

Salisbury University Department of Mathematical Sciences

MATH 490 : Special Topics: Prediction Methods
Syllabus (Tentative)

Description: Enables study in specialized areas such as complex variables, logic, non-Euclidean geometry or other topics suggested by faculty or students. 4 Hours Credit: Meets four hours per week.

Prerequisites: Varies by topic but usually C or better in MATH 306, MATH 310. May be taken twice under different titles. This course requires a C or better in MATH 202, MATH 216, and COSC 117 .

Intended Audience: Junior- and senior-level mathematics and computer science majors

Objective: To introduce students to popular methods for using data to make predictions; to introduce students to the R programming language via R-Studio.

Textbooks: *Who's #1?: The Science of Rating and Ranking*, by Amy N. Langville and Carl D. Meyer, Princeton University Press 2012, ISBN 978-0691154220

Introduction to Stochastic Processes with R, by Robert P. Dobrow, John Wiley & Sons, Inc. 2016, ISBN 978-1118740651

Technology: R programming language via R-Studio

Topic	Weeks
Introduction to R and RStudio/Data Analysis	3
Preliminaries, R scripts, data frames, importing and exporting data, basic data analysis	
Ranking and Rating Methods	5
Simple winning percentage, Massey's method, Colley's method, handling ties, incorporating weights, applications to sports forecasting	
Stochastic Processes and Simulation	5
Deterministic and stochastic models, stochastic processes, Monte Carlo simulation, Markov chains, applications to stock market forecasting	
Midterm Exam/Presentations	1
Total	14

Evaluation

Homework	30%
Projects/Presentations	30%
Midterm Exam	20%
Final Exam	20%

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**
- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.