Physics 441 Winter Quarter 2012

Professor: Larry Sorensen
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Class Website: http://faculty.washington.edu/seattle
Office hours: Right after class, or by appointment

Virtual Text: Bra, Ket, Dirac, and all that---free PDF on the class website

Grading: Three take-home exams

Week of	Topic	Chapter in Virtual Book	Associated Exam	Exams "Due"
January 9	The Mathematics of QM 1	1	Exam 1	
January 16*	The Mathematics of QM 2	1	"	
January 23	The Postulates of QM	2	"	
January 30	One-Dimensional Problems 1	3-5	Exam 2	
February 6	One-Dimensional Problems 2	3-5	"	
February 13	The Simple Harmonic Oscillator	8	"	Exam 1 due
February 20*	Angular Momentum	9	Exam 3	
February 27	The Hydrogen Atom	10	"	
March 5	Makeup Jan 16 and Feb 20		"	Exam 2 due
March 12	Final Exam Week	Path Integrals		
March 19	Grades Due			Exam 3 due
January 16*	University Holiday			
February 20*	University Holiday			

Page contents:

Course Description
Homework Assignments
Virtual Book
Reading
Lectures
Feynman

Physics 441
Quantum Mechanics 1

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Course Description
An introduction to non-relativistic quantum mechanics. Topics will include: the mathematics of quantum mechanics, bra and ket notation, the postulates of quantum mechanics, one-dimensional problems, the harmonic oscillator, angular momentum, the hydrogen atom, and non-relativistic path integrals.
Course information

Bra, Ket, Dirac, and all that---aka, the Virtual Book
Table of Contents
Preface **Please read this**
Dedication

1.1 The Mathematics 1
1.2 The Mathematics 2 **Next two weeks**
1.3 The Mathematics 3
Shankar

2.1 The Postulates 1 **Third week**
2.2 The Postulates 2
Shankar **Shankar's postulates chapter**

3.1 Free Particles 1
3.2 Free particles 2
Eisberg
Griffiths
Shankar

4 Transmission and Refelection Coefficients
Eisberg
Liboff
Shankar
PBQM

5.1 Square Wells 1
5.2 Square Wells 2
5.3 Square Well Figures
Eisberg
Griffiths
Shankar
PBQM
Cohen-Tannoudji

6 Ehrenfest's Theorem **We won't do chapters 6 and 7**

7 The Heisenberg Uncertainty Relations

8.1 The Simple Harmonic Oscillator 1
8.2 The Simple Harmonic Oscillator 2
8.3 The Simple Harmonic Oscillator 3
8.4 The Simple Harmonic Oscillator Figures
8.5 The Simple Harmonic Oscillator Summary
Griffiths
Shankar

9.1 Angular Momentum 1
9.2 Angular Momentum 2
9.3 Angular Momentum Figures
Eisberg
Griffiths
Shankar
Griffiths 2

10.1 Hydrogen 1
10.2 Hydrogen 2
10.3 Hydrogen Figures
Eisberg

Griffiths
Shankar

Recreational Reading
Nine Formulations of Quantum Mechanics
Is the moon there when nobody looks?
What's the difference between a Hilbert space and a finite-dimensional vector space?
Have fun
It's supposed to be fun
Stay playful
We represent the Physics Department
Classified 4F
Any port in a storm
Guess who's coming to your talk
Traveling backward in time
Diagrams in momentum space

Online Reference Books
Shankar
Griffiths.djvu
Griffiths.pdf
Liboff
Cohen-Tannoudji
Baym
Gasiorowicz

If you want to buy a conventional textbook look at these

The Most Famous Quantum Book of All Time (at least so far)
Dirac
about Dirac

Visual Quantum mechanics
Visual QM 1
Visual QM 2
Visual QM 3
Visual QM 4

Good Summaries of the Mathematics of QM

UCSD
Webber
Ballentine
Schwinger

Yet More Quantum Books
Phillips
Rae
Dah

The Interpretations of Quantum Mechanics
Auletta
Baggott
Bell.djvu
Bell.pdf
Bell 2
Braginsky
Laloe
Marquardt
Omnes
Peres
Polkinghorne
Schlosshauer
Schlosshauer 2
Stanford Encyclopedia
von Neumann
Wheeler-Zurek

Homework Problems and Solutions from the Virtual Book

Homework Assignment 1
Chapter 1.1: 26, 27, 29, 33, 34, 36
Chapter 1.2: 27, 30, 32
Correction for 1.1.26b: -10+4i should be -10-4i
Correction for 1.2.27a: det(A)=4 should be det(A)=1
Homework Set 1 Solutions
Homework Set 1b Solutions

Homework Assignment 2
Chapter 1.2: 33, 34, 38, 39, 40

Chapter 1.3: 30, 32, 39, 40
Homework Set 2 Solutions
Homework Set 2b Solutions

Homework Assignment 3
Chapter 2: 33, 34, 36, 38, 41, 42
Homework Set 3.1 Solutions
Homework Set 3.2 Solutions

Homework Assignment 4
Chapter 3: 37, then rework 37 using wavefcn in 31
Chapter 4: 10, 13
Chapter 5: 30, 31, 33
Chapter 3 Solutions
Chapter 4 Solutions
Chapter 5 Solutions

Homework Assignment 5
Chapter 8: 40, 41, 42, 43, 45, 46
Homework Set 5 Solutions
HW Set 5 Figures

Homework Assignment 6
Homework Assignment 6
Homework 6 Hints
Homework Set 6 Solutions
HW 6 Figures

Homework Assignment 7
Homework Assignment 7
Homework 7 Hints
More HW 7 Help
Homework Set 7 Solutions

More Problems and Solutions
Lim
Cahn
Squires
Princeton
Chicago

Tamvakis
Schaum's
Eisberg

2012 Lectures

2011 Lectures
Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18
Lecture 19

Last year's lectures

this year's will be similar

2010 Lectures
Lecture 1
Lecture 2
Lecture 3
Lecture 4

Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Lecture 17
Lecture 18

2009 324 Lectures
Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16
Square Well
Lecture 17
Lecture 18
Lecture 19

SHO-1

SHO-2
SHO-3

Angular Momentum 1
Angular Momentum 2
Angular Momentum 3

Hydrogen 1
Hydrogen 2
Hydrogen 3
Factorization

Path Integrals 1
Path Integrals 2

Feynman Diagrams 1
Feynman Diagrams 2

Reading
Supersymmetry 1
Supersymmetry 2

Shankar Path Integrals
Feynman Path Integrals
Introduction to Path Integrals

Canonical QFT
Nutshell 1
Nutshell 2

Enrico Fermi
Fermi Problems

Feynman

The Quantum Mechanical View of Nature

QED 1

QED 2
QED 3
QED 4
QED 5

QED Videos
QED Simulations

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