THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Physics

PHY 415 – Digital Electronic

Course Code: PHY 415
Course Title: Digital Electronics
No. of Units: 3
Course Duration: Three hours per week for 15 weeks.
Status: Compulsory
Course Email Address: tewetumo@futa.edu.ng
Course Webpage: http://www.fwt.futa.edu.ng/courseschedule.php?coursecode = PHY310
Prerequisite: PHY210, PHY202, PHY315, PHY310

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course is a continuation course of basic electronics designed primarily for students in Physics disciplines. It also meets the need of students to design circuit for various applications up to automobile system control, etc. The focus is to impart useful skills on the students in order to enhance their appreciation of digital electronics and technological advancements and prepare them for other specialised applications to be encountered at higher levels. Topics to be covered include the transistor as switch, power dissipation base over-drive storage drive and switching speed, logic gates: NAND, OR with close logic, the TTL AND GATE. Truth table, noise margins, to-tem pole, open collector and tri-state, TTL, CMOS, NMOS, ECL Combinational systems, Boolean algebra, identities, de Morgan's law Karnaugh maps. Quine McChusky minimisation by computer aided techniques. The half and full adder. Flip-flop; R-S, J-K, and D types edge and level trigger, master-slave, the shift register. Circuit techniques. Oscillation sine wave amplitude control sequencing frequency stability, waveform discrimination, practical ramp generators. Conversion techniques, frequency to voltage, analogue digital, D to A. Termination of pulsed lines, Beageron diagram. Low noise amplifier design. Use of discrete components for minimum noise.

COURSE OBJECTIVES

The objectives of this course are to:

i. To understand basic digital electronic design procedure and necessary requirement; and
ii. The understand will assist students to applied in communication design, instrument design, automobile electronic design and other area of electronic application.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:
(Knowledge based)

- Understanding of binary number system is essential
- Introduces to special code used in digital system handling decimal number representation;
- Understand logic function, relating logic circuit inputs and outputs, are described and manipulated using Boolean algebra, a special from of algebra that allows symbolic representation of logic levels;
- Introduces into basic digital storing techniques and basic digital counting processes;

(Skills)

The student will

- transfer knowledge to practical class when encounter problem and applied appropriate techniques theoretical to solve the digital circuit problem.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

i.	Assignment	10%
ii.	Test	25%
iii.	Attendance	05%
iv.	Final Examination	60%
v.	Total	100%

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures. 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 lecturers 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 lecture room.

READING LIST

[1,2,3]Paul Horowitz and Winfield Hill (1995): *The Art of Electronics*. Published by Cambridge, Second edition.United Kingdom 1125p.

[3] Gupta B. R. (2003): *Electronics and Instrumentation*.Published by S. Chand and Company Ltd, New Delhi, India 520p.

[1,3]B. L. Theraja and R. S. Sedha(2003): Principle of Electronic Devices and Circuits (Analog and Digital), S. Chand & Company LTD, New Delhi.

[1,3]J.R. Nowicki and L.J. Adam (1990): Digital Circuits, Edward Arnold, London.

Legend
1- Available in the University Library
2- Available in Departmental/School Libraries
3- Available as Personal Collection

COURSE OUTLINE

TIME	TOPIC	LECTURER	Assignment submission/Time for test
1ST WEEK	The transistor as a switch, power dissipation, base over and switching speed. Logic gates: AND, OR, NAND, NOR, EX-OR, EX-NOR consider truth tables of each gate.	Dr. Ewetumo	All assignment should be submitted by 12 noon on every Friday.
2nd Week	TTL (Diode-transistor logic, transistor-transistor logic,), P-channel metal oxide semiconductor logic, N-channel metal oxide semiconductor logic, complementary metal oxide semiconductor logic, High speed CMOS, Emitter-coupled logic and integrated injection logic		
3rd Week	Combinational system: Boolean Algebra, identities, De-Morgan's law		
4th/5th Week	Combinational system cont'd: K-map and Quinne McClusky minimization by computer aided techniques.		
6th/7th Week	The half and full adder. Flip-flop: R-S, J-K and D types. Register and circuit techniques (counter technique: asynchronous and synchronous counter)		
8th/9th Week	Oscillator sine wave amplitude control, frequency stability, waveform discrimination.		
10th Week	Conversion techniques: frequency to voltage, staircase generation,		
11th /12th Week	Conversion techniques cont'd: digital to analogue		
13th Week	Conversion techniques cont'd: analogue to digital		
14th Week	Low noise amplifier. Use of discrete components for minimum noise		
15th Week	Revision		