UNIVERSITY COLLEGE of the FRASER VALLEY



COURSE IMPLEMENTATION DATE: July 1994
COURSE REVISED IMPLEMENTATION DATE: September 2005
COURSE TO BE REVIEWED: September 2009
(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 420** | | **3** |
|---|---|---|
| COURSE NAME/NUMBER | FORMER COURSE NUMBER | UCFV CREDITS |

**Empirical & Non-Parametric Statistics**
COURSE DESCRIPTIVE TITLE

### CALENDAR DESCRIPTION:

Empirical and non-parametric statistics are used either when little can be assumed about the underlying distribution or when the underlying distribution is very complex. These methods are based on order statistics, rankings, or re-sampling, and are very useful when a relatively quick answer is required.

PREREQUISITES: **MATH 211 and MATH 270**
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: | **30** | Hrs |
| Seminar: | | Hrs |
| Laboratory: | **30** | 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 two years.**

| | | |
|---|---|---|
| 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: Gillian Mimmack *(Curriculum Committee)*
Department Head: Gillian Mimmack
Dean: Jacalyn Snodgrass
PAC Approval in Principle Date:
PAC Final Approval Date: December 10, 2004

**LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:**

The course is designed to introduce students to a range of techniques that do not conveniently fall into one of the standard schools of inference. The successful student will:

1. develop a theoretical framework in order to use order statistics and empirical distribution functions;
2. use order statistics and empirical distribution functions in inferential procedures;
3. use inferential procedures based on randomization and rank-randomization;
4. obtain estimates of variances using bootstrap and jack-knife resampling procedures;
5. demonstrate an understanding of simple standard measures of bivariate association.

**METHODS:**

Lectures, class discussion, use of statistical software in computing labs.

**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 textbook is chosen by a departmental curriculum committee. Recent texts used:

Gibbons & Chakraborti. Nonparametric Statistical Inference. 3rd edition. Marcel Dekker.

Choulakian, Lockhart, and Stephens. Cramer-von Mises Statistics for Discrete Distributions. The Canadian Journal of Statistics. 1994.

**SUPPLIES / MATERIALS:**

**STUDENT EVALUATION:**

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

| | |
|---|---|
| Assignments | 20% |
| Term Tests | 40% |
| Final Exam | 40% |

Students must obtain 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. Review of joint probability distribution theory and transformations.
2. The distribution of the empirical distribution function, order statistics.
3. Quantile point and interval estimation, tolerance limits.
4. Kolmogorov-Smirnov statistics, and Cramer-von Mises, Watson and Anderson-Darling tests of fit. Durbin's method for allowing for adjustable paramaters or, equivalently, components of the statistics.
5. Fisher-Pitman randomization and rank-randomization methods, especially the Wilcoxon and Kruskall-Wallis tests.
6. Bivariate association, rank correlation, Kendell's tau, concordance.
7. Efron's boostrap techniques.
8. The Quenouille-Tukey jack-knife methods for obtaining standard errors.