

U540-101: General Physics

Course Format: Online

Course Author/s: William Parker, Ph.D.

Course credits: 3

Prerequisites: C or better in College Algebra

Course Description: Physics is a way of viewing the world through quantitative relationships among qualities of physical objects in ever broadening abstractions of the relationships among these objects, established through the scientific method. In this course, you will learn two of the classical theories of physics that first established the field: Newton's law of motion and the kinetic theory of gases. Along the way, you will learn the ideas that undergird these broad-ranging principles and practice quantifying their interrelationships.

Required Course Materials

- Lab kit: Custom lab by Carolina Labs; ordered through the UW Extended Campus partner bookstore, [Follett](#)
- Stellarium and NAAP Labs
 - Instructions for setting up both tools are available in the course in Canvas
 - Note: These tools will not run on a Chromebook.
- An empty milk gallon jug or two-liter bottle (needed for the experiment 8)

Optional/Recommended Course Materials

- Urone, P. P., Hinrichs, R., Dirks, K., & Sharma, M. (2012). [College Physics](#). OpenStax College.
 - The specific sections of this text used in the course will be linked directly in Canvas

Hardware Requirements

You will need a webcam, speakers, and a microphone. You will document your experiments using all three of these components.

Course Learning Objectives

By the end of this course, you should be able to:

- describe and use the basic equations of classical physics to answer simple questions
- define, justify, and give examples of the core concepts of classical physics
- explain the principles of the laws of motion, gravity, and thermodynamics
- demonstrate the key theories of classical physics through logically ordered references to their supporting concepts, principles, and observational evidence
- use graphical representations to reinforce concept and principle interconnections applied to particular situations
- create scientific reports that explain procedure, present results, cite references, and connect theory to experiment

Course Overview

UNIT #	UNIT TOPIC	EVALUATED ACTIVITIES
0	Get Started	0 Introduce Yourself 0 Set Goals 0 Learn Analysis in Excel 0 Learn Diagramming in Excel 0 Set Up Astronomy Software
1	Natural Philosophy	1 Conceptualize – Explain Natural Philosophy 1 Experiment – Find Philosophical Assumptions 1 Predict – Project Philosophical Stance
2	Forces and Density	2 Conceptualize – Relate Force and Floatation Properties 2 Experiment – Build a Balance 2 Predict – Figure Out How Much Force is Needed
3	Earthly Motion	3 Conceptualize – Describe Motion 3 Experiment – Measure Acceleration Due to Gravity 3 Predict – Calculate Projectile Flight Time and Range 3 Reflect – Consider Your Learning So Far
4	Heavenly Motion	4 Conceptualize – Interpret the Motion of Sun, Moon, and Planets 4 Experiment – Measure Earth's Circumference 4 Predict – Discover Astronomy on Mars
5	Universal Motion by Force	5 Conceptualize – Integrate Projectile and Orbital Motion 5 Experiment – Find Friction's Amount 5 Predict – Determine Whether the Sun Would Float in Water
6	Universal Motion by Work	6 Conceptualize – Connect Motion and Force to Energy 6 Experiment – Investigate Collisions 6 Predict – Investigate the Power of Work 6 Reflect – Consider Newton's Accomplishment
7	Thermodynamics	7 Conceptualize – Distinguish Heat from Temperature 7 Experiment – Measure Specific Heat 7 Predict – Say How Hot Something Will Get
8	Kinetic Theory of Gases	8 Conceptualize – Justify the Atomic Theory Using Mechanics 8 Experiment – Experience Gas Property Relationships 8 Predict – Calculate the Speed of Atoms
9	Finish Up	9 Reflect – Consider the Entire Course

Evaluation Methods

Your final grade will be based on your performance on the following:

- 1) Setup Activities (10%)
- 2) Conceptualizations (30%)
- 3) Experiments (30%)
- 4) Predictions (30%)
- 5) Reflections (10%)

This intentionally adds up to 110% to provide flexibility in your course completion. In addition, you are encouraged to respond to feedback on assignments with a second submission to improve your performance and raise your grade.

Setup Activities (10%)

The setup activities lay the foundation for you to successfully complete the course through developing and demonstrating skills in simulation use, spreadsheet editing, diagram creation, and web page design that we will employ throughout the course and so will cumulatively account for 10% of your final course grade.

Conceptualizations (30%)

The conceptualizations are content-organization assignments, one per module, for you to explain, give examples of, and define the concepts and principles you are studying this course and will cumulatively account for 30% of your final course grade.

Experiments (30%)

The experiments are content-testing assignments, one per module, for you to explore and quantify physical relationships you are studying this course in real-life objects that you manipulate and will cumulatively account for 30% of your final course grade.

Predictions (30%)

The predictions are content-application assignments, one per module, for you to take the concepts and principles you have studied in this course and use them to make quantified predictions about concrete physical situations—they will cumulatively account for 30% of your final course grade.

Reflections (10%)

The reflections are content-integration assignments, three total for the entire course, for you to look back and bring together in your mind the processes and ways of thinking that you have been developing in this course and connect them to other processes and ways of thinking you have experienced in other areas of knowledge—they will cumulatively account for 10% of your final course grade.

Exam Method: There are no exams in this course.

Grading Scale

The following grading scale is used to evaluate all course requirements and determine your final grade:

A = 93–100	B = 83–87.9	C = 70–77.9	D = 60–69.9
AB = 88–92.9	BC = 78–82.9		F = Below 60

Pass/Fail Option

Students who enroll in an Independent Learning (IL) course under the pass/fail option will receive a final grade of S in place of a final grade equivalent to an A, AB, B, BC, or C and a final grade of U in place of a final grade equivalent to a D or F.