

STAT 5511 Spring 2021

Time Series Analysis

University of Minnesota – Twin Cities

Instructor and TA Information

Professor: Charles Doss [he/him]	TA: Ziyue Zhu
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Hours: 3:30–4:30pm MW (after class)	Hours: 10am–12pm Tues

Basic Course Information

- Class Time: MWF 2:30pm–3:20pm.
- Location: online (sometimes synchronous via zoom with recorded video also posted, sometimes asynchronous)
- Description: This course will cover elements of time series analysis, including ARIMA models (chap. 3 of text), state space models, forecasting, frequency domain methods and other topics (time permitting). The course covers basic theory, methodology, and data analysis (using the statistical software R).
- Prerequisites: Basic statistics courses that cover basic probability and linear regression (STAT 5101–2 (4101–2), STAT 3032, 3302, 5302; STAT 5021). Familiarity programming in the R language. Basic understanding of complex numbers is helpful. There is a pre-requisite practice quiz publicly available on my website at <http://users.stat.umn.edu/~cdoss/5511.shtml>
- Schedule: There will be one midterm exam. There is one final exam. Quizzes and exams will be administered online or will be of “takehome” type. Details are given below in the section on Grading, Exams, and Schedule.

Grading, Exams, Schedule

The grading/schedules will be as follows.

Homeworks: There will be on the order of 7 homeworks of varying lengths. The first (“zeroth”) homework is assigned on the first day of class. Lowest HW score dropped.

Quizzes: There will be regular (weekly or every-other-week-ly) quizzes, especially before the midterm. Quizzes will be administered online (Canvas); the quiz will be short and timed; there will be a period of a day or two during which you can begin the quiz. Lowest quiz score dropped.

Midterms: The midterm exam is a takehome exam given on Thurs, April 15 (week 12) and handed in Sun, April 18.

Final: The ‘final exam’ is a takehome exam that will be assigned on May 3 (the final day of class) and due by Thurs, May 6. (Some schedule information: the last day of instruction: Mon, May 3. Study days are May 4 and 5 (and 9). Final exam period is May 6–12; our scheduled final exam time is 8–10am Fri May 7 per [Onestop](#). Also, here is the university’s [policy on exam scheduling](#). Spring break is Apr. 5 – Apr 9.

Grading:

- Weighting: Homework is 30%; Quizzes are 30%; The midterm is 20%; The final is 20%.
- A student taking the class P/F needs a C- or higher to earn a P.
- The lowest homework score is dropped automatically. The lowest quiz score is dropped automatically.
- In 2021 since the course is online, the exams will be administered online. There will be a flexible time window in which exams can be taken. Therefore, there is no makeup exam possible. A missed exam or an exam not turned in on time will get a 0 (and may result in failing the course). In cases of serious illness or COVID-related caretaking responsibilities causing the midterm to be missed, the final exam can count for the midterm exam (this must be arranged in advance).

Course Materials

Textbooks: Robert H. Shumway and David S. Stoffer. *Time Series Analysis & Its Applications: With R Examples (4th Edition)*, Springer

Additional reading materials may be posted to the course website.

Software: R (available for free at <http://www.r-project.org/>)

Webpage/Notes: U of M Canvas (<https://canvas.umn.edu/>). (Note: slides will be provided. But these are a supplement, *not* a replacement for lecture.)

Homework

- Overview: Assignments will require you to do basic derivations, and to write R code, analyze real data, and *clearly* summarize your results.
- Submission: Your answers and all the associated R code should be submitted online by the deadline given in Canvas.
- Policy: Assignments are submitted online through Canvas (*not* email). This can be done in the “Assignments” tab. There will be a hard deadline set in Canvas at which time the assignment must be uploaded (usually before class starts on Wednesday). After that deadline passes generally no upload will be allowed (and zero points will be given for any homework or assignment not turned in). The lowest homework score is automatically dropped, and the lowest quiz score is dropped. You may discuss the homework problems but you should write up the solution independently.
- We will *only accept PDF files!* (This is simpler for us for technical reasons.)
 - You can/should only upload a *single file* in Canvas. This means that if you initially generated your homework as two files (e.g., one via latex and another from a photo of handwritten homework) then you need to convert the photo to pdf, and then use a pdf utility to combine the two pdfs. *Please ensure that you can follow this procedure well in advance of the due date for homeworks.* Canvas will allow you to upload multiple files; *do not do this*, it is not possible for us to download and manage multiple files from > 50 students. There are utilities available for combining other files into a single pdf; camscanner, or just Microsoft Word, or pdftk, or many others.
 - If any student has a concern about how to upload homework assignments (e.g., lack of access to a camera), please let me know *soon!* (We will not be able to address concerns that are only brought up at the due date and this will result in your receiving a zero for the assignment.)
 - Homework grading: raw grades will be available on Canvas as usual. Comments on the homeworks will be recorded in Canvas. Each assignment will have a “comments” section that you can view. Where and why points were deducted will be recorded there.

