INFO 5602: Information Visualization
Tuesday/Thursday, 9:30-10:15
TLC 158

Nuts & Bolts:

Instructor:
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Office Hours: TBD & by appointment, TLC 229

Course Description:
Data is everywhere. Charts, graphs, and other types of information visualizations help people to make sense of this data. This course explores the design, development, and evaluation of these information visualizations. By combining aspects of design, computer graphics, HCI, and data science, you will gain hands-on experience with creating visualizations, using exploratory tools, and architecting data narratives. Topics include interactive systems, user-centered and graphic design, graphical perception and cognition, data storytelling, and insight building. Throughout this course, you will work directly with stakeholders to analyze data from a variety of domains and applications.

Textbook:
Tamara Munzner. Visualization Analysis & Design.

The book is available online through the Libraries:
http://www.crcnetbase.com.colorado.idm.oclc.org/isbn/9781466508934

Hard copies are available through Amazon or other online retailers. Note that the full-text download link through the Libraries is not currently functioning, but you can download individual chapters. Any additional readings will be made available through the course website.

Topic Schedule:
Subject to Change

Week One *Aug 27 + 29*	Ways & Histories of Data Analysis ➔ What is visualization? ➔ How has data changed? ➔ How has visualization changed?
Week Two *Sept 3 + 5*	Touring the Visualization Zoo ➔ Historical to Modern Vis ➔ Common Visualizations ➔ Lying with Data
Week Three *Sept 10 + 12*	Common Systems, Tools, & Platforms ➔ Ways to Create Visualizations

	➔ Tableau ➔ Non-Traditional Visualizations
Week Four *Sept 17 + 19*	Building Visualizations: ➔ D3 ➔ Alternative libraries
Week Five *Sept 24 + 26*	Data Abstractions & Task Analysis ➔ Basics of data representation ➔ Sensemaking ➔ Questions We Ask of Data
Week Six *Oct 1 + 3*	Design Processes ➔ Task-Based Design ➔ Design Studies ➔ Participatory Design
Week Seven *Oct 8 + 10*	Principles of Perception ➔ Graphical Perception ➔ Color
Week Eight *Oct 15 + 17*	Uncertainty & Interaction ➔ Representing Uncertain Data ➔ Interaction Techniques
Week Nine *Oct 22 + 24*	To Be Determined
Week Ten *Oct 29 + 31*	Evaluation Methods & Insights ➔ Levels of Evaluation ➔ Insight-Based Evaluation
Week Eleven *Nov 5 + 7*	Quantitative Evaluation ➔ Experimental Design ➔ Experimental Statistics
Week Twelve *Nov 12 + 14*	Handling Scalability ➔ Data Structures ➔ Aggregation
Week Thirteen *Nov 19 + 21*	Visual Data Mining ➔ Dimensionality Reduction ➔ Model Visualization ➔ Human-in-the-Loop ML
Fall Break	
Week Fourteen *Dec 3 + 5*	Data Storytelling ➔ Presentation vs. Exploration ➔ Story Structures ➔ Specificity vs. Flexibility
Week Fifteen *Dec 10 + 12*	Final Project Work **Final Projects "Due" 12.12**

Course Objectives & Outcomes:

The purpose of this course is to enable students to design, construct, and evaluation visualizations, with an emphasis on user-centered design and system development. Upon completing this course, students will:

- Understand the basic factors, workflows, and processes involved in creating effective visualizations
- Compare methods for visualizing data and understand how these different methods might guide users towards different conclusions
- Understand different ways of formally measuring trade-offs in different visualization approaches
- Develop a toolkit for exploring and communicating complex data using visualizations
- Construct interactive visualizations for the web using D3 and other popular platforms
- Conduct a series of design studies with stakeholders to develop novel solutions to current analytics challenges
- Understand design and engineering challenges for data-centered systems

Assignments & Grading:

Grades in this course will be assessed as a combination of participation, weekly assignments, small course projects, and a larger final project. All information about class assignments will be posted to the course Canvas page: https://cuboulder.instructure.com/courses/16157

Participation:

This course meets in person twice per week. During this time, you are expected to attend class, participate in course discussions, and actively complete in-class activities. There will also be two presentation sessions that will likely occur outside of class hours during which you will showcase your work. I will give you at least two weeks advance notice for any such showcase.

Weekly Assignments:

You will be expected to post a response to a weekly reading prompt directly on the course message board. Unless otherwise posted, responses must be posted on Mondays at 11:59pm. Late responses will not be accepted for credit. However, you will be allowed to drop your lowest two scores from your overall grade. Send me an email with the subject line "<First Name Last Name> has read the syllabus" by the start of class on August 29 to receive a third drop.
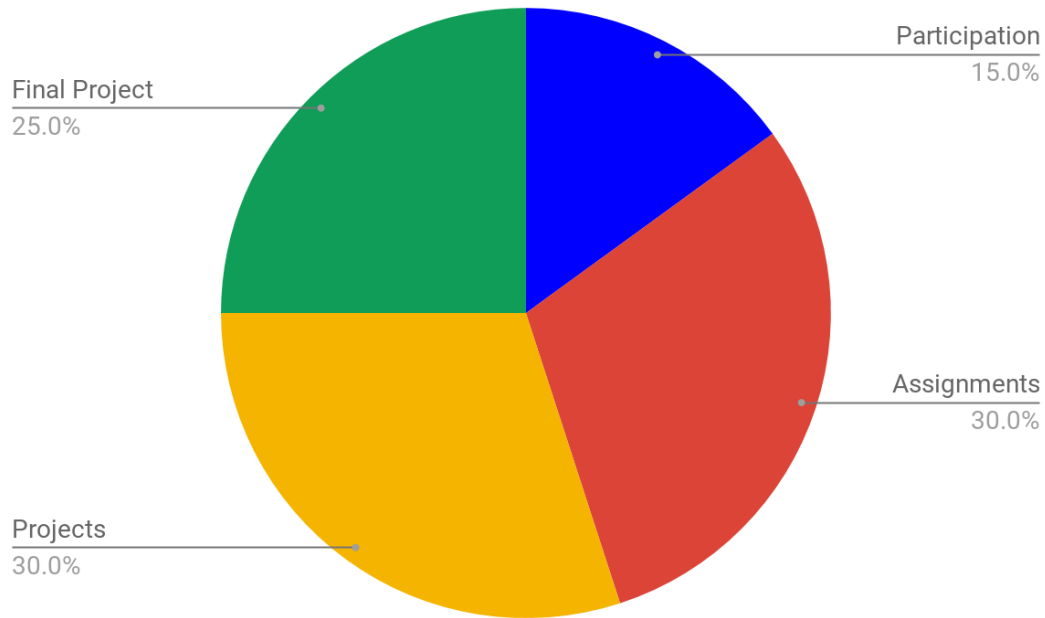
Projects:

