Math 3121B (Advanced Linear Algebra) Course Outline

1. Course Information

Course information
Mathematics 3121B-001, Winter 2023-24, location and time posted on Extranet

List of prerequisites
Mathematics 2120A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Counselling) 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

Dr David Riley, Professor, dmriley@uwo.ca, MC 136. Students must use their Western (@uwo.ca) email addresses for all University correspondence. Office hours (in-person) TBA.

3. Course Syllabus, Schedule, Delivery Mode

Course syllabus (as time permits)
A continuation of the material of Mathematics 2120A/B including properties of complex numbers and the principal axis theorem; singular value decomposition; linear groups; similarity; Jordan canonical form; Cayley-Hamilton theorem; bilinear forms; Sylvester's theorem.

Course-level learning outcomes

Students will be able to identify, formulate and solve problems in advanced linear algebra, including proof writing.

Students will able to present mathematical information, including proofs, in correct mathematical English.

In particular, students will demonstrate these competences in the following topics:

- Normal, self-adjoint, unitary and orthogonal linear operators
- The Principal Axis Theorem
- Orthogonal projections and the Spectral Theorem

- Singular value decomposition
- Canonical forms

What is expected of students

Students should attend all classes, make a serious effort to understand all course material, and do all of the assigned work. The student must assume responsibility for any missed classes. It is up to the student to seek out help when needed. Students are expected to keep up with the material of the course by reading and learning definitions, theorems and results, and doing additional practice problems. They should review all learning materials in a timely fashion, follow class announcements, complete all assignments, and write all examinations. Solutions of collected homework problems must be written neatly and submitted using GradeScope.ca by the deadline. A fundamental component of the course is to **prove** mathematical theorems.

Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

Textbook: Linear Algebra, Fifth Edition, by Friedberg, Insel and Spence.

OWL statement: 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.

Technical requirements: All assignments must be submitted using GradeScope.ca.

5. Methods of Evaluation

Breakdown: five assignments worth 5% each, one in-person Midterm Exam worth 30%, and one in-person Final Exam worth 45%. The Final Exam will be cumulative.
Tentative due dates for assignments: January 24, February 7, February 28, March 25, April 8.

Tentative Midterm Exam date: March 6 (in-class).

Policies for assignments: All assignments must be submitted using GradeScope.ca. No late submissions will be accepted.

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: The only assessments worth less than 10% in this course are the individual assignments. If you miss one or more assignments during the course, for any reason, the corresponding 5% weight of each missed assignment will be added to the weight of your final exam component. Note, however, assignments are a fundamental component of the course, and so students are strongly recommended to submit all five assignments.

Assessments worth more than 10% 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/academic_consideration.pdf.

The Student Medical Certificate is available at

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

If you miss the Midterm Exam and accommodation is granted by your Academic Counselling Office, the corresponding 30% weight of your missed Midterm Exam will be added to the weight of your Final Exam.

Absences from Final Exam: 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 Exam (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).

6. 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

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.

7. 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 electronic devices (computers, calculators, smart phones, smart watches, etc) will be allowed in any 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.

8. 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.

Learning-skills counsellors at the Student Development Centre (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/.