COURSE PREREQUISITES
(i) Graduate Standing; (ii) familiarity with college statistics and computer programming concepts will be helpful but not mandatory.

COURSE OVERVIEW
Our ability to, mine, interpret, and utilize large amounts of data has transformed every industry. However, data analysis alone does not have meaning without context and interpretation. Being able to effectively present analytics with a compelling narrative is a true differentiator and is paramount in influencing decision-makers. The goal of this course is to expose students to key data visualization design principles, leading analytical techniques, Business Intelligence tools, and strategic communication to bring insight to complex data and drive real value. Students will go through the data discovery journey, focusing on how to present information clearly and effectively translate data into dynamic stories with actionable outcomes.

This course’s guiding philosophy is “getting dirty with data”. Students will complete data analysis and data visualization assignments and projects using multiple data sets. The expectation is to design, build, and present their findings using Tableau and PowerPoint.

This is not a programming language course (i.e. R, Python, SQL, etc.). Students with a coding background will be given the chance to work on visualization projects that involve coding only if they choose so.

OBJECTIVES
This course is designed to provide students with the foundations necessary for understanding and extending the current state of the art in data visualization.

• An understanding of the key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction
• Have an analytical thinking mind set. Understand data driven problem solving and be able to wrangle, manipulate, and visualize data to drive insight
• Expose to available popular visualization software and provide hands-on experience
• Apply analytics and data visualization in a strategic context
• Effectively translate data into dynamic stories with actionable outcomes

COURSE STRUCTURE
The course will include lectures, supervised group training exercises, case studies, video tutorials, and will promote interaction between students and instructor.

EVALUATION
• 18% - Class work and participation, including exercises and case studies to create visualizations using provided data
• 12% - Quizzes (6 total)
• 35% - Midterm Project - Design/create your individual visualizations and presentation
• 35% - Final Project - A mini capstone using data from specified public sources
**CASE STUDIES**

During the course, I will be assigning multiple mini case studies consisting of an assigned data set. The solution requires designing a visualization or dashboard to support a recommendation to drive value. The audience for these case studies range from middle management to the Board of Directors. More details to be provided at the time the cases are assigned.

