INTRODUCTION TO PROBABILITY & STATISTICS I

MATH 4740/8746

Course Description:

A mathematical introduction to probability theory including the properties of probability; probability distributions; expected values and moments, specific discrete and continuous distributions; and transformations of random variables. **3 credits**

Prerequisites:

MATH 1970 and either MATH 2230 or MATH 2030

Overview of Content and Purpose of the Course:

The student should gain a solid foundation in elementary probability theory and should be ready to apply it to a statistical inference in MATH 4750/8756.

Major Topics:

1. Probability Theorem
- a) Properties of probability
- b) Conditional probability
- c) Independence
- d) Bayes theorem

2. Discrete Distributions
- a) Probability distribution functions and cumulative distribution functions
- b) Mean and variance; moment-generating functions
- c) Marginal and conditional probability distributions
- d) Some specific discrete distributions

3. Continuous Distributions
- a) Probability density functions and cumulative distribution functions
- b) Mean and variance; moment generating functions
- c) Marginal and conditional probability distributions
- d) Some specific continuous distributions

4. Functions of Random Variables
- a) Distribution function technique
- b) Transformation technique
- c) Moment-generating function technique

Methods:

The class will be presented by lecture; class discussion and questions; and problem assignments, possibly including the use of statistical software packages.

Textbook:

Miller, M. Miller. *John Freund's Mathematical Statistics, 8th ed*. Upper Saddle River: Prentice Hall, 2014.

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