PHYSICS DEPARTMENT
COURSE OUTLINE

PHYS 200 MECHANICS 2

A second year calculus-based course in classical mechanics with an introduction to special relativity. Topics include: rotational motion; torque and angular momentum; oscillatory motion; mechanical waves; fluid mechanics; kinetic theory of gases; gravitation and planetary motion; introduction to the theory of special relativity.

OFFERED:	Fall
CREDIT:	4
IN-CLASS WORKLOAD:	4 lecture, 2 lab (semester)
PREREQUISITES:	Physics 115 and Math 101
COREQUISITES:	Math 220, *Math 235 recommended*

REQUIRED MATERIALS:

Textbook: Physics for Scientists & Engineers with Modern Physics, 6th edition, Serway, R.A. and Jewett, J.W.Jr.
Supplementary material provided by instructor
Physics 200 lab manual

DEPARTMENT POLICIES REGARDING TESTING:

1. Students must write quizzes, tests, midterm tests, etc., on the date and time assigned by the instructor. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test or provide a make-up test only in the event of documented illness or other extenuating circumstances.

2. Midterm tests may be dropped if: (a) a first-class mark is obtained on the comprehensive final exam, and (b) all term work has been completed and is judged to be satisfactory. In this case, the final grade for the course may be based on a combination of the final exam and the lab mark.

DEPARTMENT POLICIES REGARDING LABS:

1. All assigned laboratory exercises and reports must be completed with an overall grade of 60% in order to obtain credit for this course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances.

2. A student who is repeating a Physics course does not have to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

STUDY TIME

It is recommended that between 5 and 10 hours per week (or more for students with a weak background) be spent studying for this course outside of class time.

GRADING

The standard mark distribution for this course is as follows:

Final Exam	50%
Midterms	30%
Lab Reports and other work	20%
	100%

This distribution may be amended by the instructor (see your Instructor's Information sheet).

GRADE SCALE

Final letter grades are normally assigned as follows (subject to above conditions):

Percentage	Letter Grade
95 to 100	A+
90 to 94	A
85 to 89	A-
80 to 84	B+
75 to 79	B
70 to 74	B-
65 to 69	C+
60 to 64	C
50 to 59	D
below 50	F

OUTLINE:

1. **Rotational Motion**

    1.1 Rotational kinetic energy; moment of inertia (with extended mass distribution)
    1.2 Angular kinematic quantities
    1.3 Torque and angular momentum
    1.4 Problems involving rotational (fixed axis) dynamics of rigid bodies

2. **Oscillatory Motion**

    2.1 Simple harmonic motion
        2.1.1 Energy of simple harmonic motion
        2.1.2 Damped simple harmonic motion
        2.1.3 Forced simple harmonic motion
    2.2 The simple pendulum
    2.3 The physical pendulum

3. **Mechanical Waves**

    3.1 Types of mechanical waves
        3.1.1 Wave velocity
        3.1.2 Superposition and interference
    3.2 Transmission and reflection of waves
        3.2.1 Transmission of energy
    3.3 Sound Waves
        3.3.1 Velocity of sound waves
        3.3.2 Spherical and plane waves
        3.3.3 The Doppler effect
    3.4 Standing Waves

4. **Fluid Mechanics**

    4.1 Fluid statics
        4.1.1 Pressure and density
        4.1.2 Pascal's principle
        4.1.3 Archimedes' principle
    4.2 Fluid dynamics
        4.2.1 Equation of continuity
        4.2.2 Bernoulli's equation
        4.2.3 Applications of Bernoulli's equation

5. **Kinetic theory of gases**

- 5.1 The ideal gas model
  - 5.1.1 Kinetic calculation of pressure
  - 5.1.2 Kinetic interpretation of temperature
  - 5.1.3 Internal energy of an ideal gas
- *5.2 Non-ideal gases – Optional material*
- 5.3 *Transport phenomena – Optional material*

6. **Gravitation**

- 6.1 Universal law of gravitation
- 6.2 Gravitational potential energy
- 6.3 Gravitational field
- 6.4 Kepler's laws of planetary motion

7. **Special Relativity**

- 7.1 Introduction
  - 7.1.1 Simultaneity
  - 7.1.2 Relativistic description of time
  - 7.1.3 Relativistic description of length
  - 7.1.4 Lorentz transformations
  - 7.1.5 Relativistic momentum
  - 7.1.6 Relativistic energy
- 7.2 Consequences of special relativity
- 7.3 Space-time diagrams (Refer to supplementary material provided by instructor)