**OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)**

| | |
|---|---|
| COURSE IMPLEMENTATION DATE: | September 1994 |
| COURSE REVISED IMPLEMENTATION DATE: | January 2013 |
| COURSE TO BE REVIEWED: | May 2013 |
| *(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 270 | SCIENCE/MATH & STATS | 4 |
|---|---|---|
| COURSE NAME/NUMBER | FACULTY/DEPARTMENT | UFV CREDITS |

Introduction to Probability and Statistics

COURSE DESCRIPTIVE TITLE

**CALENDAR DESCRIPTION:**

An introduction to the theory and practice of statistics for engineering, science, and mathematics students who have experience with calculus. Topics include descriptive statistics, elementary probability theory, expectation and variance of random variables, bionomial, hypergeometric, Poisson, uniform, normal and exponential distributions, sampling distributions, confidence intervals and hypothesis tests for means and proportions, tests of goodness-of-fit and independence, correlation, and linear regression.

Note: This course is offered as STAT 270 and MATH 270. Students may only take one of these for credit.

Note: Students with credit for STAT 106 may subsequently take STAT 270/MATH 270, but students with credit for STAT 270/MATH 270 may not subsequently take STAT 106.

| | |
|---|---|
| PREREQUISITES: | MATH 112 or MATH 118 |
| COREQUISITES: | None |
| PRE or COREQUISITES: | |

**SYNONYMOUS COURSE(S):**

| | | |
|---|---|---|
| (a) | Replaces: | |
| (b) | Cross-listed with: | **MATH 270** |
| (c) | Cannot take: | **STAT 104, STAT 106, STAT/ MATH 270** for further credit. |

**SERVICE COURSE TO:**

**TOTAL HOURS PER TERM:** 60

STRUCTURE OF HOURS:

| | | |
|---|---|---|
| Lectures: | 40 | Hrs |
| Seminar: | | Hrs |
| Laboratory: | 20 | Hrs |
| Field experience: | | Hrs |
| Student directed learning: | | Hrs |
| Other (specify): | | Hrs |

TRAINING DAY-BASED INSTRUCTION:

Length of course: N/A

Hours per day: N/A

**OTHER:**

Maximum enrolment: 36

Expected frequency of course offerings: Annually

*(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): | Stats Committee | | |
| Department Head: | Greg Schlitt | Date approved: | **March 5, 2012** |
| Supporting area consultation (Pre-UEC) | | Date of meeting: | **March 30, 2012** |
| Curriculum Committee chair: | Norm Taylor | Date approved: | **April 20, 2012** |
| Dean/Associate VP: | Ora Steyn | Date approved: | **May 4, 2012** |
| Undergraduate Education Committee (UEC) approval | | Date of meeting: | **May 23, 2012** |

**LEARNING OUTCOMES:**

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

1. summarize and describe the pattern of uni-variate and bi-variate data graphically and numerically;
2. derive, manipulate and apply fundamental formulae and use in probability;
3. calculate and use measures of location and spread for a variety of discrete and continuous random variables;
4. recognize binomial, hypergeometric, Poisson, uniform, normal and exponential random variables and solve problems requiring calculation of the respective probabilities;
5. understand and use the Central Limit Theorem for sampling distributions;
6. construct and interpret confidence intervals for means and proportions;
7. generalize the philosophy of hypothesis testing to the extent that results of more sophisticated tests can be interpreted withoutdetailed knowledge of the technique used for means and proportions including, P-values;
8. build simple linear regression models, use them for estimation, and perform relevant inferential procedures;
9. express discrete bi-variate distributions and calculate covariances, correlations and conditional means;
10. test whether data have a specific distribution;
11. Test whether two variables are associated.
12. Use statistical software to find a multiple linear regression model, and use the fitted model to produce estimates of the response.

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

Classroom lectures. Evaluation includes assignments, tests, and a three-hour comprehensive examination. Some assignments require use of statistical computer software and/or graphing calculators.

**METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):**

☐ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☒ Other (specify): Course Challenge Please check online at: http://www.ufv.ca/Assets/Secretariat/Policies/106.pdf

☐ PLAR cannot be awarded for this course for the following reason(s):

**TEXTBOOKS, REFERENCES, MATERIALS:**

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

The text is chosen by departmental curriculum committee.
Jay Devore, Probability and Statistics for Engineering and the Sciences, Seventh Edition, Duxbury.

**SUPPLIES / MATERIALS:**

A graphing calculator is required.

**STUDENT EVALUATION:**

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

The weighting of the components may vary amongst instructors and years. There have to be at least two tests. The final examination has to be comprehensive and has to be worth 40-50%. A student must obtain at least 40% on the final exam to pass the course.

A typical breakdown is as follows:

| | |
|---|---|
| Assignments | 10% |
| Quizzes | 15% |
| Tests | 35% |
| Examination | 40% |

**COURSE CONTENT:**

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

Descriptive statistics for samples and finite populations: frequency tables, histograms and other graphical representations, mean, median, variance, standard deviation, percentile. Means and standard deviations of functions of variables

Probability: events, axioms, counting rules, conditional probability, independence, Bayes Theorem

**Course content continued:**

Discrete distributions: probability mass functions, mean, variance, binomial, negative binomial, hypergeometric and Poisson random variables Discrete distributions: probability mass functions, mean, variance, binomial, negative binomial, hypergeometric and Poisson random variables

Continuous distributions: probability density functions, mean, variance, normal and exponential random variables

Joint probability distributions, covariance and correlation in terms of expectation, conditional mean, mean and variance of a linear combination of variables

Statistics and their distributions: the Central Limit Theorem and other rules

Introduction to the chi-squared, *t* and *F* distributions without proofs

Confidence intervals and tests of hypotheses for means and proportions

Chi-squared tests for goodness of fit and independence

The simple linear regression model, Pearson sample correlation coefficient, least squares estimation, coefficient of determination, the ANOVA table and model utility test. Linear regression as the minimization of the Mean Square Error

Introduction to multiple linear regression using statistical software