Statistics 421   H(3-0)   Mathematical Statistics

(see Course Descriptions under the year applicable: http://www.ucalgary.ca/pubs/calendar/)

Syllabus

Topics	Number of hours
Review – Common univariate distributions; use of cdf, mgf, pdf; variable transformations (Jacobians, graphical domain transformation); distribution of order statistics.	2
Multivariate Normal Distribution (MVN) - Definition, mgf, joint marginals, and constant density contours; distributions of linear combinations of MVN random variables.	3
Limit Distributions - Concept of a degenerate distribution; convergence in distribution (use of the cdf, mgf); convergence in probability; proof of the CLT; use/proof of Slutsky's theorem.	5
Sufficiency and Completeness - Concept of a sufficient set of statistics, factorization theorem; Rao-Blackwell theorem; concept of a complete family of distributions; completeness and uniqueness (Lehmann-Scheffe theorem); minimal sufficient and ancillery statistics; completeness and independence (Basu's theorem); minimum variance unbiased estimation; Cramer-Rao inequality.	8
Exponential family of distributions	2
LR Tests - A review of the Neyman-Pearson lemma; the Likelihood Ratio test; power of a test, uniformly most powerful test; noncentral t, chi-square, and F distributions.	5
Normal Models - Cochran's theorem on quadratic forms (no proof); chi-square tests; analysis of variance.	5
Additional Topics - Selections from the following topics should constitute about 6-8 hours: sequential tests; general linear model; nonparametric tests (sign, Wilcoxon); Bayesian statistical inference. Topics should be selected in	6

accordance with class interests in mind, and emphasize applications.

TOTAL HOURS   **36**

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Date: August, 2013
Creator: DPMS