
Bergen Community College
School of Mathematics, Science and Technology
Department of Science and Technology
Course Syllabus
PHY 290 – Physics II

Semester and year:

Course Number:

Meeting Times and Locations:

Instructor:

Office Location:

Phone:

Office Hours:

Email Address:

COURSE TITLE AND NUMBER: PHY-290 Physics II

PRE-REQUISITE: MAT-280 Calculus I, with a grade of "C" or better, PHY-280 with a grade of "C" or better

CO-REQUISITE: MAT-281 Calculus II

COURSE CREDITS: 4

COURSE HOURS: 3 lecture hours; 3 laboratory hours

COURSE CLASSIFICATION: General Education Course

COURSE DESCRIPTION: Physics II is the continuation of PHY-280, Physics I, and is primarily a study of electricity and magnetism. It covers electrostatics, electrical circuits, magnetic fields and forces, capacitance and inductance, Maxwell's equations, and the properties of fluids.

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, 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 and 2), by William Moebs, Samuel J. Ling, Jeff Sanny, OpenStax publication, Web version, 2021, with ExpertTA (<https://theexpertta.com/physics/>)

Free textbook:

Volume 1 - ISBN-10: 1-947172-20-4 and ISBN-13: 978-1-947172-20-3:

<https://openstax.org/details/books/university-physics-volume-1>

Volume 2 - ISBN-13: 978-1-50669-816-8 and ISBN-10: 1-947172-21-2:

<https://openstax.org/details/books/university-physics-volume-2>

LABORATORY MANUAL: Details will be provided by the class 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 II 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. Four or more non-cumulative (modular) "hourly" exams and possibly quizzes | 45% |
| 2. Laboratory (performance and written reports) | 25% |
| (Attendance required in at least 70% of the experiments that the class performs. At least 70% of the experiments must be performed and handed in to pass the course no matter how high the test scores.) | |
| 3. Final exam (cumulative) | 30% |

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." A daily listing of cancelled classes will be listed at the BCC home page under Class Cancellations located at the bottom of the home page (www.bergen.edu). A daily list of cancelled classes may also be posted in the main building and in Ender Hall. Students should consult these cases before going to class. 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 (Lecture and Laboratory) 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. Elementary Fluid Statics and Dynamics
2. Coulomb's Law for Electric Fields
3. Gauss' Law for Electric Fields
4. Electric Potential Energy and Electric Potential
5. Dielectric Materials
6. Capacitance
7. Direct Current Circuits and Kirchhoff's Rules
8. Magnetic Fields and Their Effects on Moving Charges
9. Sources of the Magnetic Field and the Biot-Savart Law
10. Gauss' Law for Magnetic Fields
11. Faraday's Law of Electromagnetic Induction
12. Inductance
13. Alternating Current Circuits and Electromagnetic Energy
14. Maxwell's Equations, the Lorentz Force, and Electromagnetic Waves

LABORATORY ASSIGNMENTS:

Title of Experiment	Chapters from Wiley Textbook	Chapters from OpenStax Textbook
Archimedes' Principle: Buoyancy and Specific Gravity	14	14 (vol 1)
Fields and Equipotential	22, 23, 24	5 and 7 (vol 2)
Ohm's Law	26, 27	9 (vol 2)
The Potentiometer: emf and Terminal Voltage	26	7 and 9 (vol 2)
The Voltmeter and Ammeter	27	9 and 10 (vol 2)
The Measurement of Resistance: Ammeter-Voltmeter Methods and Wheatstone Bridge Method	27	9 and 10 (vol 2)
Resistivity	26	9 and 10 (vol 2)
The RC Circuit: Manual Timing	25	8 and 10 (vol 2)
Resistances in Series and Parallel	26, 27	9 (vol 2)
Introduction to the Oscilloscope		15 (vol 2)
The RC Circuit: Oscilloscope Study	25, 27	15 (vol 2)
Electromagnetic Induction	30	13 (vol 2)
Phase Measurements and Resonance in ac Circuits ac Filters	31, 32	15 (vol 2)

SUGGESTED TEXTBOOK ASSIGNMENTS:

Chapter	Topic	Suggested Chapter Questions from Wiley Textbook
14	Fluid and Fluid Dynamics	3,5,14,17,21,27,28,33,37,39,51,52,59,61,64
21	Electric Charge	3,4,5,6,7,9,24,25,26,27,31,46,59,64,66
22	Electric Field	4,5,6,8,11,19,23,31,34,35,40,43,44,47,53,56,57,80
23	Gauss' Law	1,3,7,17,19,22,25,31,37,39,41,45,47,51,57,62,63,78
24	Electric Potential	1,4,9,12,21,23,25,34,36,37,42,43,49,67,76,92
25	Capacitance	2,3,8,10,11,19,21,30,31,33,43,47,51,57
26	Current and Resistance	1,5,8,12,15,19,23,25,31,40,43,49,56,62,69,74,75
27	Circuits	1,5,6,11,15,23,24,41,44,45,49,58,60,81,86
28	Magnetic Fields	1,3,4,7,8,13,14,17,21,23,25,33,39,40,45,56,57,85
29	Magnetic due to Currents	3,7,10,13,23,35,45,46,47,50,51,52,57,74
30	Induction and Inductance	3,7,9,11,15,23,29,36,37,40,45,46,50,53,55,67,69,73,80
31	AC Currents	1,3,5,6,9,10,13,20,21,25,26,29,30,31,41,43,45,53,54,63,83
32	Maxwell's Equations	1,3,5,7,13,20,27,31,33,34,35,41,49
33	Electromagnetic Waves	2,4,5,8,9,11,12,15,17,21,27,29

Chapter	Topic	Suggested Chapter Questions from OpenStax Textbook
Ch14 (vol 1)	Fluids	50,55,60,62,66,68,70,78,80,84,85,87,89,110,113,126
Ch5 (vol 2)	Electric Charge & Field	37,41,45,48,53,55,62,63,65,68,76,79,80,83,94,96,106,125
Ch6 (vol 2)	Gauss's Law	20,24,27,37,40,50,51,64,67,68,70,89,90
Ch7 (vol 2)	Electric Potential	29,37,41,47,50,52,55,56,61,70,72,77,79,94,105
Ch8 (vol 2)	Capacitance	19,22,25,27,30,33,36,37,38,40,46,51,55,64,68,71,78
Ch9 (vol 2)	Current & Resistance	21,23,24,25,30,33,35,36,39,42,47,49,55,61,71,74,81,88,91
Ch10 (vol 2)	DC Circuits	20,24,26,30,35,37,38,39,41,42,43,49,53,67,69,77,79,85
Ch11 (vol 2)	Magnetic Forces	21,23,25,27,32,36,38,41,46,48,50,54,56,60,62,71,78,88,106,110
Ch12 (vol 2)	Magnetic Fields	16,21,23,26,27,32,33,34,36,37,43,44,45,50,55,65,67
Ch13 (vol 2)	EM Induction	24,27,28,33,35,37,40,42,45,47,50,51,55,57,63,68,70
Ch14 (vol 2)	Inductance	28,31,33,35,38,41,44,46,49,53,57,59,62,66,77
Ch15 (vol 2)	AC Circuits	22,23,25,27,30,33,36,39,42,44,47,49,51
Ch16 (vol 2)	EM Waves	37,39,42,44,51,57,58,61,66,69,76,86,90

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.

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 suggested that you use your official 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/>.