LIS 697: INFORMATION VISUALIZATION

Section: LIS–697–10
Semester: Fall 2012
Meeting Information: Wednesday, 6:30–8:50 pm
Location: PMC, Room 609
Credits: 3
Prerequisites: None

Chris Alen Sula, Ph.D.
Office: PMC, Room 604B
Office Hours: Wednesdays, 4:00–6:00 pm
p   212.647.7377
e   csula@pratt.edu
w   http://chrisalensula.org

COURSE DESCRIPTION

This course examines the art, science, and practice of information visualization. Particular emphasis is placed on the ways in which position, shape, size, brightness, color, orientation, texture, and motion influence perception of information and facilitate comprehension and analysis of large and complex bodies of information. Topics include cognition and visual perception; the aesthetics of visual media; techniques for processing and manipulating information for the purpose of visualization; studies of spatial, relational, multivariate, time-series, interactive, and other visual approaches; and methods for evaluating information visualizations.

COURSE GOALS + LEARNING OBJECTIVES

The goals of this course are to:
- explore various theoretical, practical, and aesthetic perspectives on information visualization
- examine cognitive and psychological studies relevant to visual perception and information processing
- develop familiarity with a wide variety of visual representations, with particular emphasis on selecting appropriate representations based on data frameworks and audience
- build skills in planning, developing, and evaluating information visualizations

By the end of this course, students will be able to:
- critically discuss information visualizations in light of current theories and empirical research
- plan and implement effective information visualizations using current software tools
- evaluate information visualizations from theoretical, practical, and aesthetic perspectives

COURSE WEBSITE

All students enrolled in the course have access to course materials on Pratt's Learning Management System (a Moodle installation) available at my.pratt.edu. Please make sure you know how to access LMS and use Moodle. Also, please note that LMS facilitates communication using Pratt e-mail only. If you do not use your Pratt account, please use webmail to forward your Pratt e-mail to an account that you do use.

REQUIRED TEXTS

- Stephen Few, *Now You See It: Simple Visualization Techniques for Quantitative Analysis* (Analytics Press 2009) [ISBN 0970601980]
- Cynthia Brewer, *Designing Better Maps: A Guide for GIS Users* (ESRI Press, 2005) [ISBN 1589480899]
- Additional readings [available on LMS]

COURSE FORMAT

This course will be structured as a lecture/seminar. Each student is required to read the articles assigned on a weekly basis in advance of the session for which they are assigned. While the professor will clarify the main points of each session and address more advanced research material, the main portion of class will be devoted to discussion of the required readings for that week, as well as student work pertaining to those readings. Students will bring their own ideas, experience, and interpretations to class and will learn from contributing and hearing others.

COURSE REQUIREMENTS + ASSIGNMENTS

Your grade in the course will be based on the following:

Participation	5%
Unit exercises (4)	40%
Final project	40%

Participation (5%)
Students are expected to actively and thoughtfully contribute to classroom discussion.

Unit exercises (4 assignments, 15% each)
Following each unit, students will be expected to submit a small collection of exercises reflecting the topics and skills in that unit. For each set, students may choose to submit either
- visualizations they have created using one or more related datasets
- found visualizations prefaced by a description of their content and source and accompanied by significant critique and suggestions for improvement

Students are strongly encouraged to complete the first option and submit focused, production-ready visualizations that are shared publicly. Exercises are due one week following the last session in each unit.

Final project (35% project, 5% presentation)
Students may complete a range of activities for their final projects including:
- analytic—creating a set of visualizations pertaining to one set/type of information (the visualizations may be print or digital, static or interactive, as appropriate to the information and intended audience and must be accompanied by critical reflections on that work)
- methodological—creating a tool for visualizing one set/type of information (accompanied by critical reflections on that work), or proposing such a method in the form of a research paper
- evaluative—completing a written evaluation of several different methods or tools on one set/type of information

Any of these activities may be carried out individually or collectively. All students will make a short presentation of their projects in class on December 12, 2012, and the final version must have some individually written component of at least 1,5000 words that incorporates theory and research in information visualization. Students should email a short proposal (no more than 250 words) before November 14, 2012. Proposals require approval by the professor before work may begin.

GRADING

All graded assignments are due on the date indicated. The date of submission, your name, the course number, and the title of the assignment should be included at the top of each assignment. A detailed description of each assignment will be provided separately and made available online. **Written assignments must be uploaded to LMS by the beginning of the class in which they are due**. Non-graded assignments and in-class exercises will be also administrated over the semester and evaluated as part of participation and attendance.

