

# MISM 6210. Information Visuals and Dashboards for Business

Myles D. Garvey, Ph.D

Spring, 2023



**E-mail:** m.garvey@northeastern.edu

**Office:** Hayden 225E

**Office Hours:** By Appointment Only  
(min 2 days advance notice)

**Class Room:** Shillman Hall 215

**Class Hours:** W 7:50am - 10:20pm

---

## Contents

<b>1 Course Description</b>	<b>1</b>
<b>2 Required and Recommended Materials</b>	<b>2</b>
<b>3 Course Format</b>	<b>2</b>
<b>4 General Course Policies</b>	<b>2</b>
<b>5 Task-Based Evaluation</b>	<b>3</b>
<b>6 24-Hour Communication Silence Period</b>	<b>6</b>
<b>7 Recording Policy</b>	<b>6</b>
<b>8 A Note on Use of Software</b>	<b>6</b>
<b>9 Course Schedule* and General Syllabus Changes</b>	<b>7</b>

## 1 Course Description

Introduces design principles for creating meaningful displays of information to support effective business decision making. Studies how to collect and process data; create interactive visualizations; and use them to demonstrate or provide insight into a problem, situation, or phenomenon. Introduces methods to critique visualizations along with ways to identify design principles that

make good visualizations effective. Discusses the challenges of making data understandable across a wide range of audiences. Provides an overview of data visualization, key design principles and techniques for visualizing data, and the fundamentals of communication that are required for effective data presentation. Other topics may include ethical uses of information displays, storytelling, infographics, immersive visualizations, and information dashboard design. Offers students an opportunity to use one or more software tools.

## 2 Required and Recommended Materials

- Weekly Course Notes and Videos (to be posted weekly on Canvas)
- (Recommended) Healy, K. (2018). Data visualization: a practical introduction. Princeton University Press. (<https://socviz.co/>)
- (Recommended) Wilke, C. O. (2019). Fundamentals of data visualization: a primer on making informative and compelling figures. O'Reilly Media. (<https://clauswilke.com/dataviz/>)
- (Recommended) Acharya, & Chellappan, S. (2017). Pro tableau: a step-by-step guide. Apress. (<https://link-springer-com.ezproxy.neu.edu/content/pdf/10.1007%2F978-1-4842-2352-9.pdf>)

You also will need the following software installed:

- R and RStudio
- Tableau

Tableau has academic licenses available for students. The links to these are posted on Canvas. You are required to have all of these software products installed before day 1 of class. I have posted videos on Canvas that detail how to go about installing these products. If you are having difficulty, you can always reach out to me or my TA for further assistance.

## 3 Course Format

Our course will be in-person. However, I am running our course as a *flipped classroom*. This means that you will be responsible for reading and watching any assigned reading and viewing material, if any, as directed by the professor, *outside of our classroom time*.

Meanwhile, on a weekly basis, our meeting times will be primarily dedicated to working on problem sets, case studies, simulations, quizzes, and presentations, often together and in groups. **Attendance is mandatory.**

## 4 General Course Policies

1. Please adhere to professional behavior in class.
2. If we hold any meeting via Zoom, I ask that you mute your microphone when attending the class in such a manner.

3. Any virtual sessions will be conducted on Zoom.
4. The most important announcements **will be made in person**. If you do not receive an important announcement, it is your responsibility to catch up on any missed assignments.
5. **Final course grades are final**. I do **not** round grades. No requested changes can or will be made once submitted. Directly after submission, the professor is usually unavailable for email inquiries for final grade for a minimum of two weeks after grade submission.
6. Accommodating students with special learning needs should reach out to me with proper documentation immediately following the first class session.
7. It is against university policy to cheat. Please read the Northeastern University Policy on Academic Integrity at <http://www.northeastern.edu/osccr/academichonesty.html>. Cheating entails working in groups on individual assignments, completing others examinations and assignments, having others complete your examinations and assignments, or more generally having someone else complete the course on your behalf. You are allowed to use ChatGPT, even copy and pasting directly.
8. Extra credit opportunity is **not** offered in this class unless otherwise explicitly states
9. **It is YOUR responsibility, not mine, to keep track of your grades**. Please book an appointment with me to meet during my office hours if you have any questions regarding your grade.
10. All submissions in this course are digital and are to be submitted via Canvas unless otherwise instructed to do so. Please do not submit hard-copy versions of assignments or exams.

