

LLO 8200 Introduction to Data Science

Introduction

We have entered a time in which vast amounts of data are more widely available than ever before. At the same time, a new set of tools has been developed to analyze this data and provide decision makers with information to help them accomplish their goals. Those who engage with data and interpret it for organizational leaders have taken to calling themselves data scientists, and their craft data science. Other terms that have come into vogue are "Big Data," "Predictive Analytics" and "Data Mining." These can seem to be mysterious domains. The point of this class is to demystify much of this endeavor for individuals who will be organizational leaders.

Learning goals

This class is organized around the following learning goals:

- Understanding Data Structures and Measurement
- Understanding How Models Can Be Used to Make Predictions
- Understanding How Results of Data Analysis Are Presented

Textbooks and Readings

- Gutman, A. J., & Goldmeier, J. (2021). *Becoming a data head: How to think, speak, and understand data science, statistics, and machine learning*. John Wiley & Sons. [\(Available for free from Vanderbilt Libraries. This is referred to as *Gutman and Goldmeier*\)](#)
- Harvard Business Review. (2018). *HBR Guide to Data Analytics Basics for Managers (HBR Guide Series)*. Harvard Business Review Press. [\(Available for free from Vanderbilt Libraries. This is referred to as *HBR Guide*\)](#)
- Additional readings will be provided, as needed, in the schedule below.

Software

This class will use Excel along with the Data Analysis Toolpak (also called: XLMiner Analysis Toolpak). You have access to these through Vanderbilt University's Office 365 license, if you have any questions about accessing these tools please contact the instructor.

Assignments

Assessment for this class is built around a data analysis project that you will undertake using your choice of one of several datasets that will be provided to you. You may work by yourself or with one to two other members of the class on this assignment. There will be seven biweekly assignments, each of which will help you create one of the components of the final assignment. The final assignment will consist of a five-minute presentation and a written report.

Evaluation

Grading for the class will be as follows:

- *Participation (10%)*: There will be fourteen weekly reflections. These will be graded on a 10-point scale and will jointly count for 10% of the final grade. These short, written assignments are designed to point out something you found interesting, to relate the lesson to your work in your organization, or to summarize "The Point" of the lesson in your own words. These should be no longer than a page in length (minimum 250 words). The lowest two grades from among these assignments will be dropped.
- *Biweekly assignments (60%)*: There will be seven biweekly assignments. These will be graded on a 10-point scale and will jointly count for 60% of the final grade. These assignments are designed to be the building blocks of the final assignment. The lowest grade from among these assignments will be dropped.

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- *Final assignments (30%):* The final assignment will be a report based on the data analysis you conducted. There will be two components: a 5-minute presentation to the class and a 10-page report based on the data analysis.
 - Presentations: 10% of final assignment grade
 - Report: 90% of final assignment grade

Schedule for Class Meetings

- *Week 1: What's the Problem?*
 - Readings: Gutman and Goldmeier chapter 1
- *Week 2: What is Data, Anyway?*
 - Readings: Gutman and Goldmeier chapter 2
 - Assignment 1 due before class
- *Week 3: How to Think statistically*
 - Readings: Gutman and Goldmeier chapter 3
- *Week 4: Arguing with the data*
 - Readings: Gutman and Goldmeier chapter 4; Shadish 1993
 - Assignment 2 due before class
- *Week 5: Measurement*
 - Readings: HBR Guide Chapters 4 and 6
- *Week 6: Surveys*
 - Readings TBD
 - Assignment 3 due before class
- *Week 7: Explore the Data*
 - Readings: Gutman and Goldmeier chapter 5
- *Week 8: Challenge the Statistics*
 - Readings: Gutman and Goldmeier chapter 7
 - Assignment 4 due before class
- *Week 9: Finding Hidden Groups*
 - Readings: Gutman and Goldmeier chapter 8
- *Week 10: Regression*
 - Readings: Gutman and Goldmeier chapter 9, HBR Guide Chapter 10
 - Assignment 5 due before class
- *Week 11: Classification*
 - Readings: Gutman and Goldmeier chapter 10,
- *Week 12: Deep Learning*
 - Readings: Gutman and Goldmeier chapter 12; [Wolfram, S \(2023\) What Is ChatGPT Doing ... and Why Does It Work?](#)
 - Assignment 6 due before class
- *Week 13: Pitfalls*
 - Readings: Gutman and Goldmeier chapters 13 and 14
- *Week 14: Presentations*
 - Assignment 7 due before class
- **Final Assignment Due 24 Hours After Last Synchronous Session**

Peabody and Vanderbilt Policies

Attendance

Attendance at synchronous sessions is mandatory. An exception to this policy may only be granted if Vanderbilt University's Equal Opportunity and Access office provides a student with an accommodation that does not require attendance. Requests for such accommodations should be initiated with the Equal Opportunity and Access

Honor Code Statement

All assignments for this class, including the final project, are to be conducted under the obligations set out in Vanderbilt's Honor Code, found in the student handbook: https://www.vanderbilt.edu/student_handbook/the-honor-system/. If you have any doubts about how the Honor Code applies to your work in this class, please ask me for clarification. Uncertainty about application of the Honor Code does not excuse a violation.

Class Accommodations

Vanderbilt is committed to equal opportunity for students with disabilities. If you need course accommodations due to a disability, please contact [VU Student Access Services](#) to initiate the process. After SAS has notified me of relevant accommodations, we will discuss how these accommodations may best be approached in this class, and I will facilitate the accommodations.

Mental Health & Wellness

If you are experiencing undue stress that may be interfering with your ability to perform academically, Vanderbilt's Student Care Network offers a range of support services. The Office of Student Care Coordination (OSCC) is the central and first point of contact to help you navigate and connect to appropriate resources. You can schedule an appointment with the OSCC at <https://www.vanderbilt.edu/carecoordination/> or call 615-343-WELL. You can find a calendar of services at <https://www.vanderbilt.edu/studentcarenetwork/satellite-services/>.

If you or someone you know needs to speak with a professional counselor immediately, the University Counseling Center offers Urgent Care Counseling. Students should call the UCC at (615) 322-2571 during office hours to speak with an urgent care clinician. You can also reach an on-call counselor after hours or on the weekends by calling (615) 322-2571 and pressing option 2 at any time. You can find additional information at <https://www.vanderbilt.edu/ucc/>.

Mandatory Reporter Obligations

All University faculty and administrators are mandatory reporters. What this means is that all faculty and administrators must report allegations of sexual misconduct and intimate partner violence to the Title IX Coordinator. In addition, all faculty and administrators are obligated to report any allegations of discrimination. If you want to talk with someone in confidence, officials in the Student Health Center, the University Counseling Center, and the Office of the Chaplain and Religious Life (when acting as clergy) can maintain confidentiality. In addition, officials in the [Project Safe Center](#) have limited confidentiality, in that they must report the incidents but can do so without providing identifying information. The Project Safe Center serves as the central resource for those impacted by sexual misconduct and intimate partner violence and can assist with navigating all facets of the University's resource and support network and other processes.

Names and Pronouns

If you would like to use a different name or pronouns than those provided through YES, please let the instructor know at any time prior to or during the semester. Information is available through the [LGBTQI Life offices](#) about how to change either or both of these in YES.