Grades will be awarded as follows:
- A   sustained level of superior performance demonstrated in all areas of course requirements
- B   consistent level of performance that is above average in a majority of the course requirements
- C   performance that is generally average and course requirements are achieved
- D   below average performance and achievement of the course requirements
- F   accomplishment of the course requirements is not sufficient to receive a passing grade

Late work will receive a reduced grade and not will be annotated with comments or other feedback.

E-PORTFOLIO

Starting Fall 2012, all students entering the MSLIS degree program are required to complete an e-portfolio that must be approved by their advisor before graduation. The e-Portfolio provides students with an opportunity to showcase their best work from the courses they have taken at SILS, and an opportunity to demonstrate they have met the learning objectives of a Master of Information and Library Science. Work completed for this course may be included in the e-portfolio. Students must demonstrate that their work fulfills at least one of the following learning outcomes:
1. Students carry-out and apply research
2. Students demonstrate excellent communication skills and create and convey content
3. Students use information technology and digital tools effectively
4. Students apply concepts related to use and users of information and user needs and perspectives
5. Students perform within the framework of professional practice

Detailed information on the learning outcomes, requirements and how to create your e-portfolio is available from: http://www.pratt.edu/academics/information_and_library_sciences/degree_programs/sils_eportfolio

POLICIES

Academic Integrity
Students are expected to adhere to the Academic Integrity Code and Judicial Process of the Pratt Institute available online at http://www.prattsenate.org/learning/02-academic.htm. All infractions will be reported, and I am disposed to fail all violators for the entire course.

Attendance
Students with three or more absences (for any reason, including documented medical reasons) cannot expect to receive an A in the course and, in accordance with Pratt Institute policy, may fail the course at the discretion of the professor. If you do miss a class, for whatever reason, it is your responsibility to notify the instructor as soon as possible and get notes from classmates.

Disabilities
Students who require special accommodations for disabilities must obtain clearance from the Office of Disability Services at the beginning of the semester. For further information, contact the Coordinator of Disability Services in the Office of the Vice President for Student Affairs at 718.636.3711.

Incompletes
Incompletes will not be awarded except in cases of documented medical reasons and at the discretion of the professor.

Institute-Wide Policies
Students must adhere to the Pratt Community Standards listed in the current Student Handbook available online at http://www.pratt.edu/uploads/Online_Student_HandbookFINAL.pdf.

Revisions to the Syllabus
While this syllabus provides a reliable framework for the course, including readings and assignments, it is subject to change pending notice in class and on the course website.

COURSE SCHEDULE

This is a tentative outline of topics, readings, and assignments. On occasion, I may add, delete, or substitute topics or readings. Changes will be announced in class and posted to LMS; no printed updates will be given.

WEEK	DATE	TOPICS, READINGS, AND ASSIGNMENTS

FOUNDATIONS OF INFORMATION VISUALIZATION

1   8/29   Course Introduction
- Heer, Jeffrey, Michael Bostock, and Vadim Ogievetsky. (2010). "A Tour through the Visualization Zoo: A survey of powerful visualization techniques, from the obvious to the obscure" *ACM Queue* 8(5)
- Keim, Daniel A., et al. (2008). "Visual Analytics: Scope and Challenges" in *Visual Data Mining, LNCS 4404*, eds. S. J. Simoff, et al., 76–90

2   9/5   History and Theory of Information Visualization
- Few, *Now You See It*, Ch. 1
- Friendly, Michael (2008). "A Brief History of Data Visualization" in *Handbook of Data Visualization*, eds. Chunhouh Chen, Wolfgang Härdle and Antony Unwin. Berlin: Springer, 15–56.
- Fekete, Jean-Daniel, et al. (2008). "The Value of Information Visualization" in *Information Visualization: Human-Centered Issues and Perspectives*, eds. Andreas Kerren, et al. Berlin: Springer, 1–18
- Bateman, Scott, et al. (2010). "Useful junk? The effects of visual embellishment on comprehension and memorability of charts" *CHI '10 Proceedings of the 28th international conference on Human factors in computing systems*: 2573–2582

3   9/12   Perception and Visual Processing
- Few, *Now You See It*, Chs. 3, 6
- Healey, Christopher G. (2009) "Perception in Visualization" http://www.csc.ncsu.edu/faculty/healey/PP/index.html
- MacDonald, Lindsay W. (1999). "Using Color Effectively in Computer Graphics" *Computer Graphics and Applications, IEEE* 19.4: 20–35