## 5 Task-Based Evaluation

My course is *task-driven*. This means that you will be evaluated based on tasks that you choose to take on (or not). I let you choose the tasks to complete, but in order to earn a grade, you must show a reasonable attempt. If a task submission does not show an effort on your part to solve the problem, the specific task will not count. Tasks must be completed by deadlines. Otherwise, they will not count. No exceptions to this rule. Here are the type of tasks in this class that you can attempt:

- In Classwork Sessions
- At-Home Exercises
- Interesting Article Presentation

Before we discuss grades, let's get something really important explicitly stated: It is the policy of D'Amore-Mckim School of Business that no more than 50% of graduate students in any business course receive greater than a B+.

To this end, you will be evaluated in a manner that will ensure this outcome. If you are highly questionable of the grading process, **please feel free to immediately withdraw from this course**.

You will be evaluated using a method of your choosing. I grade your work along two primary criteria: the quantity of ungraded work that was reasonably completed, and the quality of your work.

Therefore, for grades, I have a two-tier system. If a student would like to receive any letter grade within the range of C- to B+, they can choose this letter grade at the beginning of the semester under the promise of completing the minimum required effort for each assignment.

If a student by the end of the semester fails to complete what they promised to complete, the student possibly can drop to the grade that corresponds with the work that they did submit to me, plus a penalty of one whole letter grade for not providing certainty in your decision making to me.

Otherwise, if a student chooses at the start of the semester that they would like to attempt to a grade of A- or A, they **must compete against other students for the A or A-**. Your work will be graded on a relative scale, and you will be required to serve on a team in a leadership position for the entire semester.

At a bare minimum, in order to obtain an A- or an A, the student must first complete all of the work, with a reasonable degree of effort, corresponding to grades between C- to B+, inclusively. Failure to meet this threshold will result in a grade lower than A or A-, **with a penalty of one whole letter grade**.

Letter Grade	Requirements
A, A-	<ul style="list-style-type: none"> <li>• Complete all deliverables for the course project.</li> <li>• Serve in a leadership position on your team.</li> <li>• Complete all tasks at an effort that shows a sufficient realistic attempt at every task that is required for a grade of B+ and the final project.</li> </ul>
B+	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 8 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These)</li> <li>• Complete and Submit, on time, 8 At Home Exercises</li> <li>• Complete and Submit, on time, 1 Interesting Article Presentation on a team of two.</li> <li>• Actively participate in the class in an impactful way. I will subjectively determine the level of participation in the class that you provided.</li> </ul>
B	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 6 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These)</li> <li>• Complete and Submit, on time, 6 At Home Exercises</li> <li>• Actively participate in the class in an impactful way. I will subjectively determine the level of participation in the class that you provided.</li> </ul>
B-	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 6 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These)</li> <li>• Complete and Submit, on time, 6 At Home Exercises</li> </ul>
C+	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 6 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These)</li> <li>• Complete and Submit, on time, 3 At Home Exercises</li> </ul>
C	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 3 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These)</li> <li>• Complete and Submit, on time, 3 At Home Exercises.</li> </ul>
C-	<ul style="list-style-type: none"> <li>• Complete and Submit, on time, 1 In Class Sessions (In Person Attendance, Wellness Days Cannot Be Used on These) 3/8</li> <li>• Complete and Submit, on time, 1 At Home Exercises</li> </ul>

## 6 24-Hour Communication Silence Period

You are free to email me at m.garvey@northeastern.edu. You are also free to book an appointment with me to meet virtually via Zoom or physically in my office. Please note that any emails pertaining to an assignment that are sent to me within 24 hours of an assignment's due date **will be ignored**. For example, if you have an assignment due at 5:00pm on Thursday, the latest you can email me regarding the assignment is on Wednesday 5:00pm. Any emails after this will only be answered after the due date.

