

Math 1600B Winter 2025 Course Outline

1. Course Information

Course Information

Course Name:Mathematics 1600B (LINEAR ALGEBRA I)Academic Term:Winter 2025

List of Prerequisites

One or more of Ontario Secondary School MCV4U, Math 1120A/B, Math 1229A/B, Calculus 1000A/B, Calc 1500A/B. Calc 1000A/B or Calc 1500A/B may be taken as a pre- or corequisite.

List of Antirequisites

Mathematics 1700A/B, Numerical and Mathematical Methods 1411A/B, the former Applied Mathematics 1411A/B, Math 1229A/B, Applied Math 2811B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) 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. Chris Hall (Course Coordinator) | chall69@uwo.ca | | See OWL |
| Dr. Taylor Brysiewicz | tbrysiew@uwo.ca | | See OWL |

Course Contact Policies

• Students must use their Western (@uwo.ca) email address when contacting their professor.

• Any email sent to a professor MUST say Math 1600 in the subject line, be addressed to the professor of the section in which the student is enrolled and be sent from a Western email address. The email may be overlooked if these conditions are not met.

• In general, email is not an efficient means of contact, and should be limited to urgent matters. For questions about the course material, use the forums or ask questions before/after class or in office hours. For administrative questions, please check first whether the question has been answered on the course outline or OWL site.

• Office Hour information and Help Centre information will be posted on the course OWL site.

3. Course Syllabus, Schedule, Delivery Mode

Course Syllabus

Complex numbers; vectors, lines, and planes; solving linear systems; spanning sets and linear independence; matrix algebra; the fundamental subspaces of a matrix; bases, dimension and rank; introduction to linear transformations; determinants; eigenvalues and eigenvectors; similarity and diagonalization; Markov chains and other applications.

Course Learning Outcomes

By the end of this course, successful students will be able to:

- Describe Euclidean space.
- Perform arithmetic operations with complex numbers \mathbb{C} .
- Perform arithmetic operations with vectors over \mathbb{R} and \mathbb{C} .
- Represent geometric objects such as lines, planes, and hyperplanes, via algebraic equations.
- Recognize systems of linear equations (SLEs) and their solutions.
- Perform arithmetic operations with matrices such as addition, scaling, and multiplication.
- Determine whether a matrix is invertible and find its inverse when possible.
- Solve SLEs using elimination and matrix inverses.
- Determine whether a set of vectors is linearly independent and their span.
- Find bases and dimensions for the row space, column space, and null space of a matrix.
- Determine the rank and nullity of a matrix.
- Recognize basic linear transformations of Euclidean space.
- Represent rotations, reflections, and projections in Euclidean space using matrices.
- Relate invertibility to other properties of a square matrix.
- Compute the determinant of a square matrix using cofactor expansion.
- Calculate the characteristic polynomial of a square matrix and use it to compute eigenvalues.
- Calculate the eigenspace corresponding to a given eigenvalue.
- Determine whether a square matrix may be diagonalizable.
- Judge, with justification, whether a given statement (related to the course material) is true or false.

Course Delivery

This is an in-person course, with 3 in-person lecture hours per week

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.

Key Sessional Dates

| 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

Textbook

Custom eBook: MATH 1600: University of Western Ontario: ISBN 9780176907532.

It consists of selected sections of the book: D. Poole, Linear Algebra: A Modern Introduction, 4th edition.

It is available to <u>purchase</u> (or <u>rent</u>) through the Western bookstore for \$152.95 (or \$74.00). Students are welcome to purchase second-hand and/or earlier editions of this textbook.

Learning Management System (OWL)

All course material will be posted to OWL (https://westernu.brightspace.com/). Important information will be posted there in Announcement widget. Students are responsible for checking the OWL site regularly and for turning on notifications for course announcements. Students are expected to be aware of information, and make use of materials, posted on the site.

If a student needs assistance with the course OWL site, they can seek support on the <u>OWL Brightspace</u> <u>Help</u> page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Other online platforms/apps used in the course

Other than the OWL Brightspace website, discussed above, we will use the following websites and apps: WeBWorK: For online assignments

Gradescope: To access the graded midterm

iClicker: To assess class participation

Technical Requirements

In addition to pencil, paper, and eraser, you need to have access to:

- Computer or laptop able to run a recent version of web browser such as Chrome, Safari or Firefox.
- Stable high-speed internet connection.
- Web-Enabled Device.

A phone, tablet, laptop or other web-enabled device will be used for the iClicker component during class. You will receive course-specific instructions on how to sign up and register yourself during the second week of classes. You can use Western's WiFi with your Western credentials. Students will need to create a free iClicker account (using your Western email address.) Please also refer to the instructions at <u>https://presswestern.uwo.ca/</u>. If you already have an iClicker account, please go into the settings and verify that it uses your uwo.ca email address. This software will be used during class lectures to gauge participation, solicit feedback, and for other Q and A.

Further Course Policies

• All in-person or online interactions with peers, as well as communication with TAs or Professors for this course should be conducted in a professional and respectful manner. Failure to do so will result in academic discipline.

• Recording lectures without the explicit consent of the Professor or TA is grounds for academic discipline.

• Course content created by a faculty member is considered the faculty member's intellectual property; it should not be distributed, shared in any public domain, or sold by a student or other third party without prior written consent of the faculty member.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Participation5%Assignments15%Midterm Test35%Final Exam45%

Participation

Regularly attending and engaging in lectures is important for doing well in the course. We will measure class participation using responses to iClicker lecture questions. Your score is based on the percentage of questions you answer, not the percentage of questions you get correct.

