

DATA 562 Data Visualization with JavaScript

Spring 2016 · Syllabus

Class Information

Instructor: Dr. Lauren Williams

Class Meeting: MWF 1-2:05, Old Main Advanced Lab

Office: Old Main 404 (Tower)

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Office Hours: Mon 2:15 - 3:30, Tues 11:45 - 1, Wed 2:15 - 3:30, Thur 11:30 - 2

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Course Description

This course will explore several modern libraries specifically created for data visualization on the web. Students will create interactive, animated, and well-designed graphics that accurately and effectively depict a data set. JavaScript libraries studied are subject to change, but students will learn to create basic charts and graphs, radar charts, trees, word clouds, cartographs, and several other styles of visualization that complement their data.

Course Objectives

On successful completion of the course, students should be able to:

- communicate data clearly and effectively using visual representations created with JavaScript libraries
- apply basic design principles to create attractive and appropriate visualizations of data
- define and utilize several types of graphs, charts, and diagrams
- create interactive visualizations, taking full advantage of JavaScript in relaying the “story” of the data

Required Textbook

Interactive Data Visualization for the Web, by Scott Murray. Other books and resources may be recommended, but will not be required.

Required Materials

No additional materials are required. You may find it useful to bring your own computer to class, but this is not necessary. If using the lab computers, you may want to invest in a flash drive to save your work. At a minimum, you will need a text editor and internet access to complete assignments and projects. Recommendations on software will be given in class.

Assignments

For the first half of the semester, you will be given assignments (roughly once per week) that will reinforce the material in class. These assignments will cover a wide range of topics and types of visualization, but each assignment will focus on a single important concept.

You will be expected to adhere to the project policies, included in this syllabus, on all assignments. Be sure to read these requirements carefully.

Final Project

After you've mastered the basics of JavaScript and visualization libraries, you'll be prepared to design and implement your own final project. Sample data sets will be provided, though you're encouraged to work with data that is of particular interest to you. Further details and a rubric will be provided. Well written code, accurate depictions of data, and overall appearance will all be considered.

Exams

We will have a midterm exam and a final exam. The midterm will be a written exam (mostly multiple choice) that checks your knowledge of JavaScript and visualization libraries, as well as design principles.

Exam Dates:

Midterm Exam: Friday, April 1

Final Exam: Wednesday, May 18, 1-3 pm

Final Grades

Grades will be calculated as follows:

40% - Average of Weekly Assignments

30% - Final Project

10% - Midterm Exam

20% - Final Exam

Grading scale:

F	D	D+	C	C+	B	B+	A
0-59	60-64	65-69	70-77	78-83	84-89	90-93	94-100

Course Outline

The course will cover the following topics, with possible changes to the ordering. We will not adhere to a strict schedule, as we may incorporate new libraries and topics as they develop.

- Introduction to Data Visualization: History, Definition, and Significance
- HTML and the Document Object Model (DOM)
- Developer Tools and the Department Server
- Types of Visualization and Design Standards
- Scalable Vector Graphics (SVG)
- Introduction to JavaScript
- Including and Using JavaScript Libraries
- Data Types, Finding Data, and Choosing the Best Visualization for Data
- Charting Libraries
- Google Charts
- D3.js
- Interactive Visualizations

Support of the Mercy Mission

This course supports the mission of Mercyhurst University by creating students who are intellectually creative. Students will foster this creativity by: applying critical thinking and qualitative reasoning techniques to new disciplines; developing, analyzing, and synthesizing scientific ideas; and engaging in innovative problem solving strategies.

Learning Differences

In keeping with college policy, any student with a disability who needs academic accommodations must call Learning Differences Program secretary at 824-3017, to arrange a confidential appointment with the director of the Learning Differences Program during the first week of classes.

Citing Sources

The majority of the code you submit should be your own, but in some cases, it will be appropriate to use code you've found elsewhere as a starting point or to add an additional feature to your project. Any external code must be acknowledged by including a comment in your project indicating the origin of the code. This should include the web address or text where the code was found, and the author's name (if known). Using parts of complex projects you find online may be appropriate, but you should never simply copy and paste large portions of your code (even with citation). When in doubt, ask me if your intended usage is acceptable.

