J460 INTERACTIVE DATA VIZ - SPRING 2017

LOCATION - Franklin Hall 058
SECTION - 17274 - Meets MW 4:00-5:15pm
INSTRUCTOR - Nic Aguirre - naguirre@indiana.edu
OFFICE HOURS - FF M130S (Stack 4), Friday 10:00-11:00a

Description

In *Interactive Data Visualization*, students will develop web-based graphs, charts, maps, and other informational tools. Course content is very technical; we will work with **JavaScript** and the **d3.js** library. Much of our work will involve the active development and maintenance of data-driven software code. The result takes the form of compelling and elegant multimedia - anything from a simple bar chart to a full-page web app.

This course, while very tech-oriented, also has a strong focus on **visual design**. The use of font, color, size/proportion, and positioning are important for our work to communicate effectively. We are also very concerned with narrative and communication; most of our work serves to deliver a story or message substantiated by data.

Work in this course will be found both challenging and rewarding. The aim of this course is for students to develop projects that can also serve as portfolio pieces. Interactive data viz is still somewhat in its infancy and hasn't been widely adapted as it is subject to constant change.

Prerequisites

Must have a Junior or Senior standing. J460 may be repeated for credit with a different topic.

Objectives

In this course, you will:

- Learn principles of visual design
- Learn to find, clean and organize data
- Learn how to structure information
- Develop technical mastery of `HTML/CSS/JavaScript`
- Learn to analyze and disect visualizations
- Practice effective communication and storytelling with visualization-based stories

- Gain familiarity with the software development process
- Develop a vocabulary for discussion on the topic of visualizations and code
- Build an effective workflow and digital work environment
- Understand project management and version control for your code
- Build numerous attractive portfolio pieces
- Gain a demonstrable command of front-end web languages
- Learn to adapt to a constantly-changing medium

Work

This class is project-driven, and demands consistent effort inside and outside of the classroom. Classes are intended to be variable and may feature lectures, tutorials, in-class exercises, discussions and lab time. The demands of our work and discussion in class are designed to prepare students for real-world application. Coverage of technical details such as code syntax is primarily handled outside of the classroom. This is intended to give offer a more engaging and less passive experience during class time.

Projects

You will be responsible for completing three assigned projects, which will constitute 60% of your grade. Each project will require critical thinking and analysis, prototyping and design, and also a good amount of coding.

Because this course aims to provide tangible skillsets and viable portfolio pieces, the instructor aims to provide projects that will prove enticing or useful to those considering working in the industry.

Project 1 - Highcharts

You will use the **highcharts.js** library to create two visualizations. You must have:

- An interactive bar chart
- An interactive map *(choropleth)*

Project 2 - d3 Scatterplot

You will make an interactive scatterplot using d3. In addition to rendering a scatterplot, you must provide some means of user interaction - e.g., filters, view changes, a slider or something that allows users to explore data.

Project 3 - d3 Story

You will use a combination of d3 visualizations - charts, maps, plots - to create an interactive story. This project is designed so students can combine their technical d3 prowess with narrative skills to create an enticing story.

Elective Assignment

Most work in this class is assigned by the instructor, but 20% of your grade will come from an elective assignment that you get to choose. With the instructor's consent, you will be able to work on an assignment of appropriate length and complexity. Some examples of elective assignments might be:

- Enhancing, improving, or revising a previous work
- Collaboration with another student on a more complex project
- Researching and/or implementing new technology such as R, Python or Tableau
- A detailed writeup of a visualization concept, an algorithm, technique, or finding supported by data
- Reverse-engineering someone else's visualization

In-class Activities

Participation is an important element of this class. It is not enough to read about web design and its constituent languages; one must actively practice and hone their skills to be successful. Many of our classes will focus on the completion of certain exercises, tutorials, and discussions. The instructor reserves the right to adjust students' participation grade according to the level of participation and frequency of attendance for that student. Students are allowed **two unexcused absences** per semester. Additional absences will deduct points.

Final

There is no final exam for this class. Your final product should be a portfolio website featuring your visualizations.

Grade

There are a total of **100** points in this class.

The grade is divided as follows:

Assignment	Points
Three projects (20 each)	60
Elective assignment	20
Attendance and participation	20
Total	**100**

Your grade will be assigned as follows:

Points	Grade
93 - 100	A
90 - 92	A-
87 - 89	B+
84 - 86	B
80 - 83	B-
77 - 79	C+
74 - 76	C
70 - 73	C-
67 - 69	D+
60 - 66	D
59 - 0	F

Grading criteria will be given for each individual assignment.

Revisions

When software is created in a professional environment, changes and revisions are common. Factoring that web development is an iterative process, students are allowed to revise and resubmit assignments. As long as students submit their work by the assignment due date, they may revise their work for an improved grade. The privilege to revise submitted work is only available for students who submitted substantial work; incomplete or dysfunctional code is not eligible for resubmission.

Extra Credit

One opportunity earn **two extra credit points** will be offered during the semester. The Institute for Communication Research needs research subjects, and you can participate in their research to receive extra credit.

If you do not want to participate in the ICR's studies, you can instead opt for an assignment that involves

building a visualization using a technology not taught in class (e.g., Tableau).

