OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE: January 2012
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 271	Science/Mathematics & Statistics	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Introduction to Data Analysis and Statistical Modeling
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This is a practical course on the use and understanding of statistical data as it arises in many areas of study. Topics include graphical presentation and interpretation of different types of statistical data, linear and nonlinear regression, design and analysis of experiments, survival time analysis, and time series analysis. Emphasis in this course is on the application and analysis of statistical data by using statistical software. Students are expected to complete a project on a real data set. Students who complete this course will be able to perform basic statistical computing in SAS and will have sufficient knowledge of data analysis to take upper-level applied statistics courses.

Note: Students with credit for MATH 271 cannot take this course for further credit.

PREREQUISITES: One of the following: STAT 104 with a B, STAT 106, or STAT 270.
COREQUISITES:
PRE or COREQUISITES:

SYNONYMOUS COURSE(S):
(a) Replaces: **MATH 271**
(b) Cross-listed with:
(c) Cannot take: for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **45**

STRUCTURE OF HOURS:

Lectures:		Hrs
Seminar:		Hrs
Laboratory:	**45**	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 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): **Ali Reza Fotouhi**

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. Distinguish between different types of statistical data.
2. Explore the data graphically and interpret the properties of the data.
3. Propose appropriate family of models for analyzing a data set.
4. Analyze the relationship through linear regression model, investigate the assumptions, propose a remedy if any assumption is violated, interpret the effectiveness of the fitted model, make estimation and prediction.
5. Analyze the relationship through a nonlinear regression model including logistic regression for binary data and log-linear Poisson model for count data.
6. Build an appropriate model including significant predictors and interpret the predictors effect such as odds ratio.
7. Design and analyze single-factor and factorial experiments, give recommendation for obtaining optimum response variable.
8. Determine the sample size for an experiment by using the power of the test.
9. Analyze survival data through a regression model, distinguish between censored and non-censored data, apply empirical approach of Kaplan-Maier to estimate the survival function, interpret the hazard and survival functions.
10. Interpret the components of a time series data, apply the regression approach to explain the trend, use the moving average and weighted moving average for prediction.
11. Perform basic statistical computing using statistical software and interpret the outputs.
12. Extend the knowledge of data analysis and statistical modeling in statistical software by independent study or by taking higher level courses in applied statistics.

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

Lectures, hands-on-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:]*

Coursepack

SUPPLIES / MATERIALS:

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

The weighting of the components may vary amongst instructors and years. There must be at least two tests, and the final examination must be comprehensive and worth 40 to 50%. Students must obtain at least 40% on the final exam to pass the course. A typical breakdown is as follows:

Assignments and project	30%
Term tests	30%
Final exam	40%.

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

1. Statistical data and graphical methods: Observational and experimental data, continuous data, count data, categorical data, contingency tables, life time data time series data, graphical methods for presentation of different type of data, searching the properties of data through graphs, searching for pattern and unusual observations.
2. Linear regression method: Simple and multiple linear regression models, fitting the linear regression models, diagnostics, Box-Cox transformation, significance test of regression, confidence interval and significance test for coefficients, correlation, practical interpretation of coefficients and R-squared, prediction, indicator variables, stepwise regression, Multivariate linear regression model, Bayesian approach for fitting linear regression models.
3. Nonlinear regression method: Nonlinear regression models, logistic regression model, fitting logistic model, test of overall adequacy of the model, interpretation of the coefficients, confidence interval and significance test for coefficients, odds ratio and interpretation, log-linear Poisson model for count data, fitting log-linear model, inference concerning log-linear model fitting and coefficients, Bayesian approach for fitting logistic and loglinear models.
4. Design and analysis of experiments: Single-factor and factorial experimental designs, ANOVA model, fitting ANOVA model, model adequacy checking, F-test for equality of factor level means, multiple comparisons, regression approach and contour plots, determining sample size, experiments with random effects and mixed effects.
5. Survival data analysis: Exponential and Weibull distributions, survival and hazard functions, censoring, empirical survival function, Kaplan-Maier estimator, fitting exponential and Weibull models, Bayesian approach in modeling survival time data.
6. Time-series data analysis: Components of a time series data, moving average method, weighted moving average method, linear trend, some specific nonlinear trend, seasonal index, autocorrelation and Durbin-Watson test.