New York University Tandon School of Engineering
Computer Science and Engineering
Course Outline CS-UY 6313 Information Visualization (Online)
FALL 2017
Professor Enrico Bertini

Contacts:
enrico.bertini@nyu.edu
2 Metrotech, 10.026
Phone: 646 997 3731
Office hours: Tuesday 7:30pm, or by appointment on Fri
Weekly meeting: TBA

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Course Pre-requisites

The coursework includes projects that requires extensive programming (in JavaScript and web technologies). While previous knowledge of JavaScript and web technologies is not required, being proficient and comfortable with extensive programming is a fundamental prerequisite for this course. Previous experience with data manipulation and analysis can also help but it is not required.

Course Description

Being able to analyze and present data visually has become one of the most important skills for students who want to work in areas related to data. Information Visualization teaches you how to design effective interactive visualizations of complex data for knowledge discovery, sensemaking, and communication.

The course is a blend of theoretical knowledge and practical work aimed at developing a well-rounded set of skills to design, implement, and evaluate complex data visualization projects. The theoretical part aims at providing a mental model to think about the visualization design space in a principled manner. This includes the theory of visual encoding, human perception and visualization techniques.

The practical part aims at teaching the skills needed to develop effective data visualization tools. This includes teaching the D3 javascript library and practical labs on exploratory data analysis, sketching, and critique.

The course also includes a series of small practical projects which enable students to gain experience with the development of fully-working interactive visualizations to solve an assigned problem. The work is organized in a way to simulate conditions happening in real-world data analysis and communication projects and includes activities to gain feedback from the instructor and the teaching assistants.

Course Objectives

- Learn what problems visualization can solve and how it relates to other disciplines in data science.
- Learn how to analyze data and present the results visually.
- Learn what visual idioms (graphs) are available and appropriate for a given data set.
- Learn how to systematically explore the visualization design space to find solutions that match a given problem.
- Learn how to evaluate the effectiveness of a given visualization.
- Learn how human perception can help make informed decisions in visualization design.
• Learn how to design, develop and deploy effective interactive data visualizations for communication and explanation.

Course Structure

The course includes recorded lectures and labs, readings, exercises, and visualization design and development projects.

Textbooks

The required texts for the course are:


Optional recommended texts are:


You can find the books on Amazon, at the NYU bookstore, and at the Dibner Library.

Course requirements

The course requires:

• **Attendance**: full attendance of weekly meetings;
• **Homework**: submission of all homework (readings, quizzes, etc.) (see details below);
• **Projects**: development and submission assigned projects;
• **Midterm and final**: graded test for midterm and final.

Grading breakdown:

• **Attendance**: 5%
- Homework: 15%
- Projects: 15%
- Final project: 30%
- Midterm: 20%
- Final: 15%

**Attendance**

The course requires full attendance of weekly (virtual or in-person) meetings. Attendance counts as 5% of the final grade (5 point out of 100). Missed meetings result in reduction of attendance points as follows:

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For special situations such as sickness, religious festivities, problems with transport, no attendance points will be removed as long as you send me a note via email before the class starts. Attendance will be recorded at the beginning or end of each meeting every week.

**Homework**

The course includes three different types of homework:

- **Readings.** To solidify, expand, and deepen the knowledge acquired in class.
- **Quizzes.** To understand what you have have learned and what needs additional explanations from the instructor.
- **Exercises on data visualization practice.** To develop data analysis and visualization design skills.
- **Programming assignments.** To train your programming skills on relevant data visualization problems.

**Grading policy**

Each assigned homework is evaluated using the following scale:

- **Not satisfactory:** Your grade is decreased of 0.25 points and you need to resubmit the assignment within one week (after getting feedback).
- **Satisfactory:** All good.
- **Excellent:** You get 1 extra point for each excellent submission (for a maximum of 10)!
Students who accumulate 5 or more excellent submissions will receive a special prize at the end of the course.

Late and no submission policy:

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<td>5 days or more</td>
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Important note on “due dates”: it is your responsibility to check that you understand when a given assignment is due. It is never a good justification to say: “I made a mistake and though the submission was due ...”. Keep in mind that 12pm is actually noon in the afternoon, not midnight!

Projects

In the second half of the course we will focus on projects. Projects aim at putting into practice all the knowledge and skills acquired in the previous weeks of the course.

A project consists of an assigned data set and a problem the visualization is supposed to solve. The solution requires designing a solution and implementing it in D3/javascript.

The students will have to submit for each assigned project the following material:

- Design sketches (developed before coding)
- Short description of the design and its rationale
- Working code showing the visualization implemented

(More details will be provided at the time the projects are assigned.)

All students are assigned the same projects so that we will be able to compare and discuss the solutions.

The projects will be easier at the beginning and will gradually increase in complexity as the course progresses.
Peer-Review
As part of the assignment each student will have to review two submissions from other students. The peer-review will be graded with the same criteria used for the rest of the homework.

Final Project
During the last week of the course we will assign a final project that will be fully graded and will count for 30% of the final grade. The project requires to develop mockups and implement visualizations to solve a specific data visualization problem.

Midterm and Final Tests
The course includes one graded test administered halfway throughout the course and one at the end. The tests are aimed at evaluating the knowledge and skills acquired in the course and it will include only questions and exercises on material that has been presented and tested in the previous weeks.

Schedule
A detailed schedule for this class can be found here: https://docs.google.com/spreadsheets/d/1DviNRKVATa1Phqwg06KXiqgTD6cFaKmWVlq1fwY3EQ/edit?usp=sharing. Note that the schedule may slightly vary during the semester. Make sure to check frequently for possible changes!

Quoting Policy and Collaboration
The work students submit for individual assignments and class projects must be their own original work. When ideas are borrowed from existing work it is necessary to provide citations and a clear statement that describes which part has been adopted and which is original. For homework students are NOT allowed to collaborate with their peers. The submitted homework must be produced and submitted individually.

Academic Dishonesty
It's always annoying having to explain that copying work or cheating is not allowed. I like to totally trust each and everyone of you. But bad things happen and I have to warn you that academic dishonesty is a very serious thing and you might get in very serious trouble if caught
cheating. Students caught in dishonest behavior get an F score for the course and are reported to the school.

**Moses Center Statement of Disability**

If you are student with a disability who is requesting accommodations, please contact New York University’s Moses Center for Students with Disabilities at 212-998-4980 or mosecsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.