



EMORY

GOIZUETA  
BUSINESS  
SCHOOL

# ISOM 675 Data Visualization

Syllabus for Fall 2017 (subject to revisions)

## General Information

### Class Meetings

Tuesdays and Thursdays @ 9:45-11:15 AM in Room W300 GBS

Classes begin on Thursday August 24<sup>th</sup> and end on Thursday December 14<sup>th</sup>

*Please note, for the weeks of October 22<sup>nd</sup> – December 11<sup>th</sup> we will only meet on Thursdays.*

There will be no class the week of Thanksgiving.

### Instructor

Jesse Bockstedt, PhD

Associate Professor, Information Systems and Operations Management

Goizueta Business School Room 417

Email: [bockstedt@emory.edu](mailto:bockstedt@emory.edu)

Phone: (404) 727-6628 (email is the best way to contact me)

Office Hours: Friday 2:00 PM – 4:00 PM

### Teaching Assistant

TBD

## Course Overview

### Course Description & Objectives

Data Visualization will introduce students to the techniques and tools used to create effective visualizations that clearly and efficiently communicate relationships within data. The field of data visualization combines the art of graphic design with the science of data analytics.

Students will learn how to perform exploratory analysis through visualization, how to create professional looking visualizations for use in business reports and presentations, and how to design interactive visualizations and dashboards. The course will cover the common quantitative messages users attempt to understand or communicate from a set of data and the associated visualizations used to help communicate each message. These include time series, rankings, proportions, deviations, frequencies and distributions, correlations, categorical comparisons, and geospatial plots. Students will analyze real data sets and utilize R, Tableau, and other tools to design and prototype their visualizations.

### Topics Covered

- Principles of Data Visualization and Graphic Integrity
- History of Data Visualization
- Visual Perception and Graphic Communication
- Design, Color, and Evaluation of Visualizations

- Common Quantitative Messages in Visualization
- Basic Graph, Visualization, and Table Types
- Advanced Graphs, Tables, and Visualizations
- Interactive/Dynamic Visualizations and Dashboards
- Common Tools for Data Visualization including:
  - R (viz libraries include: ggplot2, ggmap, colorbrewer, shiny)
  - Tableau

## Prerequisites

- Completion of the MSBA bootcamps.
- Enough familiarity with R to write and run your own scripts, install packages, import and export data sets, format data sets, and use functions.

## Course Materials

### Required Materials

A laptop with R, R Studio, and Tableau Desktop 10.3 (Academic) installed. Other tools and packages that will be needed during the semester will be discussed in class. ***It is the student's responsibility to configure and maintain his or her own laptop software.***

### Recommended Books

There is no “required” textbook and you can find much of the technical details for R plotting and Tableau online. I will post required readings, chapters, and articles to the class Canvas site. However, below is a list of several recommended books on Data Visualization that are widely recognized as good references. Owning these books can significantly help your understanding of the concepts in this class. All of these books are available on Amazon and reasonably priced. The books in bold are highly recommended.

- **R Graphics Cookbook: Practical Recipes for Visualizing Data, Winston Chang, O'Reilly (~\$35 on Amazon).**
- Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software, Dan Murray, Wiley, latest edition (~\$30).
- **Show Me the Numbers, Stephen Few, 2<sup>nd</sup> Edition, Analytics Press (~\$35).**
- The Visual Display of Quantitative Information, Edward Tufte, 2<sup>nd</sup> Edition, Graphics Press (~\$35).
- **Visualize This: The FlowingData Guide to Design, Visualization, and Statistics, Nathan Yau, Wiley (~\$20).**
- Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations, Scott Berinato, HBSP (~\$35).
- Information Dashboard Design: Displaying Data for At-a-Glance Monitoring, Stephen Few, 2<sup>nd</sup> Edition, Analytics Press (~\$30).
- Designing for Information: An introduction to the histories, theories, and best practices behind effective information visualizations, Isabel Meirelles, 2013 (~\$25)

## Course Policies

### Class Communication

We will use **Canvas** this semester to organize class materials and activities. I will post course materials, readings, assignments, grades, etc. to Canvas. I will send emails to the class (at your Emory email address) using the Canvas email feature. **You are expected to leave on your email notification feature in Canvas to ensure that you receive all class emails.** This feature is on by default, so if you don't make any changes, everything should be fine.

I will check my email regularly and will try my best to respond to you within 24-48 hours. If your email is urgent, please indicate so in the subject line. General questions about the course, course policies, course activities, assignments, missing a class, Canvas, etc., should be sent to the TA. The course TA will be monitoring email regularly and will respond to your questions. If multiple students ask the same questions, we may post a discussion board item or class announcement to Canvas. Questions about missing exams, quizzes or other important class days (e.g., presentations) should be sent to the professor directly.

### Grading

Item	Type	% of Final Grade
Module Quizzes (4-5)	Individual	20%
Homework (4-5)	Individual	30%
Final Exam	Individual	25%
Final Project	Group	25%
Total		100%

### Class Attendance

Students are responsible for all material and administrative announcements/changes covered in class. If you miss a class, follow up with a peer to understand what was missed and meet with the instructor or TA to resolve any confusion.

### Make-ups, Late Homework, and Extra Credit

- Make-up exams and quizzes may be offered only for excused absences and if arranged in advanced. If an exam or quiz is missed due to a medical emergency, a make-up may be arranged if the instructor is notified within 24 hours.
- Homework can be turned in up to one day late for a 50% penalty. Homework will not be accepted more than 24 hours after due date and time.
- No extra credit assignments are planned. If extra-credit assignments are made available, they will be announced in class and will be made available to all students.

