

This syllabus is provided as a general informational guide. Some of the information may vary depending on the specific course section and instructor. Different sections of the same course may require different textbooks. Verify the section specific textbook information in the CUNY's Academic Course Schedule Web Page. Modifications of the grading system presented here will be communicated by the instructors of the sections when they meet the class.

BOROUGH OF MANHATTAN COMMUNITY COLLEGE

The City University of New York

Department of Science

Title of Course: Modern physics

Class Hours: 4

PHY 240; Credits: 3

Laboratory Hours per Week: 0

Semester:

Instructor Information:

Course Description: First of a two-quarter sequence. Topics covered: Introduction to special relativity; photons, de Broglie wavelength, Heisenberg uncertainty principles, quantum numbers and invariance principles; introduction to quantum physics of atoms, molecules, solids and nuclei; radioactive decay; elementary particles.

Basic Skills: Modern Physics prepares students for further study in science and engineering, and for a wide range of career opportunities in industry. The course provides a conceptual-based experience to the fundamental principles, a comprehensive knowledge and a sound understanding of physics together with the practical, analytical and mathematical skills of a physicist.

Prerequisites: PHY 225

Corequisite: MAT 501

| Course Student Learning Outcomes (Students will be able to...) | Measurements (means of assessment for student learning outcomes listed in first column) |
|--|--|
| 1. Students will be able to gain insight into the developments in physics from the beginning of the twentieth century to the present day. | 1. Graded research project, will measure how students produce well- reasoned written arguments using evidence to support conclusions. |
| 2. Students will be able to develop problem-solving skills. | 2. Graded homework problems and examination problems |
| 3. Improvements in physical intuition will permit students to apply the principles of physics to real world situations. | 3 Students will be required to solve many quantitative problems in exams and homework assignments |

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Below are the college's general education learning outcomes, the outcomes that are checked in the left-hand column indicate goals that will be covered and assessed in this course

| | General Education Learning Outcomes | Measurements (means of assessment for general education goals listed in first column) |
|----------|--|--|
| X | Communication Skills- Students will be able to write, read, listen and speak critically and effectively. | Students will be required to solve many quantitative problems and make oral presentations for the demonstrated ability to solve problems and speak critically and effectively. |
| X | Quantitative Reasoning- Students will be able to use quantitative skills and the concepts and methods of mathematics to solve problems. | Examination and homework problems. |
| X | Scientific Reasoning- Students will be able to apply the concepts and methods of the natural sciences. | Graded research project, will measure how students produce well- reasoned written arguments using evidence to support conclusions. |
| | Social and Behavioral Sciences- Students will be able to apply the concepts and methods of the social sciences. | |
| | Arts & Humanities- Students will be able to develop knowledge and understanding of the arts and literature through critiques of works of art, music, theatre or literature. | |
| | Information & Technology Literacy- Students will be able to collect, evaluate and interpret information and effectively use information technologies. | |
| | Values- Students will be able to make informed choices based on an understanding of personal values, human diversity, multicultural awareness and social responsibility. | |

Required Text

“Physics for Scientists and Engineers with modern Physics Volume -Technology Update” 10th Edition

Authors: R.A. Serway and J.W. Jewitt

Publisher: CENGAGE Learning

ISBN-13: 978-1-337-55343-8

ISBN-10: 1-337-55343-3

Student Copy ISBN:

978-1-337-55327-8

Other Resources

"Modern Physics" Third Edition

AUTHORS: Raymond A. Serway, Clement J. Moses, Curt A. Moyer

PUBLISHER: Thomson-Brooks/Cole

ISBN Student Edition: ISBN 0-534-49339-4

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Use of Technology: A scientific calculator is useful for class quizzes and examinations

Evaluation & Requirements of Students

| | |
|-------------------------|------------|
| 3 examinations | 40% |
| WI project/paper | 20% |
| Home assignments | 10% |
| Final exam. | 30% |

Writing Intensive:

This is a Writing Intensive course that fulfills the WI requirement for graduation. Writing intensive courses pay special attention to developing critical reading, writing, and analytic skills to prepare students for college-level coursework in general. Both informal and formal writing will be designed to maximize your understanding of the subject matter. Formal writing assignments, at least 10-12 pages total, account for a significant portion of your grade and will include opportunities for revision.

| Student Learning Outcomes for WI component: | Measurements: |
|---|-----------------------------------|
| 1. Student will be able to complete assignments of totaling least 10-12 pages, in length that has/have gone through the revision process (e.g. writing assignments) | Examples of student paper writing |
| 2. Student will be able to generate pieces of informal writing in response to a variety of prompts, concepts, situations or reading assignments. | Examples of student writing |

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Class Participation

Participation in the academic activity of each course is a significant component of the learning process and plays a major role in determining overall student academic achievement. Academic activities may include, but are not limited to, attending class, submitting assignments, engaging in in-class or online activities, taking exams, and/or participating in group work. Each instructor has the right to establish their own class participation policy, and it is each student's responsibility to be familiar with and follow the participation policies for each course.

BMCC is committed to the health and well-being of all students. It is common for everyone to seek assistance at some point in their life, and there are free and confidential services on campus that can help.

Single Stop www.bmcc.cuny.edu/singlestop, room S230, 212-220-8195. If you are having problems with food or housing insecurity, finances, health insurance or anything else that might get in the way of your studies at BMCC, come by the Single Stop Office for advice and assistance. Assistance is also available through the Office of Student Affairs, S350, 212-220-8130.

Counseling Center www.bmcc.cuny.edu/counseling, room S343, 212-220-8140. Counselors assist students in addressing psychological and adjustment issues (i.e., depression, anxiety, and relationships) and can help with stress, time management and more. Counselors are available for walk-in visits.

Office of Compliance and Diversity www.bmcc.cuny.edu/aac, room S701, 212-220-1236. BMCC is committed to promoting a diverse and inclusive learning environment free of unlawful discrimination/harassment, including sexual harassment, where all students are treated fairly. For information about BMCC's policies and resources, or to request additional assistance in this area, please visit or call the office, or email olevy@bmcc.cuny.edu, or twade@bmcc.cuny.edu. If you need immediate assistance, please contact BMCC Public safety at 212-220-8080.

Office of Accessibility www.bmcc.cuny.edu/accessibility, room N360 (accessible entrance: 77 Harrison Street), 212-220-8180. This office collaborates with students who have documented disabilities, to coordinate support services, reasonable accommodations, and programs that enable equal access to education and college life. To request an accommodation due to a documented disability, please visit or call the office.

BMCC Policy on Plagiarism and Academic Integrity Statement

Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's Web site, www.bmcc.cuny.edu. For further information on integrity and behavior, please consult the college bulletin (also available online).

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| <u>WEEK</u> | <u>TOPICS</u> | <u>CHAPTERS</u> |
|-------------|---------------------------------------|-----------------|
| 1 | Relativity Theory I | 1 |
| 2 | Relativity Theory II | 2 |
| 3 | The Quantum Theory of Light | 3 |
| | The Particle Nature of Matter | 4 |
| 4 | Matter Waves | 5 |
| 5 | Quantum Mechanics in One Dimension | 6 |
| 6 | Tunneling Phenomena | 7 |
| 7 | Quantum Mechanics in Three Dimensions | 8 |
| 8 | Atomic Structure | 9 |
| 9 | Statistical Physics | 10 |
| 10 | Molecular Structure | 11 |
| 11 | The Solid State | 12 |
| 13 | Nuclear Structure | 13 |
| 14 | Nuclear Physics Applications | 14 |
| 15 | Elementary Particles | 15 |
| | Final Examination | |