**Phys 390 Quantum Mechanics Fall 2017**

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Office Hours: MW: 2.30-3.30pm; Th 1.10-2.10 pm; Other Hours: By Appointment

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**Lectures: Block 5 MWF 1.10-2.10pm**

**Required Textbook:** *Introduction to Quantum Mechanics* by David J. Griffiths 2nd Edition

**Recommended:**

- Ohanian, Hans. *Principles of Quantum Mechanics*. Upper Saddle River, NJ: Prentice Hall, 1989. ISBN: 0137127952.
- Feynman, R. P. *Feynman Lectures On Physics*. Vol. 3. Reading, MA: Addison Wesley Longman, 1970. ISBN: 0201021153.
- Cohen-Tannoudji, Claude. *Quantum Mechanics*. 2 vols. New York, NY: Wiley, 1977. ISBN: 0471164321.
- Gasiorowicz, Stephen. *Quantum Physics*. 3rd ed. Hoboken, NJ: Wiley, 2003. ISBN: 0471429457.

**Course overview and learning outcomes**::

This course will introduce the fundamental ideas of quantum mechanics. We will develop the mathematical techniques necessary to understand and explore physical systems. Upon completion of this course, successful students will be able to apply analytical and numerical treatment of non-relativistic theory in the interpretation of the wave function, the solution of the Schrodinger Equation for systems such as the harmonic oscillator and the hydrogen atom, and approximation methods for treating more complex systems. The students will develop competence in understanding the formalism of the following topics

- Ch 1 The Wavefunction ( Aug 30 – Sep 8)
- Ch 2 Time independent Schrödinger Equation (Sep 11- Sep 29)
    - Particles in Potentials
    - The Free Particle
    - Time dependent Schrödinger Equation
- Ch 3 Formalism (Oct 2- Oct 27)
    - Function Spaces
    - Operators and Eigenvectors
    - The Uncertainty Principle
- Ch 4 Quantum Mechanics in Three Dimensions (Oct 30- Dec 8)
    - Spherical Coordinates
    - The Hydrogen Atom
    - Angular Momentum
    - Spin
    - Applications

**Expectation:** Students are expected to put in a minimum of 12-15 hours/ week work outside the class in order to successfully complete this course.

**Homework:** Homework will be assigned regularly in class and/or posted on inquire. Homework is typically due at the beginning of the next class period, unless otherwise notified. Late homework will not be accepted,

unless you have a really good excuse and have my prior approval. A quick check on completion will earn 40% for each homework. One problem from each problem set, randomly chosen, will be graded for accuracy and correctness for another 50%. In addition, students will be randomly called on throughout the semester to discuss their solutions to class which will be worth 10%. At the end, an average of these homework discussions will be added to all the problem sets.

**In-Class Problems:** You will also be required to complete problems assigned in class.

**Quiz:** There will be 10-15 minute long quizzes scheduled once in two weeks on the lecture material covered during the two week period. Announcement about the quiz will be made in the class and/or posted on the Inquire. One low quiz grade will be dropped.

**MCSP:** You are required to attend at least 3 of the several talks as a part of the MCSP colloquia this fall. You have to write a paper on your reflections of the talk to get credit. MCSP reflection papers will count toward in-class participation grade. The reflection papers are due within one week from the day of the talk. If you show up for the talk and not submit the paper you will get 1 point. A well written reflection paper will earn you full credit of 3 points.

**Exams:** There will be two mid-term exams. Tentative Date for first exam is on Friday Oct 6th during a mutually agreed upon time. Tentative date for the second exam is on Friday Nov 20th during a mutually agreed upon time. Each test will cover the material listed on the syllabus and informed in the class, prior to the tests. There will also be a final exam, on Friday Dec 13th from 2:00-5:00pm, and it is cumulative.

**Grading:**

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| Homework Discussions | 20% |
| Exams (2 @ 20% each) | 40% |
| In-class problems/participation | 10% |
| MCSP | 3% |
| Alertness | 2% |
| Final exam | 25% |

**Attendance:** Students are required to attend every class. Your attendance will be recorded each lecture period. If you show up 10 minutes late, you will be marked absent. A student can miss up to 3 class meetings without any consequences. No questions asked and no excuses need to be given. So use your 3 chances wisely. If a fourth absence occurs, the student will be dropped from the course. A warning e-mail/letter will be sent when the third absence occurs.

Excused Absence: Beyond the three allowed absences, any unexpected absence due to major health reasons, such as surgery, extended hospitalization should be notified immediately with proper documentation. Also, students representing the college by participating in conference and sporting events will be excused for a fourth absence. You will need to inform me prior to the absence or within 48 hours of such an absence to be considered as excused. It is best to inform me about your absence in person. Emails and phone voice messages are not very reliable. It is your responsibility to make up for the work that you missed. I will not extend the deadline for turning in homework or other work assigned in the class unless you have my prior approval.

**Inquire:** Log-in to Inquire program via MyRC web portal on the College website. This will give you access to the syllabus, office hours schedules, lecture notes, any class announcements and a bunch of other stuff. Regular updates will be available posted here. Make sure to check the Inquire website regularly!!! No excuses can be made and no extensions can be granted if you miss a deadline that was posted on Inquire.

**Class Disruption**: All students are entitled to a professional learning environment. Students should not act in a manner which will distract and disrupt the class learning experience. Such practices will not be tolerated.

Cell-phones, pagers, beepers, laptop computers or any other electronic communication/entertainment devices must be turned off at all times during the lecture period.

**Academic Integrity**: Policies of Academic integrity are enforced in all aspects of this course. It is the responsibility of the student to strictly adhere to the policies of Academic Integrity of Roanoke College.

**Philosophy**: My teaching philosophy is not to make you memorize equations but rather help you understand the Physics. I am willing to work with you, if you need extra help. Please talk to me if you have any problems understanding the materials presented. It is not a good idea to postpone your questions and doubts, because you will soon see that the semester days would run through real fast, and I don't like to see you get frustrated over unsolved doubts/questions just before your exams!! ASK QUESTIONS; GET YOUR DOUBTS CLEARED WITHOUT PROCRASTINATION. Feel free to stop by my office. I will not usually offer help over phone/e-mail.

**Disclaimer:** Everything above is subject to change with notice and, where appropriate, your approval.