THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Physics

PHY 419 – Introduction to Telecommunications systems

COURSE PARTICULARS

Course Code: PHY 419
Course Title: Introduction to Telecommunications systems
No. of Units: 3
Course Duration: Three hours of theory per week for 15 weeks.
Status: Compulsory
Course Email Address: phy419@gmail.com
Course Webpage: http://www.phy.futa.edu.ng/courseschedule.php?coursecode=phy%20204
Prerequisite:

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course is an introductory course to the basics of Telecommunication systems. It discusses the techniques of modulation of radio signals, TV and Radio systems, propagation lines, telephone instruments, transmission networks, radar and navigational aids, and data transmission. The course is designed to expose students to the fundamentals of telecommunication systems so as to have basic knowledge of the application of radio-waves in communication. Students are also exposed to the electronics of the different parts of telephone system and the process of making a call. The applications of basic physics in the operations of telecommunication equipments using basic laws of electromagnetic theory and radio-wave propagation. Topics to be covered are Modulation, Radio and T.V. systems, Telephone instruments, Transmission Line losses, radar and navigational aids, data networks and data transmission.

COURSE OBJECTIVES

The objectives of this course are to:
- introduce students to the basics of telecommunications systems;
- provide students with adequate information on the applications of radio-waves in communication, and transmission lines.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:
(Knowledge based)
- understand the basic principles guiding the operations of Radio and T.V. systems, Telephone instruments, radar and navigational aids.

- Understand the process of information transmission at higher frequencies (modulation) in the electromagnetic spectrum via radio, wire, or fibre optic cable.

(Skills)
- Know that radio-waves/signals can propagate in free space or in a transmission line or waveguide; and should be able to determine the propagation parameters for any transmission line, such as:
  - Phase constant;
  - Attenuation constant;
  - Wave velocity;
  - Characteristic impedance;
- the conditions for transmission line theory to be applicable and determine the loss associated with any transmission line.
- adequate knowledge of frequency allocation policies: ranges and specifications for different applications, such as radios, satellite communications, cellular phones, police radar, burglar alarms, and navigation beacons.
- Understand the principle of operation of telephone instruments and the process of making a call

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	10%
Assignments	10%
Test(s)	20%
Final Examination	60%
TOTAL	**100%**

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures tutorial classes. 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 the lecturer.

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 during lecture hours.

READING LIST

[4] Barclay, L., (2003). *Propagation of Radio-waves (2nd edition).* The Institution of Electrical Engineers. London. U.K. 103-127pp

[4]Kai Cang, (2000): RF and Microwave wireless systems. John Wiley, inc. Publishers, New York.

Web site:

www.wiley.com

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.

Modulation, Radio and T.V. systems, Telephone instruments, Transmission Line losses, radar and navigational aids, data networks and data transmission.

COURSE OUTLINE

Week	Topic	Remarks
1	Introduction and Course Overview Modulation techniques: AM and FM	During this first class, the expectation of the students from the course will also be documented.
2 & 3	Modulation contd. • Power in AM and FM • Phase modulation	Practical examples will be sited e.g. local broadcasting stations: AM and FM stations. Numerical problems will be considered.
4 & 5	Information transmission • Parallel transmission • Serial transmission • Data network configuration • Ring network • Star network • Tree network • Local area network(LAN) • Wide area network(WAN) • Metropolitan area network(MAN)	Students will be encouraged to look for examples networks in their locality. Applications of LAN and WAN on transmission lines on campus will be shown to students.
6	Noise in communication Internal noise External noise	
7 & 8	Transmission lines • Transmission line equation • Lossless lines • Lossy lines • Transmission line constants	Problems involving calculations of impedance, propagation constant, velocity of signals on transmission lines, will be solved and relevant assignment given to students. MID-SEMESTER TEST
9 & 10	Radar • Operations of radar • Radar equation • Types of radar	Applications of Radar and relevant calculations will be involved.

11 & 12	Telephone instruments • Parts of a telephone • Simple Calculations •	Students will be guided to solve numerical problems on transmission lines.
13 & 14	Transmission networks • Data transmission • Digital transmission • Analogue transmission • Multiplexing •	Advantages of digital transmission over analogue will be discussed.
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.