

Course Last Updated 3/12/12024



University of
New Haven

Data Visualization

Section I: Course Overview

Course Code: BUS365SYD

Subject Area(s): Business Analytics, Data Science

Prerequisites: None

Language of Instruction: English

Total Contact Hours: 45

Credits: 3

Course Fees: None

Course Description

Data visualization and communication is increasingly important in the field of analytics. The ability to present visual access to the huge amounts of data that business creates is an essential skill for any analyst. The creation of easily digestible visuals and graphics of business insights gained from data is often the simplest and most powerful tool that enables communication and generates a story to drive change and decision-making.

This course will focus on making sense of the world of data science. It equips students with an understanding of how the emergence of big data has expanded the power and scope of many industries and how to utilize large amounts of information. Data literacy empowers students with the tools to apply critical thinking to topics such as the integrity and purpose of the data, enabling them to reveal evidence-based insights. Students will be introduced to some key techniques for presenting, communicating, and analyzing data, including data visualization and pattern discovery.

Learning Objectives

Upon successful completion of this course, students are able to:

- Recognize a range of static data visualization techniques,

- Demonstrate understanding of how data analysis enables discovery and improved decision making,
- Design and create data visualizations that facilitate the discovery and presentation of data-driven stories.
- Explore data ethics and privacy issues of data analysis, including limitations, social impacts and diversity in data.

Section II: Instructor & Course Details

Instructor Details

Name: TBC

Contact Information: TBC

Term: TBC

Course Day and Time: TBC

Office Hours: By appointment.

Grading & Assessment

The instructor assesses students' mastery of course learning objectives by using the forms of assessment below. Each of these assessments is weighted toward the final grade. The Assessment Overview section provides further details for each.

Engagement – 20%

Final Report Oral Pitch – 10%

Canva Infographic Social Media Campaign – 15%

Final Report Data Storytelling Presentation – 15%

Final Report Data Storytelling Slides – 25%

Final Reflection – 15%

Assessment Overview

This section provides a brief description of each form of assessment listed above. Forms of assessment may be slightly modified in the term syllabus.

Engagement (20%): Students are expected to be engaged in class, to have read the CEA CAPA Engagement Policy, and to understand the [Class Engagement Rubric](#) that outlines how engagement is graded.

Final Report Oral Pitch (10%): Students will prepare a five-minute pitch of their final project. This will form the basis of the final report and presentation. Key aspects of the final project will be identified and presented in a structured pitch presentation.

Canva Infographic Social Media Campaign (15%): Students will create a data infographic for a social media campaign using Canva. This will be on a topic of their choice. The infographic will be assessed on clarity, composition and effectiveness in the social media platform chosen.

Final Report Data Storytelling Presentation (15%): Students will give a 10-minute oral presentation of the final project. This will be held in the final class of the semester. The oral presentation enables the student to combine the visual representation of data story and their presentation skills to impact the audience.

Final Report Data Storytelling Slides (25%): The students will build a professional report of data visualisations using storytelling methods critical to contemporary data visualisation practice. In this assessment the students will gradually build a portfolio using techniques in data analysis and visualisation that they will learn through the course and labs. This is a progressive portfolio task that will be completed over the term. It will consist of 15 to 20 slides on the project chosen by the student.

Final Reflection (15%): Students critically reflect on their data visualisation experience through the completion of the final reflection. The reflection will be a 1,500-word assessment. The reflection will also be forward-looking and comment on how the student intends to build upon the material learn and the experience in their next academic and career professional path. The reflection will also outline how the student will continue to develop their data visualisation and other skills to prepare for the future of work.

Active Learning

Experiential learning is an essential component of education abroad, and participation in field studies is a required part of coursework. In this course, students explore the city in which they are studying using a variety of methods. This provides the opportunity to gain nuance and perspective on the host context and course content, as well as to collect information and resources for assigned papers, projects, and presentations. This course offers:

- Trip to local business/marketing firm

Readings and Resources

The below readings and resources are representative of what will be assigned as required in this course, but may vary slightly in the term syllabus.

All students are given access to the online library of the University of New Haven (UNH), accessible [here](#), and are expected to comply with [UNH Policies](#) regarding library usage.

Wherever possible, required readings are made accessible through the online library or Canvas. Students are responsible for obtaining all required readings.

Each course utilizes Canvas as its LMS. Students are expected to check Canvas regularly for updates and deadlines. Canvas is also the primary platform for contacting your instructor in case of questions or concerns about the course.