VISUALIZATION 1: TEMPORAL & STATISTICAL

4   9/19   Time-Series Representations
- Few, *Now You See It*, Ch. 7
- Aigner, Wolfgang, et al. (2008), "Visual Methods for Analyzing Time-Oriented Data" *IEEE Transactions on Visualization and Computer Graphics* 14(1): 47–60

5   9/26   Statistical Data & Visualizations
- Few, Stephen (2005). "Effectively Communicating Numbers: Selecting the Best Means and Manner of Display" ProClarity
- Huff, Darrell (1954). *How to Lie with Statistics*. New York: W. W. Norton [Intro, Chs. 5–6, 9]

  Tableau Lab

6   10/3   Statistical Representations 1: Part-Whole, Deviation, Distribution
- Few, *Now You See It*, Chs. 8–10

7	10/10	**Statistical Representations 2: Correlation, Multivariate**

- Few, *Now You See It*, Chs. 11–12
- Inselberg, A. (1997). "Multidimensional Detective" *Proceedings of the 1997 IEEE Symposium on Information Visualization (InfoVis '97)*: 100–107

VISUALIZATION 2: GEOSPATIAL

8	10/17	**Mapping and Countermapping**

- MacEachren, Alan M. and Menno-Jan Kraak (2001). "Research Challenges in Geovisualization" *Cartography and Geographic Information Science* 28(1), 3–12
- Crampton, Jeremy W and John Krygier (2006). "An Introduction to Critical Cartography" *ACME: An International E-Journal for Critical Geographies* 4 (1), 11–33

9	10/24	**GIS Data & Visualization**

- Goodchild, Michael F. (2007) "Citizens as Sensors: The World of Volunteered Geography" *GeoJournal* 69(4): 211-221
- Brewer, Cynthia (2005). *Designing Better Maps: A Guide for GIS Users*. Redlands, Calif.: ESRI Press

  QGIS Lab

VISUALIZATION 3: RELATIONAL

10	10/31	**Relational Representations: Hierarchies, Networks**

- Graham, Martin and Jessie Kennedy (2010), "A Survey of Multiple Tree Visualization" *Information Visualization* 9(4): 235–252
- Lothar Krempel (2011). "Network Visualization" in *Sage Handbook of Social Network Analysis*, eds. John Scott and Peter J. Carrington. London: Sage Publications, 558–77

11	11/7	**Relational Data & Network Analysis**

- Marsden, Peter V. (2011). "Survey Methods for Network Data" in *ibid.*, 370–88
- Hollstein, Benita (2011). "Qualitative Approaches" in *ibid.*, 404–16

  Gephi Lab

VISUALIZATION 4: INTERACTIVE

12	11/14	**Interactive Representations**

- Few, *Now You See It*, Ch. 4
- Cockburn, Andy, Amy Karlson, and Benjamin B. Bederson (2008). "A Review of Overview+Detail, Zooming, and Focus+Context Interfaces" *ACM Computing Surveys* 41(1)
- Yi, Ji Soo, et al. (2007). "Toward a Deeper Understanding of the Role of Interaction in Information Visualization" *IEEE Transactions on Visualization and Computer Graphics* 13(6): 1224–1231

13	11/21	**NO CLASS**—Thanksgiving Recess

FURTHER ISSUES IN INFORMATION VISUALIZATION

14 11/28 **Advanced Data Techniques**
- Kasik, et al. (2009). "Data Transformations and Representations for Computation and Visualization" *Information Visualization* 8(4): 275–85
- Ward, Matthew (2010). "Data Foundations" from *Interactive Data Visualization*, eds. Matthew Ward, Georges Grinstein, Daniel Keim. Natick, MA: A. K. Peters, Ltd., 45–71

Google Refine or R Lab

15 12/5 **Empirical Evaluation of Visualizations**
- Carpendale, Sheelagh (2008). "Evaluating Information Visualizations" in *Information Visualization: Human-Centered Issues and Perspectives*, eds. Andreas Kerren, et al. Berlin: Springer, 19–45
- Schneiderman, Ben and Catherine Plaisant (2006). "Strategies for Evaluating Information Visualization" *BELIV '06 Proceedings of the 2006 AVI workshop on beyond time and errors: novel evaluation methods for information visualization*: 1–7

16 12/12 **Final Project Presentations**

   12/16 *Final project visualization and paper due*