Syllabus
Physics 3803
Introduction to Quantum Mechanics I
Spring 2012

Instructor. K. A. Milton

Class Meetings. M W: 2:30–3:45, NH 251

Office. NH 325, x36325

Office Hours. MWF 12:00–1:30 pm, by appointment, or any other time you can catch me in my office.

Prerequisites. Some familiarity with the following subjects will be assumed:

Classical mechanics, Newton's laws, and a bit of Hamiltonian and Lagrangian physics
Electrodynamics, including Maxwell's equations
Thermodynamics and Boltzmann factors
Introduction to optics, including interference phenomena
Introduction of quantum theory, including Bohr atom, deBroglie waves, quantum interference
Matrices and determinants
Eigenvalue problems
Elementary differential equations
Complex numbers

Textbook.

Quantum Mechanics: Symbolism of Atomic Measurement, by Julian Schwinger, ed. by B.-G. Englert (Springer, Berlin, 2001). This book is at a bit high a level for this course, so it will be supplemented with my own notes, which will be posted online, based in part of Schwinger's courses at Harvard and UCLA.

References on reserve in the physics library.

G. Baym: *Lectures on Quantum Mechanics*
D. Bohm: *Quantum Theory*
C. Cohen-Tannoudji et al.: *Quantum Mechanics, Vol. I*
R. Dicke: *Introduction to Quantum Mechanics*
P. A. M. Dirac: *Quantum Mechanics*
D. J. Griffiths: *Introduction to Quantum Mechanics*
R. L. Liboff: *Introductory Quantum Mechanics*
E. Merzbacher: *Quantum Mechanics*
M. Morrison: *Understanding Quantum Physics: A User Manual*
D. Saxon: *Elementary Quantum Mechanics*

Lecture notes. Will be available on the web, at
`http://www.nhn.ou.edu/%7Emilton/p3803-11.html`
.

Grading.

Homework	30%
Hour Exams ($2 \times 20\%$)	40%
Final Exam	30%

Homework. Will be assigned roughly weekly. Solving the problems will be the most significant learning aspect of the course, and is essential for success in the examinations. Late homework will not be accepted.

Exams. In-class examinations will all be of the closed-book variety—no crib sheets may be used. Make-up examinations will not be given.

Exam schedule.

Exam I	Wednesday, February 22
Exam II	Wednesday, April 11
Final Exam	Wednesday, May 9, 4:30pm–6:30pm

Assistance. May be had from instructor *at any time*.

Tentative Course Outline

Topic

- Failure of Classical Mechanics
  - The Stern-Gerlach experiment
  - The uncertainty principle
  - Probabilities and angular momentum
- Construction of Quantum Mechanics
  - Measurement symbols
  - The algebra for spin 1/2
  - Rotation of coordinate system
  - Probabilities in terms of measurement symbols
  - States as vectors
  - Transformation functions and wavefunctions
- Developments
  - Matrix elements
  - Eigenvectors and eigenvalues
  - The adjoint
  - The trace
- Continuous degrees of freedom
  - Permutations and displacements
  - Position and momentum
  - Gaussian wavefunctions
- Time evolution
  - The Hamiltonian
  - The Schrödinger equation

"The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Disability Resource Center prior to receiving accommodations in this course. The Disability Resource Center is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173."

"It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays."