ART 335-01 — Fall 2012

Information Visualization

Tuesday / Thursday
8:45 am — 11:30 am
XARTS 006 (orange lab)

Scott Murray
shmurray@usfca.edu
xarts.usfca.edu/~shmurray
Kalmanovitz Hall 475

Office hours:
Wednesdays 9:00–11:00am
or by appointment

Course Description

This course will introduce students to the study of information visualization as a wide-ranging practice for the creation, reproduction, and dissemination of complex visual messages. Information dissemination through visual imagery has been an effective way to communicate both abstract and concrete ideas since the dawn of human existence. Examples from history include cave paintings, Egyptian hieroglyphs, Greek geometry, and Leonardo da Vinci's revolutionary methods of technical drawing for engineering and scientific purposes.

Visualization today has ever-expanding applications in the disciplines of science, education, engineering, and medicine. Through sustained project work using print and/or digital media, students will investigate the ways that illustration, text, photography, sound, and moving image can, in different ways, participate in the process of communicating multi-faceted and multi-dimensional systems of information. Lectures, readings, and student research will supplement project work, introducing students to the concentrated disciplines of mapping, comparative timelines, and the history of information representation. To successfully complete this course, students will be expected to demonstrate fluency with the formal (skill-based) and semantic (knowledge-based) strategies that have shaped the visualization of complex information systems throughout the Modern and contemporary eras.

Learning Outcomes

1. Exemplify advanced and comprehensive skill with visual representation, emphasizing the defining criteria for representing layered, hidden, and unexpected information connections, through presentations of conceptual project plans, documentation of design process, and completion of successful, final designs.

2. Demonstrate skill using the visual language of mapping, with a focus on the presentation of multiple layers of information, through the conceptualization, design process, and submission of a final mapping project.

3. Explain the workings of new media tools and applications and describe the ways in which these tools allow for the representation of complex data, through participation in group seminars and oral/visual project presentations.

4. Develop a conceptual plan and a research plan that will serve as the primary component of an information visualization project, through presentations of conceptual project plans, the creation of functional project prototypes, and the submission of design process documentation.

5. Explain how the term "information" has changed meaning throughout modern and contemporary history, and describe information as a critical component of the design process in light of these changing definitions, through participation in group seminars.

Academic Integrity

By definition, information visualization *is copying*. It is the process of taking an original data set and representing it in a changed visual form. The simple act of copying, in this context, does not constitute plagiarism, although *failing to cite one's sources* does.

You will be expected to draw from a wide range of sources — technical, textual, and visual — in order to develop your projects. For each project, you must clearly credit the original sources of any borrowed elements, whether they are text-based (as in written work), visual (as with photographs or other visual elements), or technical (as with software-based tools or program code incorporated into your own).

Additionally, you must observe and respect the university's policy regarding plagiarism as noted in the college's Academic Honesty Policy. As this policy stipulates, all writing submitted for this course, whether in draft form or final form, must not represent the words or ideas of another person without reference or citation. All writing projects for this course, including research papers, annotated bibliographies, and project text must be submitted to the TurnItIn website when requested by the professor. Any student who violates plagiarism standards or any other Academic Integrity standards can expect to receive a failing grade for the project and the course.

Classroom Standards

Most of this course will be spent in guided discussion as lectures, project critiques, and seminars. This course will follow a hybrid lecture/studio format. A small amount of time for project work will be provided, but the majority of your individual project work must occur outside of class.

In-class work time must be used toward this course only. Any student found doing work for another course, or concentrating on extracurricular interests, will be asked to leave class and will be given an absence for the period.

Please no email, text messaging, mobile devices, Facebook-ing, iTunes-playing, YouTube-watching, or other extraneous activities during class. Please turn phones completely off (not just to "vibrate" or "silent") when you enter the classroom.

Exceptions can be made if your project somehow incorporates one of the services or devices above. (If you decide to build a mobile application that visualizes your network of Facebook friends, you will need to be able to access it during class.)

Feel free to bring your own computer to class if that helps you work efficiently.

Supply List

Please bring a sketchbook or notepad to each class.

Other than that, there are no other required supplies. For the most part, you will get to choose what kinds of analog or digital tools you use for each project.

Attendance

Attendance in every class session for the full session is vital to succeeding in this course. Each student will be allowed **two** absences. Three absences will lower a student's grade by one entire grade level, and four absences will result in an unconditional failing grade for the course.

Students will be counted as late if they appear in class more than ten minutes after class has begun. Two such late arrivals will equal one absence. Students arriving more than ten minutes late for any project critique or final presentation will be asked to leave their work and will be given an absence for that day.