Required Readings and Materials

There is no required text for this course. Most of our reading will be in the form of free documentation available on the web. Some we will reference frequently are **bl.ocks.org**, **W3Schools** and **Codecademy**. Students will also maintain a website with their work. This can be hosted anywhere, written with any technology (wordpress, plain HTML) as long as it fulfills the requirement of a basic portfolio site.

Hosting

You will need to purchase a domain name and hosting service. I recommend using asmallorange.com. The cost is about $5 per month for hosting. Most domain names available through asmallorange.com start at $15.

If you have another means of hosting - through IU Pages, Burrow, or GitHub pages, that is also fine. The idea is for you to build a functional website with your work as the semester progresses.

Software

Software is a focal point of this course, and an effort was made to ensure that free, cross-platform software will be used wherever possible. Tools, applications, and services prove invaluable in web development. A good deal of class time will be spent assisting students with installation and configuration of software.

We will use:

1. A text editor - SublimeText is recommended. Good alternatives are Atom and TextWrangler.
2. A means of version control - GitHub is recommended, Google Drive, Box, and Dropbox are good alternatives. **Lost data is not an excuse for late or missing work**, so it is extremely important to have duplicate files for your work.
3. A file transfer tool - OSX users can use Cyberduck, Windows users should use PuTTy
4. A way to edit CSV files - Most students will have access to Microsoft Excel. If not, I recommend OpenOffice Calc

Hardware

While web development can be done from any operating system, the instructor teaches workflow for OS X users. Access to a computer with Mac OS X is recommended but not required. All students should have access to a Mac through the computer lab. Students who aren't using OS X are expected to learn PC keyboard shortcuts and find Windows-compatible substitutes for software.

It is also useful to have access to a large display, or dual display configuration. If you are bringing your own laptop to class, it is recommended to bring a mouse.

Policies

Attendance

Students should make a serious effort to attend every lecture. A repeated pattern of absence or tardiness will result in a deduction of points from your participation grade. Course material is cumulative in nature and class periods are used to develop programming skills and work on projects. As such, **attendance is the strongest guarantor of success** in this course.

Lost Data

You are responsible for keeping backups/duplicates of your files. As an IU student, you should have access to a Box account. You can also use Google Drive or GitHub to maintain copies of your files. Losing your files is not an excuse for late or incomplete work.

Food and Drink in Class

Sorry, they are not permitted.

Deadlines

Deadlines are strict and non-negotiable. Late assignments will be accepted for the first five calendar days after a deadline. After that, I will remove 10% daily. Assignments may not be submitted after five calendar days have elapsed (Example - Deadline is September 8th, you cannot submit after September 13th)

Proper Attribution for Referenced Works

By nature, code is re-usable and extensible. It is both acceptable and encouraged to utilize and adapt examples of code; this is common on websites like StackOverflow. However, the sources for all referenced code must be given in your code commenting. I will assist students with finding code that is reusable (such as under the GNU license), and help with giving proper credit to the source.

Students with Disabilities

If any student requires assistance or academic accommodations for a disability, please contact me by after class, by e-mail, or during office hours. The student must have established eligibility for disability support

services through the Office of Disability Services for Students.

For more information - https://studentaffairs.indiana.edu/disability-services-students/

Religious Holidays

It is the policy of Indiana University that instructors must reasonably accommodate students who want to observe their religious holidays at times when academic requirements conflict with those observances. This policy is intended to ensure that both faculty and students are fully aware of their rights and responsibilities in the accommodation of students' religious observances.

Source: http://enrollmentbulletin.indiana.edu/pages/relo.php

Syllabus

Our schedule will be followed more rigidly in the first half of the semester, and more loosely in the second half. Courses such as this one will have a wide array of students with varying strengths and weaknesses. Because this course is rich in content, the instructor reserves the right to amend this syllabus to better match the needs of a given class.

Schedule

Schedule is subject to change. A given class of students can differ widely in skills and teaching needs, so our schedule is likely to be looser in the second half of the semester.

	Dates	Activity
week 1	Mon 1/9 Wed 1/11	Intro to HTML. Visualization principles
week 2	Mon 1/16	*Martin Luther King Day - No Class*
	Wed 1/18	HTML, introduction to CSS
week 3	Mon 1/23 Wed 1/25	CSS box model, IDs and classes
week 4	Mon 1/30 Wed 2/1	Introduction to JQuery and JavaScript
week 5	Mon 2/6 Wed 2/8	JavaScript - Arrays, objects, methods
week 6	Mon 2/13 Wed 2/15	Project 1 due **Friday 2/17**
week 7	Mon 2/20 Wed 2/22	Introduction to d3 - data joins and structure
week 8	Mon 2/27 Wed 3/1	d3.csv/d3.tsv - loading and cleaning data
week 9	Mon 3/6 Wed 3/8	d3 bar charts, line charts
	Sun 3/13 - Sun 3/19	*Spring Break*
week 10	Mon 3/20 Wed 3/22	Project 2 due **Friday 3/24**
week 11	Mon 3/27 Wed 3/29	d3 UI elements for interactivity
week 12	Mon 4/3 Wed 4/5	Introduction to leaflet
week 13	Mon 4/10 Wed 4/12	d3 transitions and effects
week 14	Mon 4/17 Wed 4/19	Adding interactivity - buttons, filters, sliders
week 15	Mon 4/17 Wed 4/19	Continue working on project 3
week 16	Mon 4/24 Wed 4/26	Project 3 due **Friday 4/28**