

## Course Syllabus

CP321 Data Visualization

Department of Physics and Computer Science, Faculty of Science, Waterloo

Winter | 2024

*I acknowledge that in Kitchener, Waterloo, Cambridge and Brantford we are on the traditional territory of the Neutral, Anishnawbe, and Haudenosaunee peoples.*

### Instructor Information

Jiashu (Jessie) Zhao | N2076G

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Weekly Office Hours: Wednesday 14:20-15:20

### Tutorial Leader, Lab Instructor or Teaching Assistant Information

TBD

### Course Information

Data visualization represents information using elements like charts, graphs, maps and etc. The visualization techniques provide an accessible way to view and understand trends, outliers, and patterns in data. This course will provide students an overview on how to visualize data to present large data sets in a meaningful way. Rigorous policy analysis must be based on evidence, but once you have gathered the evidence, it can be overwhelming to figure out how to present data in a meaningful way. This course offers instruction on how to distill and interpret large amounts of information to highlight the key information.

3 lecture hours / Credit: 0.50

Meeting Time: 13:30-14:20

MWF

SC N1001

Jan 8, 2024 – Apr 8, 2024

### Course Overview and Approach

This course will provide a broad coverage of the key principles, methods, concepts, and examples to visualize different types of data. First, introduction to data visualization, data preparation and visualization tools will be presented. Then various visualization methods will be discussed, including visualizing distributions, time series, texts, geospatial data, etc. Facts and logical reasonings of the data will also be revealed. Students will practice data visualization approaches in assignments and the course project.

All data visualization techniques serve to tell a clear and concise story to convey our insight to our audience. This course will also teach how to think like a designer and utilize concepts of design in data visualization.

## Course Goals and Learning Outcomes

By the end of this course students should be able to:

- Explain and familiar the basic concepts and terminologies in data visualization
- Search for Information and prepare data for visualization
- Understand and use various plot types, such as python
- Identify which type of methods is appropriate to visualize a given data set
- Design and Implement different visualization approaches to construct clear, attractive, and convincing figures
- Reinforce your knowledge of various data formats and representations
- Explore and present the insights identified from a variety of real-world applications

## Course Tools and Learning Materials

Reference books:

- Data Visualization with Python: Create an impact with meaningful data insights using interactive and engaging visuals. By Mario Dobler and Tim Großmann. (ISBN-13: 978-1789956467)
- Interactive Visualization: Insight through Inquiry. By Bill Ferster and Ben Shneiderman. (ISBN-13: 978-0262018159)
- Fundamentals of Data Visualization. By Claus O. Wilke. (ISBN-13: 978-1492031086)

## Student Evaluation

Assessment	Weighting
Assignment	20%
Test 1	30%
Test 2	30%
Project	20%
<b>Total</b>	<b>100%</b>

## Tentative Weekly Schedule(s) (lecture, lab, seminars, tutorials, etc.)

Week	Lecture	
1	Introduction	
2	Understand data and tools	
3	Visualize distributions and proportions	
4	Visualize associations	Assignment 1 Due (on Feb 2 <sup>nd</sup> at 5pm)

Week	Lecture	
5	Visualize time series	
6	Visualize geospatial data	Test 1 (Feb 16 <sup>th</sup> 13:30-14:20)
7	Reading Week	
8	Textual data processing	Assignment 2 Due (on Mar 1 <sup>st</sup> at 5pm)
9	Visualize textual data	
10	Interactive visualization	
11	Online visualization	Test 2 (March 22 <sup>nd</sup> 13:30-14:20)
12	Tell a story from data	
13	Summary and Project Discussion	Project Due (on April 15 <sup>th</sup> at 5pm)

### University and Course Policies (proposed and required text)

Laurier has several senate approved policy statements it requires instructors to include in their syllabus. Those with specific wording approved by senate are indicated specifically below.

