General Information

Title: Physics 452, Introduction to Quantum Mechanics

Instructor: Dr. J. W. Van Orden
OCNPS 321
683-5801, 269-7631 (Jefferson Lab)
jvanorde@odu.edu, vanorden@jlab.org

Room: Lecture: OCNPS 204, Recitation: OCNPS 303

Time: Lecture: Tuesday and Thursday 1:30-2:45 p.m., Recitation: Thursday 3:00-3:50 p.m.

Web Page: Blackboard

Office Hours: Tuesday and Thursday 9:30 a.m. to 11:30 a.m. or by arrangement.

Catalog Entry: PHYS 452/552. Introduction to Quantum Mechanics. 3 Credits. Introduction to the physical and mathematical structure of quantum theory, including the historical and experimental origins of the subject. The subject matter includes techniques for solving the Schrödinger equation in one, two, and three dimensions. Both coordinate and momentum space representations are used. The harmonic oscillator and the Hydrogen atom receive particular attention. Prerequisites: PHYS 319, PHYS 323, and PHYS 355.

Text: Stephen Gasiorowicz: Quantum Physics, 3rd Edition, Wiley, ISBN 978-0471057000 and lecture notes. The course material is covered in detail in the provided typeset lecture notes. The textbook is not really necessary, but may be useful. If you wish to obtain a copy, I would recommend that you obtain a good used copy from the internet. The list price of this book is outrageous.

Attendance: Attendance is mandatory. If you have to legitimately miss a class, it is your responsibility to find out what you missed.

Lecture Format: Emphasis is this class will be on obtaining a sound understanding of quantum mechanics, rather than just listening. Classroom sessions will include lectures and problem solving sessions. It is crucial to read (and study) the assigned chapter sections before each class. Please notify Prof. Van Orden in advance (if at all possible) of any absences.
Recitation: Beginning this semester, recitation session of one hour each week is required for this course. Please let me know if the scheduled time has a serious conflict with your schedule. This time will be spent reviewing concepts, discussing solutions to homework problems and studying additional examples of application of the course material.

Exams: There will be two midterm exams on Tuesday, 16 October 2018 and Tuesday, 13 November 2018. The Final Exam is on Thursday, 13 December 2018 from 12:30 to 3:30 p.m. Exams are closed notes and closed book. I will provide a basic formula sheet for each exam. No other notes allowed. All exams will be in OCNPS 204. Make-up exams will not be given. If you have to miss an exam please notify Prof. Van Orden immediately. In special circumstances only, your other exams will be averaged to replace the missed exam score.

Homework: Homework problems will be assigned periodically. You are encouraged to work with your classmates on the homework, but all submitted work must be your own, in your own handwriting (or typesetting). In order to master this material, it is imperative that after studying, you write out all Homework solutions starting with a blank sheet of paper and without consulting any sources other than your notes and the Lecture notes provided while writing. This means that fellow students or the internet should not be used at this point. If you cannot complete a problem in this manner, continue studying, then start Homework problem over. It is expected that all assignments will be submitted and that they will have complete, easily readable solutions for all problems. The solutions should contain an explanation in words of the assumptions, sources and steps needed to complete the solution.

Grading:

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Midterms</td>
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<td>Final Exam</td>
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Topics to be Covered:

- The old quantum theory
- The Schrödinger equation
- Mathematical background of quantum mechanics
- Time-independent wave function
- Solutions to the one-dimensional Schrödinger equation
- Scattering in one dimension
- Solution to the Schrödinger equation in three dimensions
- Formal foundations of quantum mechanics

Additional Resources: By its nature Quantum Mechanics is highly mathematical. I will expect that you should be able to understand and use the mathematics that arises. Help with can be obtained from a variety of mathematical tables, review previous mathematical course work and the use of computer programs such as Mathematica, Wolfram Alpha, etc. Student copies of Mathematica can be obtained without charge under the ODU site license agreement.
**Disabilities:** Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

**University Honor Code:** You are expected to conform to the University Honor Code in all aspects of your conduct in this course. You may work with others on the homework assignments, however, what you submit must represent your own understanding of the problem. Copying solutions from the web is not allowed. Misconduct of any form will not be tolerated. If you are ever unsure of what is allowed, please consult with Dr. Van Orden for clarification.