

Chatham University Course Syllabus

GENERAL INFORMATION

Course Title: Data Visualization and Communication

Course Number: DSA400W

Semester/Year: Fall 2018

Classroom: Falk 117

Instructors and Contact Information:

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Office Hours: TBD

COURSE INFORMATION

Course Description:

Covers the different ways of visualizing data, given different types and characteristics of data. Includes assessment and evaluation of existing data visualization techniques. Current tools used transform data and visualize data are reviewed, including Python, Google Charts, and Tableau.

Student Learning Outcomes:

Program Level Student Learning Outcomes

Graduates of bachelor's-level programs in data science will be able to demonstrate that they possess academic skills, professional attributes and broad-based and in-depth knowledge of data science concepts and functions.

This course fulfills the following Program Level Student Learning Outcomes for undergraduate applied data science majors:

- Effectively organize and manage datasets for analytical projects
- Communicate analytics problems, methods, and findings effectively orally, visually, and in writing
- Critically evaluate ethical, privacy and security challenges in data analytics

Specific learning outcomes for this course include:

- Understand and apply key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction.
- Differentiate a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text and cartography.
- Design and evaluate visualization systems.
- Apply appropriate visualization techniques to different datasets.

Required Texts and Materials:

Storytelling with Data: A Data Visualization Guide for Business Professionals. Cole Nussbaumer Knaflic. 2015.

Visual Display of Quantitative Information (2nd Edition). E. Tufte. Graphics Press, 2001.

DATA + DESIGN: Simple introduction to preparing and visualizing information.

<https://infoactive.co/data-design/>

Chatham University acknowledges that this course may utilize content from outside sources, including, but not limited to print media, film, and digital/internet media. While Chatham University makes every effort to professionally review resources, we cannot be held liable for broken links, inappropriate content or questionable material that may appear after the review process. If you find material that may be considered questionable or offensive, please report this to your assigned instructor.

Course Requirements: (tests, assignments, etc.)

This course includes almost-daily reading assignments and 3 homework assignments.

Daily Reading Assignments/Presentations

Reading assignments are designed to give you an understanding of the historical and state of the art advances in human cognition, visualization, and communication. Additionally, they should help you understand how to write about your visualizations to different audiences in a clear way. Readings will be available to you through Moodle. We will be discussing the readings in class **on the day they are due**. Your ability to participate in the discussions and present summaries of some of the papers (a significant portion of your grade) depends on reading the papers in advance.

Programming Assignments

In addition to readings, students should learn how to write visualizations, critique others' visualizations, and present their work to an audience. Each of three assignments is designed for students to write programs from scratch on their own. Assignments will reinforce concepts taught in class, but will require students to do significant outside research to learn new visualization techniques. All programs must be the students' own work (See Course Policies), and must be submitted on time. This semester we will use a website template for students to submit their work. Students will write a website for each assignment to be viewed and presented in class. **Moodle will have instructions for submitting assignments.**

As always, all code must also be commented and include readable variable names for easy evaluation by the instructor. Because we will be going over the assignments in class, **all assignments should be submitted on their due date by 11:59PM**. A 0 will be given for any assignment not submitted by this deadline.

The grades will be based on the assignments and midterm as follows:

- Daily Readings Discussions: 35%
- Assignment 1: 10%
- Assignment 2: 15%
- Assignment 3: 30%
- Revision 1 (for Peer Review #1): 5%
- Revision 2 (for Peer Review #2): 5%
- Feedback to Peers: 5%
- Final Visualizations: 10%
- In-Class Presentation: 5%
- Midterm Exam: 10%

Course Policies:

Attendance Policy

Every student enrolled at Chatham accepts the responsibility to attend all required class meetings. To obtain the fullest benefit from their courses, students must participate fully. This implies attending regularly, engaging in course activity, completing work on time, and making up work missed because of an emergency absence. **It is the student's responsibility to let the course instructor know within the drop-add period if he or she will have to miss class for religious reasons, athletics, or other.**

Attendance will be recorded on a sign-in sheet available at the room entrance. You are not permitted to sign-in for other students. Leaving early constitutes an absence unless the professor is advised of this necessity at least 24 hours in advance. If you miss a class, it is up to you to get the notes for that day from a classmate. **Six unexcused absences will result in a failure in the course.**

Code Help, and Collaboration Requirements

Unless otherwise specified, all assignments should be completed individually. **It is encouraged for students to collaborate in studying the course material, to seek help from the instructors, but the "writing on the page" or the "code in the file", as examples, should be your own thought product. We strongly encourage using the Internet to look for help but not exact answers.** Similarly, help from classmates is encouraged but the helper should not show their code or answers when helping someone else (only the help requester should show their code to their classmate(s)). Paper and pencil and/or whiteboards are the recommended collaborative study and help tools to prevent any possibility of copying working code.

If portions of your individual assignments have been significantly influenced by someone else, you should prominently give them credit for their contribution. Proper attribution is critically important -- and is an absolute defense against charges of Academic Dishonesty, Cheating, or Plagiarism.

