Sule Lamido University, Kafin Hausa
Faculty of Natural and Applied Sciences
Department of Physics
2019/2020 Second Semester

Course Title: Quantum Mechanics II **Course Code:** PHY 434 **Credit Unit:** 3

Course Staff:

Lecturer: Prof. Y. I. Yola

Room Number: A5

Laboratory Instructor: Mal.

Course Prerequisites: 435

Lecture Period: Wednesday, 04:00 pm – 06:00 pm

Lecture Venue: Lecture Room 6

Reference Texts:

1. **Principles of quantum mechanics** 2nd ed, 1994, Plenium Press, ISBN: 0-306-44790-8, ***by Ramamurti Shankar***.
2. **Quantum Mechanics: A modern and concise introductory course,** 3rd ed, Springer, ***by Daniel R. Bes***
3. **Quantum mechanics for scientist and engineers,** 2007, Cambridge University Press, ***by David Miller***
4. **Quantum mechanics concepts and applications,** 2nd ed, 2009, Wiley, ISBN: 978-470-02678-6, ***by Nouredine Zettili.***
5. **Introduction to quantum mechanics,** 2004, Wiley, ***by A. C. Philips.***

Lecture Notes: Lecture guides will be given to the class representative at least a day before each lecture.

Course Objectives:

The objectives of the course are as follows:

1. To develop concepts in quantum mechanics such that the behavior of the physical universe can be understood from a fundamental point of view.
2. To provide a basis for advanced study of quantum mechanics.
3. To discuss and elaborate the time-independent perturbation theory.
4. To explain the basic concept of scattering theory: elastic potential scattering, Green's function and partial wave methods.
5. To define and discuss selected phenomena from each of atomic physics, molecular physics, solid-state physics and nuclear physics.

6. To describe the concept of atomic physics, molecular physics, solid-state physics nuclear physics and then interpret them using quantum mechanical models.

Measurement of Course Outcome:

At the end of the course lectures, a student will be able to:

1. Explain and derive the time-independent perturbation theory.
2. Define and explain the basic concept of scattering theory.
3. Briefly describe and derive the expression for Green's function and partial wave methods.
4. Define and explain the phenomena of atomic physics, molecular physics and solid-state physics.
5. Describe and make calculations using quantum mechanical models.

Course Grading:

1. Assignment / Project:**10%**
2. Continuous Assessment Tests: **30%**
3. Final Examination: **60%**

General Information:

1. Students must attend a minimum of 70% of the total lecture hours in order to be eligible to write the final exam. Students should notify the course staff of any intended absence from a lecture or laboratory at least a day prior to such lecture or laboratory. In a situation where the student is ill, an official documentation should be obtained from the university clinic.
2. The continuous assessment tests will be conducted in the weeks five and ten of the semester; thereafter, lecture commence for the week.
3. The final examination timetable will be as scheduled by the Faculty. Students are expected to liaise with the Sub-dean of the faculty to make sure that there are no clashes on their examination schedule.
4. Students are encouraged to meet with course staff to sort out any administrative and academic issues they may have relating to the course.
5. Students will be expected to fill out an online course assessment form, midway through the semester to get a feedback of what their lecture and laboratory experiences have been.
6. Students are encouraged to collaborate on assignments but every student must do the assignment on their own. It is important for student to note that cheating or any kind of academic dishonesty will not be tolerated and will be met with harsh punishment by the university administration if discovered (Please refer to student handbook).

Lecture Schedule

Lect. No.	Date	Topic
1	Week 1	Course Administration and general review of the course
2	Week 2	Time-independent perturbation theory
3	Week 3	Scattering theory
4	Week 4	Elastic potential scattering.
5	Week 5	Green's function and partial wave methods.
6	Week 6	**(Test 1)** partial wave methods.
7	Week 7	Selected phenomena from atomic and molecular physics.
8	Week 8	Selected phenomena from solid-state physics.
9	Week 9	Selected phenomena from nuclear physics.
10	Week 10	**(Test 2)**
11	Week 11	Interpretation quantum mechanical models in atomic and molecular physics
12	Week 12	Interpretation quantum mechanical models in Solid-state and nuclear physics
13	Week 13	General Course Revision