**Department of Statistical and Actuarial Sciences**

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**Advanced Mathematics for Statistical Applications, Statistical Sciences 2503B, Section 001**

**1. Course Information**

**Course Information**

• Course name: SS2503B, Advanced Mathematics for Statistical Applications.

• Lecture hours: Mon, Wed, Fri, 1:30-2:30 pm

• Lecture delivery mode: In person, NSC-7

**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.

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**

|  |  |  |  |
| --- | --- | --- | --- |
| **Instructors** | **Email** | **Office** | **Office Hours** |
| Dr. Mohsen Mollahajiaghaei | mmollaha@uwo.ca | MC128 | TBA |

Any email should be sent from the university account (@uwo.ca) and contain “**Stat2503B**” in **the subject line.** Any email without this, and/or any email sent from other than a UWO email address, risks being directed to spam, deleted unread, or otherwise going missing.

**3. Course Syllabus, Schedule, Delivery Mode**

This course will consist of two parts. The first part (approximately nine weeks) is on differential equations. It will constitute an introduction to first-order ordinary differential equations (ODEs) and related topics, with emphasis placed on applications. Specific topics include linear and separable differential equations, qualitative analysis and stability, modeling deterministic systems (in particular population growth and savings/investment), and linear systems of ODEs. We will also discuss second-order ODEs, Laplace transforms and moment generating functions. The second part of the course (approximately four weeks) will constitute an introduction to discrete-time Markov chains. Specific topics include the Chapman-Kolmogorov equations, classification of states, stationary distributions and ergodic theorems. If time is permitted, continuous-time Markov chains and the Poisson process will be discussed.

Classes begin: January 6, 2025

Spring Reading Week: February 15 – 23, 2025

Classes end: April 4, 2025

Exam period: April 7 – 30, 2025

**4. Course Materials**

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

1. *Differential Equations with Boundary Value Problems,* 2nd Edition by John Polking, Albert Boggess, and David Arnold, Pearson (ISBN: 9780134689500).
2. *The cost of this textbook is $161.50*

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

**Students are welcome to purchase second-hand or earlier editions of this textbook.**

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly 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 Brightspace Help](https://brightspacehelp.uwo.ca/) 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**

**Grading Scheme and Assessment Dates**

The overall course grade will be calculated as listed below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Assessment** | **Format** | **Weighting** | **Date** |
| Assignments | Online | 4 Equally weighted assessments totaling 16% of the course grade | TBA |
| Midterm Test 1 | In-person | 22% | Saturday, Feb 8, 9 – 11 PM |
| Midterm Test 2 | In-person | 22% | Saturday, March 15, 9 – 11 PM |
| Final Exam | In-person, synchronous | 40% | TBA (during the exam period) |

**Other Information About Tests and Examinations:**

* The midterm tests and final exam will be in-person. Virtual proctoring will be employed on the midterm test and the final exam if the course will be run online, otherwise, the test and final exam will be held in classrooms.
* The midterm test will be 120 minutes in duration and will consist of a mixture of short answer and multiple-choice-style questions. *These will be a closed book test.*
* The final exam will be 180 minutes in duration and will consist of a mixture of short answer and multiple-choice-style questions. *This will be a closed book exam.*
* For multiple choice components of tests and the exam: use may be made of software to check for unusual coincidences in answer patterns that may indicate academic integrity violations.
* The use of communication devices (except of what will be indicated in test and exam instructions) during the test and final exam **is prohibited**.
* Missing a test, the final exam, or the due date of a submitted assignment will result in a grade of zero unless appropriate permission is sought and granted. In that case, your mark may be re-weighted, or a makeup evaluation may be arranged.

**General information about missed coursework**

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:

<https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf>,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](http://academicsupport.uwo.ca/accessible_education/).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar’s webpage:

<https://registrar.uwo.ca/academics/academic_considerations/>

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests normally must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

* Midterm 2

Academic Consideration without supporting doc can only applied to one of two midterms.

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

There will be no make-ups for Tests 1 and 2. If you miss any of the two tests due to a legitimate reason the following will apply:  
• If Test 1 is missed, 20% will be appended to the final exam, thus making it worth 22 + 40 = 62%.  
• If Test 2 is missed, 30% will be appended to the final exam, thus making it worth 22+ 40 = 62%.  
• In the case of two missed tests, 22 + 22 = 44% will be appended to the final exam, thus making it worth 22 + 22 + 40 = 84%.

**Evaluation Scheme for Missed Assessments**

*Late assignment*s: Late submissions may be submitted up to 2 days after the deadline without penalty. After 2 days, assignments will not be accepted and will be marked as 0. Academic Consideration without supporting doc cannot be used. This does not account for accommodations. No accommodated assignments will be accepted more than one week after the assignment deadline – any accommodations that extend more than one week after the assignment deadline will result in the weight of that assignment being moved to the final exam.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_70)), especially for those who miss multiple final exams within one examination period.

**6. Additional Statements**

**Religious Accommodation**

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university’s EDID website for the recognized religious holidays:

[https://www.edi.uwo.ca](https://www.edi.uwo.ca/).

**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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf).

**Academic Policies**

The website for Registrar Services is <https://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.

All exams are closed book, no electronic devices. A non-programmable calculator is allowed in exams. You will be required to bring your photo ID/ student card to both tests 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:

<https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf>.

**Support Services**

Please visit the Science & Basic Medical Sciences Academic Advising 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.

Learning-skills counsellors at Learning Development and Success ([https://learning.uwo.ca](https://learning.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.

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/>.

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