Mr. FitzGerald **Physics 312: Quantum Mechanics** **Fall 2019**

Course Information Sheet

Lectures: MWF 11:00 - 11:50 in Wright 114

Instructor: Mr. FitzGerald: Ph: x-8334
Office: Wright 217 or Wright Basement 016
e-mail: stephen.fitzgerald@oberlin.edu

Problem Session: Wednesday Evening 8:00 – 9:00
Office Hours: Send me email with preferred times, and I will try to choose the ones that work the best.

Textbooks:
Required: Introduction to Quantum Mechanics by David J. Griffiths **3rd Edition**
If you have a copy of the 2nd edition that should work, although you may have to occasionally copy problems from the 3rd edition. There are dozens of books in the library on quantum mechanics. Attached is a list of 5 that I have put on reserve in the science library.

Course Description
Quantum mechanics is quite simply the most successful theoretical model the human species has ever devised. Theory and experiment have been found to agree (over and over again) on a whole range of different systems to an amazing level of precision. Quantum mechanics has made many theoretical predictions that at first seemed bizarre but have always been confirmed by experiment. The goal of this course is to introduce you to the tools of quantum mechanics and to show you how to use them on real world systems.

Why quantum mechanics works so well and what it all means is a much more subtle question that we will touch on only briefly.

Grades:

1st midterm (take home Oct 4 - 8)	20 %
2nd midterm (take home Nov 15 -19)	20 %
Final Exam	25 %
Weekly Problem sets	20 %
In-class presentation and class participation	15 %

Exams:
The midterm and final exams will be take home and open book.

Problem Sets:
In general problem sets are handed out on Friday and due the following Friday.
You get to miss/drop one problem set for the semester.
It is a ton of work for the grader so please only ask for any extensions in extraordinary circumstances.

In-class Presentation
These will consist of a 10-15 minute oral presentation, with 5 minutes for questions afterwards. Presentations will be made by pairs of students and should cover a topic in quantum mechanics. You should also prepare a one-page handout to accompany your talk. This should summarize the calculations and derivations used in your talk and will be distributed to the class. The topic is of your own choosing. American Journal of Physics articles are a good place to start for inspiration.

Course Topics: A tentative list of topics and the schedule.

Dates	**Topics**
Sep 4, 5	Ch. 1. Schrodinger Eq. & The Wave Function
Sep 9, 11, 13	Ch. 1. Normalization & Momentum Ch. 2. Schrodinger (time independent) & Stationary states
Sep 16, 18, 20	Ch. 2. Infinite square well & SHO
Sep 23, 25, 27	Ch. 2. Free Particle, Delta-Function, & Finite well
Sep 30, Oct 2, 4	Ch. 3. Linear Algebra and Function space
1st Midterm Exam	
Oct 7, 11	Ch. 3. Uncertainty Principle & Ch. 4. 3-d
Oct 14, 16, 18	Ch. 4. Spherical Coordinates & The Hydrogen Atom
Fall Recess	
Oct 28, 30, Nov 1	Ch. 4. Angular Momentum & Spin
Nov 4, 6, 8	Ch. 5. Identical Particles & Quantum Statistics
Nov 11, 13, 15	Ch. 5 Atoms & Ch. 6. Conservation Laws
2nd Midterm Exam	
Nov 18, 20, 21	Ch. 7. Perturbation Theory
Nov 25, 27	Ch. 7. Fine structure & Zeeman Effect
Dec 2, 4, 6	Entanglement
Dec 9, 11	Special topics and student presentations

HONOR CODE:
Oberlin take's the honor code **very** seriously, and expect the same of its students. You should all be familiar with the honor code (available at http://www.oberlin.edu/~stlife/Honor_Code/Honor_Code.html), and expect your professors to describe its application on their syllabi. In particular, it is essential that you write and sign the honor code on all work you hand in for this class. The Honor Code reads: "I affirm that I have adhered to the Honor Code on this assignment."