

## STAT 5550 INTRODUCTORY TIME SERIES ANALYSIS SPRING SEMESTER 2020

**Lecture:** MWF 10:20-11:15AM in Cockins Hall 240 (exception on Friday, April 17th, we will meet in Page Hall 20)

**Instructor:**

Dena Asta

Office: 317 Cockins Hall

Office Hours: Monday and Friday 1:00PM-2:00PM or by appointment

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**Grader:**

Guowei Li

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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. The book is available for free at <http://www.stat.pitt.edu/stoffer/tsa4/>.

**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.

<b>Homework</b>	15%	
<b>Midterm I</b>	20%	tentatively on Feb 17th (Monday) in class
<b>Midterm II</b>	20%	tentatively on March 20th (Friday) in class
<b>Project</b>	15%	
<b>Final</b>	30%	April 23rd (Thursday) 10:00-11:45AM

**Homework:** Graded homework assignments will be assigned regularly during the semester. The assignments are to be turned in during 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 Misconduct

Although students are encouraged to work together on assignments, each student must submit their own written work in his or her own words. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with University Rule ([oaa.osu.edu/procedures](http://oaa.osu.edu/procedures)).

## Special Accommodations

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu>.