

CUNY School of Professional Studies

Syllabus

School of Professional Studies

DATA 608 - Knowledge and Visual Analytics

Instructor Name: Charley Ferrari

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Degree Program: M.S. in Data Science

Credits: 3 graduate credits

Prerequisites: DATA 607; DATA 606

Type of Course: Required course

Description

In this course students will learn non-statistical aspects of elucidating from data its information content which leads to knowledge. Several differing visual techniques will be examined to gain this knowledge through exploratory use of visualizations as well as visualization techniques for presenting data to a variety of stakeholders. Exploratory techniques look to find patterns in the data. Finding patterns that underlie the system's characteristics when the data sets are large or have many dimensions by reducing the dimensionality in intelligent ways is a complex task that often includes user direction. Presentation visualizations provide the viewer with useful information and knowledge since the visualizations are created with context in mind. This course will be completed completely online: assignments will be issued most weeks and due before the next class begins. One larger visualization project will be completed at the end of the course and will be displayed on a public website.

Course objectives: At the completion of this course, students should be able to:

- Understand the principles of data visualization
- Apply these principles in both interactive and status graphics
- Demonstrate familiarity with several modern data visualization tools and libraries
- Efficiently create visualizations for diagnostics and analysis

Grading:

You will be graded on your understanding of the theory of data visualization, your presentation of information, and how you apply the tools we will be using the course (code quality, etc.). Each homework assignment will be worth 10% of your overall class grade, with your lowest score being dropped. Late projects will be docked 1% of your overall class grade for each day late. Additionally, there will be a small quiz at the beginning of some classes which will be worth 2% of your final grade, with your two lowest scores being dropped. The breakdown of points available over the course will be as follows:

Homework Assignment: 60%

Discussion / In-class 10%

Final Project: 30%

Grade Distribution

Quality of Performance	Letter Grade	Range %	GPA/ Quality Pts.
Excellent - work is of exceptional quality	A	93 - 100	4.0
	A-	90 - 92.9	3.7
Good - work is above average	B+	87 - 89.9	3.3
Satisfactory	B	83 - 86.9	3.0
Below Average	B-	80 - 82.9	2.7
Poor	C+	77 - 79.9	2.3
	C	70 - 76.9	2.0
Failure	F	< 70	0.0

Students are encouraged to discuss approaches to homework assignments together, and I expect many of you to take similar approaches to visualization, though you each must turn in your own work, and it should have been completed solely by you. However, the final project will be done individually. Participation is part of the grade, but those who engage above and beyond the minimum discussion questions and replies will be awarded up to 10% of addition credit at the instructor's discretion.

The only reason students have failed this course in the past is that they did not put enough thought into their Final Projects and their rights to the data they were working with and did not communicate issues to me in a timely manner.

Textbooks: There is no textbook for this course: readings will be linked to or distributed by your instructor.

Hardware, Software, and Network Requirements:

- You should have network access for lectures (every other week).
- You should also have a computer on which you can save software and different files.
- A Github account will be mandatory for submitting projects.

Academic Integrity & Netiquette:

I expect that you will honor the principle of academic integrity. This means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. I strongly encourage you to look for help on coding problems from the internet (StackOverflow, etc.) If you use code found online in your academic work, provide a link to the original code as a reference so it is clear what was added. We all stand on the shoulders of giants, and you will be graded on how you creatively apply borrowed code to a novel problem.

Constructive criticism of your fellow students (and of me and the class) is encouraged. It should go without saying that bullying and intolerant speech will not be tolerated.

Note on Timing Communications:

Office hours are conducted via GoToMeeting or phone. You are encouraged to ask questions on the course discussion board where other students will be able to benefit from your inquiries. For the most part, you can expect me to respond to questions by email within 24 to 48 hours. If you do not hear back from me within 48 hours of sending an email, please resend your email. You can expect me to grade and return assignments within 14 days. Please do not hesitate to ask if you have questions or concerns.

Projects & Schedule: Project due dates are listed in the class-by-class schedule below:

Module	Meeting	Project Due Date	Module Notes
Exploratory Data Analysis	Wednesday, 08/25/2021	Sunday, 09/05/2021	Exploratory data visualization with R. Skill focus: static visualizations, R Markdown
Big Data Visualization	Wednesday, 09/08/2021	Sunday, 09/13/2021	Big Data Visualization with R or Python Skill focus: Data cleansing, “Bring your code to the data”, Bigvis, Datashader
Interactive visualizations in R	Wednesday, 09/22/2021	Sunday, 09/27/2021	Interactive data visualizations in Shiny Skill focus: web development concepts, Shiny
Interactive Visualizations in Python	Wednesday, 10/06/2021	Sunday, 10/11/2021	Interactive data visualizations with Plotly and Dash Skill focus: web development concepts, Plotly, Dash
Introduction to Javascript	Wednesday, 10/20/2021	Sunday, 10/25/2021	Build your first true web app. Skill focus: web development concepts (frontend), HTML, basic JavaScript
Visualizing data using JavaScript	Wednesday, 11/03/2021	Sunday, 11/15/2021	Visualize data on the web. Skill focus: d3.js, Flask (optional)
Final Projects	Wednesday, 12/01/2021	Sunday, 12/12/2021	Present your final projects

Accessibility and Accommodations

The CUNY School of Professional Studies is committed to making higher education accessible to students with disabilities by removing architectural barriers and providing programs and support services necessary for them to benefit from the instruction and resources of the University. Early planning is essential for many of the resources and accommodations provided. For more information, please see:

[Disability Services on the CUNY SPS Website.](#)

Online Etiquette and Anti-Harassment Policy

The University strictly prohibits the use of University online resources or facilities, including Blackboard, for the purpose of harassment of any individual or for the posting of any material that is scandalous, libelous, offensive or otherwise against the University’s policies. Please see: [“Netiquette in an Online Academic Setting: A Guide for CUNY School of Professional Studies Students.”](#)

Academic Integrity

Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, plagiarism and collusion in dishonest acts undermine the educational mission of the City University of New York and the students' personal and intellectual growth. Please see:

[Academic Integrity on the CUNY SPS Website.](#)

Student Support Services

If you need any additional help, please visit [Student Support Services.](#)