ROWAN UNIVERSITY
Department of Mathematics

Syllabus
STAT 02.360 - Probability/Random Variables

CATALOG DESCRIPTION:

STAT 02.360 Probability/Random Variables 3 s.h.
(Prerequisites: Math 01.231 Calculus II and Math 01.150 Discrete Math with a grade of C- or better in both)

An introduction to the theory and application of mathematical statistics at the post-calculus level. After a brief introduction to the concepts of descriptive statistics, the emphasis is on probability theory and its applications. Topics covered include sample spaces, random variables, discrete and continuous probability distributions, mathematical expectation, and multivariate distributions. Use of a graphing calculator is required.

OBJECTIVES:

Students will gain skills in using the theory of probability, combinatorics, and probability distributions to model applications. They will be able to recognize and apply many discrete and continuous probability distributions. They will derive and use moment generating functions, and study discrete and continuous random variables in enough depth to prepare them for the study of the Central Limit Theorem in Mathematical Statistics.

CONTENT:

1. **Descriptive Statistics**

2. **Elementary Probability**

2.1 Axiomatic approach
2.2 Combinatorics
2.3 Probability theorems
21.4 Bayes' theorem

3. **Discrete Probability Distributions**

3.1 Discrete random variables
3.2 Expected values of a random variable and functions of a random variable
3.3 Binomial distribution
3.4 Geometric and negative binomial distributions
3.5 Hypergeometric distribution
3.6 Poisson distribution
3.7 Moment generating functions

4. Continuous Probability Distributions

4.1 Continuous random variables
4.2 Expected values of a random variable and functions of a random variable
4.3 Uniform distribution
4.4 Normal distribution
4.5 Gamma and exponential distributions
4.6 Beta distribution
4.7 Moment generating functions.

5. Multivariate Probability Distributions

5.1 Multivariate distributions
5.2 Marginal and conditional distributions
5.3 Independent random variables
5.4 Expected values for functions of random variables
5.5 Covariance and correlation
5.6 Linear Functions of random variables

POSSIBLE TEXTS:

Hastings, Probability and Statistics. Pearson, Boston, 1997.

Hogg and Tannis, PROBABILITY AND STATISTICAL INFERENCE, 8th edition. Pearson, Boston, 2010.

Larsen and Marx, An Introduction to Mathematical Statistics and Its Applications, 5th edition. Pearson, Boston, 2012.

Mendenhall, Wackerly, and Schaeffer, MATHEMATICAL STATISTICS with APPLICATIONS, 7th edition, Brooks/Cole, Belmont, CA, 2008.