STA 4853 **Introduction to Time Series** **Spring 2024**
STA 5856 **Applied Time series**

Course Information

Time: Tuesday (Period 8-9) Thursday (Period 8) **Location:**

Instructor: Dr. Sayar Karmakar

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

Teaching Assistant: Sai Veeresh Jithendra Addala

Office: **E-mail:jithendra.addala@ufl.edu** tbd@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)

Course/Exam modality

The course will be offered in a hyflex/hybrid mode with the understanding that the in-person students would mark their attendance before 12.00 pm on Tuesday and Thursday in an online record system. This will allow the instructor to observe the pattern of attendance and if none are coming to the class the instructor might switch to teaching those classes virtually.

Masks are strongly encouraged for students attending in-person classes. Office hours are kept online in the beginning and might change later if the situation improves. Additionally there will be a few classes that will be completely online/pre-recorded.

1. Lecture 1 Jan 6
2. Lecture 14 Feb 8 (pre-recorded as we have exam on that day)
3. Lecture 28 Mar 22 (pre-recorded as we have exam on that day)
4. Lecture 39 Apr 19 (pre-recorded as we have exam on that day)

Important: Exams are strictly in-person and will be proctored by the TA.

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: **Thursday, Feb 8** (Covers Lecture 1 to Lecture 14)

  Exam 2: **Thursday, Mar 21** (Covers Lecture 15 to Lecture 27)

  Exam 3: **Tuesday, April 23** (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`.