# Calculus-Based Physics for Scientists and Engineers: A

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| **C-ID Number** | PHYS 205 |
| **Discipline** | Physics |
| **Date Approved** | April 29, 2011 |

## General Course Description

This course, intended for students majoring in physical sciences and engineering, is part of a three-semester course whose contents may be offered in other sequences or combinations. Core topics include an introduction to kinematics, dynamics, work and energy, momentum, gravitation and simple harmonic motion.

## Minimum Units

4.0

## Any rationale or comments

This is the first semester of a three-semester physics course, intended for students majoring in physical sciences and engineering.  PHYS 205 is composed of topics that together with PHYS 210 and PHYS 215 constitute all of the topics included in PHYS 200.  Topics may be offered in varying sequences and combinations, including “floating topics”.  The floating topics may be placed in different courses in the sequence, but all must be covered during the three-semester sequence. Since different colleges vary slightly in the order in which the topics are presented, it is strongly recommended that students take the entire sequence at the same institution.

## Advisories/Recommendations

A year of high school physics or a physics prep course is recommended. Completion of 1 semester of calculus and concurrent enrollment in second semester calculus is highly recommended.

## Course Content

Vectors and Scalars Newton’s Laws Statics and Dynamics Translational Kinematics Rotational Kinematics Rotational Dynamics Work and Energy Momentum Gravitation "Floating Topics" which may be included in this semester Fluids Mechanical Waves Special Relativity Laws of Thermodynamics Heat Engines Kinetic Theory Entropy Simple Harmonic Motion

## Laboratory Activities

Laboratory activities should cover the range of topics designated for lecture. The majority of labs should be hands-on activities with “real-world” data collection as opposed to computer simulation, although simulations may be appropriate for some topics in modern physics.

## Course Objectives

Lecture Course Objectives: At the conclusion of the lecture component of this course, the student should be able to: Predict the future trajectory of an object moving in two dimensions with uniform acceleration. Analyze a physical situation with multiple constant forces acting on a point mass using Newtonian mechanics. Analyze a physical situation with multiple forces acting on a point mass or extended object using concepts of work and energy. Laboratory Course Objectives: At the conclusion of the laboratory component of this course, the student should be able to: Analyze real-world experimental data, including appropriate use of error propagation, units and significant figures. Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class.

## Prerequisites

## Corequisites

1 semester college-level calculus (C-ID MATH 210 OR MATH 211) (co-requisite)

## Methods of Evaluation

Examinations which include problem solving exercises, final examinations, projects, homework problems, laboratory reports. \*Note that not all of the methods listed are required.

## Sample Textbooks

Typical Textbooks: Giancoli, Douglas C. Physics for Scientists and Engineers Halliday, David; Resnick, Robert; Walker, Jearl. Fundamentals of Physics Knight, Randall D. Physics for Scientists and Engineers: A Strategic Approach Serway, Raymond A.; Jewett, John W. Physics for Scientists and Engineers Typical Lab Manuals: Edmonds, Jr., Dean S. Cioffari's Experiments in College Physics Laws, Priscilla. Workshop Physics Activity Guide, Modules 1 and 2 Loyd, David. Physics Lab Manual Sokoloff, David, Real Time Physics: Active Learning Laboratories, Module 1 Laboratory manuals developed on-site

## Notes