Western Science Department of Statistical and Actuarial Sciences

SS 4861B/9861B Outline

1. Course Information

Course Information
Course Name: Time Series
Course number: Statistical Science 4861B/9861B – Winter 2023
Lecture hours:
Tuesday: 12:30 - 2:30 PM
Thursday: 1:30 - 2:30 PM

List of Prerequisites
A minimum mark of 60% in both Statistical Sciences 3858A/B and Statistical Sciences 2864A/B.
Antirequisite: The former Statistical Sciences 3861A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructor	Email	Office	Phone	Office Hours
Dr. Shahidul Islam	mislam22@uwo.ca	WSC-268	TBA	Thursday 2:30-3:30PM

Students must use their Western (@uwo.ca) email addresses when contacting. For in-person meeting, students can drop by during office hour.

3. Course Syllabus, Schedule, Delivery Mode

Concepts and uses of time series, ARIMA models, seasonality, dynamic regression, model building and diagnostics using an interactive computer package, forecasting, intervention analysis, applications in econometrics, business, and other areas.

Learning Outcomes: Upon successful completion of this course, students will have a basic understanding of:

- Time domain analysis with various time-series models (AR, MA, ARMA, ARIMA, ARCH, GARCH)
- Model fitting and parameters estimation
- Model diagnostics
- Forecasting
- Comparing Box-Jenkin's algorithm with other algorithms
- Basic concepts of frequency domain analysis

Some important dates are provided below:

Classes begin	**Reading week**	**Classes end**	**Exam period**
January 9, 2023	February 18 – 26, 2023	April 10, 2023	April 13 – 30, 2023

Classes will be in-person interactive in nature. Students are encouraged to engage in discussion for any topic scheduled for lecture.

Although the time of the topics might be changed depending on the situation, complete list of topics along with tentative time table are as follows:

Week	**Classes**	**Topics to be covered**
1 : January 9-13	January 10, 12	Background concepts
2 : January 16-20	January 17, 19	Introduction of time series analysis
Assignment-1	**January 19**	**Submit by January 26, 11:59PM on OWL**
3 : January 23-27	January 24 January 26	Time series decomposition Exponential smoothing
4: January 30-Feb 03	January 31 February 2	Exponential smoothing Stationary Process
Assignment-2	**February 2**	**Submit by February 9, 11:59PM on OWL**
5 : February 6-10	February 7, 9	ARMA models
6 : February 13-17	February 14, 16	Modeling and forecasting with ARMA processes
Test	**February 28**	**During class time**
7 : February 27-March 3	March 2	Nonstationary and seasonal time series models
8: March 6-10	March 7 March 9	Nonstationary and seasonal time series models Time series models for financial data
Assignment-3	**March 9**	**Submit by March 16, 11:59PM on OWL**
9: March 13-17	March 14 March 16	Time series models for financial data Project explanation
10: March 20-24	March 21, 23	Advanced forecasting methods
Assignment-4	**March 23**	**Submit by March 30, 11:59PM on OWL**
11: March 27-31	March 28, 30	Frequency domain analysis
12: April 3-7	April 4 April 6	Presentations by the grad students Review of the course material
Project submission	**April 6**	

Contingency plan for an in-person class pivoting to 100% online learning
In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Main textbook: **Introduction to Time Series and Forecasting** (2016 edition) by Peter J. Brockwell and Richard A. Davis.

Some selected topics will be covered from: Hyndman, R.J., & Athanasopoulos, G. (2021) *Forecasting: principles and practice*, 3rd edition, OTexts: Melbourne, Australia. OTexts.com/fpp3

Occasionally, softcopies of the slides and R codes will be shared. Students are highly encouraged to attend all the classes.

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

- Assignments: Regular assignments have been designed to prepare the students for the project and final exam. There will be four assignments, from which best three will be considered for final grade. Assignments will be posted on **January 19**, **February 2**, **March 9** and **March 23** which should be handed in the following Thursdays.

- Mid-term exam: There will be one mid-term exam on **28th February**. The duration of the test will be one hour. The test will be CLOSED-BOOK exam and will cover the topics taught prior to reading week.

- Final exam: Final exam will cumulative with a duration of two hours. Schedule for the final exam will be set up by the Registrar's office. This will be CLOSED-BOOK exam.

- Projects: All students are required to submit a project report. How to retrieve datasets for the projects, will be demonstrated during class time. Project will be given on **16th March** and the submission date is **6th April**.

- Presentation: Grad students are required to make a presentation on selected articles. The date for the presentation is **4th April**. Students will choose from a list of articles and will present the topic in 10 minutes. There will be question-answer session for each presentation. For the students taking **STAT 4861B**, the attendance in the grad presentation carries marks weighing 2%.

  The overall course grade will be calculated as listed below:

STAT 4861B		**STAT 9861B**	
Assignments: (3 out of 4)	30%	Assignments: (3 out of 4)	25%
Midterm test	20%	Midterm test	20%
Project	13%	Project	10%
Attendance during grad presentation	2%	Presentation	10%
Final Exam	35%	Final Exam	35%

Accommodated Evaluations

- There will be NO makeup for assignments, as enough flexibility has been provided.
- There are NO make-up exams for midterm test. The weight of a missed midterm exam (with a valid academic consideration, See section 6) will be transferred to the final exam. The student must contact the instructor to confirm any weight transfer. A weight transfer will only be made with an approval from the Academic Counselling Office and the confirmation from the instructor.
- Deadline for submission of project will only be accepted when required permission from Academic Counselling Office is received.
- To pass the course, a student must complete the final exam.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade:

For work worth less than 10% of the total course grade, the instructor is empowered to grant academic considerations without referring the student to their academic counsellors.

Assessments worth 10% or more of the overall course grade:

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as

soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

Note: missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

7. Accommodation and Accessibility

Religious Accommodation
When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

https://multiculturalcalendar.com/ecal/index.php?s=c-univwo.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

8. Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No calculator or electronic device is required to perform midterm or final tests. Smartphones and other devices that can carry or transmit texts are forbidden during the tests.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.