UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: June 1994
COURSE REVISED IMPLEMENTATION DATE: September 2006
COURSE TO BE REVIEWED: November 2010
(Four years after implementation date) (MONTH YEAR)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Science, Health & Human Services / Mathematics & Statistics**

MATH 451		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Parametric Statistical Inference
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

A course on the ideas, nomenclature and techniques of the main schools of parametric statistical inference, namely, likelihood, Neyman-Pearson, Bayesian. The general similarities of the inferences made by each school will be emphasised, but inference situations which are controversial will also be discussed. This course is directed towards students specialising in either mathematics or statistics.

PREREQUISITES: **Math 450, or MATH 270 and (MATH 280 or MATH 460) and MATH 211 and at least two upper-level courses.**
Effective September 2006, the prerequisites will be: MATH 450.

COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: _____ *(Course #)* for further credit.

SERVICE COURSE TO:
_____ *(Department/Program)*
_____ *(Department/Program)*

TOTAL HOURS PER TERM: **60**

STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: _____
HOURS PER DAY: _____

MAXIMUM ENROLLMENT: **36**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **every second year**
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only) ☐ Yes ☒ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department) ☐ Yes ☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: ☐ Yes ☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): _____ Math Curriculum Committee
Chairperson: _____ *(Curriculum Committee)*
Department Head: _____
Dean: _____ JD Tunstall
PAC Approval in Principle Date:
PAC Final Approval Date: December 10, 2004

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

This course is designed to enable students to be familiar, in a straightforward manner, with the standard tools of parametric statistical inference, excluding linear model theory. These will include:

1. The method of likelihood.

2. The frequency or Newman-Pearson approach. Where possible, the sampling distribution approach will be illustrated by simulation.

3. Bayesian inference.

In addition, there will be discussion about special problems and techniques, such as: conditional and marginal likelihoods, conditional tests, exact tests, the problem of the relevant reference set.

In particular, the general similarities of the inferences made by each school of thought will be emphasised, but inference situations which are controversial will also be discussed.

METHODS:

Lecture

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Course challenge. Please check online at http://www.ucfv.ca/math/challenge.htm for the departmental challenge policy.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

The text is chosen by a departmental curriculum committee.

Recent texts:

Kalbfleisch, JG. Probability and Statistical Inference, Valume 2: Statistical Inference.

Mood, Graybill & Boes. Introduction to the Theory of Statistics

Lindley, DV. Introduction to Probability and Statistics, from a Bayesian Viewpoint. Part 2: Inference.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments	10%
Midterm exams	30%
Final exam	60%

Students must achieve at least 40% on the final exam in order to receive credit for this course.

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

1. Likelihood methods: likelihood, method of maximum likelihood, score and information functions, relative likelihood and contour maps, likelihood regions and intervals, continuous models, censoring, invariance, transformations, normal approximations, numerical methods.

2. Frequency or Neyman-Pearson methods: sampling distributions (use of computer where possible), expected (or Fisher) information, the likelihood ratio statistic, Pearson's chisquare approximation, confidence intervals, tests of significance, power, unbiasedness, uniformly most powerful tests. The sequential probability ratio test. Sample size estimation

3. Special cases: nuisance parameters, the problem of the number of parameters increasing with the sample size, conditional and marginal likelihoods, residual maximum likelihood estimation, sufficient and ancillary statistics, the exponential family, conditional tests, exact tests, the reference set. [Fiducial inference, if time allows.]

4. Bayesian inference: prior and posterior distributions, posterior intervals, Bayesian significance testing - the Bayes' factor, predictive distributions and intervals, setting the prior distribution - simple priors, invariance priors, conjugate priors, quantification of prior knowledge, priors for multi-parameter situations, exchangeability; the Gibb's sampler; empirical Bayes. Sequential experimentation. Sample size estimation with prior information and costs.

5. Discussion of competing inferences in common situations.