Quantum Mechanics
PHY 450 --- Spring 2014 Syllabus
Physics Department --- Mercer University

> **Text:** A Modern Approach to Quantum Mechanics, 2nd edition, by John S. Townsend
> **Class Meetings:** TR 9:25-10:40, SEB 143
> **Instructor:** Dr. Jose L. Balduz Jr
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>   **office hours:** R 1-3, F 2-4, or by appointment (or try email)...
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This is an advanced course in the theory of quantum mechanics, for junior or senior level students. It is intended primarily for physics majors, but should be of interest also to many other students, especially those in math, science and engineering. Prerequisite are PHY 305 Modern Physics I, MAT 293 Multivariable Calculus, and MAT 330 Introduction to Differential Equations. Students are therefore assumed to know some basic quantum physics, and to be able to use vector calculus and simple differential equations. They will learn the mathematical formalism of quantum mechanics, its application to various systems, and some philosophical implications of its physical interpretation. The goal is for students to go beyond conceptual understanding of these topics, becoming able to perform nontrivial analysis and calculations beyond the level of an introductory survey course.

We assume students are familiar with the basic wavefunction approach presented in the typical Modern Physics course such as PHY 305; the emphasis here is instead on the more abstract features of quantum theory, especially as applied to systems with a finite number of possible classical states, as opposed to the continuum of possible position values of a particle in space. The text begins with interpretation and theoretical description of basic experiments in Ch. 1 Stern-Gerlach Experiments. Basic state manipulation techniques are developed in Ch. 2 Rotation of Basis States and Matrix Mechanics and Ch. 3 Angular Momentum. The time-dependent Schroedinger equation is explored in Ch. 4 Time Evolution. Quantum properties of composite states are described in Ch. 5 A System of Two Spin-1/2 Particles. Finally we return to continuum properties in Ch. 6 Wave Mechanics in One Dimension and Ch. 7 The One-Dimensional Harmonic Oscillator. Some sections of these chapters may be skipped along the way...

Lectures: During most class meetings there will be some conventional lectures. We will also discuss the material and go over problems in the main text, including homework, as well as exam questions.

Homework (70% of total grade): From time to time the instructor will assign some homework problems from the text to be worked by the students and handed in for grading. There will be one or two assignments for each chapter. After the papers are collected, a solution sheet will be provided.

Final exam (30% of total grade): The only exam will be the take-home final exam, with mathematical derivations and numerical problems. This will be due at noon on Saturday 5/3.

Grading: The percentage for each activity is shown in the left table below. To convert the total percentage to a letter grade, use the scale shown in the right table below.

	#	% @	Total %
Homeworks	9	~8	70
Final exam	1	30	30
		Total	**100**

	GP	%
A	4.0	90-100+
B+	3.5	85-89
B	3.0	80-84
C+	2.5	75-79
C	2.0	70-74
D	1.0	60-69
F	0.0	0-59

Miscellaneous policies:

If changes to this syllabus are necessary, they will be implemented after discussion and negotiation with the students. Note that the accompanying course schedule is not a part of the syllabus: it is tentative and subject to revision, including all due dates.

Homework assignments are always due in class on the due date: However, they will not be considered late as long as they are turned in before the next sunrise. Beyond that, any late homework sets will suffer a 5% penalty per day (excluding weekends and holidays) until they are handed in: i.e., 5% on the first day, 10% on the second day... The take-home final exam must be submitted on or before May 3 at noon, or it will not be accepted.

There will be no dropped grades or extra-credit work. All work done in the course will be counted.

The College of Liberal Arts' academic misconduct policy will be followed. In addition, all students are bound by the Mercer University Honor Code.

Students are *strongly encouraged* to discuss with the instructors all their work during the course, *regardless of their grades*. Questions about point awards should be brought up as soon as possible, as all grades will be final *one week* after the materials are graded and returned to the students.

Students requiring accommodations for a disability should inform the instructor at the close of the first class meeting or as soon as possible. The instructor will refer you to the ACCESS and Accommodation Office to document your disability, determine eligibility for accommodations under the ADAAA/Section 504 and to request a Faculty Accommodation Form. Disability accommodations or status will not be indicated on academic transcripts. In order to receive accommodations in a class, students with sensory, learning, psychological, physical or medical disabilities must provide their instructor with a Faculty Accommodation Form to sign. Students must return the signed form to the ACCESS Coordinator. A new form must be requested each semester. Students with a history of a disability, perceived as having a disability or with a current disability who do not wish to use academic accommodations are also strongly encouraged to register with the ACCESS and Accommodation Office and request a Faculty Accommodation Form each semester. For further information, please contact Carole Burrowbridge, Director and ADA/504 Coordinator, at 301-2778 or visit the ACCESS and Accommodation Office website at http://www.mercer.edu/disabilityservices.