

Course Syllabus

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GRAD 8340/6340: Data Analysis and Presentation for Impact (soon to be Data Analysis and Visualization)

Instructors


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Course Overview

In your graduate program, you use data to gain knowledge. In your job, you will use data to make decisions, and convince others of the validity of your decisions. This course provides a practical and comprehensive approach to data analysis, so students may quickly gather, organize, analyze and present data to non-experts. Analysis includes hypothesis testing with basic statistics, predictions, sensitivity analysis and decision-making. The work will be done in Excel and Tableau, so that students can easily use and re-use these analytical tools without programming. Credits: 2.

Pre-requisites

Enrollment in a graduate program at UNC Charlotte, with an undergraduate degree that includes some math, statistics, finance, or other quantitative coursework.

Learning objectives

1. Students will be able to quickly organize and combine sets of complex data
2. Students will be able to aggregate data using formulas and Pivot Tables
3. Students will generate data for sensitivity analysis using data tables and goal seek
4. Students will use Excel for hypothesis testing
5. Students will learn advanced graphing and visualization in Tableau
6. Students will use advanced Tableau functions to analyze data and use statistics
7. Students will practice the above and present a project using presentation best practices

Topics

- Organize data
 - What is needed for data set/s to be useful?
 - Manipulation, sorting, filtering
 - De-duplication
 - VLOOKUP
- Formulas in Excel to organize and aggregate
 - IF, OR, IFERROR
 - COUNTIF, COUNTIFS
 - SUMIF, SUMIFS
 - Pivot Tables
- Computation and modeling to quickly see the impact of one thing on another
 - Sensitivity analysis with data tables
 - What If: Goal Seek

- How to show meaning in the data
 - Graphs to look for trends, correlations and relationships
 - Excel
 - Tableau
 - Make observations, suggest hypotheses
- Basic statistics for hypothesis testing
 - Understanding distributions
 - Understanding P values
 - T Test
 - ANOVA
 - Correlations with trend lines, model types and formulas, R^2
- Predictive modeling: multiple linear regression
- Data organization and presentation in Tableau
 - Tableau vocabulary
 - What does Tableau do with the data?
 - Graphing details
 - Maps
 - Calculations
 - Dashboards
 - Stories
 - Basic statistics - trend lines, P values and R^2
- Presentation best practices

Assignments

1. In-class assignments: to complete during class. Upload your effort into Canvas at the end of class. Grades will be based on effort, not necessarily completion or perfection. This is a class participation grade.
2. Take-home exam: one exam to complete at home and return on the date due. It will be due around mid-term, before unsatisfactory grades are due.
3. Video presentation (two or three people teams): Do a data analysis project, and explain your story in a presentation. Find something interesting related to your research or completely new to you, and dig deep into the data to explore. Show us what you learned in your presentation. ***This should be something new that you wouldn't have done without this class.*** Grade will be based on effective use of course material (see details below), including presentation best practices.

Grading criteria for presentations:

1. Introduction
 1. What is the problem you are working to solve, or question you seek to answer?
 2. What is its significance? Explain its importance.
2. Approach
 1. What is your approach to solving/answering your problem/question?
 2. How well did you explain the approach and data? Your goal should be to give us a simple, visual explanation, and cite the source data.
3. Analysis
 1. Show an observation, explain how it leads to your first question
 2. Show some analysis to answer that question
 3. Explain the next observation, the next question
 4. Explain the analysis to answer that question
 5. Repeat - this is the scientific method
4. Conclusion
 1. Use the data to explain an overall conclusion.
 2. Put it in a broader context; why does this matter?
5. Presentation details
 1. Slides – visual and not wordy.
 2. Graphs: make sure you break them into pieces and not have giant graphs on a slide
 3. Spoken volume – can we hear you?
 4. Video quality - looking at the camera often?
 5. Slide titles: make sure they convey the idea of the slide
 6. Tell a good story

Grading

- In-class Assignments (39 points, 3 points for each of 13)

Work on the assignments during class, and whatever we have covered during that class is included in the in-class assignment. Each assignment will be graded by:

Full credit (3 points) = you showed great effort and care in your work;

Most credit (2.5 points) = you showed effort;

Minimal credit (1 point) = you turned it in but didn't attempt much, showing little effort.

- Exam (30 points)

One exam will be handed out in class, to be completed at home and posted to Canvas by the due date. You must work on this on your own.

- Presentation (31 points)

Video presentation (two or three people teams): Do a data analysis project, and explain your story in a presentation. Find something interesting related to your research or completely new to you, and dig deep into the data to explore. Show us what you learned in your presentation. ***This should be something new that you wouldn't have done without this class.*** Grade will be based on effective use of course material (see details below), including presentation best practices.

