

## Department of Statistical and Actuarial Sciences SS4864A/9864A

### Course outline for Fall/Winter 2020



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
September 9	November 2 - 8	December 9	December 10	December 11 - 22

\* November 12, 2020: Last day to drop a first-term half course or a first-term full course without penalty

## 1. Course Information

### Course information

**Course Name:** Advanced Statistical Computing  
**Course Number:** SS4864A/SS9864A  
**Academic Term:** Fall, 2020  
**Lecture Hours:** Synchronously online; MWF 10:30 – 11:30 AM.

### List of Prerequisite(s)

#### Undergraduate Students

A minimum of 60% in SS2864 and SS3859

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.

## Graduate Students

Enrolled in the graduate program in the Department of Statistics and Actuarial Sciences at Western (Statistics, Actuarial Science, Financial Modelling, Biostatistics) and have taken a first course in mathematical statistics using calculus and linear algebra. Good understanding of linear equations and basic mathematics including algebra and geometry. A previous course in computing.

## 2. Instructor Information



Instructor	Contact Information
Hao Yu	hyu@stats.uwo.ca

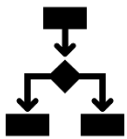
Teaching Assistant(s)	Contact Information
Charvadeh Yasin Khadem	ykhademc@uwo.ca
Li Yi	Lyi7@uwo.ca

Office Hours	Zoom or MS Teams or in Person	Names
Tu 10:00-11:00 AM	Zoom online	Hao Yu

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

## 3. Course Syllabus, Schedule, and Delivery Mode

This course introduces students to ways of implementing various statistical procedures in R. For computation intensive procedures, C programming and R to C interface will be introduced. The aim is to gain a good understanding of how to efficiently use packages to perform data analysis. The approach will be research-orientated and therefore students will learn in detail how various statistical procedures are implemented. If time permits, SAS macro and Python programming will be discussed. Topics covered though not restrict to those will include:



- Data preprocessing
- MLE, Inference including hypothesis tests, bootstrap, and MCMC
- Regression (simple, multiple, glm, smoothing, etc)
- Statistical parallel computing
- SAS macro/Python programming (time permits)

Type	Mode	Dates	Time	Frequency
Lecture	Synchronous online	MWF	10:30 – 11:30 AM	weekly

- Attendance at synchronous sessions is required
- A recording will be provided for synchronous sessions

## Learning Outcomes



Upon successful completion of this course, students will be able to

- Use R efficiently to work with advanced statistical computing problems.
- Break down a big and/or complex computing problem into many small and easy handle tasks.
- Interactive with other languages such a C to speed up computation time.

## Online Participation and Engagement



- Students are expected to participate and engage with content as much as possible
- Students can also participate by interacting in the forums with their peers and instructor and TAs.

## 4. Course Materials

There is no required textbook. The main reference book is Modern Applied Statistics with S. 4th edition, Springer by Venables, W.N. and Ripley, B.D. (2002)

**Software needed:** A personal computer that has R and RStudio installed (Windows, Mac, Linux) is highly recommended since they are required to complete the assignments. The majority of the course will be in R while there might be SAS, Python coding involved in the later part of the course if time permits. If needed, <https://myvlab.uwo.ca> will be used to run SAS codes.

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

The overall course grade will be calculated as listed below:

Assignments	<u>  25  </u> %
Midterm(s)	<u>  35  </u> %
Course project	<u>  30  </u> %
Oral presentation	<u>  10  </u> %

There are about 5 assignments, given out roughly one every two weeks. All assignments must be done electronically (all assignments must be prepared using RStudio Markdown/Notebook (PDF)) and be submitted to owl before deadline. No late assignment is allowed.

There will be a 2-hour midterm on November 3, 10:00 am to 12:00pm, with ProctorTrack proctoring. It needs to be confirmed through university scheduling system. See Section 7 for policies of using Zoom or ProctorTrack proctoring.

There will be a course project with oral presentation involved. The maximum number of students in each group will be 2, might change later depends on the number of students enrolled in this course. The oral presentation will contribute 10% toward the final grade. 30% will be graded based on your written project.

Presentation Slides Due: Nov 29 11:55 pm. To be submitted through OWL (pdf or PowerPoint).

Written Project Due: Dec 20 11:55 pm. To be submitted through OWL with dataset if applicable.

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading.

### **Accommodated Evaluations**

- Late assessments without illness self-reports will be counted 0.
- Late assessments with illness self-reports should be submitted within 24 hours of submission of the last illness self-report.
- No makeup midterm. The weight may be redistributed to other categories by the instructor.
- If permission to waive the requirement that students receive evaluation on work totaling 15% of their final grade at least three days prior to the deadline for withdrawal without academic penalty has been obtained from the Dean's Office, a statement to this effect must be made.

### **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.

## 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf)

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

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://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](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.

### **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, all remaining 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.

### **All of the remote learning sessions for this course will be recorded.**

The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

**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](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Tests and examinations in this course will be conducted using both Zoom and the remote proctoring service, such as Proctortrack.

When Zoom is used for exam invigilation, you will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session using Zoom will not be recorded.\*

Proctortrack will require you to provide personal information (including some biometric data). The session will be recorded. By taking this course, you are consenting to the use of this software.

More information about remote proctoring 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 system and technical requirements for both Zoom and Proctortrack. Information about the system and technical requirements are available at the following links:

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

<https://support.zoom.us/hc/en-us>

\* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

## 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
- All recorded sessions will remain within the course site or unlisted if streamed

## 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](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>.

This course is supported by the Science Student Donation Fund. If you are a BSc or BSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the chair of the department or email the Science Students' Council at [ssc@uwo.ca](mailto:ssc@uwo.ca).