

Bergen Community College
Division of Mathematics, Science & Technology
Department of Science and Technology

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 TEXT – Options:

Fundamentals of Physics, Extended Edition, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 11th Edition (Extended) w/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 w/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

REQUIRED LABORATORY MANUAL: Physics Laboratory Experiments For PHY-280 and PHY-186, by Jerry D. Wilson and Cecilia A. Hernandez, Cengage Learning, Combined Edition, 2016, ISBN 978-1-337-05124-8 (custom edition only).

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.
 - d.

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 Divisional Dean's Office, A-304 or the Evening Office C107.

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, pagers, laptop or portable computers *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: In addition to the required text and laboratory manual, the following supplies should be purchased:

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

LABORATORY ASSIGNMENTS From Wilson:

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

TEXT ASSIGNMENTS:

<u>READ AND STUDY CHAPTER/SECTION</u>	<u>SUGGESTED PROBLEMS</u>
1. Measurement	1, 5, 7, 9, 14, 17, 22, 24, 27, 37, 47, 53
2. Motion Along a 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. Motion in Two and Three Dimensions	1, 5, 6, 11, 13, 20, 23, 25, 37, 43, 47, 58, 59, 60, 61, 67, 75, 98, 109, 111
EXAM #1	
5. Force and Motion I	2, 3, 7, 14, 15, 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. Potential Energy and Conservation of Energy	3, 5, 7, 11, 15, 23, 24, 31, 40, 42, 47, 49, 50, 53, 56, 84, 88, 102
EXAM #2	
9. Center of Mass and 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. Rolling, Torque, and Angular Momentum	2, 3, 7, 9, 21, 25, 27, 32, 33, 37, 39, 45, 51
EXAM #3	
12. Equilibrium and Elasticity	1, 3, 5, 7, 8, 9, 11, 15, 21, 23, 25, 35, 37, 43, 44, 49, 54, 77
13. 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

THE FINAL EXAM (COMPREHENSIVE)**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 Jewett, 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.

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All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You'll find directions on how to do this at <http://go.bergen.edu/email>. 5/18