Required

Badiu, A. (2022, November 18). Gestalt Principles: Understanding Its Importance in Report Design. *Enterprise DNA*. <https://blog.enterprisedna.co/gestalt-principles-understanding-its-importance/>

Knaflic, C. (2014, April 14). Exploratory vs Explanatory Analysis. *Storytelling with Data*. <https://www.storytellingwithdata.com/blog/2014/04/exploratory-vs-explanatory-analysis>

Franconeri, S. (2020, December 3). 4 Keys to Effective and Honest Data Visualizations. *Kellogg Insight*. https://insight.kellogg.northwestern.edu/article/data-visualization-honesty-infographics?utm_source=piano&utm_medium=onsite&utm_campaign=364

McGurgan, K. (2015). *Data-ink Ratio and Task Complexity in Graph Comprehension* [Thesis, Rochester Institute of Technology]. Rochester Institute of Technology Digital Institutional Repository. <https://repository.rit.edu/cgi/viewcontent.cgi?article=9824&context=theses>

Rodgers, T. (2022). What Type of Chart or Graph is Right for You? *Tableau*. <https://www.tableau.com/learn/whitepapers/which-chart-or-graph-is-right-for-you>

Campbell, J. (2008). Prologue. In *The Hero with a Thousand Faces*. 3rd Edition (pp. 1-37). New World Library, Novato.

Gatterbauer, W. (2005). The Minto Pyramid Principle or the Case for Hierarchically Structured Thinking and Communication. *The Proseminar Quadrology*, 2(4). https://gatterbauer.name/download/051104_The_Minto_Pyramid_Principle.pdf

Yang, L., Xu, X., Lan, X., Liu, Z., Guo, S., Shi, Y., Qu, H., and Cao, N. (2022). A Design Space for Applying the Freytag's Pyramid Structure to Data Stories. *IEEE Transactions on Visualization and Computer Graphics*, 28(1): 22-932. https://idvxlabs.com/papers/2021VIS_Pyramid_Yang.pdf

Nussbaumer Knaflic, C. (2015). Chapter 2 and Chapter 3. In *Storytelling With Data: A Data Visualization Guide for Business Professionals* (pp. 35-98). 1st Edition. Wiley.

Winston, Wayne L. (2014). Chapter 3 and Chapter 4. In *Marketing Analytics: Data-Driven Techniques with Microsoft Excel* (pp. 59-106). Wiley.

Tutorial: Getting Started with Tableau Desktop. Tableau. <https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm>

Tutorial: Creating a Story. *Tableau*. <https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm>

How to Make An Infographic. *Canva Design School*. <https://www.canva.com/learn/how-to-make-an-infographic/>

Design For Social Media. *Canva Design School*. <https://www.canva.com/designschool/tutorials/designing/design-social-media/>

Gindham, A. (2023, June 2). How To Write the Perfect ChatGPT Prompt. *Writesonic*. <https://writesonic.com/blog/how-to-write-chatgpt-prompts/>

Parsons, G. (2022, July 13). The DALL-E 2 Prompt Book. *DALLery GALLERY*.
<https://dallery.gallery/the-dalle-2-prompt-book/>

Gallo C. (2020, January 6). What it Takes to Give a Great Presentation. *Harvard Business Review*.
<https://hbr.org/2020/01/what-it-takes-to-give-a-great-presentation>

Vogel, W. (2018). Presenting With Confidence. *Journal of Advanced Oncology*, 8(5): 545-548. DOI
<http://dx.doi.org/10.6004/jadpro.2018.9.5.9>

Price, James H. and Murnan, J. (2004) "Research Limitations and the Necessity of Reporting Them."
American Journal of Health Education 35(2): 66-67. DOI
<http://dx.doi.org/10.1080/19325037.2004.10603611>

Theofanidis, D. and Fountouki, A. (2019). Limitations and Delimitations in the Research Process.
Perioperative Nursing 7(3): 155-162. <http://doi.org/10.5281/zenodo.2552022>

Think With Google. (2023). *Diversity in Advertising Trends*.
<https://www.thinkwithgoogle.com/consumer-insights/trending-data-shorts/diversity-in-advertising-trends>

Zamith, R. (2019). Transparency, Interactivity, Diversity, and Information Provenance in Everyday Data Journalism. *Digital Journalism*, 7(4): 470-489.
<https://doi.org/10.1080/21670811.2018.1554409>

Lund, S., Madgavkar, A., Manyika, J., Smit, S., Ellingurd, K. and Robinson, A. (2021, February 18). The Future of Work after COVID-19. *McKinsey Global Institute*, <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>

Monkey Learn. (2022). 5 Data Visualization Trends of 2022 and Beyond.
<https://monkeylearn.com/blog/data-visualization-trends/>

Recommended

All recommended readings will be made available on Canvas.

