RICE SOCIAL SCIENCES
Department of
Sport Management

Course: SMGT 430/530 – Introduction to Sport Analytics
Term: Fall 2025
Class: 1:00 p.m. – 2:15 p.m. Tue/Thu

Instructor Contact Information

Instructor: Scott Powers
Office: Kraft 246
Email: scott.powers@rice.edu
Office Hours: 12:00 – 12:50 p.m. Tue, 2:30 – 3:20 p.m. Thu

Required Texts and Materials

Class Website: canvas.rice.edu
Required Text: All readings will be made available on Canvas.
Required Material: Bring your laptop to class every day, but please leave your laptop packed away when we are not working on coding exercises.

Topics

The general flow is that we will alternate between (a) discussing math/models using a whiteboard and (b) implementing these concepts in code. The course is divided into 4 units, each approximately 3 weeks:

- Unit 1: Estimating Team and Player Strength
  Pythagorean Formula, Bradley-Terry Model, Plus-Minus Models
- Unit 2: Reducing Noise in Player Evaluation
  Regression to the Mean, Regularized Regression, Regularized Adjsted Plus-Minus
- Unit 3: Applications of Markov Chains in Sports
  Markov Chains, Win Probability, Credit Attribution, In-Game Strategy, Markov Decision Processes
- Unit 4: Practicum
  Guest Speakers, Student Projects

Course Objectives and Learning Outcomes

After successfully completing this course, you will be able to:

- Use R to apply theoretical statistical models to real-world sports data, and interpret the results.
- Calculate estimates of team and player strengths, adjusting for sample size and strength of schedule.
- Estimate in-game win probability models based on game state (e.g. score, possession, time remaining).
- Identify an interesting research problem in sports, solve it with data, and present your solution.

How Your Grade Is Determined

Sport analytics is a demanding and highly competitive field. This class aims to provide the tough but honest feedback that you will need to succeed in it. Note that the points below sum approximately (but not exactly) to 100. Your grade is based on your percentage earned of available points.

			$[93\%, \infty)$	$\rightarrow$	A	$[90\%, 93\%)$	$\rightarrow$	A–
$[87\%, 90\%)$	$\rightarrow$	B+	$[83\%, 87\%)$	$\rightarrow$	B	$[80\%, 83\%)$	$\rightarrow$	B–
$[77\%, 80\%)$	$\rightarrow$	C+	$[73\%, 77\%)$	$\rightarrow$	C	$[70\%, 73\%)$	$\rightarrow$	C–
$[67\%, 70\%)$	$\rightarrow$	D+	$[63\%, 67\%)$	$\rightarrow$	D	$[60\%, 63\%)$	$\rightarrow$	D–
			$[0\%, 60\%)$	$\rightarrow$	F			

Assignments. (45pts) There are 3 individual assignments, each worth 15pts. You are encouraged to help each other, but your submission must reflect work you have done yourself. Assignments will be graded anonymously, so please remove any personally identifying information from your submission. The expected completion time for each assignment is 15 hours.

Project. (45pts) This is a project-based course, and the project you build in stages over the course of the semester will determine a large chunk of your grade. You are encouraged to work with a partner on the project (no more than 2 students per team), but you may work individually if you wish.

- Project #0 (0pts): Registration — expected hours: 0
- Project #1 (5pts): Proposal — expected hours: 5
- Project #2 (10pts): Abstract — expected hours: 10
- Project #3 (10pts): Presentation — expected hours: 10
- Project #4 (20pts): Paper — expected hours: 20

Attendance. (0.5pts per class) Showing up is a requirement for most jobs in sport analytics. In this class, you are expected to show up and engage in discussions, which are part of the learning experience. We will keep attendance and collect feedback using exit tickets at the end of almost every class although there will be a few days we skip this (these days will not be counted toward your attendance grade).

Article Report. (10pts, SMGT 530 only) There is one additional assignment for graduate students enrolled in SMGT 530. You will read and write a report on a published academic journal article of your choice.

Late Work. You may submit late work subject to a 10% score deduction for each late day.

Absence Policy. If you notify me of your absence before the beginning of class, you will receive an opportunity to make up your absence.

Tentative Schedule

This schedule is subject to change with appropriate notice.

Assignment Due	Date	Lesson Plan
	Aug 26	Last Name Dice Game, Introductions
	Aug 28	Introductory/Review R Tutorial
	Sep 2	Pythagorean Formula Discussion
	Sep 4	Pythagorean Formula R Tutorial
	Sep 9	Bradley-Terry Model Discussion
	Sep 11	Bradley-Terry Model R Tutorial
	Sep 16	Plus-Minus Model Discussion
	Sep 18	**NO CLASS (POWERS TRAVEL)**
	Sep 23	Plus-Minus Model R Tutorial
Assignment #1: Bradley-Terry Model	Sep 25	Free Throw Prediction Game, Discussion
	Sep 30	Regression to the Mean Discussion
	Oct 2	Regression to the Mean R Tutorial
	Oct 7	Regularized Regression Discussion
	Oct 9	Regularized Regression R Tutorial
	Oct 14	**NO CLASS (MIDTERM RECESS)**
Project #0: Registration	Oct 16	Regularized Ajusted Plus-Minus R Tutorial
Assignment #2: Regression to the Mean	Oct 21	Win Probability Models Discussion
	Oct 23	Win Probability Models R Tutorial
	Oct 28	Player Eval and Game Strategy Discussion
	Oct 30	Player Eval and Game Strategy R Tutorial
Project #1: Proposal	Nov 4	Markov Decision Process Discussion
	Nov 6	Markov Decision Process R Tutorial
Assignment #3: Win Probability Models	Nov 11	Powers Research Presentation
	Nov 13	Guest Speaker – Kristen Mori
Project #2: Abstract	Nov 18	Project Working Session
	Nov 20	Guest Speaker – Nick Fleder
	Nov 25	Guest Speaker?
	Nov 27	**NO CLASS (THANKSGIVING RECESS)**
Project #3: Presentation	Dec 2	Student Presentations
	Dec 4	Student Presentations
Project #4: Paper	Dec 15	

Rice Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

AI Policy. You are allowed (and even encouraged) to use AI as a tool for developing R code (attribution in this case is not necessary). Please do not use AI to generate any part of your writeups.

Disability Resource Center

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with the Disability Resource Center (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Mental Health Policy

The wellbeing and mental health of students is important; if you are having trouble completing your coursework, please reach out to the Wellbeing and Counseling Center. Rice University provides cost-free mental health services through the Wellbeing and Counseling Center to help you manage personal challenges that threaten your personal or academic well-being. If you believe you are experiencing unusual amounts of stress, sadness, or anxiety, the Student Wellbeing Office or the Rice Counseling Center may be able to assist you. The Wellbeing and Counseling Center is located in the Gibbs Wellness Center and can be reached at 713-348-3311 (available 24/7).

Title IX Responsible Employee Notification

At Rice University, unlawful discrimination in any form, including sexual misconduct, is prohibited under Rice Policy on Harassment and Sexual Harassment (Policy 830) and the Student Code of Conduct.

Please be aware that all employees of Rice University are "mandatory reporters", which means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must share that information with the Title IX Coordinator.

Although I have to make that notification, you will control 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.

To report sexual harassment, please contact the Title IX Coordinator at titleix@rice.edu. To explore supportive measures and other resources that are available to you, please visit the Office if Interpersonal Misconduct Prevention and Support at safe.rice.edu.

This syllabus is only a guide for the course and is subject to change with advance notice.