SMU Spring 2012

Physics 1307 : Mechanics

Syllabus

Instructor : Will McElgin
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Office Hours : Tuesday and Thursday 2pm-4pm

Lecture Times : Tuesday and Thursday 12:30pm-1:50pm
Lecture Location : Fondren 158

Teaching Assistant : Farley Ferrante
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Text: Halliday, Resnick and Walker, "Fundamentals of Physics, Volume 1, 9th edition"
Text Website : http://edugen.wileyplus.com/edugen/class/cls247379
Course Website : http://www.physics.smu.edu/mcelgin/P1307_spring2012/P1307.html

Course Description

This course is intended as a calculus-based introduction to classical mechanics. The goal is for the student to gain an understanding of the relationship between force and motion embodied in Newton's laws, and to understand how to make use of these laws to solve physical problems. Initial topics to be covered will include single particle motion, Newton's laws of mechanics, and uniform circular motion. The concept of conservation of (kinetic plus potential) energy which follows from Newton's laws will then be explored in detail, along with a treatment of motion in a gravitational field. Following this, the motion of systems of particles and the concept of conservation of momentum will be discussed. This will be followed by a discussion of rotational motion of extended bodies and the related concepts of torque, angular momentum, and static equilibrium. Finally, the topics of oscillatory and fluid motion will be explored. There will be an emphasis on in-class problem solving using similar ideas and techniques as required on homework and exams.

Evaluation

There will be two exams (25% each), and a semi-cumulative final (25%). Homework (25% total) will be collected approximately weekly. Attendance in class is strongly expected and, unless expressly told otherwise, students are responsible for all aspects of the class discussion.

Instructor Formulated Student Learning Outcomes

It is expected that students should be able to incorporate physical concepts with mathematical techniques to solve problems in Mechanics and related topics. While only algebraic techniques will be required on exams, calculus will be utilized in the class discussion and in selected homework problems, and is expected that students will be conversant in these descriptions of physics.

General Education Student Learning Outcomes

Students demonstrate the ability to understand, critique, and draw conclusions from numerical arguments and data. Students demonstrate basic facility with the methods and approaches of scientific inquiry and problem-solving.

Schedule

1/17 : Preliminaries and One-dimensional Motion. Chapter 2.

1/19 : One-dimensional Motion and Vectors. Chapters 2 and 3.

1/24 : Vectors and Two-dimensional Motion. Chapters 3 and 4.

1/26 : Vectors and Two-dimensional Motion. Chapters 3 and 4.

1/31 : Two-dimensional Motion and Newton's Laws. Chapters 4 and 5.

2/2 : Newton's Laws. Chapter 5.

2/7 : More on Newton's Laws. Chapters 5 and 6.

2/9 : More on Newton's Laws. Chapters 5 and 6.

2/14 : More on Newton's Laws. Chapters 5 and 6.

2/16 : Exam 1.

2/21 : Kinetic Energy and Work. Chapter 7.

2/23 : Kinetic and Potential Energy. Chapters 7 and 8.

2/28 : Energy and Gravity. Chapters 7, 8 and 13.

3/1 : Potential Energy and Gravity. Chapters 8 and 13.

3/6 : Potential Energy and Gravity. Chapters 8 and 13.

3/8 : Gravity and Momentum. Chapters 13 and 9.

3/20 : Momentum. Chapter 9.

3/22 : Momentum. Chapter 9.

3/27 : Exam 2.

3/29 : Rotational Motion. Chapter 10.

4/3 : Rotational Motion, Torque and Angular Momentum. Chapters 10 and 11.

4/5 : Torque and Angular Momentum. Chapter 11.

4/10 : Torque, Angular Momentum and Static Equilibrium. Chapters 11 and 12.

4/12 : Static Equilibrium. Chapter 12.

4/17 : Static Equilibrium and Oscillations. Chapters 12 and 15.

4/19 : Oscillations and Fluids. Chapters 15 and 14.

4/24 : Oscillations and Fluids. Chapters 15 and 14.

4/26 : Fluids. Chapter 14.

5/7 : Final Exam 8am-11am