- Grading Scale for Course
 - A= 90-100
 - B = 80-89
 - C = 70-79
 - U = 69 and below

Schedule

In-class assignments: complete during class and upload into Canvas. All assignments should be loaded into Canvas by the end of Reading Day.

Midterm Exam: Deadline in Canvas.

Presentations deadline: in Canvas - due during finals.

Policy on lateness

- In-class assignments may be submitted any time before 11:59pm, on Reading Day, with no penalty.
- All assignments will lose 5% of the total available points for every 24 hours they are late.

Course Policies and Expectations

This syllabus contains the policies and expectations I have established for GRAD 6340 and GRAD 8340. Please read the entire syllabus carefully before continuing in this course. These policies and expectations are intended to create a productive learning atmosphere for all students. Unless you are prepared to abide by these policies and expectations, you risk losing the opportunity to participate further in the course.

I will conduct this class in an atmosphere of mutual respect. I encourage your active participation in class discussions. Each of us may have strongly differing opinions on the various topics of class discussions. The conflict of ideas is encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. However, I will exercise my responsibility to manage the discussions so that ideas and argument can proceed in an orderly fashion. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect I expect in this class, you will not be permitted to participate further.

The standards and requirements set forth in this syllabus **may be modified at any time** by the course instructor. Notice of such changes will be by announcement in class, or by written or email notice, or by changes to this syllabus posted on the course website on Canvas.

If I am late in arriving to class, you must wait a full 20 minutes after the start of class before you may leave without being counted absent, or you must follow any written instructions I may give you about my anticipated tardiness.

Students in this course seeking **accommodations to disabilities** must first consult with the Office of Disability Services and follow the instructions of that office for obtaining accommodations.

All students and the instructor are expected to **engage with each other respectfully**. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or

perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

This course **affirms people of all gender expressions and gender identities**. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me.

All students are required to read and **abide by the Code of Student Academic Integrity**. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code. The Code is available from the Dean of Students Office or online.

UNC Charlotte is committed to providing an **environment free of all forms of discrimination and sexual harassment**, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. UNC Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that many UNC Charlotte employees, including all faculty members, are considered Responsible Employees who are **required to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator**. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must report the information to the Title IX Coordinator. Although I have to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to **speak to someone confidentially**, you can contact any of the following on-campus resources, who are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center (counselingcenter.uncc.edu, 7-0311); (2) Student Health Center (studenthealth.uncc.edu, 7-7400); or (3) Center for Wellness Promotion (wellness.uncc.edu, 7-7407). Additional information about your options is also available at titleix.uncc.edu under the "Students" tab.

Students are expected to complete all courses for which they are registered at the close of the add/drop period. If you are concerned about your ability to succeed in this course, it is important to

make an appointment to speak with me as soon as possible. The University policy on withdrawal allows students only a limited number of opportunities available to withdraw from courses. It is important for you to understand the financial and academic consequences that may result from **course withdrawal**.

The use of cell phones, **smart phones, or other mobile communication devices is disruptive**, and is therefore prohibited during class. Except in emergencies, those using such devices must leave the classroom for the remainder of the class period.

Students are permitted to use computers during class for note-taking and other class-related work only. Those using computers during class for work not related to that class must leave the classroom for the remainder of the class period.

Students are expected to attend every class and remain in class for the duration of the session. Failure to attend class or arriving late may impact your ability to achieve course objectives which could affect your course grade. An absence, excused or unexcused, does not relieve a student of any course requirement. Regular class attendance is a student's obligation, as is a responsibility for all the work of class meetings, including tests and written tasks. Any unexcused absence or excessive tardiness may result in a loss of participation points.

Class sessions will all be audio- and/or video-recorded for the purposes of student-participant reference and access by other students enrolled in the same course (including students enrolled in different class sections or break-out groups). Student consent to being recorded during class is a condition of class participation. If you do not consent to being recorded during class, you will need to deactivate your video camera, keep your mute button activated, and participate only via the chat feature, but please note that such actions may have a negative impact on any portion of your grade that is based on class participation. Students are not permitted to make their own recordings of class sessions or to share or distribute University recordings of class sessions. NOTE: Students with specific electronic recording accommodations authorized by the Office of Disability Services may record classes; however, the instructor must be notified of any such accommodation prior to recording. Any distribution of such recordings is prohibited.

This course uses Canvas, which provides the instructor with analytics and data on student engagement with the Canvas page, including page views, participation, submissions, timeliness, etc. I will be monitoring student activities on Canvas to ensure successful engagement and participation in the course. If I notice that a student's activities on Canvas indicate issues with pedagogically appropriate engagement, I may reach out to the student to discuss improving course engagement and participation.