
Bergen Community College
Division of Mathematics, Science & Technology
Department of Physical Science
Course Syllabus
PHY-280
Physics I

Semester and year:

Course Number:

Meeting Times and Locations:

Instructor:

Office Location:

Phone:

Office Hours:

Email Address:

COURSE TITLE AND NUMBER: PHY-280 Physics I

PRE-REQUISITE: MAT-180 Pre-Calculus with a grade of "C" or better.

RECOMMENDED PRE-REQUISITE: PHY-185 Introduction to Physics, or one year of high school physics.

CO-REQUISITE: MAT-280 Calculus I.

COURSE CREDITS: 4

COURSE HOURS: 3 lecture hours; 3 laboratory hours

COURSE CLASSIFICATION: General Education Course

COURSE DESCRIPTION: Physics I is the first semester of a three-semester, calculus-based physics sequence, and is a study of mechanics (motion, forces, and the conservation laws). It covers kinematics, dynamics, statics, energy, momentum, oscillations, gravity, and the properties of solid matter. The laws of physics are investigated and applied to problem solving.

REQUIRED TEXTBOOK – (Recommended – Wiley all electronic version or OpenStax electronic textbook. *Class instructor will provide the details of textbook option.*)

Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 11th Edition (Extended) with Wiley Plus, 2018 ISBN: 978-1-119-45917-0. (3-ring binder version)

Fundamentals of Physics, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 11th Edition Volume 1 for Phy-280 with Wiley Plus, 2018 ISBN: 978-1-119-46330-6 (3-ring binder version)

Fundamentals of Physics, Extended Edition, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 11th Edition (all electronic version with Wiley Plus), 2018 ISBN: 978-1-119-30695-5

University Physics, Volume 1 by William Moebs, Samuel J. Ling, Jeff Sanny, OpenStax Publication, Web eversion, 2021, ISBN-10: 1-947172-20-4 and ISBN-13: 978-1-947172-20-3 (Free textbook:

<https://openstax.org/details/books/university-physics-volume-1>),
with ExpertTA (<https://theexpertta.com/physics/>)

LABORATORY MANUAL: Details will be provided by the instructor.

STUDENT LEARNING OBJECTIVES:

As a result of meeting the requirements of this course, students will be able to:

1. Identify and describe in his or her own words the concepts and meaning behind the physical principles and laws encountered in the course.
2. Use correct terminology to describe physical processes and carry out problem solving.
3. Create sketches, diagrams, and graphs to describe physical processes and problem solving.
4. Apply appropriate mathematical relationships in the description of physical processes and problem solving.
5. Demonstrate proper use of laboratory instrumentation to perform measurements and data acquisition during laboratory sessions.

These objectives are intimately interwoven throughout the physics sequence and serve as a repeated reinforcement of the knowledge and skills necessary for the student to become successful in the engineering or scientific program of his or her choice. This course serves as foundations for further study in engineering, physics, astronomy, and many other areas, including chemistry, biology, environmental science, and the health professions.

CHEATING/PLAGIARISM: Physics I follows a Zero Tolerance Policy towards Cheating/Plagiarism. The definition and consequences of Cheating/Plagiarism are described in the Bergen Community College Catalog under *Academic Regulations*.

ASSESSMENT MEASURES: The student learning objectives will be assessed by:

1. Test scores.
2. Laboratory experiments and written laboratory reports.
3. Essay questions on laboratory reports (and possibly exams) will be used to assess the students' knowledge of physical principles and understanding of problem solving techniques.
4. Word problems on exams and laboratory reports that will require:
 - a. The construction and reading of graphs.
 - b. The use of precise sketches and diagrams, correct application of physical principles, and the correct use of computational skills.
 - c. Derivations of formulas requiring algebraic, trigonometric, and calculus-based manipulations.

