

Department of Statistical and Actuarial Sciences
STATISTICAL SCIENCE 4861B/9861B
Time Series

Course outline for Winter 2021



Although this academic year might be different, Western University is committed to a **thriving campus**. We encourage you to check out the [Digital Student Experience](#) website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: <https://www.uwo.ca/health/>.

Technical Requirements and Important Dates:



Stable internet connection



Laptop or computer



Working microphone



Working webcam



Classes Start	Reading Week	Classes End	Study day(s)	Exam Period
January 11	February 13 - 21	April 12	April 13	April 14 - 30

* March 14, 2021: Last day to drop a second-term half course or a second-term full course without penalty

1. Course Information

Course information

Time Series
 Statistical Science 4861B/9861B – Winter 2021

This is a synchronous course. The main vehicles for delivering the course will be Zoom, OWL, and e-mail (rzitikis@uwo.ca).

List of Prerequisite(s)

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(s) or Teaching Assistant(s)	Contact Information
Dr. Ricardas Zitikis	rzitikis@uwo.ca , zitikis@stats.uwo.ca



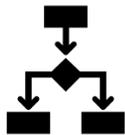
Office Hours	Modes of Communication	Names
Flexible	Zoom, e-mail, or other	Dr. Ricardas Zitikis
Flexible	Zoom, e-mail, or other	Team of TAs

Students must use their Western (@uwo.ca) email addresses when contacting their instructors and indicate the course number (SS4861 or SS9861) in the subject line.

3. Course Syllabus, Schedule, and Delivery Mode

Course Description

ARIMA models, seasonality, dynamic regression, model building using an interactive computer package, forecasting, intervention analysis, control, applications in econometrics, business, and other areas.



Type	Mode	Dates	Time	Frequency
Lecture	Synchronous online	Tuesday	12:30 pm - 2:30 pm	weekly
Lecture	Synchronous online	Thursday	1:30 pm - 2:30 pm	weekly

Learning Outcomes

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

- Various time-series models (AR, MA, ARMA, ARIMA, ARCH, GARCH)
- Model fitting
- Forecasting
- Parameter estimation



Table of Contents and Schedule

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

Week	Textbook chapters	Concepts (to be updated weekly)
1	January 11 - 15 Introduction	
2	January 18 - 22 Introduction	
	QUIZ 1	Tentative: Thu, Jan 21, 1:30 pm - 2:30 pm
3	January 25 - 29 Stationary Processes	
4	February 1 - 5 Stationary Processes	
	TEST 1	Tentative: Sat, Feb 6, 7:30 pm - 9:30 pm
5	February 8 -12 ARMA Models	
6	February 13 - 21 Reading Week	N/A
7	February 22 - 26 ARMA Models	
	QUIZ 2	Tentative: Thu, Feb 25, 1:30 pm - 2:30 pm
8	March 1 - 5 Modeling and Forecasting with ARMA Processes	
9	March 8 - 12 Modeling and Forecasting with ARMA Processes	
	TEST 2	Tentative: Sat, March 13, 7:30 pm - 9:30 pm
10	March 15 - 19 Nonstationary and Seasonal Time Series Models	
11	March 22 - 26 Nonstationary and Seasonal Time Series Models	
	QUIZ 3	Tentative: Thu, Feb 21, 1:30 pm - 2:30 pm
12	March 29 – Apr 2 Time Series Models for Financial Data	
13	April 5 – 9 Time Series Models for Financial Data	



Online Participation and Engagement



- Students are expected to participate and engage with content as much as possible.
- Students can post on OWL Forums their questions, answers, and have discussions with their peers, TA's, and the instructor.

4. Course Materials

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

Students should check OWL (<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. Students are responsible for checking OWL on a regular basis.



All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, 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.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

5. Methods of Evaluation

A) Tests

There will be two tests administered through OWL.

Students will have 2 continuous hours to complete each test.

Tests 1 and 2 will be scheduled by the Registrar and announced on OWL as soon as possible.

Chapters and topics for the tests will be announced in advance through OWL. Students shall upload their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 15 minutes of completing each test.

B) Quizzes

The goal of our quizzes is to make sure that students keep up with the course material between the two tests. There will be three quizzes administered through OWL.

Students will have 1 continuous hour to complete each quiz.

Quizzes 1, 2 and 3 will be during class time and announced on OWL as soon as possible.

A student's "Quizzes" component in the marking scheme is based on their top two quiz grades (i.e., we drop the single lowest quiz grade). Students shall upload their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 15 minutes of completing each quiz.

C) Final Exam

The final exam will be a three-hour cumulative examination. It will be scheduled by the Registrar's office. Students shall upload their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 15 minutes of the end-time of the final exam.

Note: Quiz and test topics will be finalized and announced closer to their dates.

The overall course grade will be calculated as listed below:

Quizzes (best 2 of 3)	30%
Test 1	20%
Test 2	20%
Final Exam	30%

Accommodated Evaluations

- There is NO makeup test to either Test 1 or Test 2. If you miss either test (with a valid reason), the weight of the test(s) will be moved to the final exam.
- Due to the flexibility of the marking scheme, there are no accommodations for missing quizzes. Accommodation is already taken into consideration within the marking scheme.
- To pass the course, a student must complete the final exam.

Rounding of Marks Statement

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

Proctortrack

Tests and examinations in this course will be conducted using the remote proctoring service, Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link: <https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link: <https://www.proctortrack.com/tech-requirements/>

6. Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at:

[https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

Academic Consideration for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- For exams scheduled by the Office of the Registrar (e.g., December and April exams).
- Absence of a duration greater than 48 hours.
- Assessments worth more than 30% of the student's final grade.
- If a student has already used the self-reporting portal twice during the academic year.

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see:

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

and for the Student Medical Certificate (SMC), see:

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

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar:

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

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

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 Academic Calendar for details (under [Special Examinations](#)).

7. Academic Policies

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

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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 his/her official university address is attended to in a timely manner.

Use of Electronic Devices

Students are allowed to use a non-programmable calculator on quizzes, midterms, and the final exam.

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.

Tests and examinations in this course will be conducted using the remote proctoring service, such as Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link:

<https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link:

<https://www.proctortrack.com/tech-requirements/>

Professionalism & Privacy

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:



- Students are expected to follow online etiquette expectations provided on OWL.
- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared.
- Recordings are not permitted (audio or video) without explicit permission.
- Permitted recordings are not to be distributed.
- Students will be expected to take an academic integrity pledge before some assessments.

Copyright Statement

Please be aware that all course materials created by the instructor(s) are copyrighted and cannot be **sold/shared**. Those include materials used in tests/quizzes, midterms, and finals. Any posting/sharing of such materials in part or whole without owner's consent is considered as violation of the Copyright Act and will be considered as a scholastic offence.

In addition, online services such as Chegg are actively monitored. Any questions that are coming out during midterms and finals and are posted to an online service will be searched. Such an activity will be considered as a scholastic offence and will result in academic penalty.

8. Support Services

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

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 Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

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

Additional student-run support services are offered by the USC,
<http://westernusc.ca/services>.