



Statistics 323 (3 – 1T)

Introduction to Mathematical Statistics

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

## Syllabus

<u>Topics</u>	<u>Number of hours</u>
<b>Introduction to parameter estimation using an estimator/statistic:</b> Properties of estimators/statistics, including unbiasedness, bias, and the mean square error of a statistic.	4
<b>Confidence interval estimation:</b> Pivotal quantities. Large sample confidence interval estimation of the population mean and proportion. Confidence interval estimation of the population variance, ratio of population variances, difference between population means, population proportions.	6
<b>Functions of random variables:</b> Change of variable and method of moment generating functions. Coverage to include both univariate and bivariate cases. Order statistics and their applicability to parameter estimation.	6
<b>Distributions of Statistics:</b> revisit the Central Limit Theorem. The derivation of the chi-square, t, and F distribution. Derivation of the distribution of the sample variance.	4
<b>Efficacy of estimators/statistics:</b> the relative efficiency, consistency. Methods of obtaining estimators/statistics including the method of moments and maximum likelihood estimation.	4
<b>Hypothesis Testing:</b> Developing formal hypothesis tests using discrete and continuous distribution theory. Type I and Type II errors. P-values. Applications to both single parameter and bi-parameter cases. Uniformly most powerful tests and the Neyman Pearson Lemma.	6
<b>Simple Linear Regression Analysis:</b> correlation, least-squares estimation, inference for estimated coefficients, coefficient of variation and analysis of variance. Derivation of the F-test. Model assessment and prediction of the response variable. Bivariate Normal Distribution.	6
<b>TOTAL HOURS</b>	<b>36</b>

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