Data Visualization

ECB121 Block 6 2018

Cornell College

General

Location:	College Hall 102
Time:	MWF 9:30 – 12:30 p.m. *Note: Day 1 will begin at 9 a.m.*
	TTh 12:30 p.m. – 3:00 p.m.
Instructor:	Cindy Bradley, Lecturer Business Analytics
Office Hours:	M-Th. 3:00 – 4:00 p.m. Other times by appointment
Office:	College Hall 216
Office Phone:	319-895-4283
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Course Overview

Data tell a story. The availability of massive amounts of data combined with substantial improvements in computing power to consume it represents a wealth of potential to improve any product or service. Data visualization is a means of unlocking that potential. This course will introduce three activities associated with visualization:

- Data Exploration – gaining an understanding of the meaningful patterns and messages contained within a data set
- Data Presentation – the creation of interactive dashboards to monitor those patterns
- Data Communication – effectively conveying the message being told by the data to decision makers

Course Learning Objectives

The content of this course supports the Educational Priorities and Outcomes of Cornell College and places emphasis on the following educational priorities:

- *Communication* – You will develop communication skills by learning to create effective visualizations of data as well as how to present those results to an audience.
- *Reasoning* – You will develop your analytical reasoning skills by using visualization techniques to evaluate and interpret various sets of data.
- *Inquiry* – You will learn how visualization techniques can be used to analyze real world problems across a variety of disciplines.

Expectations of Students

Developing effective visualizations is as much an art as a science and takes lots of practice. To be successful in this course you must put in the effort and be willing to explore. You need to take the initiative to explore your data, explore the capabilities of your toolkits (Microsoft Excel and Tableau) and explore how others are visualizing similar data for best practices and innovative visualization by participating in peer reviews, reading blog posts, etc. Do not be afraid to "fail fast" in this class. If visualization isn't working, throw it away and start from scratch. A fail is a first attempt in learning. I am here to guide you and provide a basis of knowledge, but you must explore, make mistakes, and find solutions on your own.

Attendance Policy

Daily attendance is HIGHLY encouraged and required to be successful in this class. Missing class will result in you falling significantly behind your peers. Daily assignments and weekly case projects will be distributed in class and successful completion of these projects requires daily classroom attendance. Your weekly participation grade will be negatively impacted for each unexcused absence. Absences for health, family-emergencies and college sponsored events must be communicated in advance of the start of class.

Electronic Device Policy

We will spend considerable time on your laptops during this course. Come to class prepared with your laptop fully charged. Random web browsing or any unrelated use of electronic devices during class time is not acceptable. Other electronic devices (especially cell phones) may not be used in our classroom while class is in session. Failure to adhere to these policies will negatively affect your participation score.

Late Work Policy

No credit will be assigned to daily homework assignments that are turned in late. Weekly and final projects turned in late will receive 25% deduction if received within 24 hours of the deadline, 50% deduction within 48 hours and zero credit thereafter. **All assignments/projects are to be submitted through Moodle and a strict submission cutoff will be enforced (note that late projects will need to be submitted directly to me via email).** Keep in mind computers fail… at some point your computer will freeze/crash and you will lose something. This is **not** an excuse for late work. Get started early and save often!

Course Components

Daily visualization assignments

On most class days I will distribute a take-home exercise to build on the content discussed in class. You can expect to spend approximately 1-2 hours on each of these assignments. You should also plan to spend 1-2 hours per night with assigned readings. Assignments will be due the following morning by 8 a.m.

Weekly visualization projects

These projects are intended to develop your knowledge of the content discussed each week. For each project I will provide you with a dataset and ask you to produce a number of different visualizations and identify patterns within the data. The goal of these projects is to develop your skills of communicating effectively with data visualization. ~~Therefore grading of Project 3 will be partially based on a score assigned by your peers (1/3), along with a score assigned by me (2/3). Note: I reserve the right to adjust peer scores in the event that they appear bias or inconsistent.~~

Final visualization project

You will complete one final comprehensive visualization project on a topic of your choosing. For this project you will select a dataset and develop an oral presentation along with a stand alone interactive graphic, dashboard or storyboard that helps deliver an overall message that you have determined from the data. One third of this project will be graded based on a peer evaluation of your presentation and two thirds on my evaluation of presentation. **This project composes the largest portion of your grade and is your opportunity to present the cumulative skillset you developed in the class.**

Effective Peer Feedback

Data analytics is of little to no value if you cannot effectively communicate the story to those individuals who can make decisions and take action on the findings. These skills are developed largely through practice and exposure to both good and not so good data visualizations. As noted above, a portion of your grade will be based upon feedback from your peers. Was your message effectively received by the consumer? You will be expected to both receive feedback from your peers and deliver feedback to your peers in a respectful manner. You should be willing to share your thoughts and be open to differing perspectives.

Grading Policy

Daily visualization assignments (~~10~~ 6 @ 10 pts, 2 @ 25 pts, 1 @ 40 pts)	~~100~~ 150 points
Participation and Effective Peer Feedback (25 points per week)	100 points
Weekly visualization projects	~~500~~ 350 points
Week 1 (150 points)	
Week 2 (~~150~~ 200 points)	
~~Week 3 (200 points; 1/3 peer 2/3 instructor)~~	
Final visualization project	~~300~~ 400 points
Check In #1 Data Set Preparation (~~30~~ 50 points)	
Check In #2 Exploratory Analysis (~~30~~ 50 points)	
Check in #3 Dashboard (75 points)	
Final Presentation (225 points; 1/3 peer 2/3 instructor)	
Total Points	1,000 points

Course grades will be based upon the following grading scale:

A	93-100%	B+	87-89%	C+	77-79%	D+	67-69%
A-	90-92%	B	83-86%	C	73-76%	D	63-66%
		B-	80-82%	C-	70-72%	D-	60-62%

Academic Integrity

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

Equality of Opportunity

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.