## 7 Recording Policy

Every single one of our in-class sessions are recorded. This is for the benefit of every student. At the beginning of each session, everyone must consent to recording. If you do not consent, you will be required to complete an additional assignment in order to show your participation in the class. The assignment will entail a minimum of a 2-page, double-spaced, 12pt write up of a summary of our lecture. If you do not consent, you agree to not participate in class and agree to complete the additional assignment. If you are attending class virtually, please note that recordings on Zoom may show your name, picture, and voice. If you do not consent to recording, you agree to change your name to an unidentifiable one, to keep your camera and microphone turned off, and not to engage in the chat box. Active vocal, visual, or textual participation is assumed to be your implicit consent to recording. Put simply: consent to record if you would like to participate in class, do not consent and you will be required to complete an additional summary assignment for each class session.

## 8 A Note on Use of Software

Data Visualization is a lot like programming: there are many tools for which the concepts can be lectured within. Generally, there are two ways to accomplish visualization: point-and-click and programmatic. Even within these two categories of visualization tools, there are a plethora of options. I have decided to choose Tableau and an R Stack (ggplot, RShiny, etc) for various reasons. First, Tableau can handle more data, and has more functionality than Excel or PowerBI. It is used widely in business applications, and many job positions request knowledge in Tableau. With this stated, Tableau has **many** limitations.

Solely learning Tableau would do you an injustice. We are in an analytics program, **not** an MBA program. With this stated, you should know how to render plots, generate visuals, animations, and dashboards programatically as well. For this, I have chosen R for many reasons. For one, R was specifically designed with data analysis in mind, while other languages, like Python, was not. Second, there are a plethora of packages that allow the user of R to quickly generate plots of many different forms and shapes, whereby similar functionality in Python and other languages is lacking. Third, R allows for a smooth integration of seamless flow in an analytics pipeline, while Python and other languages are more "choppy".

With all of this stated, you are expected to work within BOTH Tableau and R. We will not accept any work in any other software. Rest assured, you will be able to take the knowledge and skills curated and cultured in this course and apply it using other tools. However, the very

basic expectation for this course is that you work within, and submit work within, Tableau and R. There are not exceptions to this expectation.

## **9 Course Schedule\* and General Syllabus Changes**

\*Note that all topics are subject to change, as well as the schedule itself.

### **1. Intro to Data Viz**

- (a) A welcome to everybody in class!
- (b) Syllabus review and student introductions.
- (c) Some technology installations!
- (d) Definition and importance of data visualization
- (e) Overview of tools and techniques used in data visualization (R and Tableau)

### **2. Human Visual Information Processing**

- (a) **Overall Process of Visual Communication**
- (b) **Decoding and Encoding Visual Information**
  - i. Physiological and psychological processes of decoding visual information
  - ii. Definition and importance of encoding visual information
  - iii. Choosing appropriate visual encodings and design principles for effective data visualization

### **3. Data Visualization Design Process**

- (a) Does a process exist to design data visualizations?: A Proposed Solution
- (b) Applying the design process to business analytics problems.

### **4. Determining the Purpose of Visual Information**

- (a) Types of purposes for using visual information
- (b) Process for determining the purpose of visual information

### **5. An Applied Model of Data and Visual Artifacts**

- (a) Definition and types of data
- (b) Modeling techniques for different types of data
- (c) Properties of a dataset (e.g. size, complexity, quality)

### **6. Using Data Wrangling to Prepare for Visual Artifact Design**

- (a) Importing and cleaning data
- (b) Transforming and reshaping data
- (c) Summarizing and aggregating data

### **7. Determining the Container Structures of Visual Information Artifacts**

- (a) The importance of structure in organizing visual information artifacts
- (b) Types of structures for visual information artifacts
- (c) Factors to consider when determining the structure of visual information artifacts
- (d) Process for determining the structure of visual information artifacts

#### **8. An Overview of Visual Information Artifacts**

- (a) Types of visual information artifacts: graphical, geospatial, symbolic, composite, temporal, textual, image-based, audio-visual
- (b) Encoding visual information in visual information artifacts
  - Use defining characteristics and grammar of graphics to effectively encode data

#### **9. Constructing Visual Information Artifacts**

- (a) Overview of different types of visual information artifacts including charts, maps, diagrams, and others such as infographics and interactive visualizations
- (b) Tips for effectively encoding data and information in these different types of visual information artifacts

#### **10. Evaluating Visual Information Artifacts: The Cognitive Process of Decoding**

- (a) The role of gestalt principles and cognitive processes in decoding visual information
- (b) Use gestalt principles and cognitive decoding processes to evaluate visual information artifacts and make adjustments as needed