sarc5400

Tuesday 7:00-9:30pm
Eric Field

data visualization

Date	Topic	Assignments / Exercises
PART I : INFORMATION AS A CONSTRUCTION		
January 23	**Introductions** - Visual Data / Visual Problem Solving - `1+1=3` - Using and Building Visualization Tools - Professional Context - Semester Goals and Contexts	
	Language, Graphics, and Communication - Re-thinking how we see to communicate - Means of communication - speak, write, draw, gesture - Graphics, Signs, Symbols, and Icons - Ideograms and the Language of Symbols - Braille, Morse Code, Sign, and Gesture - Diagrams of Language - Music and Dance Notation - Graphic Inventions	*Assignment I -* *the Good, the Bad, and the Ugly* *Reading -* - Norman, The Design of Everyday Things, Preface. - Tufte, Visual and Statistical Thinking
January 30	**Review - the Good, the Bad, and the Ugly** - In-class presentations and discussion	*- peer review -*
	Tools for Graphic and Data Description - Describing the display of information - Adobe Illustrator: Objects with Properties	*Assignment II -* *Me, graphically / the quantified self* *Task -* Install Adobe Illustrator
February 6	**The Material of Information** - The Five Senses (and how we use them) - Information Mapping and Recording - Cognitive Load Theory: too much information? - Elements of Differentiation	
	Structuring Information Objects - Meta languages: Illustrator, SVG, HTML - Basic object description - Writing Code: Objects with Properties - Collecting Properties - Cascading Style Sheets - [Brackets], Chrome and Dev tools - A preview of Procedural HTML/SVG	*Task: Install Brackets* Browse: W3 Schools HTML, CSS, and SVG tutorials. Workshop: Adobe Illustrator / Inkscape
February 13	**Review - Me, graphically / the quantified self** - In-class presentations and discussion	*- peer review -*
	Visualization Tools for Data - RAW - "the missing link between data and graphics" - Tableau - "visual analytics for everyone" - capacities and limitations	*Assignment III -* *Visual Data Analysis*
February 20	**Visual Literacy / Escaping Flatland** - Coding / Decoding - How people experience and understand - Color - Time - Statistics, Graphs, Maps, and Diagrams - Edward Tufte & The Grand Principles of Analytic Design - Visualization types, techniques, and examples - Context of graphic principles over time	*Reading -* - Tufte, Escaping Flatland - Elkins, How to Look at Color - Elkins, How to Look at the Periodic Table *Reference -* - Brinton, Graphic Methods for Presenting Facts

	Seeing into Complexity – more with Tableau – "Show Me" – visual order and strategy – Visual Hierarchy – The 'squinty eye test' – Custom measures – Layering data – Combining visual approaches – in-class exercise	Workshop: RAW / Tableau
February 27	**Review – Visual Data Analysis** – *In-class Review and Discussion* **Building Procedural Visualizations** – Intro to Javascript and D3 – Data-driven graphics	*– peer review –* *Technical Exercise –* *Constructing Visual HTML* Workshop: HTML / D3
March 3–11	*Spring Break*	
PART II : INFORMATION AS AN AGENT		
March 13	**Seeing into Problems – Interactive Information Systems** – "Games", Data Interfaces, and Complex Problems – Seeing into Systems – Visual Analytics for Problem Solving? – Interaction design – 'Apps' and professional practice **Big Data / Encoding the Structure of a Visualization** – "Drawing" Insight – Processing large datasets quickly – the Powerplants exercise – hands on big data	*Assignment IV –* *Between Things*
March 20	**The Data in D3** – Data formats, reading, parsing – Manipulating data, nests, rollups, hierarchies – Dynamic data – more Powerplants	*Workshop: Individual Meetings*
March 27	**Review – Between Things. Visual Insights.** – Discussion of visualizations **Interaction and Screen Dynamics – making things move** – Interaction modes and concepts – HTML and Javascript dynamics – Building an interactive page	*– peer review –* *Final Project, Part I –* *Visualization Prototype* *Technical Exercise –* *Adding Visual Dynamics* *Reading –* – Wired, Make it so: Interaction Design Lessons from Science Fiction *Reference –* – Moggridge, Designing Interactions
April 3	**Maps and Geospatial Visualization** – Maps and Mapping – views, context, and grammar – Encoding and recording places – D3 GeoJSON – Maps APIs	*Reading –* – Elkins, How to Look at a Map Workshop: Data – Finding, Cleaning, and Preparing
April 10	**Review – Project prototypes** – presentations and discussion of prototype visualizations	*– peer review –* *Final Project:* *Visualizing Complexity*
April 17	**Wicked Problems / Visualization Challenges**: – Case Studies in Visualization and Information tools – Examples from Professional Practice **More D3, Dynamics, Data Connectivity** – Hiding and showing layers – Providing visual feedback – Popups for extra information	Individual Meetings

April 24	**Preliminary Design Review** - Review Final Project Ideas and Progress - Interim review of sketches / mock-ups - Technical/Topical challenges and solutions	*Individual Meetings*
May 1	**Spatial Interfaces: Visual Information and Context** - Orientation and Organization - Space, Place, and Information - Finding your way - A technical history of Information Space - Human Interface **Semester wrap-up / Conclusions** - Gehry's squiggle - Hierarchy of Visual Understanding? - Syn(thesis)	*Individual Meetings*
May XX - TBD	**Final Project Public Showcase Event**	

Instructor

Eric Field, emfield@virginia.edu, office: 136 Campbell Hall, or email

TAs

Han Gu, Computer Science, Economics, Philosphy, hg5mc@virginia.edu
Sanjana Mendu, Computer Science, sm7gc@virginia.edu
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Zihao Zhang, Landscape Architecture, zz3ub@virginia.edu

Open Workshop Hours

Wednesdays 6-7:30pm, 105 Campbell Hall
Fridays 11-12:30pm, 105 Campbell Hall

Course Objectives

Experience and understand how visual and spatial thinking is part of how humans see into problems.
Learn theories, techniques, strategies, and tools for constructing information visually.
Exercise and explore the use of tools and strategies for visualizing data.
Critically synthesize the theory and practical application of visualization for problem solving.
Develop an iterative approach to evolve and test visualization methods.
Produce compelling and useful data visualizations.
Extract Insight!
Have Fun.

Assignments and Grading

Grading is used as a mechanism for feedback and discussion about individual work.
Final grades in the course will be determined based on a variety of factors, including performance on assignments, class participation and contribution, and an individual assessment of what and how the student has learned and progressed through the semester.

While this subject is not numerically quantifiable in the manner that a course with tests and quizes is, there is still necessity for some quantifiable basis.

Assignment weightings:

Assignment I:	5%
Assignments II, III, IV (each):	10%
Technical Exercises:	10%
Final Project:	40%
Peer Review:	5%
Participation and Contribution:	10%

Grading rubric:

A/5 Extends content and demonstrates effort and inquiry that pushes the concepts toward insight.
B/4 "Gets it" and accomplishes work that demonstrates understanding of concepts.
C/3 Basically gets it, but work could improve or lacks deep effort or serious understanding.
D/2 Struggling to meet criteria, needs extra attention.
F/1 Completed something, but seriously deficient.
0 Didn't even turn it in.