Grades will be assigned as follows

94-100% = A	80-82% = B-	67-69% = D+
90-93% = A-	77-79% = C+	63-66% = D
87-89% = B+	73-76% = C	60-62% = D-
83-86% = B	70-72% = C-	Below 60% = F

Midterm Grades

As a check on progress, mid-term grades will be posted after completion of the Mid-Term Exam. Mid-term grades will be based principally on performance on the Mid-Term Exam as well as on completion of assignments and class participation and attendance to that point in the course. **The last date to withdraw from the course is Wednesday, November 7th.**

Missed Exams/Assignments

Only absences that are excused by an appropriate authority qualify as excused. If you must miss a class, please obtain the notes for that day from a classmate and check the class website for updates. Exams must be taken on the scheduled day. There is no provision for makeup tests other than for extreme emergency situations that must be documented by an appropriate authority.

Laptops and cell/smart phones

Use of electronics for note taking or other functions directly related to class activities is permitted when appropriate. **Note: some days, laptops will be required for in-class discussions.** Unrelated online/electronic activity that interferes with your and/or others' ability to pay attention in class is not permitted. Failure to abide by this policy will result in dismissal from the class and an unexcused absence.

Behavior

Common courtesy is expected. Every student is expected to come to class prepared to learn and participate in a meaningful way. Under no circumstances is a student's behavior to detract from the learning environment of others in the class. (Disruptive behavior may result in the student's dismissal from the course.)

Course Calendar/Schedule:

	Day	Date	Topic	Readings and Assignments Due
1	8/27	M	Syllabus, Introductions, Expectations	
2	8/29	W	What is Visualization?	
3	8/31	F	Value of Visualization Discussion	1) Design and Redesign in Data Visualization
4	9/3	M	No Class. Add/drop deadline is 9/4	
5	9/5	W	Psychology of Perception	1) Graphical Perception 2) 39 Studies about Human Perception in 30 Minutes
6	9/7	F	Test your own perception abilities	Assignment 1 out
7	9/10	M	Histograms, Boxplots, Scatterplots	
8	9/12	W	Reading Discussion	1) The Eyes Have It 2) Voyager
9	9/14	F	Assignment 1 Presentations	Assignment 1 due
10	9/17	M	Visualization tools	
11	9/19	W	Data Wrangling tools	
12	9/21	F	Analyzing software tools	Assignment 2 out
13	9/24	M	Representation and Perception	1) Chapter 3: Power of Representation 2) Color Use Guidelines for Data Representation
14	9/26	W	Layout Possibilities	1) Perception in Visualization 2) Graph Visualization and Navigation in Information Visualization
15	9/28	F	Best Practices	
16	10/1	M	Programming Interactions for Visual Data Exploration	1) Interactive Dynamics for Visual Analysis 2) The Death of Interactive Infographics? 3) In Defense of Interactive Graphics
17	10/3	W	Programming Animations and Animated Data Exploration Stories	1) Animated Transitions in Statistical Data Graphics 2) Effectiveness of Animation in Trend Visualization
18	10/5	F	Assignment 2 Presentations	Assignment 2 due
19	10/8	M	No Class (Long Weekend)	
20	10/10	W	History of Visualization (Maps and Explorers)	TBD
21	10/12	F	Map Applications (heatmaps, plotted maps, more) (Midterm grades due)	Assignment 3 out
22	10/15	M	Word Clouds, Scrolling Text	
23	10/17	W	Social Networks, Computer Networks, Centrality, Tools (GraphViz, D3, att.dot)	1) VISAGE: Interactive Visual Graph Querying 2) Apolo: Making Sense of Large Network Data by Combining Rich User Interaction and Machine Learning
24	10/19	F	Midterm	

25	10/22	M	Human Computer Interaction Principles	1) Review and Analysis of Human Computer Interaction (HCI) Principles
26	10/24	W	Heuristic Evaluation	TBD
27	10/26	F	Practice in Class	
28	10/29	M	Think Aloud and Cognitive Walkthrough	
29	10/31	W	Affinity Diagrams, Speed Dating	
30	11/2	F	Peer Review #1	Assignment 3 Revision 1 due
31	11/5	M	Visualizing Uncertainty	1) Error Bars Considered Harmful 2) Visual Semiotics and Uncertainty Visualization
32	11/7	W	Visualizing Algorithms	1) Visualizing Algorithms
33	11/9	F	Practice: Incorporating Ideas into Your Visualizations	
34	11/12	M	Webhosting for Portfolios	
35	11/14	W	HTML and CSS	
36	11/16	F	Peer Review #2	Assignment 3 Revision 2 due
37	11/19	M	Work in Class	
38	11/21	W	No Class (Thanksgiving)	
39	11/23	F	No Class (Thanksgiving)	
40	11/26	M	Ethical, Privacy, and Security Considerations in Visualization	TBD
41	11/28	W	Visualization of non-visual features	
42	11/30	F	Guest Speaker	
43	12/3	M	Presentations	
44	12/5	W	Presentations	
45	12/7	F	Wrap-up	Assignment 3 Final Visualizations due

