Salisbury University Department of Mathematical Sciences

MATH 493/593 : Advanced Topics in Statistics: Applied Time Series
Syllabus (Tentative)

Description: Study in specialized areas of statistics such as time series, stochastic processes, quality control designs and analyses or other topics suggested by faculty or students. 4 Hours Credit: Meets four hours per week.

Prerequisites: C or better in MATH 213 or MATH 216, and permission of instructor. May be repeated once under different subtitles.

Intended Audience: Students considering employment in areas of statistics, actuarial science or applied mathematics.

Objective: Develop a comprehensive understanding of time series analysis, including foundational concepts, ARIMA and state-space models, and their applications in real-world scenarios. Students will gain proficiency in exploratory data analysis, model selection, diagnostics, and forecasting, with a focus on case studies in economics, finance, and public health.

Textbooks: Shumway, R.H. & Stoffer, D.S. (2019). *Time Series: A Data Analysis Approach Using R* (1st ed.). Taylor & Francis. ISBN: 9780367221096.

Topic	Weeks
Chapter 1: Characteristics of Time Series	1
Chapter 2: Correlation and Stationary Time Series	1
Chapter 3: Time Series Regression and Exploratory Data Analysis	2
Chapter 4: ARIMA Models - Foundations (AR, MA, and Stationarity)	2
Chapter 5: ARIMA Models - Model Selection, Diagnostics, and Forecasting	2
Chapter 8: Additional Topics: State-Space Models and Cross-Correlation	2
Case Studies and Applications	2
Projects, Presentations, and Exams	2
Total	**14**

Evaluation

Homework, Quizzes, and Projects	50%
Midterm Exam	20%
Final Exam	25%
Class Participation and Attendance	5%

- Graduate students will be assigned special homework/test problems or projects.
- 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.