

Physics 480 – Quantum Mechanics I – Syllabus¹

Fall Semester 2022, University of Hawaii at Manoa
Class: Mon, Wed, Fri 12:30 pm – 1:20 pm, in Watanabe Hall 114

Instructor:	Prof. Sven E. Vahsen	Phone:	(808) 956 2985
Office:	Watanabe Hall 227A	E-mail:	sevahsen@hawaii.edu
Office Hours:	Mondays 3-4 pm, Wat 227A (t.b.c.)	TA:	Majd Ghrear (t.b.c.)

Lecture Format and Rules, incl. Masking requirement

- The current plan is to have all lectures in-person (only).
- We follow the university mask guidance, which states: Students are required to wear masks the entire lecture. The professor may remove their mask while lecturing.
- No cell phones use or texting in class.
- Please interrupt me any time to ask relevant questions. I strongly encourage it.

Course materials

All important course news and materials (such as homeworks) will be sent out via google classroom.

- **If you were enrolled as of August 22, you should have already received an email invitation to join google classroom. Please accept this promptly.**
- **If you are not enrolled yet, instead google classroom at:**

<https://classroom.google.com/c/NDk3NzgwNTU1MjUx?cjc=oxun65p>

You may need the class code, which is: **oxun65p**

Description in Course Catalog

Wave mechanics, Schrodinger equation, angular momenta, potential problems.

Course Description

Quantum mechanics (QM) got me truly excited about physics – and I hope to pass on this excitement to you. Quantum mechanics was originally developed in the early 1900s to understand atomic and sub-atomic phenomena. For example, elementary particles exhibit many phenomena that appear very puzzling from a classical perspective, but which can be understood in a unified way through quantum mechanics.

QM can be mathematically and conceptually difficult. To become proficient requires solving sometimes time-consuming problems, on your own, so expect to work hard. The intellectual rewards are, however, great. QM tends to lead to a number of interesting 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.

Recitations

¹ Version: 8/21/2022.

Under discussion, will be announced later.

Prerequisites

Formal Prerequisites: Physics 274, 310, 350, and MATH 244 or MATH 253A; and MATH 311; or consent. Co-requisite: Physics 400. In practice, you need to be comfortable with linear algebra, complex numbers, differential equations, and probability density functions. **Review Appendices A, B, C in the textbook!**

Required Materials

Textbook: *Quantum Mechanics, A Paradigms Approach* by David H. McIntyre

Homework

Weekly sets of written problems, and occasional reading assignments. Typically, written problems are due one week after assignment, and will be handed in at the beginning of class. Honest collaboration is encouraged, but the **material handed in must be your own work.**

Cheating

Utilizing homework solutions manual or similar help (e.g. websites that may provide you previous exams and homework solutions) will be considered cheating and will be reported.

Learning Goals

- You don't have to know everything in the book.
- You should understand and will be tested on all *material presented in class and/or covered in homeworks.*
- You should be able to independently solve problems of the same difficulty level as the homework.
- The end-of-chapter summaries in the book provide a good overview of the major concepts.
- A more detailed, lecture-level list of concepts will also be developed during the semester.

Evaluation (may be revised – preliminary plan)

Quizzes & Class Participation	10%
Homework	20%
Midterm I	20%
Midterm II	20%
Final exam	30%

Office hours

I want to get to know you, and help you succeed in the class. I strongly encourage you to come to office hours. These will be held online via zoom. These will be scheduled at the optimal time, as determined by the poll. **If you have physics questions, do not ask them via email. Come to office hours to discuss instead. Physics via email is highly inefficient.**

Course Outline

This course is part of a 1-year sequence (Physics 480 and 481) that will cover most of the material in the textbook by McIntyre. I plan to cover chapters 1 through 8 in Physics 480, nominally using the schedule shown on page xvii in the preface of the textbook, but I will adjust the pace as needed. When I teach Phys 481, I tend to substitute scattering and some particle physics for chapters 15 and 16 and will use Griffiths in addition to McIntyre.