



Course description:

Students perform 10 experiments of 3 hr/week duration, The general concepts in mechanical physics , These experiments are: experimental and data analysis, measurements and uncertainties, vectors and forces in equilibrium, newton's second law of motion, projectiles motion, collision in two dimension, friction, simple pendulum, hook's law and rotational motion.

Aims of the course:

1. To conduct organized, experimental, scientific investigations
2. • To report your observations and results clearly and completely
3. • To draw conclusions from the results based on your understanding of the relevant physics
4. • To study introductory physics via computer simulation experiments and exercises

Intended Learning Outcomes: (ILOs)

A. Knowledge and Understanding

- A1. Concepts and Theories:** Use the principles of experimental and data analysis, measurements and uncertainties, vectors and forces in equilibrium, newton's second law of motion, projectiles motion, and collision in two dimensions, friction, simple pendulum, hook's law and rotational motion
- A2. Contemporary Trends, Problems and Research:** apply physics in a variety of physical settings. Build simple mathematical models that describe your experiments

- **A3. Professional Responsibility:** Make measurements using basic tools and instruments.

B. Subject-specific skills

B1. Problem solving skills: The purpose of this course is to introduce some fundamental concepts of physics which build the foundation of all of Science and Engineering. The "Scientific Method" Consists in conducting systematic, reproducible experiments and observations, analyzing and organizing the results, abstracting the important parameters and observables, and finally constructing models and theories about their relationships that lead to testable predictions.

B2. Modeling and Design: measurements on the apparatus that correspond to model variables
In some labs, you will be required to design parts of the experiment

B3. Application of Methods and Tools:.

C. Critical-Thinking Skills

C1. Analytic skills:



In this course, we will learn how to perform measurements, describe the results in rigorous terms, and compare them to the predictions of models and Laws of physics. We will also learn how to use these Laws to examine new situations and predict the outcome of experiments (real or hypothetical - this is called "doing problems").

C2. Strategic Thinking: The power of physics lies in the vast range of phenomena that can be explained, understood and **predicted** in terms of a relatively small collection of concepts and models.

C3. Creative thinking and innovation: trying to minimize mathematical "obfuscation", but since physics is a **quantitative** science, we will have to use at least some elementary math to arrive at interesting results.

D. General and Transferable Skills (other skills relevant to employability and personal development)

1. **D1. Communication:** I encourage the student to attend lectures regularly by giving bonus marks for attendance, give students tasks, and ask questions about previous lectures.

Mutual respect is between the lecturer and students and among students themselves. I deal with them as young mature people, responsible for their actions and schedules

1. **D2. Teamwork and Leadership:** Students ask questions during the lecture, work in groups, and communicate with each other and with me electronically, and periodically visit the sites I recommended.

Course structures:

| Week | Credit Hours | ILOs | Topics | Assessment methods |
|------|--------------|-------------|---|-----------------------------------|
| 2 | 3 | C1 | Experimental errors and data analysis Measurements and uncertainties | Oral quizzes |
| 3 | 3 | A3,A3,A2 | Vectors and force in equilibrium | Group discussion and quizzes |
| 4 | 3 | B1,B2 | Newton's second law of motion | quizzes |
| 5 | 3 | A2,A3,B2 | Projectiles motion | Group discussion and Oral quizzes |
| 6 | 3 | A3,A3,A2 | Collision in two dimensions | quizzes |
| 7 | 3 | B1,B2 | Friction | Group discussion |
| 8 | 3 | C2,C1,D2,D1 | Simple pendulum | Oral quizzes |
| 9 | 3 | A2,A3,B2 | Hook's law and simple harmonic motion. | Group discussion |
| 10 | 3 | A3,A3,A2 | Conservation of energy I | Oral quizzes |
| 11 | 3 | C2,C1,D2,D1 | The viscosity | Group discussion and quizzes |



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