



MGT 9080
Advanced Research Methods Topics
Predictive Analytics
Fall 2023

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Co-Instructor: **Aisha Pectyo**
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Classes meet Mondays at 6pm, and Thursdays at 6pm during Residencies

Recommended Pre-read:

Siegel, E. (2013). *Predictive analytics: The power to predict who will click, buy, lie, or die*. Wiley

ADDITIONAL READING & MATERIAL

Barry, Paul. (2023). *Head First Python: A Brain-Friendly Guide*. O'Reilly.

I will also post copies of data, notes, files, additional readings etc. to the course website throughout the semester to supplement our discussion. I will also use Canvas to communicate any announcements, grades, slides, and code, so you should be certain to regularly check this site.

All analyses in class will be conducted using Python. Instructions for downloading and installing it will be provided (please be mindful of which operating system you will be using and let us know up front) along with supporting resources will be provided during the first week of class. Aisha will be your go-to resource for assistance with Python.

COURSE OVERVIEW & OBJECTIVES

The primary goal of this course is to introduce you to predictive analytics along with how it can be applied to and impacts modern business. You will not only be introduced to how to model data hand on, but the course will also help you gain a better overall understanding of ethical usage and implementation, visualization, interpretation, reporting and insights. You will also be introduced to and use AI Transformers such as ChatGPT. Because statistics represents a more robust and contextual way of thinking about the world and how you make business decisions, you should also realize a benefit in the way that you think, in general, about phenomena.

The course will be a hybrid of conceptual and hands on to give the best overall introduction and understanding of predictive analytics.

Upon successful course completion, students will be able to:



- understand the differences between descriptive, relational, and predictive analytics,
- feel comfortable with basic manipulation and modeling of data in python,
- understand data preparation and data/text mining
- understand the distinction between structured and unstructured data and how they may need to be approached to tackle business problems
- understand the foundations of predictive analytics, natural language processing (NLP), and artificial intelligence (AI)
- Understand the concept of neural networks and how they apply in predictive analytics
- Understand how transformers (e.g., Chat GPT) have been developed and discuss the ethical implications of using transformers in daily life and business, and
- build basic visuals of data models in python.

COURSE FORMAT

The class will be structured into three parts:

1. Statistics Recap and Foundations of Predictive Analytics
2. Introduction to Predictive Analytics and Advanced Data Models
3. Discussion of Ethics and Bias within ML

I will structure the class sessions by presenting relevant background information and concepts related to a particular topic/analysis, illustrating these concepts by running the analyses of interest and reviewing relevant output, and allowing you the opportunity to practice with the methods through assignments and individual projects.

I will post lecture videos to support the material we cover each week. You should watch these videos along with reading the assigned material and completing any assignments. Because our weekly meetings will be virtual, I will also maintain regular office hours to answer any questions or discuss any material.

Our in-residence meetings will focus on using Python and on allowing you to work on your projects in Python. We will also use our in-residence sessions for our discussions about transformers and talk about the impacts of predictive analytics on business and how you lead in the now and future of modern business. aspects

COURSE REQUIREMENTS

Course evaluations in this class are structured around assignments and final projects

Assignments (50%)

You will be given weekly assignments that will help you better understand the course content and practice python. The assignments will be graded on timeliness (10%) completion (60%) and accuracy (40%). Each assignment will be out of 50.

Projects (50%)

Projects will emphasize the use of Python to clean and manipulate data, to build assigned models, and to create clean visualizations. You will have the opportunity to work on this project throughout the semester at your pace as we learn content, and this project will provide the opportunity to write and run the code for analyses, take your results from an output file and then explain them in your own words (and show with visualizations) with a focus on real-world business applications. For any project, you can always choose

to work with your colleagues. I believe that working together actually facilitates learning. I do expect, however, that the work you turn in is your own.

The project will be graded on timeliness (10%), completion (10%), code cleanliness and accuracy (20%) and data structure and accuracy (20%), visualizations (20%), model interpretation (20%). The project will



be out of 100.

