STA 4853 Sec 1250,OL50 **Introduction to Time Series** **Spring 2021**
STA 5856 Sec 1251,OL51 **Applied Time series**

Course Information

Time: MWF 11:45 a.m. – 12:35 p.m. (Period 5) **Location:** FLG 0260

Instructor: Dr. Sayar Karmakar

Office: Zoom (Links shared in the first announcement) **E-mail:** sayarkarmakar@ufl.edu

Office Hours: (might change occasionally) Mon 12.35 –1.35, Wed 12.35 – 1.35 or by appointment

Teaching Assistant: Dmitrii Nikiforov

Office: Zoom (Links TBD) **E-mail:** dmitriinikiforov@ufl.edu

Office Hours: TBD

Prerequisite

STA 4210 and STA 4321

Course Contents

Stationarity, autocorrelation, ARMA models; frequency domain methods and the spectral density; forecasting methods; and computationally-oriented application to case studies.

Text

Time Series Analysis and Its Applications With R Examples , Fourth Edition
Author(s): Robert H. Shumway, David S. Stoffer
ISBN: 978-3-319-52452-8
Optional Text: Time Series Analysis: Univariate and Multivariate Methods, 2nd edition (2005), by William W.S. Wei.
Graduate section: For the Sta 5856 section, we will have some homework(suggested/compulsory) problems that are mathematically more challenging.

Course Website

Canvas course page. Please check the canvas site regularly. Most course documents and important information, including homework exercises and solutions, sample exams and special announcements, will be posted in canvas.

Software

You will need a computer for the homework assignments and practise. There will not be any lessons on how to use software, but questions are welcomed especially in office hours. The main software used in class will be R. You can use other software if you wish as long as you yield similar results: Minitab is a user-friendly alternative, SPSS, SAS, JMP, Matlab etc.

Objective of Course:

To comprehend basic concepts of time series and autocorrelated responses, and learn how to build time series models and how to apply the models to real world problems.

Topics:

- Fundamental concepts of time series and autocorrelated responses
- AR, MA, ARIMA, and SARIMA Models
- Forecasting
- Model Identification
- Parameter Estimation
- Intervention Analysis
- Unit Root Testing and Cointegration
- ARCH and GARCH Models (time permitting)
- Spectral Domain (time permitting)
- State Space Models and the Kalman Filter (time permitting)

Tentative Outline

Exam 1: Chapter 1, 2, 3.1-3.3
Exam 2: Chapter 3.4- 4.3
Exam 3: Chapter 4.4- 5, (beginning of chapter 6 if time permits)

Virtual teaching

Due to COVID-19, this class is Hy-Flex for Spring 2021.

- Exam procedure: The quizzes and exams are online and at this point we are not enforcing honor lock. This might change depending on the situation. Exams/quizzes will be due as an upload in the canvas.
- Class recording: The classes will be recorded and uploaded right after the class.

- Online recording: Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who unmute during class and participate orally are agreeing to have their voice recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials by students or any other party is prohibited.
- Class policy flexibility: Due to the online nature often times, some of these policies might need to change depending on how the class behaves or performs. Students should feel free to directly email the instructor to discuss concerns.
- Canvas announcements: In general, the number of announcements will be considerably more than an in-person class. These will generally talk about when certain lecture notes/exams become available or about some class policy. The zoom links for the class and office hours (both instructor and TA) are going to be the same throughout. This will be sent in the morning of the first class. Please keep checking the cnavas announcement page regularly.

Grades

- There will be three in-class exams, (25% each, counting for 75% in total) . Approximately nine quizzes, of which three will be dropped (counting for 25% in total).
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		A	91 to 100	A-	88 to < 91
B+	84 to < 88	B	80 to < 84	B-	77 to < 80
C+	74 to < 77	C	70 to < 74	C-	67 to < 70
D+	64 to < 67	D	60 to < 64	D-	55 to < 60
E	< 55				

Note that, the scores shown in canvas does not account for conditional weightage of exams.

Exams

- Three in-class (**non-cumulative**) exams are tentatively scheduled:

  Exam 1: **Monday, Feb 15** (Covers Lecture 1 to Lecture 14)

  Exam 2: **Friday, Mar 17** (Covers Lecture 15 to Lecture 27)

  Exam 3: **Monday, April 19** (Covers Lecture 28 to Lecture 39)

- You will be permitted to bring one 8.5 by 11 inches sheet of paper with formulas or notes written on both sides to each exam.

- Make-up exams will be offered and you must either let the instructor know well before the scheduled day of the exam which you need to be excused from (for a non-emergency reason), or produce a proof of emergency (or medical problem) as soon after the missed exam as possible. We will try to restrict make-up exams to at most one per student.
- **Calculator:** A non-graphing calculator might be used for the exams and quizzes however you will not be penalized for not simplifying terms like $\binom{20}{4}/\binom{30}{6}$

Homework Exercises and Quizzes

- There will be approximately nine in-class quizzes, typically scheduled on every Friday, based on homework exercises assigned about a week before. Each will take place during the final 10 to 15 minutes of class time. No books, notes or other references may be used during a quiz. All quizzes have equal weight for grading, but three of your (lowest) quiz scores will be dropped. No make-up quizzes will be offered.
- You are encouraged to discuss homework problems with other students; however, you must answer on your own during the quizzes. Solutions to the homework exercises will be posted after the quizzes.
- The instructor and Teaching Assistant make every effort to ensure that grades assigned are scrupulously fair and reflect the quality of the work concerned. Due to this process of consultation and the use of uniform grading criteria, the TA has complete authority in all actions that he undertakes regarding the quizzes, and the instructor is unlikely to rescind any of his decisions.

Suggested Additional Exercises

In order to master the course material it is essential that you work as many exercises as possible. For this reason, along with the weekly homework exercises, additional suggested exercises from the textbook will also be posted on the course web-page on a regular basis. You are not expected to submit answers to these suggested exercises, but you should solve all of them to keep up with the pace of the course and thoroughly learn the material. This will also help you prepare for the exams.

Lecture Attendance

Classroom lecture attendance is fully expected, even if not strictly enforced. You are responsible for learning all material presented during lecture, and any topic covered is a potential exam topic (unless otherwise stated).

Reasonable Accommodations

To request classroom accommodation, please be certain that you have made all necessary arrangements with the Dean of Students Office, and obtain from them documentation to submit to the instructor at the time of your request. A request must be made to the instructor at least one week in advance of the date for which the accommodation is requested. This course information and policies sheet can be made available in alternative formats to accommodate print-related disabilities. Contact the instructor for more information.

Academic Integrity

Please familiarize yourself with the Student Honor Code and Academic Honesty Guidelines outlined in your University of Florida Student Guide at `http://www.dso.ufl.edu/sccr/honorcode.php`.