CMPS 165 **2018 Spring**
Data Programming and Visualization

Instructor:	Suresh K. Lodha; lodha@soe.ucsc.edu; E2-361 or E2-262
Class Location:	Nat Sci Annex 101
Meeting Times:	TuTh 5:20-6:55pm
Office Hours:	TuTh 3:45-4:45pm and by appointment
Class Web Page:	Canvas
Teaching Assistant:	Karthik Balakrishnan (kabalakr@ucsc.edu)
Tutor/Reader:	Christopher Bui (chdbui@ucsc.edu), Janesh Chhabra (jchhabra@ucsc.edu)

This course will focus on creating interactive visualization on the web using D3 (d3js.org). In the first class, I will present several examples of compelling visualizations using D3 in a wide variety of domains. D3 was designed by Mike Bostock at Stanford. D3 is currently one of the most powerful tools for interactive web visualization. Last year, D3 has been upgraded from an earlier v3 version to a newer version v4 (which is not backward compatible with v3). If you are looking at on an older D3 code, you will have to modify the program to work with v4 version.

In order to use D3 effectively, we will learn a variety of web tools including web inspection tools (brackets), HTML, CSS, SVG, and JAVASCRIPT. We will learn and use the following data formats – csv and json. Focus will be on understanding the fundamentals behind binding data to visuals. Examples will include creating a variety of infographics such as bar charts, scatter plots, radial maps, interactive motion charts (similar to ones created by Hans Rosling using his famous software Gapminder) and geomapping

Several inspiring examples of data visualizations drawn from social sciences, public policy, and data journalism will be presented. Detailed attention will be provided to data scaling, axes, labeling, color, annotations, and legends to create visualizations that set them apart from mediocre visualizations.

I expect that you will be empowered to create compelling data visualizations on the web, a rare and unique skill. These skills are in high demand. I hope that you will use these skills for the benefit of the society. You could also use these skills to find a coveted job.

Although there are several books and resources on D3, I will follow the following book fairly closely for the first six weeks of the class or so covering most of the book. Therefore, it is a good idea to acquire this book. In contrast to the earlier version of the book, which was available freely on the internet, I have not found a free pdf copy of the book. Therefore, I recommend that you buy this book ASAP. You will also be able to download several examples from the website which will speed up the learning of D3.

Textbook:
Interactive Data Visualization for the Web by Scott Murray, ***2nd Edition***, *O'Reilly.*

Additional Websites:
Brackets.io; w3schools.com; developer.mozilla.org

Prerequisites: CMPS 101 or equivalent. Prior experience or knowledge of creating visualizations is not required, although it can be an added plus. In addition to this prerequisite, I expect excellent team work (working in a collaborative classroom environment), excellent motivation, and excellent effort. Prior knowledge of HTML, CSS, SVG or Javascript is *not* required.

Class Expectations and Evaluation:
Class presence is expected and required for most classes. There will be in-class participation, engagement, collaboration, and discussion on every topic. Some lectures will have lab environment where we will go over specific code step-by-step. It may be helpful if you bring your laptop (fully charged) to the class. You will be encouraged to provide assistance to and seek assistance from peers. Assignments (except geomapping) will constitute roughly 25-30% of the grade. Roughly 7-10% of the grade will be assigned for a visualization involving geomapping.

15-20% of the grade will be decided on the basis of a class presentation (that is not related to your final project) and a tutorial. You will be expected to choose a topic on which you can lead a presentation or discussion. The topic will focus on educating finer details of D3 in the context of a specific visualization with elaborate comments inserted in the code. This presentation will be coupled with creation of a very tutorial on a specific D3 command that has not been covered in the class. The presentation and tutorial tasks will require generation of simplified code with simple data sets

There may be one or two quizzes comprising roughly 10% of the grade. There will be no mid-term or final examination.

Roughly 40% of the grade will be decided on the basis of the final project that will proceed in stages culminating somewhere between the last day of class, till the final examination day. Final projects must be demonstrated in person on the examination day, Thursday, June 14, 4-7pm. Students must attend the entire presentation till 7:00pm. No exceptions will be allowed. The final project will be an interactive visualization on the web on a meaningful well-thought topic of great interest to society. I expect that the final project will be worthy of your time and effort and that you will blow away my mind.

Extra bonus points will be provided for exceptional effort and work at every stage. You can earn up to 20 bonus points, at the discretion of the instructor, throughout the class for stellar contributions to any of the assignments, for high quality classroom participation, for assisting peers, for extra effort, for great attitude towards collaborative team work, being flexible to incorporate feedback in a timely manner, bringing excellent visualizations to the instructors' attention, etc. All of this must be submitted/documented on canvas under "Bonus Points.

Students, who are frequently absent, or severely lagging in timely completion of classroom activities or programming assignments may be required to take an in-class examination with a short notice and if the performance is below par, they will be advised to withdraw from the class (since the group final project will impact the group and the class adversely). These students will also be required to take a final examination consisting of both theory and practice between the last week of classes and the final examination date.

Honesty and Integrity
You are encouraged to use any or all of the resources found on the internet and elsewhere including code. For all the assignments and final projects, it is expected that you will cite *all the sources* from the internet and include acknowledgements to all the individuals who have assisted you inside or outside the classroom (including your peers, teaching staff). These citations must be included in the web page where you publish your visualization. If you have borrowed snippets of code, please include the citation as comments within the code, in addition to citing these on the website. If you borrow a sentence of two from other sources, please surround these sentences within quotations and citing the source next to the sentences. Failure to cite or acknowledge may

be construed as a deliberate attempt to hide the sources and a case of academic misconduct may be filed. If something is unclear, please ask the instructor without hesitation.

Disability Accommodation

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Academic Access Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, at the earliest, preferably within the first week of the quarter and definitely within the first two weeks of the quarter. At this time, I would also like us to discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.

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