UNIVERSITY OF CALGARY

FACULTY OF SCIENCE
Department of Mathematics and Statistics

Statistics 421 Mathematical Statistics

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

Reference Texts: (not necessarily required texts)

1. Hogg & Craig, Introduction to mathematical statistics
2. Casella & Berger, Statistical Inference

Syllabus

Topics	**Number of Hours**
Review – Handouts with examples, review problems on: common univariate distributions; use of cdf, mgf, pdf; variable transformations (Jacobians, graphical domain transformation); distribution of order statistics.	**2**
Multivariate Normal Distribution definition, mgf, joint marginals, 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 review of likelihood ratio, Neyman-Pearson lemma; power of a test, uniformly most powerful test; noncentral t, chi-square, 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 theory	**6**
TOTAL	**36**

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2000:04:19 PFE
Calendar change H(3-1T) to H(3-0); Prerequisite change Fall 2009