

Syllabus, Physics 454, Intermediate Modern Physics I, 3 credits

Designation: Required for all Physics and Engineering Physics majors.

Course Description: Introduction to quantum mechanics, with applications to atoms, molecules, solids, and nuclei. Topics include atomic and molecular spectra and selection rules, X-rays, quantum statistics, lasers, superconductivity, electrical conductivity, magnetism, nuclear models and reactions, radioactivity, elementary particles.

Prerequisites: PHYS 315, MATH 392.

Required Text: Townsend, A Modern Approach to Quantum Mechanics, University Science Books. Estimated cost for the new hardcover book: \$86.

Class Web Pages: A class webpage with the syllabus and other information will be available and maintained in Blackboard at <http://learn.nmsu.edu>.

Course Objectives: PHYS 454 is the first semester of the course sequence PHYS 454/455, an overview of non-relativistic quantum mechanics.

Topics Covered: Fundamental principles of quantum mechanics; intrinsic spin and the Stern-Gerlach experiment; spin, rotation, and angular momentum; quantum mechanics of one-dimensional motion; the simple harmonic oscillator.

Class Schedule: Three 50 minute classes or two 75 minute classes per week; two hour final exam during exam week.

Contribution of Course to Professional Component: Quantum mechanics is fundamental to all physical phenomena. Students proficient in the concepts covered in this course will be able to understand the basics of a wide variety of more complex systems, including all modern technologies. The course provides three credits of physics.

Relationship of Course to Program Outcomes: This course teaches students to: Identify, formulate and solve engineering and physics problems.

Prepared by Dr. Boris Kiefer, Fall 2011.

Course Information
Physics 454 (Fall 2011)
TR 11:45-1pm

Instructor: Dr. Boris Kiefer
Office: Gardiner Hall 354
Office hours: W 2:30-4 pm or by appointment.
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Skype: boris.kiefer

Course description and material: Physics 454 is an introduction to quantum mechanics. No prior knowledge of quantum mechanics is required. The instructor assumes that students have taken a "modern physics" course before taking PHYS 454 and are familiar with the concept of a quantum wave equation and its solution for some simple cases.

We will cover chapters 1-7 of the textbook. It will be absolutely essential for you to read the book carefully to be successful in this course. The lectures will follow the book in subject matter, if not precisely in content.

Attendance: I will not check attendance. However, it is your responsibility to be up to date with the material covered in class, the homework, exam-times, as well as any other course related information. Note: 1) There may be material covered in class that is not covered in the textbook. 2) Lecture notes will not be available from the instructor or on the web.

Grade composition: Homework (25%), two tests (each 25%) and a final exam (25%).

Grade scale: A = 90+ %; B = 75 to 90- %; C = 60 to 75- %; D = 45 to 60- %; F less than 45%

Tests: There will be two exams (midterms) during the semester and a comprehensive final exam. No makeup exams will be granted unless you are excused for university business or you have a valid doctor's note. Each test includes the material covered in class, the textbook, the homework, and any other material that was made available to the students. If you have an excusable conflict with a homework assignment or test, please inform me as soon as possible so that we can make alternative arrangements.

Homework: The homework assignments are an integral part of the course. They provide you with the opportunity to deepen your understanding of concepts and techniques covered in class by solving physics and engineering problems. You may work on your own or in groups. If you work in groups please remember to submit your own work for grading. You will be given one homework assignment per week. Homework is due at the beginning of class on the day noted on the assignment. On the due date one student will present and discuss his/her solution in class. If you have an excusable conflict with a homework assignment or test, please inform me as soon as possible so that we can make suitable arrangements.

Grade Disputes and Errors in Grading: If you detect a miscalculation in points received on a homework assignment or report, or believe that an absence should be excused, please report this matter immediately so that your grade may be adjusted. You must present your reasons for the disagreement within **ONE WEEK** of your receipt of this graded material with a copy of any paper in question. Your opportunity to appeal the grade on the assignment expires after that week has passed.

Completely obvious statements about student conduct:

- No cell phones, no pagers, no texting while in class. You will be removed from class if you use any of these devices in class.
- Do not cheat on exams: if you do, you will receive a failing grade for the class.
- Do not copy other student's work: if you do, both students will be penalized by receiving a failing grade for the class.
- For information on plagiarism: <http://lib.nmsu.edu/plagiarism/>
- For information on student conduct: <http://www.nmsu.edu/~vpsa/SCOC/misconduct.html>
- General university policies can be found in the NMSU Undergraduate Catalog and on the NMSU web site: <http://catalog.nmsu.edu/undergrad-2011-2012/2011-2012-nmsu-undgrad-catalog.pdf>

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Discrimination policies: Feel free to call Jerry Nevarez, Director of Institutional Equity, at 575-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.

Students with disabilities: Feel free to call Diana Quintana, Coordinator of Services for Students with Disabilities, at 575-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.