ELE2201 ENGINEERING MATHEMATICS IV

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
60	0	00	60	100	60	40	4

Rationale

The course introduces students to probability and statistics and provides advanced engineering mathematics concepts and analysis of complex variables.

Course Objectives

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

- Enhances their knowledge of engineering mathematics concepts
- Apply engineering mathematics concepts and theorems to electrical engineering
- Apply stochastic methods to model engineering systems
- Apply estimation theory to simulate engineering processes and systems

Detailed Course Content:

Complex Variable Analysis: [15 Hours]

Limits and derivatives of functions of a complex variable. Analytic functions; Cauchy-Riemann's equations and harmonic functions; rational, exponential, trigonometric and hyperbolic functions of a complex variable, logarithms of functions of a complex variable; mappings and conformal mappings; linear transformations in the complex plane; line integrals in the complex plane, cauchy's integral theorem for evaluation of line integrals; cauchy's integral formula for evaluation of residues at zeros and poles; application of theory of functions of a complex variable to solve boundary value problems and telecommunications engineering.

Dicrete Mathematics: [7 Hours]

Probability and statistics: [20 Hours]

Discuss the professional responsibilities of statisticians; use/abuse of statistics in science; statistics and scientific method. Basic concepts in statistics sampling, sample quality, unbiased samples, types of samples, data frames; target population, graphical data displays; frequency distributions; measures of central tendency measures of dispersion. Rules of probability; counting techniques-permutations, combinations. The binomial and poison distribution; properties of binomial distribution; the normal distribution; the poison distribution; fitting theoretical distribution to sample frequency distributions; use of standard normal tables; simple regression and correlation analysis; curve fitting and method of least squares; statistical inferences.

Stochastic processes: [12 Hours]

Definition of stochastic/random process, qualitative discussion of examples of stochastic processes: poisson process. Markov process Brownian process, digital modulation using phase-shift keying; stationary and ergodic processes; power spectral density(PSD); properties of PSD, PSD applied to base band signals; PSD of white noise; Gaussian random processes and their application in communication theory.

Estimation theory: [6 Hours]

Parameter estimation; maximum likelihood parameter estimation; estimation of random variables.

Mode of Delivery

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

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%**

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] Hwei Hsu. *Probability, Random Variables & Random Processes*. Schaum's Outlines. ISBN 0-07-030644-3

[2] Yannis Viniotis. *Probability & Random Processes for Electrical Engineers,*McGraw Hill.

[3] Papoulis. *Probability, Random Variables & Stochastic Processes*, 3rd Edition., McGraw Hill.

[4] Jorge I Aunon, V. Chandrasekar: *Introduction to Probability & Random Processes*, McGraw Hill

[5] Venkatarama Krishnan, 2006. *Probability and Random Processes* (Wiley Survival Guides in Engineering and Science), Wiley-Interscience; 1 Edition. ISBN-10: 0471703540, ISBN-13: 978-0471703549

[6] Donald G. Childers, 1997. *Probability and Random Processes: Using Matlab with Applications to Continuous and Discrete Time Systems*. Richard D Irwin. ISBN-10: 0256133611, ISBN-13: 978-0256133615

[7] Leon Garcia, 1993. *Probability and Random Processes for Electrical Engineering*. Addison Wesley Publishing Company; 2 Sol Edition. ISBN-10: 020155738X, ISBN-13: 978-0201557381

[8] Roy D. Yates, David J. Goodman, 2004. *Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers*. Wiley; 2 Edition. ISBN-10: 0471272140, ISBN-13: 978-0471272144

Possible Lecturers:
Dr. E. Lugujjo
Dr. T. Togboa
Dr. M. K.
Musaazi Ms. M.
Tumwebaze Mr.
P. I. Musasizi