UNIVERSITY OF
CALGARY

The Department of Mathematics and Statistics

STATISTICS 357
"STATISTICS FOR THE PHYSICAL SCIENCES"

Calendar Description: H(3-1T)

Exploratory data analysis. Fundamentals of probability. Discrete and Continuous distributions. Introduction to statistical reasoning. Interval estimation. Hypothesis testing. Simple and multiple linear regression. Experimental design. Analysis of variance. Factorial design.

Prerequisite: Mathematics 249 or Mathematics 251.

Software: MINITAB (latest version)

Suggested Text: Applied Statistics for Engineers and Scientists.D.M.Levine, P.P.Ramsay, R.K.Smidt.

Syllabus

Topics	Number of Hours
Chapter 1: Populations and samples; Descriptive Statistics: Measures of Center, Spread, and Relative Standing; Visual Exploratory Data Analysis. Introduction to Probability, including a treatment of independence, conditional probability, Bayes' Theorem.	7
Chapters 2, 3, and 4: Probability Models, their expected value and variance. Discrete probability models to include: Binomial, Poisson. Continuous models to include the Normal, Exponential, Log-Normal, and Weibull distributions. The Central Limit Theorem and its applications.	6
Chapters 6 and 7: Estimation. Confidence interval estimation of the mean and proportion. Emphasis on the Wilson estimate of p. Sample size considerations.	2
Chapter 8 : Hypothesis testing. Testing on the mean (T-test) and the proportion. P-value – using the p-value to make a decision. Interpretation of p-values. Type I, Type II error, Power of a test.	5
Chapters 9 and 15: Two Sample Inference: Hypothesis testing comparing two population means, proportions. Confidence interval estimation. Wilcoxon Mann Whitney test. Matched pairs experimental design: Paired T-test and Wilcoxon Signed Rank test.	5
Chapters 12 and 13: Regression: Simple to include Pearson's r, method of least-squares, test of linear appropriateness, inference on coefficients, confidence interval estimation of the response variable. Multiple to include selection of the best model, interaction terms, test of coefficients. Log-Linear regression.	7
Chapters 10 and 11: Experimental Design: One-Way Analysis of variance, multiple comparisons to include Tukey's and Dunnett's. Randomized block design and two-way ANOVA. Factorial Design, Nested Factorial Design. *	4
TOTAL	36