- 1. Academic Calendars:** Students are encouraged to review the [Academic Calendar](#) for information regarding all important dates, deadlines, and services available on campus.
- 2. Special Needs:** Students with disabilities or special needs are advised to contact Laurier's Accessible Learning Centre for information regarding its services and resources.
- 3. Plagiarism:** The University has approved the following wording for inclusion on all course syllabi about the use of the institutionally supported plagiarism software tool. "Wilfrid Laurier University uses software that can check for plagiarism. If requested to do so by the instructor, students are required to submit their written work in electronic form and have it checked for plagiarism." (Approved by Senate May 14, 2002) .

In addition to the statement above you may wish to add the following text about academic integrity.

- 4. Academic Integrity:** Laurier is committed to a culture of integrity within and beyond the classroom. This culture values trustworthiness (i.e., honesty, integrity, reliability), fairness, caring, respect, responsibility and citizenship. Together, we have a shared responsibility to uphold this culture in our academic and nonacademic behaviour. The University has a defined policy with respect to academic misconduct. As a Laurier student you are responsible for familiarizing yourself with this policy and the accompanying penalty guidelines, some of which may appear on your transcript if there is a finding of misconduct. The relevant policy can be found at Laurier's [academic](#)

[integrity](#) website along with resources to educate and support you in upholding a culture of integrity. Ignorance is not a defense.

5. **Classroom Use of Electronic Devices:** State your classroom practice and any consequences for student failure to comply – see [Policy 9.3](#) (Approved by Senate March 8, 2012).
6. **Late Assignment Policy:** Specify any penalties that will be assessed when deadlines for the completion of course components are not met (Approved by Senate May 23, 2012). Refer to the Handbook on Undergraduate Course Management for more information.
7. **Final Examinations:** Students are strongly urged not to make any commitments (i.e., vacation) during the examination period. Students are required to be available for examinations during the examination periods of all terms in which they register. Refer to the Handbook on Undergraduate Course Management for more information.
8. **Foot Patrol, the Wellness Centre, and the Student Food Bank:** The University approved the inclusion of information about select wellness and safety services and supports on campus in the course information provided to students. (Approved by Senate November 28, 2011.) Specific language (by campus) is provided below.

#### **Multi-campus Resource:**

- Good2Talk is a postsecondary school helpline that provides free, professional and confidential counselling support for students in Ontario. Call 1-866-925-5454 or through 2-1-1. Available 24-7.

#### **Kitchener/Waterloo Resources:**

- [Waterloo Student Food Bank](#): All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.
- [Waterloo Foot Patrol](#): 519.886.FOOT (3668). A volunteer operated safe-walk program, available Fall and Winter daily from 6:30 pm to 3 am. Teams of two are assigned to escort students to and from campus by foot or by van.
- [Waterloo Student Wellness Centre](#): 519-884-0710, x3146. The Centre supports the physical, emotional, and mental health needs of students. Located on the 2<sup>nd</sup> floor of the Student Services Building, booked and same-day appointments are available Mondays and Wednesdays from 8:30 am to 7:30 pm, and Tuesdays, Thursdays and Fridays from 8:30 am to 4:15 pm. Contact the Centre at x3146, [wellness@wlu.ca](mailto:wellness@wlu.ca) or @LaurierWellness. After hours crisis support available 24/7. Call 1-844-437-3247 (HERE247).

#### **Brantford Resources:**

- [Brantford Student Food Bank](#): All students are eligible to use this service to ensure they're eating healthy when overwhelmed, stressed or financially strained. Anonymously request a package online 24-7. All dietary restrictions accommodated.
- [Brantford Foot Patrol](#): 519-751-PTRL (7875). A volunteer operated safe-walk program, available Fall and Winter, Monday through Thursday from 6:30 pm to 1 am; Friday through Sunday 6:30 pm to 11 pm. Teams of two are assigned to escort students to and from campus by foot or by van.
- [Brantford Wellness Centre](#): 519-756-8228, x5803. Students have access to support for all their physical, emotional, and mental health needs at the Wellness Centre. Location: Student Centre, 2nd floor. Hours: 8:30 am to 4:15 pm Monday through Friday. After hours crisis support available 24/7. Call 1-884-437-3247 (HERE247).