STAT 4603A/5504F: Time Series and Forecasting/Stochastic Processes and Time Series Analysis, Fall 2022

Instructor: Song Cai
Email: scai@math.carleton.ca
Phone: 613-520-2600 x 2423
Office: 5215 Herzberg Laboratories (HP)

Hours, Locations and Webiste:

Lectures: Tue. and Thu. 10:05–11:25 at Southam Hall (SA) 408
Office hours: Thu. 11:45–12:45 at 5215 HP
Course website: http://people.math.carleton.ca/~scai/teaching/stat5504f-f22/
Brightspace (for grades only): https://brightspace.carleton.ca

Important Dates:

First day of classes: Sep. 7, 2022
Last day of classes: Dec. 9, 2022 (follows a Monday schedule)
Oct. 24–28, 2022: Fall break; no classes
Important Dates and Deadlines, 2022–2023:
https://calendar.carleton.ca/academicyear/
Dates of Religious Observances (Holy days), 2022–2023:
http://carleton.ca/equity/accommodation/religious-observances/

Reference Books:

The previous textbook: Shumway, R.H. and Stoffer D.S., *Time Series Analysis and Its Applications, With R Examples*, 4th ed., Springer, New York 2017.
(downloadable from https://www.stat.pitt.edu/stoffer/tsa4/)

A very readable one: Chatfield, C., *The Analysis of Time Series, An Introduction*, 6th ed., Chapman & Hall/CRC, Boca Raton 2003.

A classic but technical one: Brockwell, P.J. and Davis, R.A., *Introduction to Time Series and Forecasting*, 2nd ed., Springer, New York 2002.

An R companion (downloadable from Library webpage): Cowpertwait, P.S.P. and Matcalfe A.V., *Introductory Time Series with R*, Springer, New York, 2009.

Prerequisites:

Required: STAT 3553 or STAT 3503

Strongly suggested: STAT 3508 and STAT 3509, or STAT 3558 and STAT 3559; familiarity with statistical software R

Assessment Rules (provisional):

- Four take-home lab exercises (5%):
  Note: You have to hand in the solutions to lab exercises on time. Your answers won't be returned, but the solutions will be posted. For each lab assignment, as long as you completed all the questions and wrote the answer independently, you get a full mark; otherwise, a zero.

- Four or five assignments (to be marked): 45%
- A three-hour final exam scheduled by the University: 50%
  Note: To pass the course, undergraduate students need to get at least 50/100 and graduate students need to get at least 70/100 in the final exam.

Topics (provisional):

1. Intorduction: Characteristics of time series
2. Simple models for time series with trend and/or seasonality
3. Stationary processes: concept and basic properties
4. Stochastic models for stationary processes
5. ARMA model fitting and parameter estimation
6. Forecasting time series
7. Vector processes and multivariate time series models
8. (if time permits) Advanced topics, selected from state-space model, ARMAX model, GARCH model, etc.

Important Notes:

- Asking content-related questions by emails is not encouraged. You should always come to my office hour for such questions to avoid unnecessary confusions.
- When asking schedule-related or clarification questions by emails, you should expect a waiting time of 24 to 48 hours for me to process.
- If you want to make an appointment other than the regular office hours, you should expect a meeting at least one week after the date you ask for the appointment.
- All due dates and deadlines are non-negotiable.
- Late submissions of assignments will not be accepted and a zero mark will be given in that case unless you can provide a documented reason (e.g medical), in which case the weight of those assignments will be shifted to the final exam.
- If you do not pass the final exam (50/100 or more for undergraduate students and 70/100 or more for graduate students), you fail regardless your term marks.
- If you want to see your final exam paper, you have to make an appointment within two weeks of the final exam.
- Your grade will not be changed in any case according to your special needs (such as scholarship, etc).
- Students from the University of Ottawa should gain access to Brightspace at Carleton University. To do this, follow the instruction given at https://gradstudents.carleton.ca/faculty-of-graduate-and-postdoctoral-affairs-access-to-brightspace/.

Academic Integrity Policy:
https://carleton.ca/registrar/academic-integrity/
https://science.carleton.ca/academic-integrity/

Academic Accommodation:

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide.

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide.

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally–scheduled exam (if applicable).