FLORIDA POLYTECHNIC UNIVERSITY

Welcome to PHY 4603 – Quantum Mechanics 2

This course is the second in a two-course sequence covering the fundamental principles of quantum mechanics and serves as a physics elective for the Engineering Physics major, Physics major, and Physics minor.

Course Information

- **Course Number and Title:** PHY 4603 Quantum Mechanics 2
- **Credit Hours:** 3 (lecture)
- **Academic Term:** Spring 2026

Course Details

Meeting Information: BARC 1142 Tuesdays and Thursdays 11:00 AM - 12:15 PM (75 minutes)

Official Catalog Course Description:

- **Course Description:** This is the second course in a two-semester sequence. This course covers the application of fundamental quantum mechanical principles to complex systems. This includes developing an understanding the principles involved in many-particle systems, along with introducing methods for approximate solutions including perturbation theory, the variational principle, the WKB approximation, and the adiabatic theorem
- **Prerequisite**: PHY 3602 – Quantum Mechanics 1

Required Texts and Materials:

- **Required Text: Introduction to Quantum Mechanics by David J. Griffiths, 3rd Edition, Cambridge University Press (ISBN: 978-1107189638)**
- **Equipment and Materials:** Scientific calculator (required for homework, quizzes, and exams). Canvas (Instructor Notes, Practice Tests, and Grades). University Email for any relevant reminders and updates.

Course Objectives: This course (through lecture, student coursework, etc.) is intended to:

- **Extend** existing knowledge of physical concepts (e.g., The Particle-Wave Duality, Heisenberg's Uncertainty Principles, Schrodinger's Time-independent Equations),
- **Apply** an understanding of fundamental quantum principles to solve realistic problems,
- **Refine** methodologies to derive a clear and concise solution from provided information.

Course Learning Outcomes: Upon completion of the course, students should be able to

- **Synthesize** knowledge of mathematics and physics applied to the Quantum Mechanical principles,
- **Integrate** scientific knowledge and **discuss** scientific information through a discussion forum and group assignments, and
- **Create** accurate solutions based on physical principles that are relevant to the realm of quantum mechanics.

Alignment with Program Outcomes:
Program Learning Outcomes and General Education Competencies may be found in the Academic Catalog (http://catalog.floridapoly.edu/).

Student Learning Outcomes (SLO) Table

Course Learning Outcome	Bloom's Learning Level	ABET Learning Outcome	PLO
Synthesize knowledge of mathematics and physics applied to Quantum Mechanical principles	**Apply and Analyze** Execute Implement Differentiate Organize	**1** an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	1
Integrate scientific knowledge and **discuss** scientific information through a discussion forum and group assignments		**1** an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **3** an ability to communicate effectively with a range of audiences	**2**
Create accurate solutions based on physical principles that are relevant to the realm of quantum mechanics	**Evaluate** Check Critique	**1** an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics **7** an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	**2**

Course Policies

Requirements and Evaluation

Your grade will be based on:

(5%) Class participation and attendance,
(10%) Reading Assignments/Quizzes,
(20%) homework,
(45%) three exams with each worth 15% of final grade, and
(20%) final exam.

Grading Scale

Below is the grading scale that will be used in the course. (See also University Grading Policy).

	90%> B+ >87%	80%> C+ >77%	70%> D+ >67%	
A >93%	87%> B >83%	77%> C >73%	67%> D >60%	F <60%
93%>A- >90%	83%> B- >80%	73%> C- >70%		

Course Schedule

The course schedule listed below is tentative and subject to change as a result of extreme weather conditions, changes made by the registrar's office or for some other unforeseen reasons. Any updates to this schedule will be announced in class and on Canvas.

Book sections, indicating the appropriate general material to be covered, are provided for accompanying reading. Hower, the lecture content will not necessarily correspond exactly to the content from the textbook.

