ORIGINAL COURSE IMPLEMENTATION DATE: September 2020
REVISED COURSE IMPLEMENTATION DATE: September 2021
COURSE TO BE REVIEWED (six years after UEC approval)**:** November 2025
Course outline form version: 05/18/2018

UNIVERSITY OF THE FRASER VALLEY

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

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

Course Code and Number: STAT 307	**Number of Credits: 3** Course credit policy (105)

Course Full Title: Data Visualization
Course Short Title:
(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:

Communicate data to different audiences by creating and presenting data visualizations. Develop static, interactive, and animated charts and place them on a dashboard to convey a specific message or to let the audience explore the data by themselves. Tableau is used to design the data visualizations.

Prerequisites (or NONE):	One of the following: STAT 104 with a B or better, 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:
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.)

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.)*

Typical Structure of Instructional Hours

Lecture/seminar hours	
Tutorials/workshops	
Supervised laboratory hours	50
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

Grading System
☒ Letter Grades ☐ Credit/No Credit

Maximum enrolment (for information only): 28

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. Classify the data types in a given data set.
2. Apply principles of communicating data and effectiveness of data encoding to visualize data for answering specific questions.
3. Design graphs to compare how much and how many.
4. Develop charts to show ratios, rates, proportions, and percentages of specific data types.
5. Create graphs to demonstrate mean and median in normal and non-normal data sets.
6. Use control charts to visualize variation and uncertainty of time series data.
7. Produce scatterplots and trend lines with colour and size to describe the relationships among multiple quantities.
8. Construct dual-axis line charts to show the development of events over time.
9. Encode variables on a global map using circle, colour, and filter.
10. Design explanatory dashboards to present key facts and deliver a specific message.
11. Develop exploratory dashboards to allow the audience to answer their own questions.
12. Complete a group project based on a real-life data set.
13. Collaborate with peers on a project which requires the skills and abilities above.
14. 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, presentations, and 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.	Jones, B.	Communicating Data with Tableau---Designing, Developing, and Delivering Data Visualizations	☒	O'Reilly	2014
2.	Tufte, E.	The Visual Display of Quantitative Information	☒	Graphics Press LLC	2018
3.			☐		

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

Computer software Tableau Public can be downloaded for free.

Typical Evaluation Methods and Weighting

Final exam:	30%	Assignments:	30%	Field experience:	%	Portfolio:	%
Midterm exam:	20%	Project:	20%	Practicum:	%	Total:	100%

Details (if necessary):

The above percentages may vary among instructors and years, but the project component will constitute at least 10% of the overall grade. The final exam is comprehensive. Students must obtain at least 40% on the final exam to pass the course.

Typical Course Content and Topics

1. Types of data: quantitative, ordinal, nominal, continuous, discrete, string, Boolean, date & time, geospatial (latitude, longitude).
2. Principles of communicating data: goal, right data, suitable visualizations, aesthetics, effective medium, check results.
3. Effectiveness of data encoding: position, length, angle, area, gray ramp, color ramp, color hue, shape.
4. Introduction to Tableau: drag-and-drop interface, data sources, dimensions, measures, columns, rows, marks cards (colour, size, label, detail, tooltip), show me, calculated fields, filters, pages, view, sort, swap, formats, sheets.
5. Comparisons of how much and how many: horizontal bars, vertical bars, heat maps, text tables, packed bubbles, word clouds, pie charts, stacked bars, circle views, treemaps, highlight tables, dot charts, histograms.
6. Ratios, rates, proportions, percentages: rank, blending data sources, table calculations, waterfall charts using Gantt bars, bullet graphs, reference lines.
7. Mean and median: normal distribution, box-and-whisker plots, outliers, synchronized dual axis, visualizing typical values of non-normal distributions.
8. Variation and uncertainty: visualizing variation in a time series, control charts (average lines, UCL, LCL), parameter control, standard error, margin of error, error bar line.
9. Multiple quantities: scatterplots, interactive explorations, adding background images, dual dot charts, trend lines, quadrant charts.
10. Changes over time: line charts, dual-axis line charts, connected scatterplots, timelines, forecasts, slopegraphs.
11. Maps and location: circle maps, filled maps, dual-encoded maps.
12. Dashboards: explanatory, exploratory, storytelling, infographics. Animation.