



## Information Visualization

### INFSCI 2415 Syllabus

#### Basic Information

Course Title: Information Visualization (INFSCI 2415)

Instructor: Dr. Lingfei Wu

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Personal Webpage: <https://lingfeiwu.github.io/>

Time & Location: TBD

Office Hours: TBA (by appointment)

#### Course Prerequisites

Basic programming experience in Python is preferred.

#### Description of the course

This course focuses on the visual design, structure, and organization of information as applied to library and information environments and website design. Topics include visualization literacy, usability research, theories of visual perception and cognition, visualization models, visual analytics, and data graphics. The emphasis is on user and task-centered design for developing and evaluating visualization-based tools for various types of data. Practical work with visualization technologies will be included.

#### Learning Objectives

Familiarity Visualization is a way to explore, present, and express meanings in data. This course aims to investigate what data presents and how to present data, which requires both data analytics and information design knowledge.

In this course, we will introduce concepts, methods, and procedures of data visualization, with emphasis on the creative process of organizing, visualizing, communicating, and interacting information. The course is designed to help students learn practical skills in solving visualization tasks and develop aesthetic principles for evaluating visualization designs. The course material will be covered through lectures, lab sessions, and projects. By the end of this course, students are expected to:

- Learn how to solve a diverse set of visualization tasks involving large-scale datasets of temporal (time series), spatial (maps), symbolic (text corpus), relational (networks) structure, and beyond.
- Make statistical graphs that permit effective comparisons to facilitate scientific reasoning.

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<sup>1</sup> \*Email: The instructor & TAs will not answer questions by email. All questions should be directed to CANVAS, either publicly (for all students in the class to see), or privately (for only instructor/TAs to see).



- Apply aesthetic principles, including data-ink ratio, data density, and beyond to evaluate visualization designs.

### Required resources

No textbook is required in this course. The following book is recommended as a reference but not required. Tufte, E. R. (1983). The visual display of quantitative information. Graphics Press Cheshire, CT.

### Class sessions

In the offline or hybrid mode, each weekly class comprises three sessions, including two lectures and one lab session in which the students practice Python programming. Each of the three sections has 45 minutes.

In the online mode (during the COVID-19 pandemic), each weekly class comprises four sessions, including three lectures and one lab session in which the students practice Python programming. Each of the four sections has 30 minutes.

The lab session is design following the “[active learning](#)” principle to encourage students applying the taught Python skills to make their own projects.

### Grading Information

Components of the final grade include five evaluating items that cumulate into a high-quality final project, including (1) attendance, (2) the mid-term quiz, (3) the mid-term report, (4) the final presentation, and (5) the final report. Each component bears a certain number of points. Assignments are due as scheduled, and grades on late work will be decreased by 10% per day late. Note that the instructor reserves the right to add up to 5 points each if they feel that the students are performing beyond the expectation in class discussion, project creativity, code sharing, or other activities that contribute to the improvement of teaching quality.

- **20% Attendance.** Attendance is mandatory and will be recorded. Arriving late and leaving early without permission will affect your grade. If you must be absent, please contact the instructor before the class with reasons provided. Three or more absences will result in automatic failure of the course except in extraordinary circumstances and/or supported by strong reasons. Attendance will be checked in this way: across classes, the TA or the instructor will randomly selecting a short list of student names. Those whose names are called in the class but did not present themselves are documented for the record.
- **20% The Midterm Quiz.** This refers to a Quiz to test the basic information visualization knowledge and entry-level Python skills that are essential to create data visualization. The basic information of the Quiz is as below. The number of questions: 20. Topics of questions: 10 for the basic knowledge of info viz covered in the class and 10 for basic Python programming questions. Types of questions: Multiple choices.

- **20% The Midterm Report.** This refers to a basic description for the final project based on the early-stage presentation. It needs to include (i) a title, (ii) a main figure produced in Python, (iii) the legend explaining the visualization components in the figure (e.g., what points, lines, and colors stand for), and (iv) findings text introducing highlights of the produced figure in bulletin points. One page in PDF containing these four components is required to be submitted due before the week-7 class.
- **20% The Final Presentation.** This refers to a 5-minute presentation for the final project summarizing the final report. Two slides in PDF are required to be submitted due before the week-12 class.
- **20% The Final Report.** This refers to a summary of all products accumulated in the past semester. It needs to include (i) a title, (ii) a main figure produced in Python (ideally an integrated version comprising both the main one and small panels on the side), (iii) the legend explaining the visualization components in the figure (e.g., what points, lines, and colors stand for), (iv) findings text introducing highlights of the produced figure in bulletin points, (v) data and method text describing the data and method used in this process, and (vi) a significance statement on why the presented figure is an important topic. A three-page maximum PDF containing these four components is required to be submitted due before the week-12 class. The submitted PDF should also include a link to a newly created GitHub page which archives the used Python code, data source, and the report itself as the documentation.
- **Evaluation Standards.** For the midterm report, final presentation, and final report, the evaluation will be based on four principles, including
  - (1) Using intensive data. This principle encourages the use of big data in creating figures (all sources of data can be used, but publicly available datasets are encouraged).
  - (2) Being creative. This principle encourages the application of taught visualization skills to a novel topic.
  - (3) Organizing aesthetic elements. This principle encourages the elegant design and organization of visual ingredients (dots, lines, colors) through repeated practice.
  - (4) improvement between submissions.

In the final presentation, presentation performance (e.g., time control, speech fluency, eye-contact with the audience, etc.) will also be evaluated in addition to the four principles listed above.

In the end of the semester, the earned points will be translated and submitted based on the grading scheme shown below:

A+	100%	to	97%
A	< 97%	to	94%
A-	< 94%	to	90%



B+	< 90% to 87%
B	< 87% to 84%
B-	< 84% to 80%
C+	< 80% to 77%
C	< 77% to 74%
C-	< 74% to 70%
D+	< 70% to 67%
D	< 67% to 64%
D-	< 64% to 60%
F	< 60% to 0%

## **University Policies**

### ***Academic Integrity***

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands- on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

### ***Disability Services***

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services](#) (DRS), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

For more, see the [university policies](#) page.

## Course Schedule

Dates	Weeks	Topics
	1	The Info Viz Hall of Fame
	2	Visualizing Beautiful Science & Selective Student Projects
	3	Making Figures with <i>Python</i> I: Basic Charts
	4	Making Figures with <i>Python</i> II: Big and Rich Data
	5	Networks I: Historical Practices
	6	Network II: Modern Theories and Models
	7	Time Series: Repetition and Change
	8	The Midterm Quiz of Basic Knowledge on Info Viz and Python
	9	Text: Symbols and Meanings
	10	Maps I: Basic Maps
	11	Maps II: Color and Layout Design
	12	The Final Presentation