

Philosophy 4930 Special Topics: Philosophy of Quantum Mechanics Syllabus

Fall 2025

Tuesdays 3:00pm - 4:55pm

Thursdays 4:05pm - 4:55pm

Little Hall, Room 221

Instructor Information

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Office Hours: Thursdays 1:30pm - 3:30pm

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Course Objectives

Quantum mechanics provides us with a spectacularly successful recipe for making predictions about the outcomes of a wide variety of physical experiments. While the intricacies of this recipe are well understood, the implications of its success for the nature of physical reality are not. What could the world be like such that the quantum recipe generates such accurate and reliable predictions of it? To answer this question is to provide an “interpretation” of quantum mechanics, and it will be our central concern in this course. We will begin by examining the basics of the quantum mechanical formalism, with an emphasis on its general structure as opposed to the mathematical details. Then we will explore its possible ontological implications, examining interpretations such as the GRW spontaneous collapse theory, the Many Worlds Interpretation, and Bohmian Mechanics. No prior background in physics is required, though students should be willing to engage with some formalism. Throughout, the goal is to equip students with the relevant background and analytic tools to think critically about the successes and failures of the primary interpretations of quantum mechanics

Student Learning Outcomes

At the end of the course, students will be able to:

- Explain the basic formal structure of quantum mechanics
- Summarize the results of some important quantum experiments
- Articulate what is meant by “quantum non-locality” and the “measurement problem”
- Explain some of the most prominent interpretations of quantum mechanics and problems facing each of them

Canvas e-Learning Environment

This course is supplemented by online content in the e-Learning environment known as "Canvas." To login to the e-Learning site for this course, go to <https://elearning.ufl.edu>, click the **e-Learning in Canvas** button, and on the next page enter your Gatorlink username and password. You can then access the course e-Learning environment by selecting PHIL 4930 from the **Courses** pull-down menu at the top of the page. If you encounter any difficulties

logging in or accessing any of the course content, contact the UF Computing Help Desk at (352) 392-4537. Please do not contact the course instructor regarding computer issues.

Syllabus Policy Links

This course complies with all UF policies. For information on those policies and for a list of campus resources, please see this page: [UF Syllabus Policy Links - Online Course Syllabi - University of Florida](#).

Course Text

There is one required textbook for this course:

- *Quantum Mechanics and Experience*, by David Z. Albert, Cambridge: Harvard University Press.

This book is available from the bookstore and on Amazon for around \$30. The majority of our readings will come from it; some other readings will be provided on Canvas.

Materials and Supplies Fee: N/A

Course Requirements

- Discussion Questions (due every Wednesday by 8pm): **10%**
- In-Class Activities (random, unannounced): **10%**
- Take-Home Exam 1 (due September 14 at 11:59pm): **20%**
- Take-Home Exam 2 (due October 12 at 11:59pm): **20%**
- Take-Home Exam 3 (due November 9 at 11:59pm): **20%**
- Final Paper (due December 7 at 11:59pm): **20%**

Discussion Questions

The weekly schedule for this course will primarily be an interactive lecture on Tuesdays, and discussions on Thursdays. The Thursday discussions will be largely concerned with clarifying aspects of the readings or lectures from earlier in the week. In preparation for this, you will be asked to pick one topic, argument, or explanation from either the reading or lecture for that week that you have a question about. This can be something that you found confusing, or just something that you would like to hear more about. Once you have selected your question, you should post it in the Canvas discussion forum for that week. **Questions should be posted no later than 8:00pm on Wednesdays.** We will aim to answer these questions during class on Friday.

In-Class Activities

In-class activities consist of reading quizzes and small group discussions.

- *Reading Quizzes:* To prepare for class, you will need to study the readings carefully. To reward you for doing this work, there will be occasional unannounced reading quizzes interspersed throughout the semester. Each quiz will contain two or three true-false, multiple-choice, or short answer questions about the required reading for that day's class.

- *Small Group Discussions:* Occasionally I will break the class up into small groups; each group's task will be to come up with an answer to a particular question relevant to that day's material. We will then reconvene to discuss our answers.

If you miss an in-class activity of either sort, you will not be able to make it up, but at the end of the semester ***I will drop your three lowest in-class activity grades.*** If you will miss an in-class activity for a religious holiday or another official university activity, you must notify me ahead of time; if you miss an in-class activity for medical reasons, you must provide me with a doctor's note. Activities missed for religious holidays, official university activities, or medical reasons will *not* count toward your three drops for the semester as long as appropriate and timely documentation is provided.