Week (Dates)	Sections and Topics	Reading Assignments/Quizzes	Homework
1 (January 13, 15)	Chapter 5.1 Two-particle systems	**RA1**	**Homework 1**
2 (January 20, 22)	Chapter 5.2 -5.2.1 Atoms and Helium	**RA2**	**Homework 2**
3 (January 27, 29)	Chapter 5.2.2 – 5.3.2 Periodic Table, Solids, and Band Structure	**RA3**	**Homework 3**
4 (February 3, 5)	Chapter 7.1 Nondegenerate Perturbation Theory **Exam 1 Review**	**RA4**	**Homework 4**
5 (February 10 Career Day, No Classes, 12)	**Exam 1 (Thursday, February 12)**		
6 (February 17, 19)	Chapter 7.2 Degenerate Perturbation Theory	**RA5**	**Homework 5**
7 (February 24, 26)	Chapter 7.3 The Fine Structure of Hydrogen	**RA6**	**Homework 6**
8 (March 3, 5)	Chapter 7.4 The Zeeman Effect and Chapter 7.5 Hyperfine Splitting	**RA7**	**Homework 7**
9 (March 10, 12)	Chapter 11.1 Two-Level Systems, Chapter 11.2 Emission and Absorption of Radiation and Chapter 11.3 Spontaneous Emission	**RA8**	**Homework 8**
10 (March 17, 19)	Spring Break - No Classes		
11 (March 24, 26)	**Exam 2 Review** **Exam 2 (Thursday, March 26)**		
12 (March 31, April 2)	Chapter 8.1 Theory and Chapter 8.2 the Ground State of Helium	**RA9**	**Homework 9**
13 (April 7, 9)	Chapter 9.1-9.2 The "Classical" Region and Tunneling	**RA10**	**Homework 10**
14 (April 14, 16)	Chapter 9.3 Connection Formulas Chapter 11.5 The Adiabatic approximation	**RA11**	**Homework 11**
15 (April 21, 23)	**Exam 3 Review** **Exam 3 (Thursday, April 23)**		
16 (April 28, Last Day of Class)	**Final Exam Review**		
17 (May 4-8)	**Final Exam (Date TBD)**		

Attendance and Participation

- **Students in this course are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor"** (University Policy, FPU-5.0010AP).
- A+ Attendance will be used to track attendance. Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.
- Students should not come to class if they are feeling ill. Students who are experiencing an emergency situation that aligns with an academic exercise of consequence (e.g., /a Common Exam) should work with CARE Services at care@floridapoly.edu.
- If you must miss class for a justifiable reason, then please make sure that the absence is excused in a timely manner.
- You will receive a ½% percent deduction from your final grade for each unexcused absence, after the first 2, or for any failures to respond in class, up to the 5% total allocated to attendance.

Homework and Reading Assignments

There are two types of assignments that need to be completed on Canvas throughout the semester.

- The reading assignments are intended to provide some quick checks of terminology and simple use of

equations, both of which are included in the chapter summary at the end of each chapter. These are due at the end of the week (11:59 pm on Sundays). These assignments consist of a list of key terms that are to be defined.

- The homework assignments consist of approximately 6 problems for which your clear and concise solution must be uploaded. These are commonly due at the beginning of the week (11:59 pm on Mondays, with two exceptions).

Exams

There will be three semester exams, and a comprehensive final exam.

- The semester exams will be conducted in class, unless otherwise specified.
- You must bring a calculator for every exam.
- Make-up exams will be given only in extreme circumstances with a documented excuse. If you miss an exam because you are sick or participating in a college-sponsored activity, inform your instructor before the exam and provide your instructor with documentation.
- The final exam grade may replace the lowest exam grade if it benefits the overall grade in the course. Note: All exams are required. The final exam will not replace a 0 from a missed exam.

Solutions to Free Response Problems

You will see a demonstration of algebraic manipulation of equations during the lectures. For the free response homework and exam problems, include an algebraic solution before the quantities and units are placed in. The following is a checklist for what is looked for in a complete and correct solution:

- the correct initial equations/justifications/diagrams are used,
- the mathematical steps are correct, and an algebraic solution is determined,
- all units and scientific notation are properly substituted, and
- the numeric solution is boxed with the correct units.

Late Work

- Contact your instructor if you need an extension of a homework or reading assignment for a justifiable reason.
- Late homework or reading assignments that have not been excused will not receive credit.

Official Email Address

Florida Polytechnic University email is the official method of communication for the University. Students are required to check their email frequently (at least once per day). We cannot reply to any email received from an address other than those that end in floridapoly.edu.

University Support and Policies

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations. Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more details, visit floridapoly.edu/writingcenter.

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodation for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodation.

If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodation is not retroactive.
If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: http://www.floridapoly.edu/disability

Accommodation for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is ***prohibited****.*