**SCHEDULE**

| Week 1: Jan 26 | Introduction to Data Visualization for Business Intelligence  
Information on the class format, materials and tools. Background to visualization  
Introduction to Tableau  
Tableau is a leading tool for data visualization and analytics, providing flexible design capabilities. Background plus hands-on introduction and activities |
|---|---|
| Continuation | Office Destination  
Tableau visualization exercises using the Office Destination data set |
| Reading | Practical Tableau. Ch 3-7 (pp 11-34)  
Ryan Sleeper, O’Reilly 2018 (available online through NYU Libraries)  
Good Charts, Ch 1 (pp 17-32)  
Scott Berinato, HBR Press 2016 (available online through NYU Libraries) |
| Week 2: Feb 2 | Visualization Design Principles: Selecting Charts  
Guidelines for how to choose between different charts styles and select what is appropriate for your requirements  
Hands-on Executive Scorecard Dashboard Exercise with Tableau  
Build a simple business performance dashboard for C-Suite insight |
| Continuation | Office Destination  
Continuation work building out the Office Destination Executive Scorecard |
| Reading | Good Charts, Ch 3 (pp 53-72)  
Scott Berinato, HBR Press 2016 (available online through NYU Libraries)  
Practical Tableau. Ch 8-12 (pp 35-60)  
Ryan Sleeper, O’Reilly 2018 (available online through NYU Libraries) |
| Week 3: Feb 9 | Visualization Design Principles: Visual Variables and Visual Psychology  
Understanding the science and design principles that underpin data visualization and provide guidelines for how to make effective dashboards and presentations  
Hands-on Executive Scorecard Dashboard Exercise with Tableau  
Update, format and improve the design of the Office Destination Executive Scorecard dashboard |
| Continuation | Wireline  
Build a Tableau visualization dashboard using the Wireline data set. |
| Reading | Storytelling With Data, Ch 3 & 4 (pp 71-126)  
Cole Nussbaumer Knaflic, Wiley 2015 (available online through NYU Libraries) |
| Week 4: Feb 16 | Presenting Data Findings  
Understand how to take you data visualizations and present them effectively to a business audience  
Hands-on  
Translate your Office Destination visualizations into presentations using templates |
| Continuation | Office Destination  
Continuation work translating your Office Destination charts and visualizations into a business presentation |
| Reading | Storytelling With Data. Lets Practice!, Ch 1  
| Cole Nussbaumer Knafflic, Wiley 2015 (available online through NYU Libraries)  
| Present Your Data Like A Pro  
| Joel Schwartzberg, Harvard Business Review 2020 (available through Brightspace) |
| **Week 5: Feb 23**  
| **In Class** | **Interactivity**  
| Understand how and why to add interactive elements that make dashboards dynamic and increase user control and engagement  
| **Hands-on** | Create a What-If analysis chart using the Office Destination data source |
| **Continuation** | **Office Destination**  
| Continuation work building out Office Destination What-If analysis dashboards |
| **Reading** | Practical Tableau. Ch 13-16 (pp 69-93) & Ch 56 (pp 353-564)  
| Ryan Sleeper, O'Reilly 2018 (available online through NYU Libraries) |
| **Week 6: Mar 2**  
| **In Class** | **Visualizing Time**  
| Create visualizations that focus on how data unfold over time  
| **Hands-on** | Visualizing temporal data including heatmap and bump chart visualizations |
| **Continuation** | **World Development**  
| Design a visualization to present a story of development using UN data |
| **Reading** | The Big Book of Dashboards, Ch 31 (pp 352-381)  
| Steve Wexler, Jeffrey Shaffer, Andy Cotgreave. Wiley. 2017. (available online through NYU Libraries) |
| **Week 7: Mar 9**  
| **In Class** | **Visualizing Geospatial Data**  
| Create visualizations with spatial data covering the mapping function in Tableau  
| **Hands-on** | Visualizing geospatial data, including origin destination and symbolic maps |
| **Continuation** | **Employment Now**  
| Extend the visualization of UN data  
| Start work on midterm project visualizing data from Employment Now program |
| **Reading** | Practical Tableau. Ch 30-35 (pp 183-210)  
| Ryan Sleeper, O'Reilly 2018 (available online through NYU Libraries) |
| **Week 8: Mar 23**  
| **In Class** | **Telling Stories with Data**  
| Introduction to the art of storytelling and presentation preparation. This class focuses on getting the messaging and communication method right to drive strategic decisions  
| **Hands-on** | Tableau stories and narrative in data visualization |
| **Continuation** | **Midterm preparation**  
| Continue working on the Employment Now midterm project by designing a presentation |
| **Reading** | Storytelling With Data, Ch 7 & 8 (pp 165-205)  
| Cole Nussbaumer Knafflic, Wiley 2015 (available online through NYU Libraries) |
| **Week 9: Mar 30**  
| **In Class** | **Employment Now Presentations**  
| Individual presentations of Employment Now analyses |
| **Continuation** | **Midterm revisions**  
| Revise your Employment Now midterm project and continue working on your presentation |
**Week 10: Apr 6**
*In Class*

**From Questions to Tasks**  
*Operationalizing initial questions about the data into tasks that can be computed from the data and visualized.*

**Continuation**  
**Office Destination**  
*Practice going from relevant questions through to tasks that can be completed through visualizing data using the Office Destination data*  

**Reading**  
**Making Data Visual, Ch 2 (pp)*  
Danyel Fisher and Miriah Meyer, O’Reilly 2018 (available online through NYU Libraries)

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**Week 11: Apr 13**  
*In Class*

**Applied Analytics and Exploratory Data Analysis**  
*Covers descriptive statistics and various analyses common for business analysts*

**Continuation**  
**Final project preparation**  
*Selecting group project topics and making initial preparations*

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**Week 12: Apr 20**  
*In Class*

**Data Abstraction, Mutation, and Transformation**  
*Data cleaning, normalization and joining multiple data sets.*

**Continuation**  
**Final project preparation**  
*Revise group project plans and make presentation preparations*

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**Week 13: Apr 27**  
*In Class*

**Final project preparation**  
*Working sessions for teams prior to final presentation*

**Continuation**  
**Final project preparation**  
*Continue working on group project presentations*

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**Week 14: May 4**  
*In Class*

**Final Presentations**  
*Group project presentations highlighting what students have learned throughout the course*

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**GRADING SCHEME**

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**ACADEMIC INTEGRITY**

All students are responsible for understanding and complying with the NYU Statement on Academic Integrity.
This policy sets forth core principles and standards with respect to academic integrity for students at New York University. Each school at New York University may establish its own detailed supplemental guidelines for academic integrity, consistent with its own culture, and consistent with the University-wide general guidelines described in this document.