Assignments

An assignment will be due each Friday of the semester at 11:55pm EDT, with the exception of the first week of class (Friday, January 10th), the Friday of Spring Reading Week (Friday, February 21st), and the Friday in the week before the midterm (tentatively Friday, March 7th). Each assignment will contain problems from the material covered in the course since the previous assignment or two and will be available for a week before the deadline.

The assignment will be an online assignment which will run on the WeBWorK website. Students can work on the WeBWorK assignment at any time during the window with no time limit. Students will have unlimited attempts to complete each assignment before the assignment deadline; the questions in each attempt will be randomly generated from question pools and may differ from others'. Of these attempts, the highest mark will be recorded as the student's assignment grade.

Midterm Test

The midterm test will contain problems from the course content covered in the first seven weeks of the term. The tentative date for the midterm is:

Tuesday, March 4, 6:00-8:00pm

The tentative date for the makeup midterm will be:

Tuesday, March 11, 4:00-6:00pm

Note that the date and time of the midterm and the makeup midterm will be finalized after they are reviewed by Exam Central. Both the midterm and the makeup midterm will be in-person exams which will take place on campus. The locations of the exams will be posted closer to the dates of these exams.

Final Exam

The final exam will cover all the course material. It will be a three-hour long exam and will take place in-person during the final exam period: April 7-30, 2025. It will be scheduled by the Registrar's office.

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 com-pleted 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 <u>Accessible Education</u>.

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 <u>one</u> Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Final Exam (Defined by policy)
- **Midterm** (Designated by the instructor as the <u>one</u> assessment that always requires documentation when requesting Academic Consideration)

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

Evaluation Scheme for Missed Assessments

Participation:

Missed Lectures (iClicker Questions): We understand that you will not be able to attend class from time to time. Therefore, the participation-based iClicker marking scheme is designed to take into account the occasional missed class. Accordingly, iClicker marks will not be adjusted for the occasional missed class. If you have a long-term absence (three or more consecutive classes) that is supported by academic consideration, then your iClicker marks will be adjusted to take your long absence into account.

Assignments:

It will not be necessary to request Academic Consideration for assignments. The lowest two assignment grades will be dropped. For the remaining assignments, any grade that is less than the student's final exam grade will be replaced by the final exam grade. This includes any number of missed assignments. In other words, missed assignments and assignments with grades lower than the final exam will be reweighted to the final exam. Do not request Academic Consideration for missed assignments and do not inform your professor about missed assignments, as these adjustments will be done automatically.

Note: This means that there will be no reason to request an Academic Consideration without supporting documentation in this course. The midterm and final exam are ineligible and no Academic

Considerations are required for assignments.

See also the **Coursework with Assessment Flexibility section** below for the 48 hour No-Late-Penalty Period for assignments, which allows you to hand in any assignment up to 48 hours late.

Midterm:

If you miss the midterm due to any circumstance, you must provide an academic consideration covering the date of the test. A makeup midterm will be available to those who are granted an academic consideration in the week following the midterm exam.

In cases where a student misses the midterm exam and the makeup midterm exam and can provide an academic consideration for both absences, the weight of the midterm will be transferred to the final exam.

Final Exam:

When a student misses the Final Exam, they are expected to contact the Academic Counselling office of their Faculty of Registration as soon as they can do so. The Academic Counselling office will assess the eligibility of the student to be granted an Academic Consideration. If an Academic Consideration has been granted, the student will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam).

If a student misses the Final Exam and the Special Examination and has been granted Academic Consideration for both exams, the date of the next Special Examination (if another Academic Consideration is 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), especially for those who miss multiple final exams within one examination period.

Coursework with Assessment Flexibility

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Flexible Completion

Assignments. This course has 12 Assignments, and the 10 assignments with the highest marks are counted towards your final grade. Should extenuating circumstances arise, students do not need to request Academic Consideration for the first 2 missed assignments. Academic consideration requests will be denied for the first 2 missed assignments. It will not be necessary to request Academic Considerational missed assignments. These additional missed assignments will be automatically transferred to the final exam.

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.

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.

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.

Electronic Devices

NO calculators or other electronic devices or any other aids are allowed on tests and exams.

Clickers

Class participation will be measured using responses to iClicker questions. To receive credit for this component, you must:

- Create a free iClicker account using your Western email address.
- Take responsibility to ensure that your device is working properly.
- Attend lectures in the section you are registered.
- Answer iClicker questions at the lectures you attend.

Questions answered in another section's lectures will not be counted towards your score. Sharing questions with students who are not present in lecture and answering questions while not present in lecture will be treated as scholastic offences.

Scholastic Offences

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.

Offences include: copying solutions from other students, online sources, textbooks, etc.; showing your work to other students; uploading questions or solutions to a web site; and accessing a web site used for providing solutions (even if you do not use any solutions on the site).

The penalty for an academic offence involving a midterm or final will at least be a failing grade in the course. The penalty for each academic offence involving homework will be a grade of 0 on the homework set. The penalty for an academic offence involving participation will be a grade of 0 on the participation component of the course grade. In some cases, the penalty can include a reduction of the overall course grade and/or expulsion from the program.

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: <u>https://www.uwo.ca/sci/counselling/</u>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<u>https://uwo.ca/health/</u>) 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 (<u>https://learning.uwo.ca</u>) 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: <u>https://www.uwo.ca/se/digital/</u>.

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