

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
SYLLABUS (Tentative)
MATH 414/514 Mathematical Statistics II

Objective: To learn how to construct and compare statistical estimators with an emphasis on proofs, formal reasoning and communicating mathematics in writing. In particular, introduce how statistics supports the theory of inference.

Intended for: Students in Mathematics or Physical Sciences.

Prerequisite: Mathematical Statistics I (MATH 413).

Text: "Introduction to probability and mathematical statistics" by Bain and Engelhardt, Cengage Learning, 2nd edition.

	Hours
<i>Limiting distributions</i>	6.0
Sequences of random variables, further study of the central limit theorem, asymptotic normal distributions	
<i>Sampling Distributions</i>	6.0
Linear combinations of Normal random variables, the Chi-Square distribution, the t, F, and beta distributions, derivations and proofs of such distributions.	
<i>Point estimation</i>	12.0
Method of moments, maximum likelihood estimation, criteria for evaluating estimators (UMVUE, CRLB, relative efficiency, consistency), and development of proofs to show that estimators have such properties. Bayes and minimax estimators	
<i>Sufficiency and completeness</i>	4.0
Sufficient statistics, and properties, complete statistics, exponential class	
<i>Interval estimation</i>	9.0
Confidence intervals, development of confidence intervals through pivotal quantities, One and two sample problems, Bayesian interval estimation	
<i>Testing</i>	11.0
Tests for normal distribution, significance level and power of the test, Neyman-Pearson Lemma, Likelihood Ratio Tests, Uniformly most powerful tests, applications selected from classical tests	
<i>Categorical Data and Nonparametric</i>	4.0
Chi-Square Tests, Simpson's Paradox, robust estimation, sign and rank	
<i>Tests</i>	4.0
<i>Total</i>	56.0

*Graduate students will be assigned special homework/test problems or projects.

NOTE: ONCE A STUDENT HAS RECEIVED CREDIT, INCLUDING TRANSFER CREDIT, FOR A COURSE, CREDIT MAY NOT BE RECEIVED FOR ANY COURSE WITH MATERIAL THAT IS EQUIVALENT TO IT OR IS A PREREQUISITE FOR IT.