COURSE GRADES

Requirements	Possible Points
Assignments (10 @ 10 points each)	100
Final Project	100
TOTAL	200

Grades will be calculated based on the percentage of points earned using the following grading scale.

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
59 or less	F

COURSE POLICIES

Academic Integrity

Please review the Clemson University Statement on Academic Integrity at <http://www.clemson.edu/academic/integrity.htm>, which states “As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.” Procedures for dealing with violations of Clemson’s academic integrity policy can be found at <http://www.clemson.edu/academic/instruction.htm>.

Use of LLM/AI Technology

Intellectual honesty is vital to an academic community and for my fair evaluation of your work. All work submitted in this course must be your own, completed in accordance with the Clemson University’s academic regulations. You may not engage in unauthorized collaboration or make use of LLMs, ChatGPT or other AI composition software.

Students must obtain permission from me before using AI composition software (like ChatGPT) for any assignments in this course unless expressly permitted or encouraged to do so by the instructor. Using these tools without my permission puts your academic integrity at risk.

The Clemson University Title IX (Sexual Harassment) Statement

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at

<http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Ms. Alesia Smith is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorrf Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).



Disability Services

Students with disabilities needing accommodations should contact the Office of Student Disability Services in G20 Redfern [Health](#) Center, 656-6848, prior to contacting me during office hours.

COURSE SCHEDULE, READINGS, AND ASSIGNMENTS

Week 1: *Thursday, August 24, 2023; 6 pm EST*

Topic: *Welcome | Philosophy of Science Bootcamp, Introduction to Python*

Assignment:

- Get familiar with Replit and Python

Week 2: *Monday, August 28, 2023, 6 pm EST*

Topic: *Introduction to Predictive Analytics | Descriptive and Relational Statistics*

Assignment:

- Final Project Ideas

Week 3: *Monday, September 4, 2023, 6 pm EST*

Topic: *LABOR DAY (NO CLASS)*

Week 4: *Residency #1; Thursday, September 14, 2023, 6 pm EST*

Topic: *Types of Data | Data Exploration*

Review of Python set up and Overview of Final Project

Assignment:

- TBD

Week 5: *Monday, September 18, 2023, 6 pm EST*

Topic: *Feature Engineering*

Assignment:

- TBD

Week 6: *Monday, September 25, 2023, 6 pm EST*

Topic: *Regression Models*

Assignment:

- TBD

Week 7: *Monday, October 2, 2023, 6 pm EST*

Topic: *Classifiers and Clustering Models*

Assignment:

- TBD

Week 8: *Monday, October 9, 2023, 6 pm EST*

Topic: *Natural Language Processing*

Assignment:

- TBD

Week 9: *Residency #2; Thursday, October 19, 2023, 6 pm EST*

Topic: *Data Visualization and Storytelling*

Assignment:



- TBD

Week 10: *Monday, October 23, 2023, 6 pm EST* **Topic:**
Ethics in ML

Assignment:

- TBD

Week 11: *Monday, October 30, 2023, 6 pm EST*
Topic: *Predictive Analytics & Business Leadership*

Assignment:

- TBD

Week 12: *Monday, November 6, 2023, 6 pm EST*
Topic: *Predictive Analytics & the Future of Business*

Assignment:

- TBD

Week 13: *Monday, November 13, 2023, 6 pm EST*
Topic: *Office Hour Drop-Ins (NO CLASS)*

Week 14: *Monday, November 20, 2023, 6 pm EST*
Topic: *THANKSGIVING BREAK (NO CLASS)*

Week 15: *Monday, November 27, 2023, 6 pm EST*
Topic: *Office Hour Drop-Ins (NO CLASS)*

Week 16: *Residency #3: Thursday, December 7, 2023*
Topic: *Course Recap, Review & Discussion*

Week 17: *Thursday December 14, 2023, by 11.59pm*
Topic: *Final projects Due – NO CLASS*