THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of physics

PHY201 – Elementary Modern Physics

COURSE PARTICULARS

Course Code: PHY 201
Course Title: Elementary Modern 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: phy201@gmail.com
Course Webpage: http://www.phy.futa.edu.ng/courseschedule.php?coursecode=PHY%20204
Prerequisite: PHY102

COURSE INSTRUCTORS

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COURSE DESCRIPTION

Modern Physics was developed over the first four decades of the 20th century, following the surprising failure of classical physics to provide a consistent description of the behaviour of light and matter on the atomic scale. It forms the backbone of many other areas of physics. It is therefore important to understand the basic principles underlying classical physics, before proceeding to modern physics which is a rich discipline that provides foundation knowledge about how high tech devices work as well as illuminates myriads of emergent phenomena that seem to be of fundamental interest on many intellectual levels and in our daily lives.

COURSE OBJECTIVES

It is expected that at the end the course students will,

- Become familiar with many important concepts of the modern physics via relative motion, inertia frame of reference, events, Galilean transformation and Lorentz transformation etc.
- Be able to appreciate how the world looks when you are moving…fast.

COURSE LEARNING OUTCOMES / COMPETENCIES

Students in this course will:

(Knowledge based)

- Gain an understanding of the fundamental laws that govern the behaviour of the universe.
- Be able to describe and explain some of the basic concepts in modern physics.

(Skills)

- Know that much of the modern technology depends on modern physics, and not only important for understanding the physics of the atom.
- Learn a process for critical thinking, and apply it to evaluate physical theories

This course will be graded as follows:

[1]Class Attendance/Quizzes	10%
Assignments	10%
Test(s)	20%
Final Examination	60%
TOTAL	**100%**

[1] Quizzes on current topic will be randomly given during the lectures (No makeup or extension). This will be strictly enforced.

GENERAL INSTRUCTIONS

Attendance: It is expected that every student come to class ON time. No or limit all discussions to the physics topic under discussion. Attendance records will be kept and used to determine each person's qualification to sit for the final examination. The university recognises that a student may miss a class for legitimate reasons. In such cases, the absences are excusable; however, student must communicate as soon as possible with the course lecturer, indicating the reason(s) 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 by 4.30 p.m. on the due date. Failure to submit an assignment, as at when due, will earn you zero for that assignment. All assignment should be done on A4, plain or rule papers of the same size. Be sure that you can do the assignments by yourself. If you need help with your assignment, you can please visit me with proof that you have tried the problems (along with your note book). Only under extenuating circumstances, for which a student has notified the lecturer-in-charge in advance, will late submission of assignments be accepted. **THERE ARE NO MAKEUPS FOR ANYTHING!** No exams, no quizzes, no assignments.

Code of Conduct in Lecture Rooms and Laboratories: All electronic devices are banned during lectures. This includes all cell phones, pagers, radios and other disruptive devices 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 class.

READING LIST

Text: [1,4,5] Modern Physics for Scientists and Engineers, by Thornton and Rex, Third Edition. ISBN 0-534-41781-7.

References:
[4] Modern Physics (2nd edition) by Serway, Moses, and Moyer (published by Brooks/Cole: ISBN 0-03-001547-2)
[4] Schaum's Outline of Modern Physics by Ronald Gautreau (published by McGraw-Hill: ISBN 0-07-024830-3)
[4] Modern Physics by Paul Tipler 5th Edition.

Legend
1- Available in the University Library
2- Available in Departmental/School Libraries
3- Available on the Internet.
4- Available as Personal Collection
5- Available in local bookshops.

COURSE OUTLINE

Week	Topic	Remarks
1	Introduction and Course Overview History and Evolution of Modern Physics	During this first class, the expectation of the students from the course will also be documented.
2 & 3	• Relativity • Defects of Newtonian mechanics • The speed of light • Michelson-Morley Experiment	• Why relativity? • Be able to define inertial frame and other relativity terms • Explain the implication of the null result.
4 & 5	• The Galilean and Lorentz transformations • Consequences of Lorentz transformations	• Be able to state Einstein's postulates • Understand the various consequences of LT. • Understand the correspondence principle **Mid Semester Test #1**
6 & 7	• The Quantum Theory of Light • Experimental basis of quantum theory • Blackbody radiation	• Inadequacies of classical physics • Be able to explain photoelectric effect
9 & 10	• Electrons and Quanta • Bohr's theory of atomic structure	• Classification of quanta • Understand the development of atomic theories. • Solve problems related to emission and absorption spectra of atoms • Solve problems using Bohr's postulates
11	De Broglie hypothesis • The Particle Nature of Matter • Matter Waves	• Wave-particle duality • Is light a wave or a particle?
12	Uncertainty principle and its implications	• Understand the implications of this concept
13	Schrodinger's equations, wave functions and simple applications	• Solve simple problems involving Schrodinger's equations
14	Revision	**Mid Semester Test #2**