FOOTBALL ANALYTICS

Course Information

Course: CIS-105-01FTE: ST: FOOTBALL ANALYTICS

Semester: Fall 2025

Location: Library 128

Schedule: Tuesdays and Thursdays, 12:30 - 1:45 PM

Credits: 3

Instructor Information

Instructor: Dr. Chad Redmond

Office: Library 416

Email: credmond@mercyhurst.edu

Phone: (814) 969-2269

Office Hours

Days/Times: Monday, Wednesday, Friday: 11:00 AM - 12:10 PM

Location: Library 416 (My Office)

Evening Hours: Monday, Wednesday: 8:15 PM - 9:30 PM

Evening Location: Cyber Security Labs

Course Description

An introduction to basic data science skills, such as AI-assisted programming, databases, and data

visualization, presented through the lens of college and professional American football analytics. Students will investigate questions that are important to this specific sport.

Recommended References

1. Football Analytics with Python: Learning Data Science Through the Lens of Sports
https://www.amazon.com/Football-Analytics-Python-Learning-Science/dp/1492099627/ref=sr_1_4

2. Introduction to NFL Analytics with R
https://www.amazon.com/Introduction-Analytics-Chapman-Hall-Science/dp/1032427752/ref=sr_1_5

Learning Objectives

Data Science Fundamentals:

- Demonstrate proficiency in using GitHub, GitHub Codespaces, and GitHub Copilot for collaborative development and AI-assisted programming
- Apply SQL queries to extract, filter, and aggregate data from large NFL play-by-play datasets
- Implement data cleaning and preprocessing techniques for sports analytics datasets

Statistical Analysis:

- Calculate and interpret basic statistical measures (mean, median, standard deviation) in the context of football performance
- Understand and apply advanced NFL analytics metrics, particularly Expected Points Added (EPA) and its applications
- Compare player and team performance using appropriate statistical methods

Data Visualization:

- Create essential data visualizations including line plots, histograms, and scatter plots to communicate football insights
- Develop interactive web applications to visualize NFL statistics and trends
- Design effective visual narratives that tell compelling stories with football data

Applied Analytics:

- Analyze NFL play-by-play data to answer specific football-related research questions
- Evaluate team and player performance using both traditional and advanced metrics
- Integrate web scraping techniques to supplement existing datasets with current information

Technical Skills:

- Write efficient code in R/Python for sports data analysis

- Build and deploy interactive dashboards for football analytics
- Present data-driven insights through visual presentations

Grading

Grade Components (Each worth 100 points):

- Midterm Exam: 100 points
- Exam 2: 100 points
- Final Exam: 100 points
- Attendance: 100 points
- Participation: 100 points
- Project: 100 points

Total Points: 600

Grade Scale:

Grade	Points Required
A	550-600
B+	500-549
B	400-499
C+	350-399
C	300-349
D+	250-299
D	200-249

F	Below 200

Tentative Schedule

Date	Day	Topics
August 21	Thursday	Orientation to GitHub, Codespaces, and Copilot
August 26	Tuesday	Creating and publishing a simple web application
August 28	Thursday	Building a web application using teams table data
September 2	Tuesday	Building a web application using players table data
September 4	Thursday	Grouping and aggregating data
September 9	Tuesday	Joining tables
September 11	Thursday	Passing, Rushing, and Receiving statistics
September 16	Tuesday	Passing, Rushing, and Receiving statistics (continued)
September 18	Thursday	Window functions in SQL

Date	Day	Topics
September 23	Tuesday	Time series analysis and line plots
September 25	Thursday	Mass of the Holy Spirit (class canceled)
September 30	Tuesday	Time series analysis and line plots (continued)
October 2	Thursday	Web scraping
October 7	Tuesday	Working with Mercyhurst Football data
October 9	Thursday	Fall Break
October 14	Tuesday	Practice midterm
October 16	Thursday	Midterm exam
October 21	Tuesday	Working with Mercyhurst Football data (continued)
October 23	Thursday	Expected value
October 28	Tuesday	Advising Day (class canceled)
October 30	Thursday	Expected Points Added (EPA)
November 4	Tuesday	Expected Points Added (EPA) continued
	Thursday	Probability

Date	Day	Topics
November 6		
November 11	Tuesday	Win probabilities
November 13	Thursday	Win probabilities (continued)
November 18	Tuesday	Rushing Yards Over Expected
November 20	Thursday	Rushing Yards Over Expected (continued)
November 25	Tuesday	Practice for exam 2
December 2	Tuesday	Exam 2
December 4	Thursday	Project work

Academic Honesty Policy

Students are expected to adhere to Mercyhurst University's Academic Honesty Policy. Please review the complete policy at:

https://www.course-catalog.com/mercyhurst/C/2023-2024/content/academic-affairs/academic-honesty/41

ADA Accommodations & Accessibility

Mercyhurst University values inclusion and is committed to the goal of providing equal opportunities for all. It is our policy and practice to create accessible learning environments consistent with federal and state law.

Students who are currently eligible should verify as instructed and contact me to discuss how their accommodations will be implemented in this class.

Students who have not been determined eligible, but have a temporary limitation (e.g., broken leg) or permanent medical, physical, sensory, learning, cognitive, or mental health disability issue that requires accommodations, should contact the ADA Coordinator to make a request. Requests for accommodations can be made at any time throughout the calendar year and at any point in a student's enrollment.

Please contact Susan Reddinger, ADA Coordinator and Compliance Officer, at ada@mercyhurst.edu, 814-824-2362, or in Old Main 300. Additional information can be found on the student hub https://lakersmercyhurst.sharepoint.com/sites/StudentsHub under the Services tab.

Students with questions about Academic Support, please refer to the Hub https://lakersmercyhurst.sharepoint.com/sites/StudentsHub and select the Academic Resources tab, then Academic Support for more information.

Title IX

Mercyhurst is committed to providing an environment free from sex discrimination, including sexual harassment and sexual violence. Please refer to the HUB: https://lakersmercyhurst.sharepoint.com/sites/StudentsHub and select the Resources tab, then Title IX – Sexual Respect from the dropdown for more information.

If you would like to file a sexual misconduct complaint, please contact Ann Miller, Title IX Coordinator and Compliance Officer, titleix@mercyhurst.edu , 814-824-2363, Egan Hall 311. Please be aware that in compliance with Title IX, educators must report incidents of sexual assault/harassment, stalking, domestic/dating violence, sex discrimination, and hostile environment harassment. If you disclose any of these situations in class, in papers, or to a faculty or staff member personally, they are required to report it to the Title IX Coordinator (or any of the Deputy Title IX Coordinators).