

# Physics 481 – Quantum Mechanics II – Syllabus<sup>1</sup>

Spring Semester 2014, University of Hawaii at Manoa

Class meets Tue, Th, 12:00 am – 1:15 pm, Fri 3:30-4:20, Watanabe Hall 114

Instructor:	Prof. Sven E. Vahsen	Phone:	(808) 956 2985
Office:	Watanabe Hall 227A	E-mail:	<a href="mailto:sevahsen@hawaii.edu">sevahsen@hawaii.edu</a>
Office Hours:	Tuesdays 2:30-3:30 pm	Grader:	Sejin Nam
		Recitations:	Jeffrey Schueler <a href="mailto:jschuel@hawaii.edu">jschuel@hawaii.edu</a>

## **Description in Course Catalog**

Continuation of 480; atomic physics, scattering, perturbation theory. Prerequisite: Physics 480.

## **Course Description**

Quantum mechanics got me excited about physics – and I hope to pass on this excitement to you. Quantum mechanics is required to understand phenomena at the atomic scale, and thus is at the heart of modern physics. Although I will do my best to elucidate the material, be warned that Quantum Mechanics can be both mathematically and conceptually difficult. The only way to become proficient is by solving a large number of problems, so expect to work hard. The intellectual rewards are however great. Quantum Mechanics tends to lead to a number of conceptual and philosophical questions. We will begin with the math and problem solving, but stop once in a while to reflect on what it all means. We will occasionally use computer simulations to visualize quantum systems.

## **Prerequisites**

Physics 480.

## **Required Materials**

Textbook: “Quantum Mechanics”, Second Edition, David J. Griffiths. While I believe Griffiths to be a good introduction, and the core of this course is based on it, you may benefit greatly from also referencing other books. There are many books out there. I’d particularly recommend the book by Bransden & Joachain, which is also titled “Quantum Mechanics”, Second Edition.

## **Homework**

Weekly, written homework: Usually assigned Thursdays, and due one week later at the

---

<sup>1</sup> Last modified 2/13/2017. May get updated later in semester.

beginning of class. Honest collaboration is encouraged, but the material handed in must be your own work. **Copying from a solutions manual is strictly prohibited.**

### **Evaluation**

Recitation (10%)  
Homework (15%)  
Two midterm Exams ( $2 \times 20\% = 40\%$ ) (each covering about  $1/3^{\text{rd}}$  of material)  
Final Exam (35%) (cumulative, but emphasis on last  $3^{\text{rd}}$  of course)  
Midterm 1 date: tbd  
Midterm 2 date: tbd  
Final Exam date: tbd

### **Course Outline**

This course is the 2nd half of a 1-year sequence (Physics 480 and 481) that covers most of the material in the textbook by Griffiths. I plan to cover chapters 4.3 through 12 in 481, but will modify the order and skip selected material as needed.

**Chapter 4.3: Angular Momentum.**  
**Chapter 4.4: Spin.**  
**Chapter 5: Identical Particles.**  
**Chapter 6. Time-Independent Perturbation Theory.**  
**Chapter 7. The Variational Principles.**  
**Chapter 8. The WKB Approximation.**  
**Chapter 9. Time-Dependent Perturbation Theory.**  
**Chapter 10. The Adiabatic Approximation.**  
**Chapter 11. Scattering.**  
**Chapter 12: Afterword.**