You will contribute to two projects either individually or in small teams depending on the specifications of the project. All projects will be submitted through the course GitHub. Late projects will be deducted 10% for each day they are late. Projects will no longer be accepted after 72 hours.

You will also work either individually or in a small team to complete a final project on a topic of your choice. No late final projects will be accepted.

Extra Credit:

While the course will not have dedicated extra credit assignments, some projects and reading assignments may have *bells & whistles.* Bells will count for 2 points extra credit and whistles will count for 5 points.

Grade Distribution:

This course will use a standard, 100-point grading scale:

93.0% and above: A
90.0%−92.9%: A-
87.0%−89.9%: B+
83.0%−86.9%: B
80.0%−82.9%: B-
77.0%−79.9%: C+
73.0%−76.9%: C
70.0%−72.9%: C-
67.0%−69.9%: D+
63.0%−66.9%: D
60.0%−62.9%: D
Below 60.0%: F

Policies & Commitments:

Information Science Teaching Pledge:
I pledge to give feedback to students constructively and quickly, specifically within 7 days of an assignment. I pledge to treat each student with respect. I invite constructive feedback if a student feels that I could improve my instruction or conduct in the classroom. I will do my best to respond to your emails within 2 business days. If you have not heard from me by then, I welcome follow-ups either in-class or over email.

Technology Requirements:
Students in this course will benefit from having a laptop or tablet available for notetaking, in-class work, homework, and presentations. If you do not have access to a laptop or tablet, please consult with me. However,

students and the instructor alike are encouraged to quit mail and other applications that may be distracting; to turn off notifications and silence phones; and to put nonessential equipment away.

Open Discussion & Debate:

(adapted from Prof. Casey Fiesler's statement, with permission and thanks). In the classroom, students and instructors need to feel comfortable sharing their opinions and questions openly, even when we disagree. Disagreement is expected, but must be respectful and civil at all times. Students should feel welcome to share thoughts during class discussion without any fear of being disparaged for their opinions. Like yourselves, I also have opinions, and I will attempt to surface my own biases when appropriate. These disagreements or differences of opinion will not impact grades, as long as students are respectful. I invite students to meet with me to discuss concerns and ideas about how to make our learning community a positive experience for all.

This policy extends to topics in the course. Please feel free to reach out to me should there be any topics you'd like to discuss more deeply in class or that are not currently part of the course but you would like to see integrated. While I cannot guarantee that every request will be accommodated, I will do my best to make sure the curriculum and topics align with the needs of all of the students in the course.

Accommodation for Disabilities:

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](). Contact Disability Services at 303-492-8671 or [dsinfo@colorado.edu]() for further assistance. If you have a temporary medical condition or injury, see [Temporary Medical Conditions]()under the Students tab on the Disability Services website.

Family Support Statement:

(Adapted from Dr. Melissa Cheyney, OSU) CU does not have a formal policy on children in the classroom. However, I firmly believe that parents should not be forced to choose between family and education. All exclusively breastfeeding babies are welcome in class as often as is necessary to support the breastfeeding relationship. For older children and babies, minor illnesses and unforeseen disruptions in childcare often put parents in the position of having to choose between missing class to stay home with a child and leaving them with someone you or the child does not feel comfortable with. While this is not meant to be a long-term childcare solution, occasionally bringing a child to class in order to cover gaps in care is perfectly acceptable. In all cases where babies and children come to class, I ask that you sit close to the door so that if your little one needs special attention and is disrupting learning for other students, you may step outside until their need has been met. Non-parents in the class, please reserve seats near the door for your parenting classmates.

I ask that all students work with me to create a welcoming environment that is respectful of all forms of diversity, including diversity in parenting status.

Mental Health Statement:

Success in this course depends heavily on your personal health and wellbeing. **Recognize** that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. Your other instructors and I strongly encourage you to **reframe** challenges as an unavoidable pathway to success. **Reflect** on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak. Please feel free to **reach out** to me about any difficulty you may be having that may impact your performance in this course or campus life as soon as it occurs and before

it becomes too overwhelming. In addition to your academic advisor, I strongly encourage you to contact the many other support services on campus that stand ready to assist you.

Religious Holidays:

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please alert me of any such situations at least one week before any potentially conflicting deadlines. See the campus policy regarding religious observances for full details.

Classroom Behavior:

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation:

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct intimate partner abuse (including dating or domestic violence), stalking, protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Honor Code:

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

The first instance of academic dishonesty will result in a grade of 0 on the assignment in question. Subsequent violations will result in a failing grade for the course.