At NYU, a commitment to excellence, fairness, honesty, and respect within and outside the classroom is essential to maintaining the integrity of our community. By accepting membership in this community, students take responsibility for demonstrating these values in their own conduct and for recognizing and supporting these values in others. In turn, these values will create a campus Department of Technology Management and Innovation climate that encourages the free exchange of ideas, promotes scholarly excellence through active and creative thought, and allows community members to achieve and be recognized for achieving their highest potential.

In pursuing these goals, NYU expects and requires its students to adhere to the highest standards of scholarship, research and academic conduct. Essential to the process of teaching and learning is the periodic assessment of students' academic progress through measures such as papers, examinations, presentations, and other projects. Academic dishonesty compromises the validity of these assessments as well as the relationship of trust within the community. Students who engage in such behavior will be subject to review and the possible imposition of penalties in accordance with the standards, practices, and procedures of NYU and its colleges and schools. Violations may result in failure on a particular assignment, failure in a course, suspension or expulsion from the University, or other penalties.

Faculty are expected to guide students in understanding other people's ideas, in developing and clarifying their own thinking, and in using and conscientiously acknowledging resources – an increasingly complex endeavor given the current environment of widely available and continually emerging electronic resources. In addition, students come to NYU from diverse educational contexts and may have understandings regarding academic expectations that differ from those at NYU. NYU values and respects all academic traditions; however, while at NYU, students are expected to adhere to the norms and standards of academic integrity espoused by the NYU community and will be assessed in accordance with these standards. Students should ask their professors for guidance regarding these standards as well as style guide preferences for citation of sources for assignments in their courses.

Following are examples of behaviors that compromise the academic and intellectual community of NYU. The list is not exhaustive. Students should consult the websites and guidelines of their individual schools for an extended list of examples and for further clarification.

1. Plagiarism: presenting others' work without adequate acknowledgement of its source, as though it were one's own. Plagiarism is a form of fraud. We all stand on the shoulders of others, and we must give credit to the creators of the works that we incorporate into products that we call our own. Some examples of plagiarism:
   - a sequence of words incorporated without quotation marks
   - an unacknowledged passage paraphrased from another's work
   - the use of ideas, sound recordings, computer data or images created by others as though it were one's own

2. Cheating: deceiving a faculty member or other individual who assess student performance into believing that one's mastery of a subject or discipline is greater than it is by a range of dishonest methods, including but not limited to:
   - bringing or accessing unauthorized materials during an examination (e.g., notes, books, or other information accessed via cell phones, computers, other technology or any other means)
   - providing assistance to acts of academic misconduct/dishonesty (e.g., sharing copies of exams via cell phones, computers, other technology or any other means, allowing others to copy answers on an exam)
   - submitting the same or substantially similar work in multiple courses, either in the same semester or in a different semester, without the express approval of all instructors submitting work (papers, homework assignments, computer programs, experimental results, artwork, etc.) that was created by another,
substantially or in whole, as one's own

- submitting answers on an exam that were obtained from the work of another person or providing answers or assistance to others during an exam when not explicitly permitted by the instructor
- submitting evaluations of group members’ work for an assigned group project which misrepresent the work that was performed by another group member
- altering or forging academic documents, including but not limited to admissions materials, academic records, grade reports, add/drop forms, course registration forms, etc.

3. Any behavior that violates the academic policies set forth by the student’s NYU School, department, or division.

MOSES CENTER STATEMENT OF DISABILITY

If you are a student with a disability who is requesting accommodations, please contact New York University’s Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 2nd floor.

If you are experiencing an illness or any other situation that might affect your academic performance in a class, please email the Tandon Student Advocate, Ms Asiya Vickers eng.studentadvocate@nyu.edu who can reach out to your instructors on your behalf when warranted.