TEL3111 COMMUNICATION THEORY

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

Rationale

He course introduces the student to the theory of communication systems

Course Objectives

By the end of the course students should be able to:

- understand signals and systems in communication and the analysis of such signals in communication systems.
- Understand principles of principles of information theory, communication theory, signal transmission, filtering and modulation
- Distinguish between different types of noise and transmission systems
- Analyse characteristics of signals and effect of noise in communication systems

Detailed Course Content:

Signal analysis and Signal Models: **[6 Hours]**

Communication systems components and definitions: analog and digital systems; communication channels and their characteristics; bandwidth, distortion, noise and other impairments. Periodic and non-periodic signals; transform theorems and power spectra;

Random Processes and Noise: **[7 Hours]**

Review of Random Processes, Noise sources, noise as a random process, noise figure and noise temperature; noise models.

Modulation/Demodulation: **[12 Hours]**

Analog modulation processes: amplitude modulation, double sideband suppressed carrier, single sideband, vestigial sideband; frequency modulation, phase modulation; frequency discriminator and the envelope detector; AM and FM receiver; pre-emphasis and de-emphasis filtering; FM threshold effect; comparison of angle and linear modulation systems.

Pulse modulation processes: **[10 Hours]**

Amplitude shift keying, phase-shift keying and frequency-shift keying; quadrature AM (QAM) and quaternary PSK (QPSK); M-ary FSK and PSK; Frequency-Division Multiplexing (FDM) and Time-Division Multiplexing (TDM); Acoustic transducers.

Introduction to information transmission theory: **[10 Hours]**

Measure of information; channel capacity; Hartley-Shannon theorem; quantization noise; probability of error in data transmission; S/N performance of a PCM system; multiple access problems

Learning Outcomes

On completion of this course the student will be able to:

- Describe various Amplitude modulation and demodulation systems.
- Describe various Angle modulation and demodulation systems.
- Describe in depth and analyse in noise performance of various receivers.
- Understand some basic information theory with some channel coding theorem

Method of Teaching /Delivery

The course will be taught by using lectures, tutorials and assignments.

Mode of Assessment

Assignments, tests and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, tests)	40
% Final examination	60
% **Total**	**100%**

Recommended and Reference Books

[1] Simon Haykin, Communication Systems, John Wiley & sons, NY, 4th Edition, 2001. [2] Roddy and Coolen, Electronic communication, PHI, New Delhi, 4th Edition, 2003. [3] Taub and Schilling, Principles of communication systems, TMH, New Delhi, 1995. [4] Bruce Carlson et al, Communication systems, McGraw-Hill Int., 4th Edition, 2002.

Possible Lecturers:

Dr. J. Butime
Dr. D. Okello
Dr. Ing. L. L.
Kaluuba Mr. D.
Nsubuga Mubiru
Mr. S. Mwanje
Mr. A Wasswa Matovu
Mr. D. Sebbaale
Mr. I. Kitone