B&E Career-Themed Mixers:

- Tuesday September 18th B&E Dept. presents the Institute for Supply Management (ISM) Pittsburgh Chapter meeting. [RSVP](#)
- Wednesday Accounting Career Day at IUP. [RSVP for transportation to IUP.](#)
- Tuesday September 25th “Accounting and Information Systems” Networking Mixer. [RSVP](#)
- *More to come!*

Other important dates:

- Add/Drop Ends Tuesday Sept. 4th
- Last Day to Withdraw Wednesday Nov. 7th
- Rosh Hashanah Sept. 10th
- Yom Kippur Sept. 19th

POLICY STATEMENTS

Chatham University Honor Code:

Chatham University students pledge to maintain the Honor Code, which states in part: “Honor is that principle by which we at Chatham form our code of living, working, and studying together. The standards of honor at Chatham require that all students act with intellectual independence, personal integrity, honesty in all relationships, and consideration for the rights and well being of others.”

Information about the Honor Code is available in the [Student Handbook](#).

Cheating and Plagiarism:

Cheating is defined as the attempt, successful or not, to give or obtain aid and/or information by illicit means in meeting any academic requirements, including examinations. Plagiarism is defined as the use, without proper acknowledgement, of the ideas, phrases, sentences, or larger units of discourse from another writer or speaker.

Turnitin.com and FERPA

In all classes, faculty must notify students if the Turnitin service may be used. Student papers are protected by the Family Educational Rights and Privacy Act as they are educational records that contain personally identifiable information. If faculty submits a paper or an excerpt from a paper on behalf of a student for evaluation by Turnitin, an alias must be used instead of the student's name and faculty will ensure that any identifiable personal information is removed before submission.

Disability Statement:

Chatham University is committed to providing an environment that ensures that no individual is discriminated against on the basis of her/his disability. Students with disabilities, as defined under the Americans with Disabilities Act of 1990 (ADA) and who need special academic accommodations, should notify the assistant dean of the PACE Center as soon as possible. The PACE Center will work with students and the course instructor to coordinate and monitor the provision of reasonable academic accommodations.

Non-Registered Students Policy:

In accordance with University policy, only officially registered students may attend this class and all other classes offered at the University after the drop/add period. Please confer with your academic advisor if you need assistance with the registration process or you need additional information.

Minimum Grade Requirements:

Graduate students must earn a grade of B- or above in all courses. Undergraduates must earn a grade of C- or above in all courses completed after spring 2011 used to fulfill major or minor requirements. Please refer to the University catalog or individual program manuals for additional information.

MINIMUM TECHNOLOGY REQUIREMENTS:

Internet Access	Broadband cable or DSL with a minimum connection speed of 768kbit is recommended; slower connections may not provide optimal course experience and performance
Operating System	Microsoft Windows 7 or higher (PC) Mac OS X 10.6 or higher (MAC) Current students may purchase Operating System upgrades from the Chatham Helpdesk
Processor Type	2.0 GHz or higher
System Memory	4GB RAM or higher
Monitor	1024x768 or higher screen resolution
Software	Microsoft Office 2013 or higher (PC) Microsoft Office 2011 or higher (MAC) All students will be provided with Microsoft Office 365 Current students may purchase Microsoft Office from the Chatham Helpdesk
Web Browser	Mozilla Firefox (Recommended for Moodle), or Google Chrome Incognito (Recommended for myPortal); other browsers such as Internet Explorer, Opera and Apple Safari are not recommended
Storage	500GB of hard drive or greater
Audio	Computer speakers and headphones
Visual	Web Camera
E-mail	Chatham University e-mail account (Microsoft Office 365)

Web Conferencing	<p>Courses using web conferencing for online meetings require the following:</p> <ul style="list-style-type: none"> • For audio: headphones and microphone • For video: web camera
Plug-ins	<p>Course content may include file types that require special plug-in software, which are typically available as free downloads (ex: Real Player, Java, QuickTime, Silverlight, Adobe Reader and Adobe Flash)</p>
Mobile Devices	<p>Some resources are available via smartphones and tablets. Please note: Mobile devices will not be able to complete all course requirements. Students will still need regular access to a computer.</p>
On Campus Resources	<p>Current students have access to the following resources:</p> <p>24 Hour Computer Lab – JKM Library 106 Computer Lab – JKM Library 101 Computer Lab – Buhl 236 (no printer) Computer Lab – Coolidge 42 Computer/CAD Lab – Eastside 209 Chatham IT Helpdesk – Woodland 100, Eastside 219, Eden Hall Lodge Library</p>
Off Campus Resources	<p>Current students have access to the following resources:</p> <p>Atomic Learning (http://www.atomiclearning.com/) Chatham IT (http://www.chatham.edu/its) Chatham IT Helpdesk (http://services.chatham.edu)</p>
Current Technologies	<p>For the most up-to-date technology, please visit Chatham IT (http://www.chatham.edu/its)</p>