Spring 2021 Course Structure

This course will be administered in a mixture of remote “modalities.” The large majority of the material will be delivered in prerecorded videos (“asynchronously”). Sometimes we may do live (“synchronous”) recorded class videos on zoom. I will communicate in advance if one of these will take place. There may be some instances where the class video may be posted online asynchronously and then the class session (or part of it) may be used in a “flipped” manner for students to engage actively with examples/problems/course material.

Office hours (both for me and the TA) will be held via zoom (links can be found on canvas).

There will be a slack channel which can be used for asking me or other students questions about the class. These can be about content or logistics. I may answer by email, in slack, or in “class” (video). You can and should also answer each other’s questions on slack, as well.

Notice/consent on recording

This course will include video and audio recordings of class lectures and classroom activities. These recordings will be used for educational purposes and the instructor will make these available to students currently enrolled in the course. Students (or TA’s or any one else) must seek instructor permission to share either course recordings or course content/materials from students whose image or name are in these recordings.

Recommendation Letter Policy

As a general policy, I do not write recommendation letters for any students who have not fully completed a course with me; once you have completed the course (and your final grade is available), it is then possible for me to evaluate whether I will be able to write a recommendation letter, based on your grade and our interactions in the class. (You are free to discuss the possibility of my writing a letter before your grade is available, but I will not be able to offer any guarantees.)

On cell phones

[This section is usually intended for in-person lectures but is relevant for any/online lectures as well.]

I ask that you not have your cell phones out during lecture. Devices (laptops, tablets) that are needed for note taking may be used during lecture, but their use should be limited to taking

notes; if I find you using them for other purposes I may ask you to put them away. (If a cell phone for some reason is needed for your note taking process or otherwise to follow along in class you may speak to me and individual exceptions can be made for phone usage during class.)

I ask this because I believe (1) that careful thinking and learning requires extended periods of focus without distraction (and we often use phones to distract ourselves precisely when material is challenging us and we would rather avoid than face the challenge) and (2) more than in other subjects, mathematical fields have many details (definitions, notation, indices, ...) that, even in the cases where they are conceptually as simple as possible, still require energy to learn and remember.

Miscellaneous

- Incompletes: Incompletes (I) are granted only in extraordinary circumstances and approval must be obtained from the instructor prior to the last day of class.
- Integrity: Students must abide by the campus regulations and student conduct code; see <http://regents.umn.edu/policies/index>
- Disability: Students with disabilities requiring accommodations should contact the instructor as soon as possible; see <https://diversity.umn.edu/disability/>.
- Stress: UMN provides services for you to help manage your mental health and stress levels; see <http://www.mentalhealth.umn.edu>.
- Changes: The content and requirements of this course and syllabus may be altered depending on the instructor's perception of the needs of the class. *See the course website for the current version of the course syllabus and schedule. Changes may be communicated by email so students are required to check their email.*

Academic Honesty and Dishonesty

The following definition of student academic integrity and scholastic dishonesty is slightly modified from the webpage of the University's Office for Student Conduct and Academic Integrity, <http://www.oscai.umn.edu>:

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

All School of Statistics teaching faculty are instructed to refer students who violate the policy for academic honesty and dishonesty to the Office of Student Conduct and Academic Integrity.

A student responsible for scholastic dishonesty can in addition be assigned a penalty up to and including an F or N for the course.