Physics 3220: Quantum Mechanics and Atomic Physics 1

Quick information
Lectures: MWF 2-2:50 P.M. in Duane G-125
Professor: Prof. Charles T. Rogers
Duane F-631
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Web page: http://www.colorado.edu/physics/phys3220

Course Description
Physics 3220 is the first semester of a two-semester sequence in quantum mechanics and atomic physics. Quantum mechanics is the most successful physical theory that we've yet discovered. There are plenty of predictions of the theory that are surprising and none that disagree with experiment. Zero point energy, quantum tunneling through barriers, uncertainty relations, and interference effects all will appear in this course. We will cover the basics of how quantum mechanics works and how to use it to predict the results of experiments. We will consider many of the exactly solvable model systems. These special cases often provide the basic language that physicists use for discussing real quantum systems. We will cover in particular a variety of 1-dimensional potentials, the infinite square well, the harmonic oscillator, two-level systems, and general properties of 2-d and 3-d central potentials. Many of the earliest experimental results that motivated quantum theory came from the study of small systems, especially atomic systems. The simplest of these, the hydrogen atom, will be discussed in this course as well. See the course learning goals for a breakdown of what we believe you should be able to do after taking the course. The required text for the course: Introduction to Quantum Mechanics, Second Edition by David J. Griffiths. For those interested in hearing a voice in addition to Griffiths, I have ordered an additional, non-required, text: Principles of Quantum Mechanics, 2nd Edition by Ramamurti Shankar. The Shankar text is often used at the graduate level, but is very readable. Lectures will be given on Mondays, Wednesdays and Fridays 2:00 to 2:50 p.m. in Duane G-125.

Clickers
We will be using clickers in class. Weekly participation points will be awarded. On occasion, points may be awarded for correct answers.

Homework
There will be approximately 14 weekly Problem Sets. They will be available on our website roughly one week prior to the due date.

Homework is exceedingly important for developing an understanding of the course material. I strongly encourage you to find some partners and work on the homework together. Essentially all physicists work as part of groups. However, it is important to be certain that you OWN the material by writing it up on your own. Work with a group, but write up your own work. If you feel that significant credit for ‘breaking’ a problem goes to one particular individual or reference work, feel free to reference the breakthrough and then press on.
Exams
There will be two closed book exams, given at a times to be announced. There will also be a comprehensive final exam.

Grading Policy
Your course grade is determined by weekly participation+homework assignments (35% of the grade), two midterm exams (20% of the grade each), and a final exam (25% of the grade).
Fine Print:

**Students with Disabilities:** If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and http://www.Colorado.EDU/disabilityservices.

If you have a temporary medical condition or injury, see guidelines at http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html Disability Services' letters for students with disabilities indicate legally mandated reasona...er accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at http://www.colorado.edu/disabilityservices

**Religious Observances:** Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, the instructor will make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or other required attendance, provided you notify him at least two weeks in advance of the scheduled conflict. The campus policy can be viewed at http://www.colorado.edu/policies/fac_relig.html

**Classroom behavior:** Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at http://www.colorado.edu/policies/classbehavior.html and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

**Discrimination and Harassment:** The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color,
national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://www.colorado.edu/odh

**Honor code**: All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at http://www.colorado.edu/policies/honor.html and at http://www.colorado.edu/academics/honorcode/