Absences may be excused only in rare cases, such as if you must miss class for a medical appointment, family emergency or other conflict. If you must miss class, please advise me in advance or immediately thereafter. You will be referred to the Center for Academic and Student Achievement (CASA), who will verify whether or not the absence is excusable, and then relay that information to me.

Field trips, outside lectures, and any other special events that take place outside of the classroom during class time will also count towards final attendance.

Data Management

To be a great information designer, you must be skilled at managing your own information. "My hard drive crashed" is not a valid reason for failing to submit work on time.

Think about how much work you are willing to lose:

_____   minutes / hours / days / weeks / months
(fill in number)   (circle one)

You should back up all of your digital files *more frequently* than the duration above. I recommend either using an online service like backblaze.com or investing in an external hard drive (RAID-1 mirrored) and automated backup software (like Time Machine).

Do *not* rely on a single hard disk or flash drive for your backups.

Email Communication

On some occasions, I will need to send you course-related information outside of class. My expectation is that you will check your email **at least once each day**. Since I only have access to your @usfca.edu email address, be sure to check that account daily. If you primarily use another email account, I recommend setting your USF account to forward all mail to your primary account, so you never miss a message. (For help with this, please see me after class.)

Disabilities

If you are a student with a disability or disabling condition, or if you think you may have a disability, please contact USF Student Disability Services (SDS) at 415-422-2613 within the first week of class, or immediately upon onset of disability, to speak with a

disability specialist. If you are determined eligible for reasonable accommodations, please meet with your disability specialist so they can arrange to have your accommodation letter sent to me, and we will discuss your needs for this course. For more information, please visit usfca.edu/sds or call 415-422-2613.

Grading

In each course within the Design program, an average amount of work, participation, and progress at the level expected of a college student will earn a "C" grade. "A" and "B" grades will be awarded to those students whose effort or improvement reaches levels above average. Semester grades will incorporate a variety of factors, notably conceptual development, engagement with design process, quality of presentation, effort, and level of interest and participation in class.

Any project that receives a grade below "D" must be reworked. No student will be able to pass the course with an "F" grade for any project, and no student will be able to achieve prerequisite status with a "D" or "F" grade for the course.

Project work assumes that each student will devote an equivalent amount of time to homework assignments as to time spent in class (i.e., **six hours per week**).

Each project must be turned in for grading following the final presentation, and projects cannot be returned until grading is completed. High-resolution, digital files of each project in its final form (including visuals and text) must be submitted to the professor at the end of the semester.

If you ever feel that a given grade does not accurately reflect the quality of your work, please contact me by email *within a week*. Provide a written argument that references the project's grading criteria and explains why a higher grade is justified.

Letter Grade Definitions

    A   Successful fulfillment of the project's communication goals, superlative process documentation, and an original, attractive and cohesive visual aesthetic. Project planning, design, and execution performed at the highest level.

    B   Successful fulfillment of the project's communication goals, excellent process documentation, and a cohesive visual aesthetic. Project planning, design, and execution performed at an above average level.

C Successful fulfillment of the project's communication goals, and adequate process documentation. Project planning, design, and execution performed at an average level.

D Did not fulfill the project's communication goals, and/or process documentation was absent or inadequate. Project planning, design, and execution performed was below average.

F Did not fulfill the project's communication goals, and process documentation was inadequate. Does not meet the minimum requirements for the course.

Grade Weights by Project

Detailed descriptions of each project will be distributed in class.

15% **In-class participation** — Come to class well-prepared to present your projects, proposals, and ideas. Ask lots of questions, offer thoughtful, critical responses to the readings, and provide helpful, considered feedback during group critiques.

15% **Project 1** **Discoveries** — Find three "good" and three "bad" visualizations, and explain and critique all three.

20% **Project 2** **Data** — Design a series of infographics using data collected from USF's *Think About It* online course for new students. Select a subset of the data to use, diagram its structure, and design graphics that tell a story about the expectations that USF's incoming students have for their college experience.

25% **Project 3** **Mapping** — Map your real-life social network. Choose which data to include (and exclude), and create at least three different, multivariate "maps" or "views" of the data set, each designed to highlight different aspects of the content.

25% **Project 4** **Timeline** — Conceptualize, research, and design a timeline on a subject of your choosing.

Required Books

Both of these books will be available on reserve, but you may want to purchase your own copies, so you can spend more time with them.