In addition, *respect the difference between helping a classmate and doing their work for them*. You are encouraged to support each other's progress in this course. However, you may not request nor provide code to your classmates without my permission. If such code sharing is appropriate, the author of the code must be cited within a comment of the project.

Using a project from another class is permitted, with permission. If you are creating a project for another course that would also satisfy the requirements for a project in this one, you may submit the project with my permission. The project must be created this semester, be your own work (not created as a group project for another course), and you should obtain permission from the instructor of the other course as well.

Failure to cite external sources used in your project may result in a grade of 0 on the project and an academic dishonesty report. Remember that as Data Science Scholars and graduate students, you are expected to set an example for the Mercyhurst community.

Basic Requirements

While many other means for creating a visualization exist, all projects submitted must be created (primarily) with JavaScript. Graphs and figures may not simply be displayed as an imported image, for instance. This does not necessarily mean that all projects must be interactive; this requirement would be specified in the project description.

Projects will be based on JavaScript, not HTML or CSS. You will be provided with basic HTML/CSS templates in which to place your JavaScript. Additional efforts in HTML will not be required unless specified in the project description. You will not be held responsible for reflexive design, the use of advanced frameworks, or styling options (other than those pertaining to the visualization itself) unless specified. You are also not required to use jQuery, though it is a common dependency for other libraries (so it will usually need to be included, even if your code is pure JavaScript).

Best practices for all languages used should be observed. As they are covered in class, your work will be expected to follow standard guidelines for HTML, CSS, JavaScript, and any supporting libraries or frameworks. This includes proper indentation, variable declaration, commenting, and safe coding techniques. This will be increasingly important throughout the semester.

Data

Use only appropriate, legally obtained data. You are encouraged to use real world data in your projects, but only data that you have legal permission to use, does not contain sensitive information, and is appropriate for wide audiences (keep it PG-13, please). You should also be respectful of your classmates when designing your projects, particularly those that are centered on political or social data. See me if you are unsure whether or not your data or layout could be considered inappropriate. Keep in mind that your project (both data and code) will be publicly available on our server.

Libraries

We will make use of a variety of JavaScript libraries in this course. Some assignments will require the use of a particular library, such as D3. In these cases, the library must actually be used to create your project (as opposed to simply including the library and using other tools to complete the assignment). While there are often several ways to achieve the same results, we will build on our knowledge of particular libraries throughout the course, so it is important that you become familiar with the required methods.

If you would like to use additional libraries in your project, including those not covered in class, you must request permission from me. In most cases, you'll be free to do so.

Project Submission

All projects must be uploaded to your public html directory on the department server. Projects submitted via email or other means may not be accepted without prior permission. Using the server is recommended while developing your projects, as you are far less likely to lose your work. It is also the fastest way for me to assist with projects as you work.

Projects will be tested on Chrome, Firefox, and Safari. You should check that your work displays properly on these browsers. Internet Explorer support will not be required unless specified, though code that functions on all four browsers will receive special consideration when grading.

Project Grading

A basis for each project's grade will be provided with the project description. You should take this criteria into account when developing your work, and note that the requirements may differ from one project to the next. For instance, some projects may prioritize code efficiency and structure, while others will have a more substantial visual component.

Complexity will be considered. Part of most project grades will be based on the overall level of effort required to produce it. Work should have an appropriate level of complexity, based on the amount of material we have covered. You will be expected to fulfill more than the bare minimum of requirements. For instance, if you are required to create a bar graph, you should pay attention to the visual aspect of the graph (color, clarity, etc). You will also be expected to go beyond some of the in class examples, which will be largely concerned with technical details.

Late Policy

Work must be submitted on time to receive full credit. Work received within 24 hours after it is due will receive an automatic 10% deduction. Work received within 24-28 hours after it is due will receive an automatic 20% deduction. Work will be considered submitted only when ALL required files are received.