Take-Home Exams

There are three take-home exams on the schedule. For each one, the exam prompts will be provided at least a week before the due date. You will have to choose a subset of them, and answer each with either a short essay or algebraic manipulations of the quantum formalism. The questions will concern the readings and topics we have discussed in class, and will typically ask you to explain a given argument, position, or concept (i.e. your goal should be to illustrate your understanding of the relevant material). While you may discuss the question prompts with other students, ***you may not work with anyone else, including AI chatbots, on the preparation of your answers.*** Late exams will be deducted 1/3 of a letter grade (i.e. a +/- increment) for each day past the due date.

Final Paper

At the end of the course you will be asked to write a final paper. You will have the option of several prompts to choose from, and will need to answer one of them with a sustained argument. In contrast to the take-home exams, the final paper is intended to give you a more significant opportunity to develop your own views and arguments. Again, ***you may not work with other students or AI chatbots on the composition of your paper.***

Grading

The following grade scale will be used to assign final letter grades for the course. Numerical grades will be rounded to the nearest whole number to determine the final letter grade. See UF grading policies for assigning grade points at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Grade Scale	Grade Value
100-93=A	A=4.0
92-90=A-	A-=3.67
89-87=B+	B+=3.33
86-83=B	B=3.00

82-80=B-	B-=2.67
79-77=C+	C+=2.33
76-73=C	C=2.00
72-70=C-	C-=1.67
69-67=D+	D+=1.33
66-63=D	D=1.00
62-60=D-	D-=0.67
59-0=E	E=0.00

Course Schedule

The following is a tentative schedule for the course. Any changes to the schedule will be announced on Canvas. The syllabus is divided into weeks; the items listed for a given week are to be read before classes that week.

Week 1: August 21

- Elizabeth Gibney, "Physicists Can't Agree on What Quantum Mechanics Says about Reality" *Scientific American*. (Provided on Canvas)
- No discussion questions this week

Week 2: August 26, 28

- *Quantum Mechanics and Experience*, Chapter 1: Superposition, pp. 1-16

Week 3: September 2, 4

- *Quantum Mechanics and Experience*, Chapter 2: The Mathematical Formalism, pp. 17-43

Week 4: September 9, 11

- *Quantum Mechanics and Experience*, Chapter 2: The Mathematical Formalism, pp. 43-60
- **Take-Home Exam 1 due by Sunday, September 14 at 11:59pm (submit on Canvas)**

Week 5: September 16, 18

- *Quantum Mechanics and Experience*, Chapter 3: Nonlocality, pp. 61-72
- Tim Maudlin, *Quantum Non-Locality and Relativity*, pp. 12-19 (on Canvas)

Week 6: September 23, 25

- *Quantum Mechanics and Experience*, Chapter 4: The Measurement Problem, pp. 73-79

Week 7: September 30, October 2

- *Quantum Mechanics and Experience*, Chapter 5: The Collapse of the Wavefunction, pp. 80-111

Week 8: October 7, 9

- Tim Maudlin, *Philosophy of Physics: Quantum Theory*, pp. 110-121 (on Canvas)
- **Take-Home Exam 2 due by Sunday, October 12 at 11:59pm (submit on Canvas)**

Week 9: October 14 (No class October 16)

- *Quantum Mechanics and Experience*, Chapter 6: The Dynamics by Itself, pp. 112-133

Week 10: October 21, 23

- Tim Maudlin, *Philosophy of Physics: Quantum Theory*, pp. 173-204 (on Canvas)

Week 11: October 28, 30

- *Quantum Mechanics and Experience*, Chapter 7: Bohm's Theory, pp. 134-155

Week 12: November 4, 6

- *Quantum Mechanics and Experience*, Chapter 7: Bohm's Theory, pp. 155-179
- **Take-Home Exam 3 due by Sunday, November 9 at 11:59pm (Submit on Canvas)**

Week 13: November 13 (November 11 is Veteran's Day—no class)

- TBD/Make-up Days
- No discussion questions this week

Week 14: November 18, 20

- TBD

Week 15: December 2

- Course wrap-up
- No discussion questions this week

Final Paper due by Sunday, December 7 at 11:59pm (submit on Canvas)

Course Bibliography

- Albert, David. 1992. *Quantum Mechanics and Experience*. Cambridge, MA: Harvard University Press.
- Gibney, Elizabeth. 2025. "Physicists Can't Agree on What Quantum Mechanics Says about Reality." *Scientific American*. Accessed at: <https://www.scientificamerican.com/article/physicists-divided-on-what-quantum-mechanics-says-about-reality/>
- Maudlin, Tim. 2011. *Quantum Non-Locality and Relativity, Third Edition*. Malden, MA: Wiley-Blackwell.
- Maudlin, Tim. 2019. *Philosophy of Physics: Quantum Theory*. Princeton, NJ: Princeton University Press.