

COURSE IMPLEMENTATION DATE: July 1994
 COURSE REVISED IMPLEMENTATION DATE: January 2013
 COURSE TO BE REVIEWED: November 2017
(six years after UEC approval) *(month, year)*

OFFICIAL UNDERGRADUATE 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 – see course syllabus available from instructor

STAT 420	Science / Mathematics & Statistics	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS
Empirical and Non-Parametric Statistics		
COURSE DESCRIPTIVE TITLE		

CALENDAR DESCRIPTION:

When the normality assumption of the underlying distribution of data does not hold, the traditional parametric approach for constructing confidence intervals and testing hypotheses fails. In this case, the non-parametric approach can be used. This course introduces various non-parametric techniques to test parameters for location and dispersion. It deals with problems in single sample, two or more independent samples, and two or more related samples. Goodness-of-fit tests and tests of association are also discussed.

Note: Students with credit for MATH 420 cannot take this course for further credit.

PREREQUISITES: One of the following: STAT 270, STAT 271, STAT 315, or STAT 330
 COREQUISITES:
 PRE or COREQUISITES:

SYNONYMOUS COURSE(S):

- (a) Replaces: MATH 420
- (b) Cross-listed with: _____
- (c) Cannot take: _____ for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: 45

STRUCTURE OF HOURS:

Lectures: 40 Hrs
 Seminar: _____ Hrs
 Laboratory: 5 Hrs
 Field experience: _____ Hrs
 Student directed learning: _____ Hrs
 Other (specify): _____ Hrs

TRAINING DAY-BASED INSTRUCTION:

Length of course: _____
 Hours per day: _____

OTHER:

Maximum enrolment: 36
 Expected frequency of course offerings: Every two years
(every semester, annually, every other year, etc.)

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

Course designer(s): <u>David Chu</u>	Date approved: <u>March 5, 2012</u>
Department Head: <u>Greg Schlitt</u>	Date of meeting: <u>March 30, 2012</u>
Supporting area consultation (Pre-UEC)	Date approved: <u>April 20, 2012</u>
Curriculum Committee chair: <u>Norm Taylor</u>	Date approved: <u>May 4, 2012</u>
Dean/Associate VP: <u>Ora Steyn</u>	Date of meeting: _____
Undergraduate Education Committee (UEC) approval	

LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to:

1. test the location parameter using sign test, Wilcoxon signed ranks test, median test, Mann-Whitney test, Kruskal-Wallis test and Friedman test;
2. construct confidence intervals for location parameter based on sign test, Wilcoxon signed ranks test, median test and Mann-Whitney test;
3. use Moses' test and Ansari-Bradley test for dispersion parameter;
4. apply chi-square test, Kolmogorov-Smirnov test and Lilliefors test for goodness of fit test;
5. employ the Spearman rank correlation coefficient, Kendall's tau, chi-square test and Kendall's coefficient of concordance to test for association;
6. use one-sample runs test and Cox-Stuart test for trend;
7. apply Hollander test of extreme reactions and Fisher exact test;
8. use McNemar test for two related samples;
9. complete a group project and test a real-life data set using one of the non-parametric techniques learned in the course.

METHODS: (Guest lecturers, presentations, online instruction, field trips, etc.)

Lectures, class discussion and use of statistical software in computer lab.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

- Examination(s) Portfolio assessment Interview(s)
- Other (specify): Course Challenge; see PLAR policy (94) at <http://ufv.ca/secretariat/policies/>

TEXTBOOKS, REFERENCES, MATERIALS: [Textbook selection varies by instructor. Examples for this course might be:]

Text: Applied Nonparametric Statistics, 2nd Edition, by W. Daniel. Duxbury.
Reference: Practical Nonparametric Statistics, 3rd Edition, by W. Conover. Wiley.

SUPPLIES / MATERIALS:

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

Assignments	20%
Test	20%
Project	20%
Final exam	40%

The above percentages may vary among instructors and years. The final exam is comprehensive. Students must obtain at least 40% on the final exam to pass the course.

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

Test for location parameter:

- One sample---sign test, Wilcoxon signed ranks test and their associated confidence intervals.
- Two independent samples---median test, Mann-Whitney test and their associated confidence intervals.
- Two related samples---sign test, Wilcoxon matched-pairs signed ranks test and their associated confidence intervals.
- Three or more independent samples---extension of median test, Kruskal-Wallis test, multiple comparisons, Lehman contrasts, comparing all treatments with a control.
- Three or more related samples---Friedman two-way analysis of variance by ranks, multiple comparisons, Durbin's test for incomplete block designs, aligned ranks.

Test for dispersion parameter:

- Two independent samples---Moses' test, Ansari-Bradley test.

Goodness-of-fit test:

- One sample---chi-square test, Kolmogorov-Smirnov test, confidence band for a population distribution function, Lilliefors test.
- Two independent samples---Kolmogorov-Smirnov test.

Test for association:

- One sample---Spearman rank correlation coefficient, Kendall's tau and its confidence interval.
- Two independent samples---chi-square test of independence.
- Three or more independent samples---Kendall's coefficient of concordance, chi-square test, partial rank correlation.

Other tests:

- One sample---binomial test, one-sample runs test, Cox-Stuart test for trend.
- Two independent samples---Hollander test of extreme reactions, Fisher exact test, chi-square test of homogeneity.
- Two related samples---McNemar test.