Course Calendar

Session 1	
Topics	Introduction Review of assessment tasks The importance of cognitive and visual perception when exploring data The difference between explanatory and exploratory visuals The major pre-attentive attributes of Gestalt principles How to decode and interpret graphs
Activity	Interpret case studies of data visualization in class

Readings & Assignments	<p>Badiu, A. (2022, November 18). Gestalt Principles: Understanding Its Importance in Report Design. <i>Enterprise DNA</i>. https://blog.enterprisedna.co/gestalt-principles-understanding-its-importance/</p> <p>Knaflic, C. (2014, April 14). Exploratory vs Explanatory Analysis. <i>Storytelling with Data</i>. https://www.storytellingwithdata.com/blog/2014/04/exploratory-vs-explanatory-analysis</p>
------------------------	--

Session 2	
Topics	<p>Visualising Data with Graphs Principles</p> <p>Discover how to design graphs for clearer communication The appropriate graph forms to represent the five major graph relationships The impact of data-ink ratios on a graph's effectiveness Distinguish between a headline and a title</p>
Activity	<p>Lecture and instruction PowerPoint fundamentals and advanced techniques</p>
Readings & Assignments	<p>Franconeri, S. (2020, December 3). 4 Keys to Effective and Honest Data Visualizations. <i>Kellogg Insight</i>. https://insight.kellogg.northwestern.edu/article/data-visualization-honesty-infographics?utm_source=piano&utm_medium=onsite&utm_campaign=364</p> <p>McGurgan, K. (2015). <i>Data-ink Ratio and Task Complexity in Graph Comprehension</i> [Thesis, Rochester Institute of Technology]. Rochester Institute of Technology Digital Institutional Repository. https://repository.rit.edu/cgi/viewcontent.cgi?article=9824&context=theses</p> <p>Rodgers, T. (2022). What Type of Chart or Graph is Right for You? <i>Tableau</i>. https://www.tableau.com/learn/whitepapers/which-chart-or-graph-is-right-for-you</p>

Session 3	
Topics	<p>Organize Ideas to Communicate Storytelling Effectively</p> <p>Use introduction to generate clear main ideas Deconstruct an argument using the Minto Pyramid Principles Create a Minto Pyramid that outlines an argument Freytag storytelling framework Monomyth The Heroes Journey, Campbell's narrative form</p>
Activity	<p>Construct an effective Minto Pyramid on possible data visualization topics Apply the Freytag storytelling framework workshop</p>
Readings & Assignments	<p>Campbell, J. (2008). Prologue. In <i>The Hero with a Thousand Faces</i>. 3rd Edition (pp. 1-37). New World Library, Novato.</p>

	<p>Gatterbauer, W. (2005). The Minto Pyramid Principle or the Case for Hierarchically Structured Thinking and Communication. <i>The Proseminar Quadrology</i>, 2(4). https://gatterbauer.name/download/051104 The Minto Pyramid Principle.pdf</p> <p>Yang, L., Xu, X., Lan, X., Liu, Z., Guo, S., Shi, Y., Qu, H., and Cao, N. (2022). A Design Space for Applying the Freytag's Pyramid Structure to Data Stories. <i>IEEE Transactions on Visualization and Computer Graphics</i>, 28(1): 22-932. https://idvxlabs.com/papers/2021VIS Pyramid Yang.pdf</p>
--	--

Session 4	
Topics	<p>Sourcing Data Sets, Data Cleaning and Graphics in Excel, Data Benchmarking</p> <p>Data benchmarking principles Garbage in – garbage out, finding high quality data to analyze Using data cleaning techniques in Excel to prepare data for analysis Creating tables in Excel to present data Creating graphs in Excel to enhance visual storytelling</p>
Activity	<p>In-class workshops on Excel Data benchmarking workshop</p>
Readings & Assignments	<p>Nussbaumer Knaflic, C. (2015). Chapter 2 and Chapter 3. In <i>Storytelling With Data: A Data Visualization Guide for Business Professionals</i> (pp. 35-98). 1st Edition. Wiley.</p> <p>Winston, Wayne L. (2014). Chapter 3 and Chapter 4. In <i>Marketing Analytics: Data-Driven Techniques with Microsoft Excel</i> (pp. 59-106). Wiley.</p>

Session 5	
Topics	<p>Data Analysis Representation</p> <p>Introduction to Tableau Importing data Creating data worksheets Using advanced features of Tableau to create data visualizations</p>
Activity	<p>Tableau workshop</p>
Readings & Assignments	<p>Tutorial: Getting Started with Tableau Desktop. <i>Tableau</i>. https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm</p>

Session 6	
Topics	<p>Data Storyboards</p> <p>Use Tableau for data storytelling Using Tableau data sheets to create story boards Integrating story boards to create the narrative Dashboard storytelling</p>

Activity	Tableau workshop
Readings & Assignments	Tutorial: Creating a Story. <i>Tableau</i> https://help.tableau.com/current/guides/get-started-tutorial/en-us/get-started-tutorial-home.htm

