STAT 5550 INTRODUCTORY TIME SERIES ANALYSIS
SPRING SEMESTER 2023

Lecture: MWF 10:20-11:15AM in Orton Hall 0110

Instructor:
Dena Asta
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Office Hours: Monday and Wednesday 1:00PM-2:00PM or by appointment
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Grader:
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Prerequisites: Stat 4202 and Stat 5302. Stat 5550 builds upon much of the material in these classes; in particular, students should be knowledgeable about random variables and their distributions, expectation and variance of random variables, and covariance and correlation between random variables. Students should also be knowledgeable about various methods for estimating parameters in statistical models (e.g., method of moments, maximum likelihood and least squares) and should be familiar with the concept of mean squared error. Students should also be able to perform a basic regression analysis, including model building, model checking using numerical and graphical summaries of model fit, and interpreting a fitted regression model. Stat 5550 will use these basic regression techniques in the analysis of time series data.

Textbook: The course text is *Time Series Analysis and Its Applications, With R Examples*, by Robert H. Shumway and David S. Stoffer, Springer, Second Edition. An e-version is available at the library.

Website: The course has a web page on Carmen. You will find the class schedule, homework assignments, solutions, and other course announcements on the web page. Please check it on a regular basis.

Course Description

Stat 5550 introduces the statistical methodology and models required to analyze time series data in practice. The course emphasizes both modeling methodology (model identification, estimation and diagnostics) and the practical implementation of time series modeling using the statistical software R. Familiarity with introductory mathematical statistics and probability (random variables and their distributions, covariance and correlation, maximum likelihood estimation, confidence intervals, hypothesis tests, regression modeling) at the level of the prerequisites listed below is assumed. Topics covered include:

1. Introduction to time series data
2. Time series models and stationary processes
3. Exploratory data analysis
4. Methods for modeling trend and seasonality
5. Estimating mean, autocovariance, and autocorrelation functions
6. ARIMA models
7. Forecasting and estimation
8. Modeling nonstationary processes

Grading

Your course grade will be based on homework assignments, two midterms, one project, and a comprehensive final exam.

Homework	15%	
Midterm I	20%	tentatively on Feb 22nd (Wednesday) in class
Midterm II	20%	tentatively on March 27th (Monday) in class
Project	15%	
Final	30%	April 27th (Thursday) 10:00-11:45AM

Homework: Graded homework assignments will be assigned regularly during the semester. The assignments are to be turned in online via carmen before class on the dates they are due. Students are allowed to consult with each other on the homework, but each student must hand in his or her own work. DO NOT copy any part of another student's homework and DO NOT turn in solutions that you have taken from other sources.

Exams: No make-up exams will be given. The final exam will be cumulative, but will emphasize the more recent material. Exam rules will be announced in class.

Computing

The class requires you to use the statistical software package R, which can be downloaded for free at http://www.r-project.org. Instructions for using R will be given in class. Many students prefer to use RStudio, an IDE designed for use with R. RStudio is available for free at http://www.rstudio.com.

Academic integrity policy

The main purpose of this course is for you to learn the material and to increase your understanding of Statistics. For the homework assignments, you are encouraged to talk with fellow students and to work on the problems with them. However, your write-up should be your own. For exams, you are to work solely on your own, and you may not use materials other than those designated by the instructor. Note that this policy of open discussion on the homework is specific to this course. Other instructors and other courses may well have a different policy. Make sure that you understand the policy for each course that you take.

Ohio State's academic integrity policy: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kind of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu.

Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Mental health statement

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.