GENERAL GRADING POLICY: The grade for the course is weighted:

- | | |
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| 1. Three or more non-cumulative (modular) "hourly" exams and possibly quizzes | 45% |
| 2. Laboratory (performance and written reports)
(Attendance required in at least 70% of labs) | 25% |
| 3. Final exam (cumulative) | 30% |

At least 70% of the experiments must be performed and handed in to pass the course no matter how high the test scores.

INSTRUCTOR'S GRADING POLICY: An instructor may modify the General Grading Policy, and the instructor will provide that policy.

CLASS ATTENDANCE/LATENESS POLICIES: Class Attendance is defined in the Bergen Community College Catalog under Class Attendance: "All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes."

ABSENCE OF INSTRUCTOR: Instructor Absence is defined in the Bergen Community College Catalog under Absence of Instructor which reads, in part: "Students are expected to wait twenty minutes for a faculty member to come to class." Cancelled classes are listed on the BCC website homepage – current students/student support services/class cancellations. If students find a class cancelled which has not been listed, they should report this to the STEM Division Dean's Office.

SERVICES FOR STUDENTS WITH DISABILITIES: Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at ossinfo@bergen.edu for assistance.

ELECTRONIC DEVICES: The use of portable electronic devices such as cell phones, voice and/or video recorders, is not permitted while class is in session. Please TURN OFF these devices before entering class. Cell phone calculators are not permitted.

MATERIALS AND SUPPLIES:

1. Several #2 (soft) pencils and a notebook.
2. A pocket-sized scientific calculator (solar cell recommended to avoid battery failure at crucial times). The functions must include direct and inverse trigonometric functions, natural logarithm, and exponents. A linear regression routine would be very helpful.

COURSE CONTENTS:

1. Units and Measurements
2. Vectors
3. Linear Kinematics
4. Projectile Motion
5. Translational form of Newton's Laws
6. Work and Energy (The Work-Energy Theorem)
7. Conservation of Mechanical Energy (Conservation of Energy)
8. Conservation of Linear Momentum
9. Translational and Rotational Equilibrium
10. Rotational form of Newton's Laws
11. Conservation of Angular Momentum
12. Mechanical Properties of Materials
13. Newton's Law of Gravitation and Planetary Motions
14. Simple Harmonic Motion and Oscillations

LABORATORY ASSIGNMENTS:

Title of Experiment	Chapter from Wiley Textbook	Chapter from OpenStax Textbook
Experimental Uncertainty (Error) and Data Analysis	1	1
Measurement Instruments (Mass, Volume, and Density)	1	1
The Scientific Method: The Simple Pendulum	15	15
The Addition and Resolution of Vectors: The Force Table	3	2
Uniformly Accelerated Motion: Measurement of g	2	3
Projectile Motion: The Ballistic Pendulum	4, 7, 8, 9	4, 7, 8, 9
Friction	6	6
Work and Energy	7, 8	7, 8
Conservation of Linear Momentum	9	9
Centripetal Force	6	6
Torques, Equilibrium, and Center of Gravity	10, 12	10, 12
Simple Harmonic Motion	15	15
Rotational Motion and Moment of Inertia	11	11
Elasticity: Young's Modulus	12	12

SUGGESTED TEXTBOOK ASSIGNMENTS:

