Spring 2013

DEPARTMENT OF MATHEMATICS

SYLLABUS

I. MATH 435 - MATHEMATICAL STATISTICS II - 3 Credits

II. Catalog Description

A continuation of Mathematical Statistics I. Functions of random variables, sampling distributions, point estimation, interval estimation, hypothesis testing theory and applications. Prerequisite: MATH 335

III. Objectives

A. To permit interested students to complete material begun in MATH Stat I.

B. To prepare students for study in more specific areas of statistics (e.g. experimental design, linear models, sampling theory, distribution theory, non-parametric statistics, regression analysis, analysis of variance).

C. To prepare students who desire to continue a study of statistical theory and applications I graduate school

D. To provide sufficient background in the application of estimation theory and hypothesis testing to students for whom this course may be terminal.

IV. Course Outline

A. Functions of Random Variables
   1. Distribution function technique
   2. Transformation of variable technique
   3. Moment-generating function technique

B. Sampling Distributions
   1. The distribution of the mean
   2. The distribution of the mean: finite populations
   3. The chi-square distribution
   4. The t distribution
   5. The F distribution
   6. Order statistics

C. Point Estimation
   1. Point estimation
   2. Unbiased estimators
   3. Consistent estimators
   4. Sufficient estimators
   5. The method of moments
   6. The method of maximum likelihood

D. Interval Estimation
   1. Confidence intervals for means
   2. Confidence intervals for differences between means
   3. Confidence intervals for proportions
   4. Confidence intervals for differences between proportions
   5. Confidence intervals for variances
   6. Confidence intervals for ratios of two variances

E. Hypothesis Testing: Theory
   1. Statistical hypotheses
   2. Testing a statistical hypothesis
   3. Losses and risks
   4. The Neyman-Pearson lemma
   5. The power function of a test
   6. Likelihood ratio tests

F. Hypothesis Testing: Applications
   1. Tests concerning means
   2. Tests concerning differences between means
   3. Tests concerning variances
   5. Tests concerning differences among k proportions
   6. Contingency tables
   7. Goodness of fit

V. Suggested Text

John E. Freund's Mathematical Statistics, 8th Ed., by Miller & Miller, Pearson, 2014.

VI. General Education Credit

This course cannot be taken for general education credit.

Date 4/05/13

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