

COURSE	Name	: Statistical Methods and Optimization
	Code	: EE185101
	Credit(s)	: 2
	Semester	: I

Description of Course

In this course, students learn the two main topics: (1) statistical methods needed to design research as well as to analyze and interpret the measurements and simulations; (2) the basics and methods of optimization needed to find solutions to various technical problems encountered in research, for example: linear programming, convex optimization, iterative methods, optimization inspired by nature: genetic algorithms, etc.

Learning Outcomes**Knowledge**

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

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

Course Learning Outcomes**Knowledge**

Mastering the concepts and methods of statistical analysis of measurement data and mastering the optimization method to solve problems in engineering in the field of electrical engineering

Specific Skill

Able to design experiments and calculate statistical analysis on measurement data and be able to define optimization problems and find optimal solutions

General Skill

Able to use software and tools for statistical analysis and optimization, e.g. Matlab and R.

Attitude

Show the attitude of being responsible for the work in his/her area of expertise independently.

Main Subjects

1. Introduction
2. Descriptive statistics
3. Experimental design
4. Univariate, multivariate and variance analysis
5. Application of statistical methods
6. Optimization problems
7. Mathematical optimization
8. Completion of analytical optimization
9. Completion of numerical optimization
10. Dynamic programming
11. Introduction to meta-heuristics and evolutionary algorithms

Reference(s)

- [1] William M. Mendenhall & Terry L. Sincich, "Statistics for Engineering and the Sciences," 6th ed., CRC Press, 2016.
- [2] Jay Devore, "Probability and Statistics for Engineering and the Sciences," 9th ed., CENGAGE Learning, 2016.
- [3] William Navidi, "Statistics for Engineers and Scientists," 3rd ed., McGraw-Hill, 2011.
- [4] Jorge Nocedal & Stephen J. Wright, "Numerical Optimization," 2nd ed., Springer, 2006.
- [5] Edwin K.P. Chong & Stanislaw H. Zak, "An Introduction to Optimization," 4th ed., John Wiley & Sons, 2013
- [6] Omid Bozorg-Haddad, Mohammad Solgi, Hugo A. Loaigiga, "Meta-Heuristic and Evolutionary Algorithms for Engineering Optimization," John Wiley & Sons, 2017.

Prerequisite(s)

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