Session 7	
Topics	Infographics and Social Media Posts Infographic principles Introduction to Canva infographic function Data social media posting for effectiveness Designing data social media posts with Canva
Activity	Canva workshop for infographics Canva design for social media posting
Readings & Assignments	How to Make An Infographic. <i>Canva Design School</i> . https://www.canva.com/learn/how-to-make-an-infographic/ Design For Social Media. <i>Canva Design School</i> . https://www.canva.com/designschool/tutorials/designing/design-social-media/

Session 8	
Topics	Implementing Generative Artificial Intelligence in Data Storytelling Overview of Gen AI The importance of prompts and asking the right questions Use of Chat GPT 4 to create research, data tables and graphs Use of Dall E to create visuals and images to enhance storytelling
Activity	Open AI and Dall E workshops Tableau and Canva workshops
Readings & Assignments	Gindham, A. (2023, June 2). How To Write the Perfect ChatGPT Prompt. <i>Writesonic</i> . https://writesonic.com/blog/how-to-write-chatgpt-prompts/ Parsons, G. (2022, July 13). The DALL-E 2 Prompt Book. <i>DALLery GALLERY</i> . https://dallery.gallery/the-dalle-2-prompt-book/

Session 9	
Topics	Presenting for Maximum Impact Learn how to present communications effectively Taking the audience perspective, what is in it for them (WIIFT) Verbal delivery choices to maximise audience impact and understanding Present high quality persuasive slides effectively

	Determine the appropriate response to different and difficult questions
Activity	Presentation Pitches
Readings & Assignments	<p>Gallo C. (2020, January 6). What it Takes to Give a Great Presentation. <i>Harvard Business Review</i>. https://hbr.org/2020/01/what-it-takes-to-give-a-great-presentation</p> <p>Vogel, W. (2018). Presenting With Confidence. <i>Journal of Advanced Oncology</i>, 8(5): 545-548. DOI http://dx.doi.org/10.6004/jadpro.2018.9.5.9</p>

Session 10	
Topics	<p>Identifying Limitations, Gaps and Future Research</p> <p>Identify the various types of research methodology and data limitations Identify gaps in the data and analysis Working with what you have, assumptions and prediction with limitations and gaps Designing for future research, overcoming limitations and gaps</p>
Activity	<p>Tableau and Canva workshop Presentation pitches</p>
Readings & Assignments	<p>Price, James H. and Murnan, J. (2004) "Research Limitations and the Necessity of Reporting Them." <i>American Journal of Health Education</i> 35(2): 66-67. DOI http://dx.doi.org/10.1080/19325037.2004.10603611</p> <p>Theofanidis, D. and Fountouki, A. (2019). Limitations and Delimitations in the Research Process. <i>Perioperative Nursing</i> 7(3): 155-162. http://doi.org/10.5281/zenodo.2552022</p>

Session 11	
Topics	<p>Ethics, Social and Diversity Impacts of Visualisation</p> <p>Investigate and identify ethical issues in data visualisation Describe the social impacts of data visualisation</p>
Activity	<p>Tableau and Canva workshops Presentation pitches</p>
Readings & Assignments	<p>Think With Google. (2023). <i>Diversity in Advertising Trends</i>. https://www.thinkwithgoogle.com/consumer-insights/trending-data-shorts/diversity-in-advertising-trends</p> <p>Zamith, R. (2019). Transparency, Interactivity, Diversity, and Information Provenance in Everyday Data Journalism. <i>Digital Journalism</i>, 7(4): 470-489. https://doi.org/10.1080/21670811.2018.1554409</p>

Session 12	
------------	--

Topics	<p>Future Careers and Data Visualisation in the Future of Work</p> <p>Overview of what students have learnt Final presentations by students of their data story Applying the subject material to student’s future careers and the future of work</p>
Activity	Final Student Presentations
Readings & Assignments	<p>Lund, S., Madgavkar, A., Manyika, J., Smit, S., Ellingurd, K. and Robinson, A. (2021, February 18). The Future of Work after COVID-19. <i>McKinsey Global Institute</i>, https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19</p> <p>Monkey Learn. (2022). 5 Data Visualization Trends of 2022 and Beyond. https://monkeylearn.com/blog/data-visualization-trends/</p>

Section III: Academic Policies and Standards

Academic Policies

Students are expected to review and understand all CEA CAPA student policies, including our [Academic Policies](#) and [Engagement Policy](#). CEA CAPA reserves the right to change, update, revise, or amend existing policies and/or procedures at any time. Additional requirements that may be associated with a specific course or program are addressed in the term syllabus.

Student Learning & Development Objectives

CEA CAPA has identified [Student Learning and Development Objectives \(SLDOs\)](#) for all programs in all locations: content in context, navigating differences, power and equity, critical thinking and intellectual curiosity, career and professional development, and sustainability and migration. These are meta-level learning objectives that transcend coursework and are infused across all elements of program delivery, beyond specifics of course offerings, addressing student learning holistically and framing it a larger learning context.