



COURSE IMPLEMENTATION DATE: January 2012
 COURSE REVISED IMPLEMENTATION DATE: _____
 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

MATH 272	Science / Math & Stats and CIS	3
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS
Statistical Graphics and Languages		
COURSE DESCRIPTIVE TITLE		

CALENDAR DESCRIPTION:

Statistical graphics are important for analyzing patterns and relationships of data sets in many disciplines. This course introduces statistical graphics generated by powerful yet flexible statistical programming languages such as SAS and R. Students will learn the codes and procedures of these languages to write computer programs for producing these graphics. They will also learn how to manipulate data, compute summary statistics, and present results in simple reports.

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

SYNONYMOUS COURSE(S):

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

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: 45

STRUCTURE OF HOURS:

Lectures: 25 Hrs
 Seminar: _____ Hrs
 Laboratory: 20 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: 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): <u>David Chu / Paul Franklin</u>	Date approved: <u>September 1, 2010</u>
Department Head: <u>Greg Schlitt</u>	Date of meeting: <u>October 7, 2011</u>
Supporting area consultation (Pre-UEC)	Date approved: <u>October 21, 2011</u>
Curriculum Committee chair: <u>Norm Taylor</u>	Date approved: <u>November 4, 2011</u>
Dean/Associate VP: <u>Ora Steyn</u>	Date of meeting: <u>November 25, 2011</u>
Undergraduate Education Committee (UEC) approval	

LEARNING OUTCOMES:

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

1. manipulate raw data to build a SAS data set and read data from external files;
2. merge several data sets to form a SAS data set;
3. use various SAS functions and different formats of SAS dates;
4. present statistical results in simple reports;
5. apply different SAS codes and procedures to chart and plot data;
6. operate R as a calculator to perform basic numerical calculations;
7. define data frames and manage data in R;
8. produce tables of summary statistics and generate random numbers in R;
9. plot various graphs using data of one variable and multiple variables;
10. design interactive graphics using graphics codes and functions;
11. visualize the graphical patterns and interpret the relationships of some given data sets.

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

Lectures and use of computer.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Examination(s) Portfolio assessment Interview(s) Other (specify): Course challenge

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

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

SAS Programming by Example (11th printing, 2007) by Ron Cody and Ray Pass.

References:

1. Statistics: An Introduction using R by Michael Crawley, Wiley, 2005.
Note that R is an open source statistical computing language, which can be freely downloaded.
2. Introductory Statistics with R (2nd edition) by Peter Dalgaard, Springer, 2008.
3. Using R for Introductory Statistics by John Verzani, Taylor & Francis, 2005.
4. R Graphics by Paul Murrell, Chapman & Hall/CRC Computer Science and Data Analysis, 2006.
5. The R Book by Michael Crawley, Wiley, 2007.
6. A Beginner's Guide to R by A. Zuur et al., Springer, 2009.

SUPPLIES / MATERIALS:

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

Assignments	30%
Tests	30%
Final exam	40%

The above percentages may vary among instructors and years. The final exam is comprehensive, and there are typically two tests in the course. Students must obtain at least 40% on the final exam in order to pass the course.

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

Suggested topics in SAS:

1. Manipulating data: Building a SAS data set from raw data, reading data from external files, grouping data values and data recording, reading and combining SAS data sets, relating information from multiple sources (table lookup tools), SAS functions (LOG, ARSIN, SQRT, MOD, ROUND, INT, MEAN, SUM, INPUT, PUT, LAG, SUBSTR, LENGTH, etc.), SAS dates (formats, informats, TODAY, DAY, WEEKDAY, MONTH, YEAR, INTCK, INTNX), SAS arrays.
2. Presenting data: Writing simple reports, producing descriptive summary statistics, using and creating formatting tools (filtering input data), charting data (bar charts, pie charts, 3D block charts), plotting data (scatter plots).

Suggested topics in R:

1. R as a calculator: $+-*/^$, exponential and logarithmic functions, trigonometric functions.
2. Managing data: Data frames, assigning values to values, generating repeats and factor levels, reading data from a file, vector functions, subscripts, writing functions, sorting and ordering, split functions, tables of summary statistics, converting continuous variables into categorical variables, random numbers.
3. Plotting data: Plots of one variable, plots of multiple variables, traditional graphics system, grid graphics system, trellis graphic system, graphics codes, graphics functions, interactive graphics, multiple plots, annotating plots, controlling the appearance of plots.