

Revised June 8, 2009, references updated May, 2021.

Each student must pass a series of three written comprehensive examinations: Exam I (Mathematical Statistics), Exam II (Applied Statistics option) or Exam II (Probability option), and Exam III (Topics in Statistics and Probability)

Syllabus for Exam I

Random variables, functions of random variables, characteristic function, moment generating function, distribution theory, random vectors.

Standard distribution and their properties.

Limiting theorems.

Sampling distributions: exact and asymptotic. Sample moments, functions of moments.

χ^2 , t , F distributions. Distributions of quadratic forms.

Point estimation, methods of estimation, properties of estimates. Rao-Blackwell

Theorem. Completeness. Uniqueness. Interval estimation.

Testing of hypotheses. Likelihood ratio tests. Most powerful and u.m.p. tests.

Power function. Neyman-Pearson Lemma.

Bayesian methods (11.1 of reference below). Order statistics.

Reference: Hogg, McKean and Craig (2019). Introduction to Mathematical Statistics (eighth edition)

Syllabus for Exam 2 (applied statistics option)

Regression: Simple and Multiple Regression.

Estimation. Hypothesis Testing.

Model selection(forward, backward, stepwise). Diagnostics

Multiple and partial correlation.

Logistic regression.

Analysis of Variance: One and two way classification. Multiple comparisons.

Analysis of Covariance.

Reference: Kutner, Nachtsheim, Neter (2004) or Neter, Wasserman, and Kutner (1990) Applied Linear Statistical Models- 4th (or 3rd) Edition

Sampling: Simple random, stratified and systematic sampling. Ratio and regression estimates.

Reference: Lohr, (2010 or 1999) Sampling: Design and Analysis (Chapters 1-4) or Cochran (1977, 3rd ed) Sampling Techniques. Chapters 1-8.

Analysis of Categorical Data: Goodness of fit. One and two way tables.

Reference:

Agresti (1996 or 2007): An Introduction to Categorical Data Analysis (Chapters 1,2)