

# Physics 4410 - Quantum Mechanics II

## Fall 2004

### General Course Information

Prof. Eric D. Zimmerman  
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- Graders:
    - Michael Allman ([michael.allman@colorado.edu](mailto:michael.allman@colorado.edu))
    - Sam Wurzel ([wurzels@colorado.edu](mailto:wurzels@colorado.edu))
  - Class meets in Duane G2B21, MWF 11:00-11:50.
  - Problem sets are issued on Wednesdays and are due on Wednesday of the following week at the **beginning** of class. The grader will pick up the problem sets at 11:00. Problem sets turned into the instructor or the grader's mailbox afterwards will not be accepted.
  - No late problem sets will be accepted. This is for practical, not punitive reasons; the problem set solutions will be published on the due date. If you have an emergency please let me know, and I may excuse a set.
  - I encourage students to work together on problem sets. However, you must generate solutions by yourself; simple copies of answers will not be accepted. Be warned that if you are collaborating too much and not learning on your own, you may find that your problem set scores outpace your understanding of the material. This tends to result in very unpleasant surprises when exams come around.
  - Grading:
    - Problem Sets: 40%
    - Midterm Exam: 20%
    - Final Exam: 40%
  - The midterm exam will be sometime around the second or third week of October. The final exam will be Monday, December 13, 1:30-4:00 pm.
  - Class Web Site: <http://www.colorado.edu/physics/phys4410>. Site will contain announcements, lecture notes, problem sets, and solutions.
  - Textbooks:
    - R. Shankar, *Principles of Quantum Mechanics*, 2nd ed., Plenum, 1994.
    - R. Liboff, *Introductory Quantum Mechanics*, 4th ed., Addison Wesley, 2003.
- Tip: You may find some books are cheaper at [amazon.co.uk](http://amazon.co.uk) than through domestic sources.

- Other Recommended Books (on reserve in the library):
  - S. Gasiorowicz, *Quantum Physics*, Wiley, 1974 (2d ed. 1996, 3rd 2003; not much changed). An alternative textbook at a similar level to Liboff.
  - D. Bohm, *Quantum Theory*, Prentice-Hall, 1951 (also in a Dover edition). A *very* different approach. Mostly wave mechanics based, but provides some interpretation and insight that might be useful.
  - R. Feynman, R. Leighton, and M. Sands, *The Feynman Lectures on Physics, Volume III*, Addison-Wesley, 1965. Feynman tried to teach this stuff to sophomores. That didn't work out too well (his preface says "I now believe the quantum mechanics should be given at a later time") but the lectures are an excellent and unique approach to the subject.
- Office hours:
  - Prof. Zimmerman: Tuesdays 9:30-11:30 AM. Other times by appointment.
  - Michael Allman: Duane C123, Tuesdays 2-3pm, alternate weeks starting September 7
  - Sam Wurzel: Duane F327, Monday 12-1pm, alternate weeks starting September 13
- Study sessions: I encourage students to organize a weekly study session. I can help provide a room, and will attend parts of the sessions to provide additional help in an informal recitation environment.
- Material to be covered:
  1. Review of state vectors, operators, matrix mechanics
  2. Review of QM postulates, time evolution
  3. 1-D problems from a state vector approach
  4. Multi-particle systems, multi-dimensional systems, mixed states
  5. Symmetries
  6. Angular momentum, spin
  7. Approximation methods: Variational method, time-independent perturbation theory, time-dependent perturbation theory
  8. Scattering theory; partial waves
  9. The Dirac Equation
- Statement from administration: *Students with disabilities who qualify for academic accommodations must provide a letter from Disability Services (DS) and discuss specific needs with the professor, preferably during the first two weeks of class. DS determines accommodations based on documented disabilities (303-492-8671, Willard 322, <http://www.colorado.edu/disabilityservices>)*