

Mata Kuliah (MK)	Course Name	: Probability, Statistics, and Stochastic Processes
	Code	: EE184405
	Credits	: 4
	Semester	: IV

Description of Course

In this course students will learn the principles and methods of statistics and stochastic processes and their applications in electrical engineering. First part describes the visual and qualitative descriptions of data, probabilities, discrete and continuous random variables, probability distributions, combined distributions, random sampling, parameter estimation, statistical intervals, hypothesis testing, and linear regression. In addition, an experimental design and analysis of measurement data will be discussed. Whereas in the second part explained the concept of stochastic processes, continuous and discrete linear system analysis with the help of the concept of probability and stochastic processes both in the time and frequency domains and the Markov process.

Learning Outcomes

KNOWLEDGE

(P01) Mastering the concepts and principles of science and engineering mathematics, and implementing them in the form of procedures for analysis and design in power systems, control systems, multimedia telecommunications, or electronics.

SPECIFIC SKILL

(KK01) Able to formulate engineering problems in power systems, control systems, multimedia telecommunications, or electronics.

GENERAL SKILL

(KU01) Able to apply logical, critical, systematic and innovative thinking in the context of development or implementation of science and technology that concerns and implements the value of humanities in accordance with their area of expertise.

(KU02) Able to apply logical, critical, systematic and innovative thinking in the context of development or implementation of science and technology that concerns and implements the value of humanities in accordance with their area of expertise.

ATTITUDE

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently

Course Learning Outcomes

KNOWLEDGE

Mastering concepts and principles of statistic and their application to analysis and design electric power systems, control systems, multimedia telecommunications, or electronics.

Mastering the concept of probability, the concept of random variables, the concept of random processes in electrical systems, the characteristics of the LTI system both continuous and discrete if given random process input, as well as the concept of the Markov process

SPECIFIC SKILL

Able to design experiments with statistical principles and analyze measurement data statistically.

Able to model random phenomena in electrical systems, conduct discrete-time and continuous-time system analysis with the help of probability and stochastic models and be able to use continuous and discrete Markov chain concepts.

GENERAL SKILL

Able to use software, for example: Excel, Matlab, etc. to perform statistical analysis and stochastic processes.

ATTITUDE

Demonstrate an attitude of responsibility for work in his area of expertise independently.

Main Subjects

1. Introduction and application of statistics in electrical engineering
2. Descriptive statistical representation of data with numerical and graphical techniques: histograms, pie charts. Location, distribution and variability.
3. Basic concepts of probability, conditional probabilities, random variables, probability distributions, combined distributions.
4. Parameter estimation, sampling distribution, and middle limit theorem, confidence interval for parameters for one sample
5. Hypothesis test
6. Linear regression: assumption of the model. The least-squares method
7. Experimental design and statistical analysis of problems in electrical engineering
8. Random Process
9. Linear Time Invariant (LTI) response with Random Input
10. Markov Chain

Reference(s)

- [1] William M. Mendenhall & Terry L. Sincich, "Statistics for Engineering and the Sciences," 6th ed., CRC Press, 2016.
- [2] Jay L. Devore, "Probability and Statistics for Engineering and the Sciences," 9th ed., Cengage Learning, 2016.
- [3] Richard A. Johnson, "Probability and Statistics for Engineers," 9th ed., Pearson, 2018.
- [4] Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, & Keying Ye, "Probability and Statistics for Engineers and Statistics," 9th ed., Prentice Hall, 2012.
- [5] Roy D. Yates & David J. Goodman, "Probability and Stochastic Processes, A Friendly Introduction for Electrical and Computer Engineers", 3rd ed, John Wiley.

Prerequisite(s)

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