

Statistical Sciences 2503B Course Outline

1. Course Information

Course Information

- Course name: SS2503B Winter 2022, Advanced Mathematics for Statistical Applications
- Lecture hours: Mon, Wed, Fri, 1:30-2:30 pm
- Location: WSC 55
- From Jan 10 to Jan 30, all lectures are offered online asynchronously (posted on OWL). Any change after Jan 30 will be notified in advance.

List of Prerequisites

Calculus 2402A/B or (Calculus 2502A/B and Calculus 2503A/B) or (Calculus 2502A/B and Mathematics 2123A/B), Mathematics 1600A/B (or the former Linear Algebra 1600A/B) or Applied Mathematics 1411A/B, Statistical Sciences 2857A/B (or the former Statistical Sciences 2657A), or Economics 2122A/B. In each course a minimum mark of 60% is required.

List of Antirequisites

The former Applied Mathematics 2503A/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. Contact Information

Instructor	Email
Dr. Ao Li	ali297@uwo.ca

Teaching Assistant	Email
Zhaoqi Yang	zyang633@uwo.ca
Yanzhi Wang	ywan4665@uwo.ca

- Any changes will be announced on OWL.
- **Office hours:** by appointment via ZOOM (at least from Jan 10 to Jan 30). Please email me with three suggested times.

- **Emails:** Students **MUST** use their Western (@uwo.ca) email addresses and include **SS2503** in the subject line.

3. Course Syllabus, Schedule, Delivery Mode

Modeling deterministic systems with differential equations: first and second order ODEs, systems of linear differential equations. Laplace transforms and moment generating functions. Modeling stochastic systems with Markov chains: discrete and continuous time chains, Chapman-Kolmogorov equations, ergodic theorems.

Learning outcomes

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

- Solve a variety of first order ODEs and second order linear ODEs.
- Apply differential equations to model deterministic dynamical systems.
- Calculate the Laplace transform and moment generating function.
- Use Laplace transform to solve ODEs.
- Solve basic systems of linear differential equations.
- Apply Markov chains to model stochastic dynamical systems.

Key dates

- Jan 10: first day of classes
- Feb 19–27: Reading Week
- Apr 8: last day of classes
- Apr 9: study day
- Apr 10–30: final exams (excluding Apr 15–17 for Easter and Passover)

Course delivery and assessment with respect to the COVID-19 pandemic

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered online. Affected lectures will be posted on OWL for students to view. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>

4. Course Materials

The first part of the course (Differential equations) is based on the following textbook:

- *Differential Equations with Boundary Value Problems*, 2nd Edition by John Polking, Albert Boggess, and David Arnold, Pearson (ISBN: 9780134689500).

The material for the second part of the course (Markov chains) will be uploaded to OWL.

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.

All course material will be posted to OWL: <http://owl.uwo.ca>.

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.

Technical Requirements

- A laptop or computer
- A working microphone and webcam
- A reliable internet connection
- Google Chrome or Mozilla Firefox are the preferred browsers to optimally use OWL; update your browsers frequently.

5. Methods of Evaluation

Students will be evaluated on the basis of four Assignments, three Quizzes and a Final Exam. The overall course grade will be calculated as listed below:

Component	Weight
Assignments	5%*4=20%
Quizzes	10%*3=30%
Final Exam	50%

Quizzes and Final Exam: There will be three equally weighted quizzes (in class). **Quiz 1: Wed Feb 2, Quiz 2: Mon Feb 28, and Quiz 3: Fri Mar 18.** The exact time of Final exam is scheduled by Office of Registrar. The final exam will be cumulative testing all material covered in the course. To pass the course, students need to complete the final exam. All quizzes and exam in this course are closed book.

Accommodated Evaluations

- There will not be any make-up quizzes. For those who do legitimately miss a quiz and provide the required supporting documentation, the weight of the quiz will be transferred to the remaining quizzes and final exam.

- Late assignments without a Self-Reported Absence will be subject to a late penalty of 20% per day or portion thereof, and assignments that are submitted 5 or more days late will not be graded.
- Late assignments with a Self-Reported Absence should be submitted within 24 hours of submission of the last self-report, after which they will be subject to a late penalty of 20% per day or portion thereof, and assignments that are submitted 5 or more days late will not be graded.
- An assignment cannot be submitted after it has been returned to the class. The weight of a legitimately missed assignment will be transferred to 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.

6. Student Absences

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
 - an absence must be no more than 48 hours
 - the assessments must be worth no more than 30% of the student’s final grade
 - no more than two SRAs may be submitted during the Fall/Winter term
- (ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

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

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

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

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

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>.

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](#)).

7. 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 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 his/her official university address is attended to in a timely manner.

Only **non-programmable calculators** may be used for quizzes and exams. Other electronic devices such as PDA's, cell phones, etc., will be **not** be allowed for 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.

In case of online examinations, tests and exams in this course will be conducted using a remote proctoring service. 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**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

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/>.

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 (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/mentalhealth>) 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>.