS 2401: Physics I

Credits/Lecture/Lab Hours: 4/4/0

Foundational Component Area: Life and Physical Sciences

Prerequisites: Credit for MATH 2402 (or MATH 2412) and credit or enrollment in PHYS 2101

Co-requisites: None

Course Description: This is the first in a two-part survey of physics for science majors using calculus. Topics include kinematics and dynamics in one, two and three dimensions, statics, dynamics, potentials, conservation of energy and momentum (linear and angular), rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, thermal properties of matter, kinetic theory of gases and the first and second law of thermodynamics. Credit for both PHYS 1307 and PHYS 2401 may not be applied toward a degree.

TCCNS Number: PHYS 2425

Demonstration of Core Objectives within the Course:

Assigned Core Objective	Learning Outcome Students will be able to:	Instructional strategy or content used to achieve the outcome	Method by which students' mastery of this outcome will be evaluated
Critical Thinking Empirical & Quantitative Reasoning	Utilize scientific processes to identify questions pertaining to natural phenomena.	Lecture presentations and problem-based lab activities focus on theories in physics and on the historical and mathematical development of Physics. The question "Why?" is prominent in both lecture and lab. All theoretical discussion is based on Calculus. Topics discussed include the Kinematics, Laws of Motion, Energy, Solids and Fluids.	Students must solve real-world problems by combining experimental observation and hypothesis development. Students must identify the correct question and devise the correct approach to answer the question. Students will be subjected to examination in which they have to solve numerous problems covering all material discussed and demonstrating command of Calculus . The exams will be graded for approach to solving the problem and scientific accuracy.

<p>Critical Thinking Empirical & Quantitative Reasoning</p>	<p>Utilize scientific processes to develop hypotheses, collect and analyze data using quantitative and qualitative measures.</p>	<p>Students must perform experiments in lab, make observations, collect data, calculate results, and generate graphs, in the co-requisite 2101 laboratory, on topics of: linear, projectile, and circular motion, gravity, collisions, Newton’s laws of motion, friction, and waves: mechanical and acoustic.</p>	<p>Students are given hands-on lab practical exams where they must arrange an apparatus, perform experiments, collect data, and calculate results. These experiments involve changes from what the student has practiced so that the student must reason through a new set up to obtain the required results. Students will be assessed on their ability to recognize and correctly use the appropriate formula and draw correct conclusions.</p>
<p>Critical Thinking Empirical & Quantitative Reasoning Communication</p>	<p>Utilize scientific processes to effectively communicate the analysis and results using written, oral and visual communication.</p>	<p>Students must record procedures, data, and observations in a bound notebook during lab. Student must perform the required analysis and generate multiple graphs to present the results in a convincing manner. All work must be documented in typed laboratory reports which are written according to publication standards. Students are often approached during lab and asked to make a defense of their procedures (whether right or wrong) and their calculations. Students are expected to understand the experiments and are given concepts and ideas to work with instead of written procedures and recipes. Once in semester each student will be required to give oral/visual presentation in the lab on topic covered. Presentations will be evaluated for quality of communication and scientific accuracy using a rubric</p>	<p>Typed laboratory reports are collected on a weekly basis and graded for content, style, and correct analysis. Written lab reports will be evaluated for both scientific accuracy and quality of written communication using a rubric. Oral/visual presentations will also be evaluated for quality of communication and scientific accuracy using a rubric.</p>

Teamwork	Collaborate in the evaluation of the quality of scientific evidence from multiple perspectives toward the goal of reaching a shared objective.	In each lab session student teams must perform experiments together with one specified piece of equipment. Students will work together to test equations by comparing observed and expected values.	All students are asked to submit a copy of their data before leaving the lab. If there is a problem with the data, students are asked to repeat the experiment or re-analyze their data. Successful completion of the experiment is part of the lab grade. A portion of the student's grade will be based on the group completion of data tables.
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Additional Course Outcomes:

Course Outline:

Lecture:

- Mechanics, Motion in One Dimension,
- Vectors and two-Dimensional Motion,
- The Laws of Motion, Energy.
- Momentum and Collisions,
- Rotational Motion and the Law of Gravity,
- Rotational Equilibrium
- Rotational Dynamics.
- Solids and Fluids
- Thermal Physics
- Energy in Thermal Processes
- Vibrations and Waves
- Sound

Lab:

- Gravitational Acceleration
- Projectile Motion
- Force Table
- Atwood's Machine
- Static and Kinetic Friction
- Conservation of Mechanical Energy
- One-Dimensional Collisions
- Centripetal Acceleration
- Torque and Moment of Inertia
- Buoyancy
- Standing Waves

Lecture: Grading/Course Content which Demonstrates Student Achievement of Core Objectives:

Course Grade A: 90-100 B: 80-89 C: 70-79 D: 60-69 F: 0-59

Summary of Course Exams, Quizzes, Activities, and Final	
Mid-term Exams (27 points each)	84 pts
Final	40 pts
Total	124 pts

Lab: Grading/Course Content which Demonstrates Student Achievement of Core Objectives:

Course Grade A: 90-100 B: 80-89 C: 70-79 D: 60-69 F: 0-59

Summary of Course Exams, Quizzes, Activities, and Final	
Lab and Related Report (7pts each/12 labs total) One lab report will be an oral presentation	84pts
Exams (14 pts each/2 exams total)	28 pts
Total	112 pts