Tufte, Edward R. *The Visual Display of Quantitative Information*. 2nd ed. Graphics Press, 2001.
   ➡ Chapter 1: "Graphical Excellence"
   ➡ Chapter 2: "Graphical Integrity"
   ➡ Chapter 4: "Data-Ink and Graphical Redesign"
   ➡ Chapter 5: "Chartjunk: Vibrations, Grids, and Ducks"
   ➡ Chapter 6: "Data-Ink Maximization and Graphical Design"
   ➡ Chapter 7: "Multifunctional Graphical Elements"
   ➡ Chapter 8: "Data Density and Small Multiples"
   ➡ Chapter 9: "Aesthetics and Technique in Data Graphical Design"

Kamvar, Sep and Jonathan Harris. *We Feel Fine: An Almanac of Human Emotion*. Scribner, 2009.
   ➡ Front cover through end of Chapter 1: "Introduction"
   ➡ Chapters 2 through 6 (exploration)
   ➡ Chapter 7: "How"
   ➡ Chapter 8: "Conclusion" through back cover (including index)

Other Required Readings (Electronic Reserve or Online)

Bertini, Enrico. "Research: How to Tell Stories with Data?" January 5, 2001. http://infosthetics.com/archives/2011/01/research_telling_stories_with_data.html

Branigan, Edward. *Narrative Comprehension and Film*. Routledge, 1992.
   ➡ Chapter 1: "Narrative Schema"

Feltron, Nicholas. Feltron Annual Reports. feltron.com. 2005–2009.

Fry, Ben. *Visualizing Data*. O'Reilly Media, Inc., 2008.
   ➡ Chapter 1: "The Seven Stages of Visualizing Data"

Gleick, James. *The Information: A history, a theory, a flood*. Pantheon Books, 2011.
   ➡ Chapter 5: "A Nervous System for the Earth"

Grefé, Richard and Jessica Friedman Hewitt. "How Design Can Save Democracy." Interactive feature on nytimes.com. August 25, 2008. http://www.nytimes.com/interactive/2008/08/25/opinion/20080825-ballot.html

Hall, Stuart, ed. *Representation: Cultural Representations and Signifying Practices*. The Open University, 1997.
➡ Chapter 1: "The Work of Representation"

Iliinsky, Noah. "Properties and Best Uses of Visual Encodings." January 24, 2012. http://complexdiagrams.com/properties

Kaminer, Ariel. "Democracy, the Hard Way." *The New York Times*. August 20, 2010. http://www.nytimes.com/2010/08/22/nyregion/22critic.html

Lausen, Marcia. *Design for Democracy: Ballot and Election Design*. University of Chicago Press, 2007.
➡ Introduction
➡ Chapter 1: "Ballot Design"

Leborg, Christian. *Visual Grammar*. Princeton Architectural Press, 2006.

Manovich, Lev. *The Language of New Media*. MIT Press, 2002.
➡ Chapter 5: "The Forms" and "The Database"

Norman, Donald. *Things That Make Us Smart: Defending Human Attributes in the Age of the Machine*. Basic Books, 1993.
➡ Chapter 3: "The Power of Representation"

Rosenberg, Daniel, and Anthony Grafton. *Cartographies of Time: A History of the Timeline*. Princeton Architectural Press, 2010.
➡ Chapter 1: "Time in Print"

Segel, Edward and Jeffrey Heer. *Narrative Visualization: Telling Stories with Data*. 2010. IEEE Transactions on Visualization and Computer Graphics, 16(6): 1139–1148. http://vis.stanford.edu/files/2010-Narrative-InfoVis.pdf

Shannon, Claude. July/October 1948. "A Mathematical Theory of Communication." Bell System Technical Journal, 27(3): 379–423.

Stefaner, Moritz. *Interview: Nicholas Felton from feltron.com*. Information Aesthetics, 2010. http://infosthetics.com/archives/2010/05/interview_nicholas_felton.html

Ware, Colin. *Information Visualization: Perception for Design*. 2nd ed.
  Morgan Kaufmann, 2004.
   ➡ Chapter 5: "Visual Attention and Information that Pops Out"
   ➡ Chapter 6: "Static and Moving Patterns"

Supplemental Readings

Arnheim, Rudolf. *Visual Thinking*. University of California Press, 1969.

Booth, Wayne C., Gregory G. Colomb, and Joseph M. Williams. *The Craft of Research*.
  3rd ed. The University of Chicago Press, 2008.

Few, Stephen. *Show Me the Numbers: Designing Tables and Graphs to Enlighten*.
  Analytics Press, 2004.

Freyer, Conny, Sebastien Noel, and Eva Rucki. *Digital by Design: Crafting Technology
  for Products and Environments*. Thames & Hudson, 2008.

