

Physics 121: Mechanics (5 credits)

Overview

Phys 121 is the first of a three-quarter sequence of introductory calculus-based physics. Upon successful completion of this course, you will be able to develop calculus-based models to describe the physical world pertaining to one dimensional motion, momentum, energy, force, motion in two or more dimensions, rotational motion, and gravity.

The course consists of lecture (3 hours per week), tutorial (1 hour per week), and laboratory (2 hours per week) components.

Evaluation

The final course grade is based on the following grade weightings.

- **60 %:** two midterms and one final exam. A better option is chosen from the two below.
 1. 40 % midterms and 20 % final
 2. 20 % midterm (better of 2) and 40 % final
- **12 %:** Lab assignments
- **12 %:** Tutorial assignments
- **16 %:** Lecture assignments

A grade of 0 for the entire course would be given if a student receives less than 2/3 of the possible points on the lab assignments or participates in less than 6 out of 8 labs. Otherwise, the final weighted percentage is converted to a grade point using the following thresholds.

grade point	course score	grade point	course score	grade point	course score	grade point	course score
4.0	91	3.0	74	2.0	57	1.0	40
3.9	89.3	2.9	72.3	1.9	55.3	0.9	38.3
3.8	87.6	2.8	70.6	1.8	53.6	0.8	36.6
3.7	85.9	2.7	68.9	1.7	51.9	0.7	34.9
3.6	84.2	2.6	67.2	1.6	50.2		
3.5	82.5	2.5	65.5	1.5	48.5		
3.4	80.8	2.4	63.8	1.4	46.8		
3.3	79.1	2.3	62.1	1.3	45.1		
3.2	77.4	2.2	60.4	1.2	43.4		
3.1	75.7	2.1	58.7	1.1	41.7		

Texts

- **Required:** *Principles and practice of Physics*, Mazur (Pearson, 2nd edition, 2020)

Lecture Topics (Textbook chapters)

- **Ch. 1 (1 lecture):** Foundations
- **Ch. 2 (2 lectures):** Motion in one dimension
- **Ch. 3 (1 lecture):** Acceleration
- **Ch. 4 (2 lectures):** Momentum
- **Ch. 5 (1 lecture):** Energy
- **Ch. 6 (2 lectures):** Principle of relativity
- **Ch. 7 (2 lectures):** Interactions
- **Ch. 8 (2 lectures):** Force
- **Ch. 9 (2 lectures):** Work
- **Ch. 10 (4 lectures):** Motion in a plane
- **Ch. 11 (3 lectures):** Motion in a circle
- **Ch. 12 (4 lectures):** Torque
- **Ch 13 (2 lectures):** Gravity

Tutorial Topics (7, 8, or 9 of the following depending on the quarter)

- Acceleration in one-dimension
- Systems and momentum
- Kinetic and internal energy
- Forces and Newton's Laws
- Work and conservation of energy
- Potential energy diagrams
- Motion in two-dimensions
- Angular momentum
- Dynamics of rigid bodies

Labs

The lab component of this course focuses on experimental design and data analysis techniques in the context of mechanics.