ORIGINAL COURSE IMPLEMENTATION DATE: January 2012
REVISED COURSE IMPLEMENTATION DATE: September 2021
COURSE TO BE REVIEWED (six years after UEC approval)**:** March 2025
Course outline form version: 05/18/2018

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: STAT 272	**Number of Credits:** 3 Course credit policy (105)

Course Full Title: Statistical Graphics and Languages
Course Short Title: Stats Graphics and Languages
(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)

Faculty: Faculty of Science	**Department (or program if no department):** Mathematics & Statistics

Calendar Description:

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, to manipulate data, to compute summary statistics, and to communicate results effectively in simple reports and presentations.

Prerequisites (or NONE):	One of the following: STAT 104 with a B, STAT 106, or STAT 270.
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Antirequisite Courses *(Cannot be taken for additional credit.)*
Former course code/number: **MATH 272**
Cross-listed with:
Dual-listed with:
Equivalent course(s):
(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar hours	25
Tutorials/workshops	
Supervised laboratory hours	25
Experiential (field experience, practicum, internship, etc.)	
Supervised online activities	
Other contact hours:	
Total hours	**50**

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

Special Topics *(Double-click on boxes to select.)*
This course is offered with different topics:
☒ No ☐ Yes *(If yes, topic will be recorded when offered.)*

Independent Study
If offered as an Independent Study course, this course may be repeated for further credit: *(If yes, topic will be recorded.)*
☒ No ☐ Yes, repeat(s) ☐ Yes, no limit

Transfer Credit
Transfer credit already exists: *(See **bctransferguide.ca**.)*
☐ No ☒ Yes
Submit outline for (re)articulation:
☒ No ☐ Yes *(If yes, fill in transfer credit form.)*

Grading System
☒ Letter Grades ☐ Credit/No Credit

Maximum enrolment (for information only): 36

Expected Frequency of Course Offerings:
Annually *(Every semester, Fall only, annually, etc.)*

Department / Program Head or Director: Ian Affleck	**Date approved:**	June 15, 2020
Faculty Council approval	**Date approved:**	September 11, 2020
Dean/Associate VP: Lucy Lee	**Date approved:**	September 11, 2020
Campus-Wide Consultation (CWC)	**Date of posting:**	n/a
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	January 29, 2021

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. Using a group project, students will learn to communicate results effectively through simple reports and presentations.
5. Apply different SAS codes and procedures to chart and plot data.
6. Create SAS macros.
7. Operate R as a calculator to perform basic numerical calculations.
8. Define data frames and manage data in R.
9. Produce tables of summary statistics and generate random numbers in R.
10. Plot various graphs using data of one variable and multiple variables.
11. Design interactive graphics using graphics codes and functions.Visualize the graphical patterns and interpret the relationships of some given data sets.
12. Collaborate with peers on a project which requires the skills and abilities above.
13. Integrate feedback and suggestions from peers, faculty, and supervisors in completion and presentation of final project findings.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.)*

Lectures and use of computer. All classes take place in a computer lab.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials *(If more space is required, download Supplemental Texts and Resource Materials form.)*

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Cody, R.	Learning SAS by Example–A Programmer's Guide	☒	SAS	2018
2.	Crawley, M.	The R Book	☒	Wiley	2013
3.	Zuur, A. et al.	A Beginner's Guide to R	☒	Springer	2009
4.	Crawley, M.	Statistics: An Introduction Using R	☒	Wiley	2014

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

SAS and R statistical software. Note: R is open-source software, available for free download.

Typical Evaluation Methods and Weighting

Final exam:	40%	Assignments:	15%	Project:	10%	Quizzes/tests:	35%

Details (if necessary):

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.

Typical Course Content and Topics

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).
3. Macro Language: Creating SAS macros.

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.