NAU NORTHERN ARIZONA UNIVERSITY

Course Title: STA 477 Time Series Analysis
Term: Fall 2022
Instructor: TBA
Course Credit: 3
Mode of Instruction: Online

Course Description:

This course contains the methods for analyzing time series including: decomposition of time series, seasonal adjustment methods, index numbers; forecasting including causal models, trend models, smoothing models, autoregressive models, moving average and integrated models. The course aims to provide students with techniques and receipts for estimation and assessment of quality of economic models with time series data.

Course Prerequisites:

STA 471 Regression Analysis

Learning Outcomes:

By the end of the course, the student should be able to:

A. Learn about important time series models and their applications in various fields;

B. Use statistical software to estimate the models from real data, and draw conclusions and develop solutions from the estimated models;

C. Communicate the statistical analyses of substantial data sets through explanatory text, tables and graphs;

D. Combine and adapt different statistical models to analyze larger and more complex data.

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Course Material:

George E. P. Box, Gwilym M. Jenkins, Gregory C. Reinsel, Greta M. Ljung, ***Time Series Analysis: Forecasting and Control***, 5th, Wiley, 2015.

Evaluation:

- Quizzes [20%]
- Homework [20%]
- Mid-term Exam [25%]
- Final Exam [35%]

Description of the Evaluation tasks:

Assignment/ Essay/ ... : During the term, students will be required to finish several evaluation tasks within due date. All the tasks are linked with specific course topics/outcomes and will adequately assess students' competence and learning outcomes. Students are encouraged to meet with instructor about these tasks at any point.

Mid-term/ Final Exams/ Quiz/... : There may be periodic quizzes given at the beginning of lecture sessions; the feedback from these quizzes will monitor the progress of the learners and help to set learning priorities. There will be mid-term exam/ final exam for the course. They are the basic criteria for the evaluation of students' learning outcomes and final grade.

Grading Policy:

Students are supposed to finish each online lecture. Prior to each class, students should finish the required readings. During the class time, students are encouraged to make use of all relevant online course resources and communicate with the instructor. Students' grades are accumulated based on the cumulative evaluations.

Students' letter grade will be assigned according to the following scale:

A+ 90-100	A 85-89	A- 80-84
B+ 77-79	B 73-76	B- 70-72
C+ 67-69	C 63-66	C- 60-62
D+ 57-59	D 53-56	D- 50-52
F < 50		

Academic Integrity:

Students must strictly adhere to the university's academic integrity rule; and all essays, exams and any other form of academic assignments must adhere to these rules. Any form of plagiarism, cheating, or misappropriation of materials will be considered a violation of academic integrity and will be punishable by the university.

Withdrawal from the Course(s):

Students will be able to apply for a transfer or withdrawal within 3 days of the starting date of the course. If a withdrawal is applied for within 3 working days, the tuition fee will be fully refunded. After 3 days, the tuition fee will not be refunded. If a withdrawal is applied for in the first two weeks, it will be recorded as W (Withdraw) on the course transcript. After this initial two-week period, the class will be recorded as F (Fail).

Tentative Schedule:

Week 1	
1	Five Important Practical Problems
2	Autocorrelation Function and Spectrum of Stationary Processes
3	Linear Stationary Models
4	Autoregressive Processes

5	Mixed Autoregressive-Moving Average Processes **Homework#1**

Week 2

6	Linear Nonstationary Models
7	Forecasting
8	Minimum Mean Square Error Forecasts Their Properties
9	Calculating Forecasts and Probability Limits **Homework#2**
10	Forecast Function and Forecast Weights

Week 3

11	Model Identification
12	Parameter Estimation
13	**Mid-term Exam**
14	Nonlinear Estimation
15	Model Diagnostic Checking **Quizzes#1**

Week 4

16	Analysis of Seasonal Times Series
17	Parsimonious Models for Seasonal Time Series
18	Additional Topics and Extensions
19	Transfer Function Models
20	Discrete Dynamic Models Represented by Difference Equations **Quizzes#2**

Week 5

21	Identification, Fitting, and Checking of Transfer Function Models
22	Cross-Correlation Function
23	Intervention Analysis, Outlier Detection, and Missing Values
24	Aspects of Process Control
25	**Final Exam**