ROWAN UNIVERSITY
Department of Mathematics

Syllabus
Math 01.517 - Engineering Probability and Statistics

COURSE DESCRIPTION:

Math 01.517 Engineering Probability and Statistics, 3 s.h.

Students in this course will be introduced to various mathematical and statistical models and techniques for analyzing data. This will include summarizing data; using probability distributions to model processes; using interval estimation for population parameters based on sample data; designing and performing tests about population parameters based on sample data; identifying and applying regression models that describe the relationship between a dependent variable and one or more independent variables.

OBJECTIVES:

Students in this course will become familiar with various mathematical models and statistical techniques of analyzing data.

At the end of this course, students will be able to:

1. summarize and present data using numerical measures and graphical techniques,
2. use the different probability distributions of random variables to model processes,
3. use interval estimation for population parameter (s) based on sample data,
4. design and make tests of hypothesis about population parameter (s) based on sample data, and
5. identify regression models that describe the relationship between a dependent variable and one or more independent variables.

TOPICAL OUTLINE:

Topics that may be covered include.

1. Introduction to probability: Axiomatic definition, conditional and joint probabilities, Bayes' theorem and applications, combinatorics.
2. Random variables: Probability density functions, some special discrete and continuous random variables, expected value of a random variable, moment generating functions.
3. Vector valued random variables: Joint distributions and densities, covariance matrices and transformations.
4. Descriptive statistics: Random sampling, measures of location and variability of data, graphical representation of data.
5. Estimation and Hypothesis Testing: Sampling Distributions, the Central Limit Theorem, interval estimation, parametric and nonparametric tests in making inferences.

6. Regression models: Correlation, description of the model, linear, polynomial and multiple regression.
7. Some applications: estimation of failure rates, failure time distribution models, quality control calculations.

TEXTS:

The following books may be used as texts for the course.

   I.   Devore, Jay (1982) Probability and Statistics for Engineering and the Sciences, Brooks/Cole.

   II.   Milton, J. S. and Arnold, J. C., (1995), Introduction to Probability and Statistics: Principles and Applications for Engineering, McGraw-Hill.

   III.   Kennedy, J. B., and Neville, A. M., (1986), Basic Statistical Methods for Engineers and Scientists, 3rd edition, Harper and Row.

   IV.   Miller, I. R., Freund, J. E., and Johnson, R., (1990), Probability and Statistics for Engineers, 4th edition, Prentice-Hall.

Reviewed: 04/2021