THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Physics

PHY 305 - Introduction to Use of Computers in Natural Resources

COURSE PARTICULARS

Course Code: PHY 305
Course Title: Quantum Physics
No. of Units: 3
Course Duration: Two hour of theory and one hour of tutorial per week for 15 weeks.
Status: Compulsory
Course Email Address: PHY305@gmail.com
Course Webpage: http://www.fwt.futa.edu.ng/courseschedule.php?coursecode=FWT%20204
Prerequisite: NIL

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course serves an introduction to Quantum physics. It covers the experimental basis of quantum physics, introduces wave mechanics, Schrödinger's equation in a single dimension, and Schrödinger's equation in three dimensions. It is designed primarily for students in Physics and applied disciplines. However, it also meets the need of students in other fields. Topics to be covered include some mathematical review and postulates of quantum mechanics.

COURSE OBJECTIVE

The objectives of this course are to:

- introduce students to modern physics
- provide students with opportunities to develop basic advanced physics skills necessary for solving quantum mechanical problems.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:

(Knowledge based)

- understand the process leading the development of quantum mechanics (Origins of Quantum Physics)
- classify and explain the basic difference between classical and quantum mechanics;
- understand purpose and use of mathematical tools of quantum mechanics;
- solve the Schrodinger equation for simple 1D and 3D systems;

(Skills)

- applying mathematical and physics skills to solve modern physic problems

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	5%
Assignments	5%
Test(s)	30%
Final Examination	60%
TOTAL	**100%**

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be kept and used to determine each person's qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person's work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

Assignments and Group Work: Students are expected to submit assignments as scheduled. Failure to submit an assignment as at when due will earn you zero for that assignment. Only under extenuating circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

Code of Conduct in Lecture Rooms and Laboratories: Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc*.) during lectures. Food and drinks are not permitted in the laboratories.

READING LIST

[1] Nouredine Zettili (2009). Quantum Mechanics Concepts and Applications. Second Edition. John Wiley and Sons, Ltd., Publication, USA. 692p.

[1] Alastair I. M. Rae (2002). Quantum Mechanics. Fourth Edition, IOP Publishing Ltd, UK 295p.

[2] David K Ferry (2001). *Quantum Mechanics An Introduction for Device Physicists and Electrical Engineers*. Second Edition. IOP Publishing Ltd. 295p, UK. 355p.

Legend
1- Available in the University Library
2- Available as Personal Collection

COURSE OUTLINE

Week	Topic	Remarks
1	Wave particle duality and the uncertainty principle	During this first class, the expectation of the students from the course will also be documented.
2 & 3	Basic principles of quantum theory	Tutorial session will be introduced.
4 & 5	The time dependent and time independent Schrodinger equation	
6	Applications of the Schrodinger equation to the free particle problem	
7 & 8	Particle in the infinite and finite potential well	MID-SEMESTER TEST
9 & 10	Solution of the Schrodinger equation for a three dimensional box and its applications	

11 & 12	The simple harmonic Oscillator and its applications	
13 & 14	Reflection and transmission of the wave function through a finite potential barrier and its applications	
15	REVISION	This is the week preceding the final examination. At this time, evaluation will be done to assess how far the students' expectations for the course have been met.