



National Taiwan University of Science and Technology

2021 Summer Program

PHY 101 Introduction to Physics with Lab

Course Outline

Course Code: PHY 101

Instructor: Roberto Vega

Home Institution: Southern Methodist University

Office Hours: TBA

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Lab TA's: TBA

Credit: 4

Course Description: This course will provide an introduction to Classical Mechanics, the precise description of motion and the causes of change of motion.

Course Objectives:

1. Students will be able to develop quantitative models appropriate to problems in Physics.
2. Students will be able to assess the strengths and limitations of quantitative models and methods used in Physics.
3. Students will be able to apply symbolic systems of representation.
4. Students will be able to collect, organize and analyze data from a variety of sources. Students will be able to formulate structured and logical arguments.
5. Students will be able to test hypotheses and make recommendations or predictions based on results.
6. Students will be able to communicate and represent quantitative information or results numerically, symbolically, aurally, visually, verbally, or in writing.



7. Students will have a basic understanding of the laws of mechanics and Newton's law of gravitation.

Required Textbooks: *Fundamentals of Physics* by David Halliday, Robert Resnick and Jearl Walker

Grading & Evaluation:

Course will be evaluated based on homework 25%, two midterm exams 50%, and one final exam 25%. Typically, the standard grade assignment will apply, i.e. 95-100 A, 90-94 A-, 88-89.9 B+, 84-87.9 B, 80-83.9 B-, 78-79.9 C+, 74-77.9 C, 70-73.9 C-, 68-69.9 D+, 64-67.9 D, 60-63.9 D-, Below 60 F.

Schedule:

Week 1:

Class 0: Administrative Info

Class 1: Units and Dimensional Analysis (Chapter 1)

Class 2: Calculus Review

Class 3: One dimensional Kinematics (Chapter 2)

Class 4: One dimensional Kinematics (Chapter 2)

Class 5 & 6: Free Fall, Vectors (Chapters 2 & 3)

Class 7: Two-Dimensional Motion, Projectile Motion (Chapt. 4)

Class 8: Dot Products of Vectors

Lab 1: Free Fall Motion Analysis

Week 2:

Class 9: Uniform Circular Motion (Chapter 4)

Class 10: Newton's Laws (Chapter 5)



Class 11: Newton's Laws Applications (Chapter 6)

Class 12: Resistance and Resistive Forces (Chapter 6)

Class 13: Kinetic Energy and Work (chapter 7)

Class 14: KE-Theorem and Potential Energy (Chapter 7 & 8)

Class 15: Conservation of Energy (Chapter 8)

Lab 2: Circular and Projectile Motion Analysis

Week 3:

Class 16: Conservation of Energy II (Chapter 8)

Class 17: Momentum and Center of Mass (Chapter 9)

Class 18: Collisions (Chapter 9)

Class 19: Rotational Motion (Chapter 10)

Class 20: Rotational Motion II (Chapter 10 & 11)

Class 21: Cross Products, Rotational Motion III (Chapt. 10 & 11)

Class 22: Torque and Angular Momentum I (Chapter 11)

Class 23: Torque and Angular Momentum II (Chapter 11)

Week 4:

Class 24: Rolling Motion (Chapter 11)

Class 25: Equilibrium and Elasticity (Chapter 12)

Class 26: Newton's Law of Gravitation (Chapter 13)

Class 27: Newton's Law of Gravitation II (Chapter 13)

Class 28: Newton's Law of Gravitation II (Chapter 13)

Class 29: Oscillations (Chapter 15)



Class 30: Oscillations (chapter 15)

Lab 4: An Exploration of Dark Matter

Introduction to Physics with Lab Homework Problems:

Homework assignments from the textbook by Halliday, Resnick, and Walker.

Homework Set 1:

Chapter 2: Questions: 1, 3, 4, and 9. Problems: 5, 7, 15, 42, 49

Chapter 3: Problems: 3, 5, 8, 15

Chapter 4: Problems: 14, 28, 61, 64

Homework Set 2:

Chapter 5: Problems: 6, 24, 54, 63

Chapter 6: Problems: 12, 16, 23, 32

Chapter 7: Questions: 2, 5, 7. Problems: 20, 30, 32

Homework Set 3:

Chapter 8: Questions: 2, 4. Problems: 7, 19, 21

Chapter 9: Questions: 5, 8. Problems: 2, 13, 50,

Chapter 10: Problems: 9, 29, 40, 41

Chapter 11: Problems: 12, 49, 53

Homework Set 4:

Chapter 12: Problems: 3, 13, 17

Chapter 13: Questions: 3, 4, 10. Problems: 12, 13, 20, 47, 50,

Chapter 15: Questions: 2, 7. Problems: 21, 33, 41