

**Bergen Community College
Division of Math, Science and Technology
Department of Physical Sciences**

**Course Syllabus
PHY 291 – Physics III**

Semester and year:
Course Number:
Meeting Times and Locations:

Instructor:
Office Location:
Phone:
Office Hours:
Email Address:

COURSE TITLE AND NUMBER: PHY-291 Physics III

PRE-REQUISITES: PHY-290 Physics II with a grade of "C" or better, and MAT-281 Calculus II with a grade of "C" or better. MAT-282 Calculus III, is recommended. (Not a pre or co-requisite).

COURSE CREDITS: 4

COURSE HOURS: 3 lecture hours; 3 laboratory hours

COURSE CLASSIFICATION: General Education Course

COURSE DESCRIPTION: Physics III is the continuation of PHY-290, Physics II, and is a study of waves, heat, and modern physics. It also covers sound and light, geometrical and physical optics, thermodynamics, relativity, and quantum theory.

REQUIRED TEXT – Options:

Fundamentals of Physics, Extended Edition, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 10th Edition (Extended), 2014 ISBN : 978-1-118-23072-5. (Hard Cover)

Fundamentals of Physics, Extended Edition, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 10th Edition (Extended) w/Wiley Plus, 2014 ISBN : 978-1-119-31950-4. (3-ring binder version)

Fundamentals of Physics, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 10th Edition Volume 3 for Phy-291 w/Wiley Plus, 2014 ISBN : 978-1-119-31713-5. (3-ring binder version)

Fundamentals of Physics, Extended Edition, by David Halliday, Robert Resnick, and Jearl Walker, John Wiley and Sons Inc., 10th Edition (all electronic version with Wiley Plus), 2014 ISBN : 978-1-118-44149-7

REQUIRED LABORATORY MANUAL: Physics Laboratory Experiments For PHY-290/291 and PHY-286, by Jerry D. Wilson and Cecilia A. Hernandez, Cengage Learning, Combined Edition, 2016, ISBN 978-1-337-05570-3 (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 III 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:

- | | |
|--|-----|
| 1. Three or more non-cumulative (modular) "hourly" exams and possibly quizzes | 40% |
| 2. Laboratory (performance and written reports)
(Attendance required in at least 70% of labs) | 25% |
| 3. Final exam (cumulative) | 35% |

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."

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). Students can consult this page before going to class. If students find a class cancelled which has not been listed, they should report this to the Evening/Saturday Office, Room L-113, or the Divisional Dean's Office, A325.

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 (Lecture and Laboratory) 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. The functions must include direct and inverse trigonometric functions, natural logarithm, and exponents.

COURSE CONTENTS:

1. Waves; mechanical, sound, electromagnetic
2. Geometrical and physical optics
3. Heat and thermodynamics
4. Relativity (Special and perhaps a little general)
5. Quantum theory
6. Atomic physics
7. Nuclear physics
8. Special topics (superconductivity, fusion, particle physics, cosmology)

LABORATORY ASSIGNMENTS:

<u>TITLE</u>	<u>APPLICABLE TEXT CHAPTERS</u>
Standing Waves in a String	16
Air Column Resonance: The Speed of Sound in Air	17
Boyle's Law (Supplied)	19
The Thermal Coefficient of Linear Expansion	18
The Specific Heats of Metals	18
Heats of Fusion and Vaporization	18
Reflection and Refraction	34
Spherical Mirrors and Lenses	34
Line Spectra and the Rydberg Constant	34, 35, 38, 39
The Transmission Diffraction Grating: Measuring the Wavelengths of Light	35
The Speed of Light (Supplied)	37
Planck's Constant (Supplied)	38
Detection of Nuclear Radiation: The Geiger Counter	42
The Absorption of Nuclear Radiation	42
Radioactive Half-Life	42

TEXT ASSIGNMENTS:

<u>READ AND STUDY CHAPTER/SECTION</u>	<u>SOLVE PROBLEMS</u>
18. Temperature, Heat, and the 1 st Law of Thermodynamics	2, 3, 5, 8, 9, 10, 12, 15, 21, 23, 27, 28, 31, 32, 39, 42, 43, 45, 49, 52, 53, 57, 79
19. Kinetic Theory of Gases	1, 3, 4, 13, 16, 17, 18, 21, 26, 29, 33, 35, 39, 41, 42, 53, 55, 64
20. Entropy and the Second Law of Thermodynamics	1, 3, 5, 6, 7, 11, 24, 27, 29, 33, 37, 38, 39, 54, 57, 66
16. Waves I	3, 5, 13, 15, 17, 19, 25, 26, 31, 35, 41, 43, 44, 45, 51
EXAM #1	
17. Waves II	1, 5, 7, 11, 16, 21, 25, 27, 28, 35, 39, 40, 47, 52, 55, 56, 59, 74, 81
33. Electromagnetic Waves (33.7 to end)	33, 34, 39, 43, 45, 47, 49, 58, 68, 69, 75, 79
34. Images	2, 7, 39, 41, 43, 45, 47, 68, 88, 89
35. Interference	5, 6, 14, 16, 19, 20, 21, 29, 35, 37, 39, 42, 47, 55, 59, 65, 75, 79, 80
EXAM #2	
36. Diffraction	3, 5, 7, 11, 13, 15, 21, 23, 24, 25, 28, 29, 31, 35, 43, 44, 45, 46, 47, 55, 56, 58, 63, 69, 74, 76
37. Relativity	1, 5, 7, 9, 10, 11, 13, 17, 19, 23, 27, 31, 35, 36, 41, 42, 47, 51, 57
38. Photons and Matter Waves	3, 6, 11, 15, 16, 17, 18, 23, 27, 29, 31, 35, 47, 49, 51, 53, 61, 62, 64, 67, 74, 81, 88, 90
39. More About Matter Waves	2, 3, 6, 7, 13, 15, 21, 23, 32, 33, 34, 35, 38, 39, 44, 49, 51, 53, 59
EXAM #3	
40. All About Atoms	2, 5, 6, 7, 16, 19, 21, 25, 27, 28, 31, 33, 39, 43, 48, 50, 53, 55, 77
41. Conduction of Electricity in Solids	2, 3, 4, 7, 15, 23, 26, 29, 31, 35, 37, 40, 41, 44, 46
42. Nuclear Physics	2, 9, 11, 13, 25, 26, 27, 30, 31, 32, 34, 47, 49, 53, 55, 56, 57, 60, 61, 62, 65, 66, 70, 71
CUMULATIVE FINAL EXAM	

IF TIME PERMITS:

44. Energy from the Nucleus

BIBLIOGRAPHY AND SUPPORTING MATERIALS:

1. University Physics, by Harris Benson, John Wiley and Sons, Inc. 1996.
2. Physics for Scientists and Engineers with Modern Physics, by Raymond A. Serway, Saunders College Publishing, 2004
3. University Physics, by Hugh D. Young, Addison-Wesley Pub. CO. 2004.
4. Physics for Scientists and Engineers, Extended Version, by Fishbane, Gasiorowicz, and Thornton, Prentice Hall, Inc. 2005.
5. Physics, Second Edition, by Keller, Gettys, and Skove, McGraw-Hill, Inc. 1993.
6. Physics with Modern Physics, by Richard Wolfson and Jay Pasachoff, Harper Collins College Publisher, 1998.
7. Physics for Engineers and Scientists, by Lawrence S. Lerner, Jones and Bartlett Publishers, 1996.

PHY291SCO.fa15

All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, check your schedule, pay your bill, check your 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 how to do this at <http://go.bergen.edu/email>. 5/18