E 120 Data Visualization Projects
Caltech, third term 2012-2013, 6 units (2-0-4)
Mondays, 7pm - 9pm, Kerchoff 101

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COURSE DESCRIPTION:
This course will provide students with a forum for discussing and working through challenges of visualizing students’ data using techniques and principles from graphic design, visual art, and visual practices in science and engineering. Working together, we will help create and edit students’ graphics and other visual forms of data to improve understanding. We will consider the strengths and weaknesses of communicating information visually in drawing, design and diagramming forms such as flow charts, brainstorming maps, graphs, illustrations, movies, animation, as well as public presentation materials, depending on the needs of students’ projects. Our approach will be derived from design principles outlined by Edward Tufte and others. The course is targeted towards students across disciplines using visual display and exploration in research. There is no pre-requisite, but students should be competent in acquiring and processing data.

SCHEDULE

4/1 Week 1
Introduction to the course
Lecture/discussion: Basic kinds of data visualization, basic design principles for visualization
Homework: Exercise 1: Paper re-design of 2D infographic

4/8 Week 2
Lecture/discussion: Maggie Hendrie, Art Center College of Design Chair of Interaction Design, lectures on the process to make data visualization interactive: progressively disclose information and have it contextualized by a state, event, permission or preference, etc.
HW: Exercise 2: Paper design of interactive visualization of simple data set

4/15 Week 3
Lecture/discussion: Santiago Lombeyda demonstrates 2D visualization software: Processing and D3.js
1/2 hour demo + in-class exercise for each one
HW: Exercise 3: Create simple interactive 2D visualization with simple data set
Reference: Visualizing Data by Ben Fry (available online through Caltech library)

4/22 Week 4
Lecture/discussion: Santiago Lombeyda demonstrates 3D visualization software: Paraview and Three.js
1/2 hour demo + in-class exercise for each one
HW: Exercise 4: Create simple interactive 3D visualization with simple data set
Project proposal: 500 words and concept design sketches

4/29 Week 5
Lecture/discussion: David Leonard, Art Center College of Design Media Design Program faculty leads a workshop: Define project goals and visual forms via storytelling techniques
HW: Project development and production

5/6 Week 6
Group meeting: Review and refine projects
HW: Project development and production
5/13 Week 7
Group meeting: Review and refine projects
HW: Project development and production

5/20 Week 8
Attend JPL-Caltech-Art Center visualization summit -- Making Meaning: From Data to Design 5/23-24
HW: Project development and production

5/27 Week 9
Group meeting: Review and refine projects
HW: Project development and production

6/3 Week 10
Lecture/discussion: Project presentations

ASSIGNMENTS

Redesign and Software Exercises
2-3 short re-designs of existing visual displays of data
1-2 software tutorials

Project
This is an opportunity to focus on creating and refining visualizations of your data with the mentorship of visual art and design experts. Ideal projects are those that already have data sets that may benefit from creative design-informed visualization approaches involving interactivity and still design formats. Clear, well-defined problems with tangible outcomes that may be achieved within the limits of the term are most appropriate. However, shorter and longer-term projects may also be developed.

Students will create your own data visualizations using technologies you choose. Students will be responsible for acquiring and processing their own data as well as designing and fabricating their own projects.

1. Write an approximately 500-word proposal
2. Create informal design concept sketches
3. Loosely outline production plans
4. Produce project

References
• Edward Tufte’s books:
  The Visual Display of Quantitative Information
  Envisioning Information
  Visual Explanations: Images and Quantities, Evidence and Narrative
  Beautiful Evidence
• Visual Strategies: A Practical Guide to Graphics for Scientists and Engineers, Authors Felice C. Frankel and Angela H. DePace
  Book and web site http://visual-strategies.org
• Fernanda Viegas and Martin Wattenberg’s web site http://hint.fm
• Flowing Data web site http://flowingdata.com/category/tutorials/
• Colin Ware’s books:
  Information Visualization: Perception for Design
  Visual Thinking: for Design

REQUIRED PROJECT MATERIALS
Students will determine the materials needed for their projects. Students will be responsible for obtaining their own materials.
Suggested:
Sketch paper
Graph paper
Erasable colored pencils and eraser

**GRADES**
Pass/Fail
Your final course grade will be based on the following percentages:

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<td>Exercises</td>
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<td>Project</td>
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