

Physics 480 – Quantum Mechanics I – Syllabus¹

Fall Semester 2025, 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
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Office Hours:	time t.b.d.	Grader:	Mae Ling Lewis

Lecture Format and Rules

- Lectures will be in-person.
- Please interrupt me any time to ask relevant questions. I strongly encourage active participation!
- No cell phone or computer use in class.

Course materials and Google Classroom

All course news and materials (such as assignments) will be sent out by me via Google Classroom so it is imperative that you sign up there promptly. You'll also be able to access your homework and test scores on Google Classroom. Google classroom will, however, **not** be used to turn in assignments.

- **If you were enrolled as of August 24, you should have already received an email invitation to join google classroom. Please accept this promptly.**
- **If you are not enrolled yet, join google classroom at:**
<https://classroom.google.com/c/Nzk5NzUzOTkyMjY5?cjc=udris24r>
You may need the class code, which is: `udris24r`

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.

Prerequisites

¹ Version: 8/24/2025.

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. There are two printings of this book, published by Pearson and Cambridge University press. The latter is less expensive, and the contents should be identical.

Homework

Weekly sets of written problems, and occasional reading assignments. Typically, written problems are due one week after assignment, and should be handed in on paper at the beginning of class. Honest collaboration is encouraged, but the **material handed in must be your own work**. Late homework and absence from tests will generally not be accepted unless you have a doctor's note. **Please staple all your homework pages together, have your name on the top of the front page, and show your work for full credit.**

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 scheduled at the optimal time, as determined by the poll.

If you have physics questions, please do not ask them via email. Come to office hours to discuss instead! Physics via email is too 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 7 or 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. If there is time, I will also cover chapter 16 (quantum computing). When I teach Phys 481, I tend to substitute scattering and some particle physics for chapters 15 and use Griffiths in addition to McIntyre.