	Chapter	Suggested Chapter Questions Wiley Textbook
1	Measurement	1,5,7,9,14,17,22,24,27,37,47,53
2	Motion in Straight Line	3,5,13,17,19,22,23,29,31,32,33,45,47,49,53,69,87,91,97,98
3	Vectors	1,3,8,9,11,12,16,24,32,34,35,37,38,41,44
4	Projectile Motion	1,5,6,11,13,20,23,25,37,43,47,58,59,60,61,67,75,98,109,111
5	Force and Motion I	2,3,7,14,1,5,17,19,25,28,31,36,41,49,55,57,74,85,92
6	Force and Motion II	3,5,7,9,11,18,39,42,44,45,51,59,96,98
7	Kinetic Energy and Work	1,5,7,8,9,10,15,17,21,25,28,31,35,42,43,45,46,47,49,75
8	Conservation of Energy	3,5,7,11,15,23,24,31,40,42,47,49,50,53,56,84,88,102
9	Linear Momentum	1,2,7,9,10,11,18,22,25,26,27,39,40,45,50,55,61,64,79,91,98
10	Rotation	1,2,4,6,12,14,19,21,23,25,33,35,37,43,45,47,49,50,61,63,85,89
11	Torque, Angular Momentum	2,3,7,9,21,25,27,32,33,37,39,45,51
12	Equilibrium and Elasticity	1,3,5,7,8,9,11,15,21,23,25,35,37,43,44,49,54,77
13	Universal Gravitation	1,3,5,8,9,11,17,19,21,28,31,32,33,37,39,44,45,47,50,53,56,57,63,64,72,88,93
15	Oscillations	3,4,5,6,7,9,10,13,15,27,29,30,31,38,41,42,59,65,68,73,87,88

	Chapter	Suggested Chapter Questions from OpenStax Textbook
1	Units and Measurement	50,52,53,54,80,81,82,83,84,85,86,87
2	Vectors	37,40,52,56,59,62,65,66,67,68,69,70
3	Motion in Straight Line	82,83,86,88,90,92,94,96,98,100,102,106,108,112,114
4	Projectile Motion	38,40,42,44,46,48,62,64,70,71,80,82,84,88,90,100
5	Force and Motion I	65,66,71,72,74,78,82,87,88,90,91,96,100,104,106
6	Force and Motion II	30,42,43,44,45,52,53,56,62,70,7280,82,94,95,108,109,123,128
7	Work and Energy	30,50,52,54,60,64,67,81,84,86,89,92,94,99,100
8	Conservation of Energy	21,23,25,27,38,42,43,60,64,70,71,74,77,79,86
9	Linear Momentum	35,36,37,47,52,54,55,59,63,76,77,94,96,106,117,118
10	Rotation and Torque	36,42,48,54,59,63,65,68,71,75,78,81,90,92,94,96,100
11	Angular Momentum	26,32,36,38,42,48,54,58,60,65,72,80,89,90,91
12	Equilibrium and Elasticity	26,28,31,35,36,38,41,42,45,47,66,70,71,72,73,
13	Gravitation	16,20,26,32,35,38,43,44,46,60,63,70
15	Oscillations	31,32,36,39,48,56,60,64,66,67,68

BIBLIOGRAPHY AND SUPPORTING MATERIALS:

1. University Physics, Revised Edition, by Harris Benson, John Wiley and Sons, Inc., 1996.
2. Physics for Scientists and Engineers with Modern Physics, by Raymond A. Serway, Robert Beichner, John Jewitt, Brooks/Cole 2000, Fifth Edition, Updated Version.
3. University Physics, 10th edition, by Hugh D. Young, Addison-Wesley Pub. Co., 2000.
4. Physics for Scientists and Engineers, Extended Version 3rd, by Fishbane, Gasiorowicz, and Thornton, Prentice Hall Inc., 2005.
5. Physics, 2nd edition, by Keller, Gettys, and Skove, McGraw-Hill Inc., 1993.
6. Physics, for Scientists and Engineers, by Richard Wolfson and Jay Pasachoff, Addison-Wesley Pub. 1999.
7. Physics for Engineers and Scientists, by Lawrence S. Lerner, Jones and Bartlett Publishers, 1996.

All BCC students enrolled in credit courses are entitled to a **BCC portal account**. With BCC portal, you may register online, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about BCC portal or to sign up online, visit <https://bergen.edu/welcome/step-1/>. While there, please make sure to update your preferred email address. It is recommended that you use your BCC email address for official communications.

Every credit course at BCC has its **Moodle** shell and every BCC student get free access to Moodle. For details of class Moodle page, visit, <https://bergen.edu/portalhelp/access-moodle/>.