

# QUANTUM PHYSICS

Physics 8101    Tu & Th    Period 3    11:10 - 12:25    Room 254    Fall Semester 2021

Physics 8101/8102 is two-semester advanced quantum physics course covering both traditional topics and new developments from a modern perspective.

*Part 1: Closed Systems.* Two-state systems. Larger Hilbert spaces. Entanglement. Operators. Applications of entanglement. Quantum measurement. Time-evolution and Schrödinger equation. Simulation. Unitary group. The quantum particle. Momentum. Harmonic oscillator. Symmetry. Angular momentum and rotations. Frame transformations. Perturbation theory. *Part 2. Open Systems.* Density matrix. Superoperators. Master equations. Entropy. Decoherence. *Part 3: Advanced Topics.* Elementary particles. Quantization. Quantum field theory.

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Office Hours            After class and by appointment  
Room 251 Physics Building

## Required Course Materials

The following textbook is required for this course: “Modern Quantum Mechanics” (second edition) by J. J. Sakurai and J. Napolitano. Earlier editions of this book are also acceptable.

## Homework

Homework problems will be assigned during class. The problems may be quite challenging and you are permitted and encouraged to work together. The midterm and final exams will be partly composed of problems similar to the homework. Homework assignments and due dates will be given in class and there will be no credit for late homework. Some homework assignments require programming in Python.

## Exams

There will be one midterm and a final exam. The midterm and final exams will be closed book and closed notes. Calculators are not allowed. The use of laptops, tablets, or other computers is forbidden. Texting or the use of mobile phones during exams is considered cheating. There will no make-up exams given, regardless of whether or not the absence is excused and approved by the university. If a student has an approved absence on the midterm date, their final exam grade will also be used for their midterm grade. Exams are property of the Department of Physics and Astronomy and will be available for viewing but are not returned.

The midterm exam will be during our regular class period on **Thursday October 7** in our regular classroom. The final exam will be on the last day of class **Tuesday December 7** during our regular class period on in our regular classroom.

## Grading

Your final grade will be determined according to:

Homework	40%
Midterm exam	30%
Final exam	30%

If for any reason you do not take the midterm, your final exam score will be used in place of your midterm score.

The grading scale is as follows (points rounded to the nearest integer):

A	89 - 100%
A-	86 - 88%
B+	83 - 85%
B	79 - 82%
B-	76 - 78%
C+	73 - 75%
C	69 - 72%
C-	66 - 68%
D	50 - 65%
F	0 - 49%

## Academic Honesty

All academic work must meet the standards contained in the document *A Culture of Honesty*, available at <https://honesty.uga.edu>. Every student is responsible for knowing and understanding this policy. If you have any questions concerning this you are obligated to ask me for clarification. Anyone caught cheating will be reported to the university and will receive an F for the course.

## General Information

This syllabus is a general plan for the course and deviations may be necessary. You are responsible for attending every lecture. Each student is responsible for the material discussed in class and the announcements made in class. Absence from class does not relieve one of this responsibility.