Goals: Welcome to CMPS165! The main goal of this course is to learn how to create interactive visualization on the web using D3 (d3.js.org).

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.

Textbooks:
Interactive Data Visualization for the Web by Scott Murray
(a pdf version of the book is available for free online at the following website:
http://chimera.labs.oreilly.com/books/1230000000345/

The Atlas of California by Walker and Lodha
Available at Amazon in $20 (approximately)
This book will be a great help in the final project. Please acquire it ASAP.

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

Catalog Description: Basics of open source programming tools to perform data analysis and create interactive visualizations and maps for the web; data integrity and scraping, statistical computation, simple and novel visualization, geomapping, examples drawn from social sciences, public policy, and data journalism.

Prerequisites: CMPS 12B or equivalent. 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 Presence: Class presence is expected and **required** with an attendance record of 90% or above, that is, 17 classes or more (out of 19). Students missing more than 2 classes will be dropped. I will use a teaching style where at least half of the classroom time will be used as a hands-on lab where we will be working together to complete tasks that will build successively upon each other. Please bring your laptops to each class. Class presence is also required to make share ideas of your final projects, receive and offer critiques to improve upon your project, and to collaborate with teams. **Class presence is required of all students during the final exam period for full three hours (December 7, Wednesday, 4-7pm) during which final group project will be presented.**

If you are left behind, at any stage, then it may require substantial resources to catch up. If you have to miss one or two classes, please identify a student in class who can fill you in so that you can catch up quickly.

Since no previous prerequisite on web technology is required, I will go slowly over the basic concepts of web technology – HTML, CSS, DOM, SVG, javascript. It is possible that some of you are already familiar with these technologies. Extra credit will be provided to students who help others. If you finish the tasks assigned in the class early, I expect you to assist at least two students to complete their tasks. With this binary help, a class of 32 can learn the tasks in just 5 iterations. It is my expectation that the class will work together as a team in learning the material.

**Enrollment and Waitlist:** Last time when the class was offered, it became full on the very first day after the enrollment opened for the class. This time, it is not full yet because the class has been added very late during summer. **“Enrolled” students who do not show up either for the first class or for the second class will be dropped from the class. Students who do not perform well during the first three weeks of classes will also be dropped from the class.** Due to these requirements, it is expected (but not guaranteed) that several students on waitlist may be able to get into the class. **To join the waitlist for the class, you must send an email to the instructor Lodha@soe.ucsc.edu with the subject line “CMPS 165 Wait List” AND sign up on the waitlist maintained at the “schedule of classes”.**

**Capstone:** This class meets the requirement of a capstone course. Since this is a capstone class and significant effort is expected towards the final project, students are not allowed to enroll in the class with P/NP.

**Evaluations:** Each class will require completion of certain micro-tasks. Micro-tasks will be assigned on programming and on final project. Some of the programming micro-tasks will be designed so that you will be able to complete them in the classroom and “graded” as completed in the classroom. Some of the micro-tasks related to final group project will require classroom presentation and classroom activities such as group discussion and feedback. If you miss the class, then you are expected to complete the tasks at your earliest convenience and demonstrate the completion of the task to the instructor in his office hours at the earliest possible opportunity or to the TA/tutor at designated times. In summary, both completion of the tasks and keeping up with the pace is critical for success. These micro-tasks together will constitute roughly 20 points. There may also be one or two short quizzes in the class.

Programming assignments will constitute 30 points. At the beginning, you will be installing software such as brackets, D3, preparing data files, making simple html, css, javascript codes, and simple interactive visualizations. There will be roughly 4 programming assignments – 2 simple and 2 of moderate difficulty -- within the first 6 weeks of classes – all with the objective to prepare you for the final project.
Finally, there will be a final group project on creating an interactive web visualization. The final project will be evaluated out of 50 points and must be presented in person during the final examination period. The final project will be developed in several stages starting from curating data, designing visualization, designing interactivity and implementing these projects in stages allowing ample time to incorporate feedback. *This quarter, all final projects will be on one and the same topic, most likely California.* There are many topics within California to choose from. Several examples of potential topics are presented in one of the textbooks: The Atlas of California.

In total, number of points will be somewhere between 100-120.

Grades as follows: C: >= 60; C+/B-/B: >=65, 70, 75; B+/A-/A: >=85, 90, 95; A+ >100

Students may 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.

Students, who are 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 or may be deleted 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 November 29 and December 7.

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