Resources

Textbook

No Required Textbook

Excerpts from the following textbooks will compliment this course and will be available on Moodle Students are not required to purchase these books.

The Truthful Art – Alberto Cairo (ISBN: 978-0321934079)
The Visual Display of Quantitative Information – Edward R. Tufte (ISBN 978-0961392147)
Storytelling with Data – Cole Nussbaumer Knaflic (ISBN 978-1119002253)
Show Me the Numbers – Stephen Few (ISBN: 978-0970601995)
Now You See It – Stephen Few (ISBN: 978-0970601988)
The Big Book of Dashboards : Visualizing Your Data Using Real World Scenarios - Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave (ISBN: 978-1119282716)
The Wall Street Journal Guide to Information Graphics – The Dos and Don'ts of Presenting Data, Facts, and Figures – Dona Wong (ISBN: 978-0393347289)
Communicating Data with Tableau – Ben Jones (ISBN: 978-1449372026)
Data at Work – Jorge Camoes (ISBN:978-0134268637)

Software

You will be required to use a computer throughout this course. If you do not have a personal laptop, you should check one out through the library loaner laptop program. The following software should be installed:

- **Microsoft Excel**: If you do not have Microsoft Excel, it is available for download via Cornell's Campus Agreement with Microsoft at https://products.office.com/en-us/student/office-in-education . Students will need to utilize their Cornell email address to obtain the software for free.
- **Tableau**: A free copy of Tableau is available to students for download to their personal laptops for the duration of this course. Students can register utilizing their Cornell email address and obtain their personal copy of Tableau. Please see instructions posted on Moodle.

Help Outside of Class

If you encounter any problems or are struggling to learn Excel or Tableau, please visit the Quantitative Reasoning Studio (QRS). Jessica Johanningmeier (JJohanningmeier@cornellcollege.edu) is the QRS director and can schedule a help session with her or a peer consultant. In addition, Amber Frazier (afrazier20@cornellcollege.edu) and Taylor Axelson (TAxelson19@cornellcollege.edu) will be serving as a tutors for the class. You may contact either of them to arrange an individual meeting.

Schedule Outline

Week 1: Build core skills of visual analysis

Date	Topics	Read Prior to Class*	Deadlines
Day 1 Monday, February 11	Course Introduction Data Visualization Introduction Qualities of a Great Visualization Install MS Excel & Data Analysis Toolpak	*The Truthful Art* – Chapters 1,2	
Day 2 Tuesday, February 12	MS Excel Workshop Installation of Tableau		Assign 1 (8 am)
Day 3 Wednesday, February 13	Visual Perception Concepts Applied Visual Perception Descriptive Statistics Introduction of Final Project Installation of Tableau	*The Truthful Art* – Chapter 5	~~Assign 2~~ ~~(8 am)~~
Day 4 Thursday, February 14	Data Preparation Descriptive Statistics	*Modeling with Spreadsheets* – Chapter 5	Assign 2 (8 am)
Day 5 Friday, February 15	Introduction to Tableau Introduction of Project 1	*Communicating Data with Tableau* – Chapter 2	Assign 3 (8 am)
Sunday, February 17			Project 1 (9 pm)

Week 2: Gain an understanding of the meaningful patterns & relationships contained within a data set

Date	Topics	Read Prior to Class*	Deadlines
Day 6 Monday, February 18	Review Project 1 Revealing Change: Time Series Analysis & Deviation Analysis	*The Truthful Art* – Chapter 8	
Day 7 Tuesday, February 19	Visualizing Distributions Introduction of Project 2	*The Truthful Art* – Chapter 7	Final Check In #1 (8 am)
Day 8 Wednesday, February 20	Part-To-Whole Analysis Ranking Analysis	*NA*	Assign 4 (8 am)
Day 9 Thursday, February 21	Seeing Relationships	*The Truthful Art* – Chapter 9	Assign 5 (8 am)
Day 10 Friday, February 22	Specialized Visualizations How to pick a chart?	*Communicating Data with Tableau* – Chapter 10 *Effectively Communicating Numbers* – Stephen Few	Assign 6 (8 am)
Sunday, February 24			Project 2 (9 pm)

** See Moodle page for specific content*

Week 3 – Conveying the message being told in the data

Date	Topics	Read Prior to Class*	Deadlines
Day 11 Monday, February 25	Project 2 Review Interactive Dashboards - Part 1	*Communicating Data with Tableau* – Chapter 12	
Day 12 Tuesday, February 26	Interactive Dashboards - Part 2	*Communicating Data with Tableau* – Chapter 13	Final Check In #2 (8 am)
Day 13 Wednesday, February 27	Telling the Data Story – Part 1	*Storytelling with Data* – Chapter 1	Assign 7 (8 am)
Day 14 Thursday, February 28	Telling The Data Story – Part 2	*Data Points* – Chapter 6	Assign 8 (8 am)
Day 15 Friday, March 1	Design for Communication	N/A	Assign 9 (8 am)
Sunday, March 3			Final Check In #3 (9 p.m.)

Week 4 – Final Presentations

Date	Topics	Read Prior to Class*	Deadlines
Day 16 Monday, March 4	Peer Feedback Workshop Final Project	N/A	Final Project (9 p.m.)
Day 17 Tuesday, March 5	Final Project Presentations	N/A	
Day 18 Wednesday, March 6	Final Project Presentations	N/A	

** See Moodle page for specific content*