E 120 Data Visualization Projects
Caltech, third term 2013-2014, 6 units (2-0-4)
Mondays, 7pm - 9pm, Powell Booth 120

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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
• Lecture:
        What is data visualization? 2D, 3D; static, interactive and animation; explore and communicate
        data
        Intro to static vis approaches: tools, methods, examples, case studies
        Highlight basic 2D design elements, principles, and techniques
• In - class exercises:
        Clock, hand sort, sketching, errors, inspiration boards
        Paper re-design of static visualization – start in class via pair/share; highlight most important
        dimensions of data
• Homework:
        Finalize re-design of static visualization on computer
        Collect data for static visualization project 1
        Install Photoshop, Illustrator and Processing

4/8   Week 2
• Hands-on demonstration of tools 1
        Photoshop, Illustrator, Processing
• In- class exercise:
        Static vis project 1: Present vis challenge, problem solve in interdisciplinary pairs via discussion,
        sketching and 3D
• Hw:
        Develop static vis project

4/15   Week 3
• Lecture: Intro to interactive and animation visualization: tools, methods, examples, case studies
        Highlight basic interactive and animation design elements, principles, and techniques
• Hw:
        Complete static vis project
        Install Mondrian, D3js, Paraview

4/22   Week 4
• Students present static visualizations in class
• Hands-on demonstration of tools 2

Processing (more), Mondrian, D3js, Paraview
• HW:
Write proposal for interactive or animated visualization project, collect data

4/29   Week 5
Students present proposals in class
Lecture:
Interactive and animation ideation methods: storyboards, personas, card sorts, paper prototypes, process book
In class exercise:
Ideate project with storyboards, personas, card sorts, paper prototypes, process book
Hw:
• Refine first draft ideation, prepare data

5/6   Week 6
Students present proposals in class
In class exercise:
• Begin implementation
Hw:
Refine first iteration

5/13   Week 7
• Lecture:
2D design elements, principles, and techniques within interactive and video data
• Hw:
Complete working first iteration

5/20   Week 8
• Share first iterations with class, discuss revisions
• Hw: Do revisions

5/27   Week 9
Review and refine projects
Hw: Finalize projects

6/3   Week 10
Project presentations

Projects
Static Data Vis Project: weeks 1-4
Interactive or Animated Data Vis project: weeks 4-10
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 static 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 be responsible for acquiring and processing their own data as well as designing and implementing their own projects.

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
• 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:

90	Projects
10	Class Participation
100	Total