### Honor Code

I expect every student to be familiar with the Goizueta Business School Honor Code. Some of the ways in which the code applies to this course are discussed below:

- The honor code stipulates that no student will lie, cheat, copy or otherwise behave in an unfair manner to obtain academic advantage over other students.

- As per the honor code, an individual's name on a report should be included only if they have contributed to the analysis. If an individual has not contributed to the analysis in an intellectual manner, it is a violation of the honor code to include his or her name.
- Furthermore, you may not refer to assignments, quizzes, exams, or projects ups from classes offered in earlier semesters.
- The premise of the honor code is that ideas should be attributed to their source. Therefore, please acknowledge the main source(s) of data, facts, and ideas (other than from the instructor or textbook) in all your written work and when you make a presentation.

You may discuss non-graded homework and exercises with your classmates, TA or the instructor. All graded homework, quizzes, and exams are individual-only assessments and any indication of copying, collaboration, or discussion with other students will result in immediate referral to the Honor Council. Students are encouraged to help each other study for exams and quizzes.

## Access, Disability Services and Resources (ADSR)

If you are registered with Access, Disability Services and Resources please inform the instructor within the first week of class so that arrangements can be made. If you register with ADSR during the semester, please notify the instructor as soon as possible so we can arrange for the remaining class activities.

## Tentative Schedule

### Module 1 - The Fundamentals (Classes 1-4)

- Intro to Data Viz
- History of Data Visualization
- Perception and Visualization Building Blocks
- Basic Graph Types and Best Practices
- More Graph Types
- Readings (see Canvas)

### Module 2 - Creating Visualizations (Classes 5-12)

- Common Quantitative Messages
- Visualization to communicate the Quantitative Messages
- Visualization using R and Tableau
- Readings (see Canvas)

### Module 3 - Visualization Design Principles (Classes 13-15)

- Basic Graphic Design: Color, Font, Typography
- Visualization Component Level Design
- Graphic Features: Annotations, Highlighting, Legends, Axes, Scale
- Readings (see Canvas)

### Module 4 - Interactive Visualizations and Dashboards (Classes 16-21)

- Fundamental Interaction Techniques

- Dashboard Design Principles
- Dashboard Creation in Tableau
- Intro to Shiny and D3 (if time)
- Readings (see Canvas)

Ann Cullen from Library Services visiting on 10/26

Guest Speaker, Dan Murray from Interworks (11/2)

Final Exam in Class on December 7<sup>th</sup>

Final Project Presentations in Class on December 14<sup>th</sup>.

***The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.***

## FAQ

Over the past decade of teaching undergraduate and graduate level courses, I have been asked some questions repeatedly. Below are my answers to these questions that always seem to pop up.

*Q1. How can I do well in this class?*

A1. Read the recommended readings before class. Be attentive in class and take notes. Study your notes on a regular basis, don't just cram for exams. If something is not clear, ask for a clarification immediately. Do not be shy. If you have questions, be sure to talk to me or a TA at the end of a class or see us in office hours. If you miss a question on an exam or assignment, make sure you understand why your answer was incorrect. Attending, being attentive in, and taking notes in every class are important for securing a good grade in this course.

*Q2. Should I buy the book for this course?*

A2. Yes. If there is a required textbook, it is highly recommended that you buy it or access it online and keep up with readings throughout the course. Non-required, but recommended books will help you learn the material more effectively, but should not make-or-break your performance in the class.

*Q3. If I miss an exam or an in-class assignment, can I make it up at a later date?*

A3. Only if you arrange ahead of time with me, furnish a doctor's note clearly stating that it was not possible for you to come to school on the day you missed the class, or provide a Dean's Excuse.

*Q4. When do you post scores from quizzes, assignments and exams?*

A4. The TAs and I will do our best to grade your quizzes, assignments and exams and post the results to Canvas within one week of the due date. However, the TAs and I also have deadlines, exams, and other commitments that may occasionally require us to take a little longer to complete grading.

*Q5. If I have an emergency (e.g., my computer breaks down) on the day an assignment or project is due, would you allow me to submit it late without any penalty?*

A5. No. I will post each assignment well in advance of the due date, so if you choose to wait until the last moment to work on it or choose not to back up your work, you will have to assume the risk of any possible emergency or technical issue. However, I am a reasonable person and I will consider reasonable family and/or medical emergencies as valid excuses as long as proper evidence is provided.

*Q6. I need to see you but I cannot come during your office hour. Can I come at some other time?*

A6. YES. I will try to be as flexible as I can to meet outside of standard office hour times. Send me an email to set up an appointment.

*Q7. I did not attend the last class. Did I miss anything important?*

A7. Yes.

*Q8. Do you offer extra credit assignments towards the end of the semester if I am about to earn a failing grade or a grade below my expectations?*

A8. No. I do not think it is fair to offer selective extra credit assignments for individual students. If I offer it to one student, I have to offer it to everyone. Extra credit may be offered during the semester to all students, but it will not be offered selectively for "special circumstances".

*Q9. If I need to earn a certain grade in the course to graduate, maintain a scholarship, maintain a GPA, etc. would you consider revising my grade to help me out?*

A9. No. It is your responsibility to work appropriately to ensure that you earn the grade you need in the class. However, if you seek extra help, myself and the TAs will be happy to provide it throughout the semester.

*Q10. Can I have any fun in this class?*

A10. Absolutely! It is my goal for you to enjoy learning the content of this course and I hope we all have a good time this semester. As long as you are not disruptive or impacting other students' learning, I encourage you to have fun this semester.