Ford, Brian J. *Images of Science: A History of Scientific Illustration*. Oxford University
  Press, 1993.

Harmon, Katharine. *The Map as Art: Contemporary Artists Explore Cartography*.
  Princeton Architectural Press, 2009.

Harmon, Katharine. *You Are Here: Personal Geographies and Other Maps of the
  Imagination*. Princeton Architectural Press, 2004.

Klanten, Robert, et al. *Data Flow: Visualizing Information in Graphic Design*. Gestalten,
  2008.

Klanten, Robert. *Data Flow 2: Visualizing Information in Graphic Design*. Gestalten,
  2010.

McLuhan, Marshall and Quentin Fiore. *The Medium is the Massage*. Random House,
  1967.

Nunberg, Geoffrey. "Farewell to the Information Age." In *The Future of the Book*. Edited
  by Geoffrey Nunberg. University of California Press, 1996.

Tufte, Edward R. *Envisioning Information*. 1st ed. Graphics Press, 1990.

Visocky O'Grady, Jennifer and Kenneth Visocky O'Grady. *The Information Design Handbook*. How Books, 2008.

Vesna, Victoria. *Database Aesthetics: Art in the Age of Information Overflow*. University of Minnesota Press, 2007.

Online Resources

General

- chartsnthings.tumblr.com
- datastori.es
- informationisbeautiful.net
- infosthetics.com
- vimeo.com/channels/eyeo2012/
- visual.ly

Design Firms

- fathom.info
- periscopic.com
- pitchinteractive.com
- stamen.com

Individuals

- aaronkoblin.com (Aaron Koblin)
- benfry.com (Ben Fry)
- datatelling.com (Jen Lowe)
- fakeisthenewreal.org (Neil Freeman)
- feltron.com (Nicholas Felton)
- itsbeenreal.co.uk (Stefanie Posavec)
- thewhyaxis.info (Bryan Connor)
- visualisingdata.com (Andy Kirk)
- well-formed-data.net (Mortiz Stefaner)

Social Good

- datakind.org
- good.is/infographics

Course Website

The course website includes the current schedule, plus links to handouts, project assignments, and other online resources. It will be updated and changed *frequently*. It is your responsibility to check for updates and stay on top of deadlines.

Schedule

The schedule below is *tentative*. Always check the website for the current schedule. Also note that each project includes many interim milestones, due dates for which will be announced in class (and posted on the website).

Week 1	Tue	Aug 21	Introductions / **Why Visualization?**
	Thu	Aug 23	Special guest: Jen Lowe
			Data Wrangler, Open Knowledge Foundation
Week 2	Tue	Aug 28	**Origins of Visual Representation**
	Thu	Aug 30	P1 introduced
Week 3	Tue	Sep 4	**Origins of Data Graphics**
	Thu	Sep 6	P1 completed
			P2 introduced
Week 4	Tue	Sep 11	**Types of Information**
	Thu	Sep 13	
Week 5	Tue	Sep 18	**Hierarchy & Structure**
	Thu	Sep 20	
Week 6	Tue	Sep 25	**Process**
	Thu	Sep 27	Special guest: Wes Grubbs
			President, Pitch Interactive
			P2 completed
			P3 introduced
Week 7	Tue	Oct 2	**Mapping & Systems**
	Thu	Oct 4	
Week 8	Tue	Oct 9	Fall Break
	Thu	Oct 11	**Data as Art**
Week 9	Tue	Oct 16	**Form & Perception**

		Thu	Oct 18	
Week 10	Tue	Oct 23	**Color & Perception**
	Thu	Oct 25	Special guest: Sha Hwang, [Trulia and Meshu.io](#)
Week 11	Tue	Oct 30	**Telling Stories with Data**
	Thu	Nov 1	P3 completed
			P4 introduced
Week 12	Tue	Nov 6	**Motion & Perception**
	Thu	Nov 8	
Week 13	Tue	Nov 13	**Interactivity**
	Thu	Nov 15	Field trip (TBD)
Week 14	Tue	Nov 20	Special guest (TBD)
	Thu	Nov 22	Thanksgiving Break
Week 15	Tue	Nov 27	**The Future of Visualization**
	Thu	Nov 29	
Week 16	Tue	Dec 4	**Final Presentations**
			P4 completed

In the end...

I hope you will:

- be comfortable thinking and talking about **information architecture**
- gain valuable experience with **data visualization**
- understand the limits and abilities of **human visual perception**
- have identified a visualization **process** that works for you
- have developed a system of **managing your own data** that includes regular backups