

## COURSE SYLLABUS - FALL 2021

### COMPUTER SCIENCE 4304: DATA VISUALIZATION

### COMPUTER SCIENCE 6934: INTRO TO DATA VISUALIZATION

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Instructor: Terrence Tricco (he/him)

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Office: ER-6031

Lectures: 11:00 - 11:50am M-W-F (Three 50 minute lectures per week.)

Lecture Room: EN-2006

Office Hours: 1:00 - 3:00pm on Mondays (or by email appointment)

4304 Pre-requisites: COMP 2001, COMP 2002, Statistics 2500 or Statistics 2500

### **Instructional Continuity**

Welcome back to campus. All lectures in this course will be taught both in-person and through recorded video posted online to Brightspace. The recorded lectures will be a duplicate of the in-person lecture. You can choose which mode of learning you prefer.

Masks are currently required on campus. If this policy changes during the term, it is still recommended to wear a mask even if not required. There will be different levels of comfort and anxiety for mask use. Please be respectful of everyone in the class.

Should there be disruption to in-person lectures over the course of the term by other health directives or the overall situation connected to Covid-19, then instruction will continue through the online videos according to the course schedule.

### **Course Objectives**

Data visualization is the art of creating images based on data. Visualizations enable users to explore, understand, and extract insights from data in an efficient way. This course will be centred on data visualization for data science, and will cover three broad topics. One will be the tools of data visualization, specifically Jupyter notebooks and Python visualization libraries. A second topic will be standard types of visualizations for different types of data. The third topic will be on the theoretical aspects of data visualization, such as viewer perception and rules of thumb for good visualizations.

### **Course Outline**

- Data Visualization Tools
  - Jupyter Notebooks and Python
  - Pandas data library

- Matplotlib, Seaborn and Plotly visualization libraries
- Vector graphics (svg), Rasterization
- Interactivity
- Standard Visualisation Types
  - Relational: Line plots, Scatter plots, Bubble plots, Heat maps
  - Categorical: Bar plots, Histograms, Box plots, Radar charts
  - Hierarchical: Pie charts, Venn diagrams
  - Multi: Scatterplot matrix
  - Spatial: Choropleth, Contour plots, Kernel density estimation
  - Data reduction: t-SNE, Principal component analysis
- Data Visualisation Theory
  - Planning and design process
  - Human perception
  - Colour theory
  - Elements of style
  - Rules of thumb, pitfalls to avoid

## Evaluation

There will not be any in-person evaluation. The final grade in the course will be determined as follows:

• Assignments (8)	<b>50%</b>
• Course Project	<b>50%</b>
○ Project Proposal	(10%)
○ Project Submission and Code	(25%)
○ Video Presentation	(15%)

## Recommended Reading (Optional)

There is no required textbook for this course. The following textbooks are only recommended for further reading on course topics.

A. Kirk, *Data Visualisation: A Handbook for Data Driven Design*, 2nd Edition, Sage, 2019.

T. Munzner, *Visualization Analysis & Design*, CRC Press, 2014.

R. Spence, *Information Visualization: An Introduction*, 3rd Edition, Springer, 2014.

## Memorial University Policies

Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within

the scope of the University Policies for the Accommodations for Students with Disabilities ([www.mun.ca/policy/site/policy.php?id=239](http://www.mun.ca/policy/site/policy.php?id=239)). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity ([www.mun.ca/blundon](http://www.mun.ca/blundon)).

Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.