

**Physics 575: Introduction to Quantum Mechanics**  
**Spring 2009 Course Document**  
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Department of Physics

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- Office: Bowers 147
- Phone: 607 753 5697
- Official office hours:
  - Monday, Wednesday, Friday 10:00 a.m. to 12:00 noon.
  - Or by appointment
- If you come by my office unexpectedly outside of the office hours and I'm there, I'll be happy to talk to you unless I'm doing something ultra-critical.
- Department web site: [www.cortland.edu/physics/](http://www.cortland.edu/physics/)

**Course Text**

- *Quantum Mechanics of Atoms, Molecules, Solids, Nuclei & Particles* by Eisberg & Resnick published by Wiley.
- You may use an earlier edition than the latest one, but be aware that changes, in particular regarding homework problems, may have been made.
- The book covers most topics to some degree. However, I may introduce material scantily covered in or omitted from the text, so keeping good lecture notes is important.
- There are other texts on quantum mechanics which you may want to look at as supplementary texts. In particular, I highly recommend
  - *Introduction to Quantum Mechanics* by David Griffiths, published by Prentice Hall. This is a very good book covering many of the topics we shall cover.
- I also recommend that you look at a general mathematical methods book in this course and in the future. In particular, I recommend
  - *Mathematical Methods in the Physical Sciences* by Mary Boas, published by Wiley.
- I recommend that you obtain a book of formulae for reference during this course and in the future. I recommend:
  - *The Cambridge Handbook of Physics Formulas* by Graham Woan published by Cambridge University Press.
  - *Schaum's Outlines Mathematical Handbook of Formulas and Tables*; publisher: McGraw-Hill; author: Murray R. Spiegel.

- *Physics Handbook for Science & Engineering* by C. Nordling & J. Österman published by Studentlitteratur, Sweden. A very useful book which got me through my undergrad degree.
- *Mathematics Handbook for Science & Engineering* by L. Råde and B Westergren published by Studentlitteratur, Sweden. This is the accompanying volume to the one above which contains only mathematics.
- *Handbook of Mathematical Formulas and Integrals* by A. Jeffrey published by Academic Press. This is a good reference book but it contains only mathematics.
- *AIP Physics Desk Reference* by R. Cohen & D. Lide published by Springer. This is another book I used as an undergrad and can recommend.

although there are others which are equally good. Check with me if you'd like to use a different one.

- The main library may have some useful books covering the topics in the course. You can check at <http://library.cortland.edu/>
- Some cheap books can be found at:
  - [www.studentmarket.com/textbooks.html](http://www.studentmarket.com/textbooks.html)
  - [www.directtextbook.com/](http://www.directtextbook.com/)

### Additional Resources

- Here are some more links:
  - For help with mathematical topics and Mathematica (a computer system for mathematics) useage try the Mathematica site <http://mathworld.wolfram.com>
  - For help with Maple (a similar computer system to Mathematica): [www.maplesoft.com](http://www.maplesoft.com)
  - Physics news: <http://physicsworld.com/cws/home>  
<http://www.physicstoday.org/>
  - Physics history: [www.physlink.com/Education/History.cfm](http://www.physlink.com/Education/History.cfm)
  - Google physics links: <http://directory.google.com/Top/Science/Physics/>
  - Calculus resources: <http://archives.math.utk.edu/calculus/crol.html>

### Course Content Overview

The course is aimed at physics majors and will cover quantum mechanics at an introductory level. We shall discuss the development of quantum theory, the Schrödinger equation, the mathematical formulation and interpretation of quantum mechanics, exactly soluble systems such as square wells, the Hydrogen atom, the harmonic oscillator, angular momentum, scattering theory, Dirac bra and ket formulation, matrix methods, Hilbert spaces, time dependent and stationary state perturbation theory.

## Prerequisite Courses and Knowledge

- Physics 420, Maths 430.
- Fulfills: LASR. (3 cr. hr.)
- If you have taken courses like the prerequisites at another institution or here a long time ago, check with me as to whether the prerequisite is satisfied.

## Lecture

- 4:25 p.m. to 5:40 p.m. on Tuesday, Thursday.

## Assessment

- We shall have one take-home mid-term exam and one unseen, in-class final.
- I shall assign homework most weeks.
- The breakdown will be
  - 40% homework
  - 60% exams
- The assignment of letter grades will be decided by me based upon your numeric score. I may take into account attendance and participation. Do not assume any grading rubric not explicitly specified by me.
- If you wish to know of your progress throughout the semester, ask me.

## General

- If you are a student with a disability and wish to request accommodations, please contact Disability Services located in Van Hoesen Hall, Room B-40, or call (607) 753-2066 for an appointment. Any information regarding your disability will remain confidential. Because many accommodations require early planning, requests for accommodations will be reviewed in a timely manner to determine their appropriateness to this setting.
- Be sure to check your college email regularly. I may send assignments or other important information this way. You can check at:  
<http://webmail.cortland.edu/secure/>
- Always write your name, school ID number, course and section number and my name on any work you submit.
- Class and exam cancellations due to emergencies or bad weather are announced in various ways. See <http://www.cortland.edu/emergency/index.html>
- Check the academic calender for important dates  
<http://www.cortland.edu/registrar/calendarinformation.html>
- Some potentially useful info:
  - Student Health Service (607) 753-4811  
<http://www.cortland.edu/sdc/hservices/index.html>

**Academic Misconduct**

- The university policy on academic misconduct can be found at:  
[http://www.cortland.edu/handbook/hb08\\_10/part3.html#chapter340-200406](http://www.cortland.edu/handbook/hb08_10/part3.html#chapter340-200406)
- Plagiarism, a serious academic offense, is defined as expropriating the ideas of others and using them as one's own without due credit. Students who cheat in examinations or plagiarize in this course will be disciplined in accordance with university rules and regulations.

## Syllabus

- This list is provisional.
- The book covers most topics to some degree. However, I may introduce material scantily covered in or omitted from the text, so keeping good lecture notes is important.

Topics to be covered:

- The development of quantum mechanics
- The wave function and the Schrödinger equation
- Hilbert spaces, Dirac notation
- Soluble examples: square wells
- Soluble examples: the Hydrogen atom and the simple harmonic oscillator
- Angular momentum
- Scattering theory
- Stationary state perturbation theory