

**Course Outline**  
**MATH 1600A - LINEAR ALGEBRA I<sup>1</sup>**  
Distance Studies, Section 001  
Summer Evening 2023.

## 1 Course Information:

- **Course Information:**

- *Course Name:* Mathematics 1600A (LINEAR ALGEBRA I)
- *Academic Term:* Summer Evening 2023
- *Sections:* Section 001 and Labs 002-009
- *Instructors:* Asghar Ghorbanpour, Ph.D.

- **PREREQUISITES:**

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

- **ANTIREQUISITES:**

Applied Mathematics 1411A/B, Applied Mathematics 2811B.

**SENATE POLICY ON PREREQUISITES:** Prerequisite checking is the student's responsibility. Unless you have either the prerequisites 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 Instructors Information:

Instructor	Section	Email	Office
Dr. Asghar Ghorbanpour	001	<a href="mailto:aghorba@uwo.ca">aghorba@uwo.ca</a>	MC 135

*Labs:* Students are enrolled in a lab section that will take place through Zoom once a week and will be run by the course teaching assistants. The information of the LAB TAs the Zoom ID for the Labs will be posted OWL. Students must attend the Lab section they are enrolled in.

- **Course Contact Policies:**

- Students must use their Western (@uwo.ca) email addresses when contacting their instructors.
- Any email sent to the instructor MUST say Math 1600A in the subject line; Any email without proper subject line, and/or sent from an email other than a Western email, may be deleted unread.
- Email is not an efficient way of contact, and response times vary wildly depending on email volume (instructors may be receiving tens of emails per day). Students can use office hours meeting for more urgent matters.

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<sup>1</sup>This course outline is subject to change, and any changes will be clearly communicated via the course OWL website.

- **Office Hours Information:** The office hours will be held online through Zoom. You can find the Zoom Meeting ID on OWL. Please use the **sign up tool** to make an appointment for the available hours.

Information about other ways to get help from will be posted on the course OWL website.

### 3 Course Syllabus, Schedule, Delivery Mode

- **Course Syllabus:** Properties and applications of vectors; matrix algebra; solving systems of linear equations; determinants; vector spaces; orthogonality; eigenvalues and eigenvectors.
- **The Course Learning Outcomes:** By the end of this course, students will be able to:
  - Calculate the operations in modular arithmetic as well as complex numbers.
  - Describe  $m$ -dimensional Euclidean space and carry out the vector operations for vectors in  $\mathbb{R}^m$ ,  $\mathbb{Z}_n^m$ , and  $\mathbb{C}^m$ .
  - Write algebraic representations (as equation in different form) for different geometric objects such as lines, planes and hyper planes, in  $\mathbb{R}^m$ .
  - Recognize linear equations, systems of linear equations (SLE), and solutions of SLEs.
  - Solve SLEs using different methods: Gauss-Jordan elimination method, method of inverse matrix and Cramer's rule, if applicable.
  - Perform basic matrix operations: addition/subtraction, multiplication and powers, inverse and transpose matrices.
  - State the fundamental theorem of invertible matrix and relate invertibility with different notions of the course.
  - Compute the determinant of square matrices using different methods: expansion along rows/columns and using the properties of determinant.
  - Calculate the characteristic polynomial and then the eigenvalues and corresponding eigenspace of a given matrix.
  - Carry out the the computational steps to check whether matrix is (orthogonally) diagonalizable and if it is, then (orthogonally) diagonalize it.
- **Course Delivery:** This is an online course and other the final exam all components of the course will be online. The final exam will take place in-person during the final exam period at the end of the term. The course content, which are offered in the form of series of videos accompanied by other related resources, will be posted on the course OWL website. A weekly lab run by a teaching assistant will take place on Zoom meeting and part of the course grade will be granted through activities in those labs.

**Note:** Midterm in this course will be online and 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>.

- **Key Sessional Dates:**
  - Classes begin: May 8, 2023.
  - Last Day to Drop (without academic penalty): June 12, 2023
  - Classes end: July 28, 2023.
  - Final Exam Period: July 31 - August 3

## 4 Course Materials

- **Textbook:**

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

The custom ebook is available to purchase through the Western bookstore.

The textbook/ebook is selected sections of the book:

D. Poole, *Linear Algebra: A Modern Introduction*, 4<sup>th</sup> edition.

- **Course OWL Website:** Various useful supplemental materials, such as lecture notes and videos of lectures, required extra homework problems, practice tests, and solutions to the homework exercises, are posted on the OWL web site (<http://owl.uwo.ca>). All students are expected to be aware of information, and make use of materials, posted on the course web site. Important information will be posted on the Announcement tab of the website. Please note that the each website will have access to two OWL website: Main website and subsite for sections. The main website will be accessible to students in both sections 650 and 651. Online quizzes, online tests, exams, and gradebooks will be available on this website. The course content posted by your instructor, however, can be found on your section subsites.

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.

- *Other online platforms/sites used in the course:* Other than OWL website, which primarily will be used to post the course content and the announcement, we will use the following websites for the related activities and purposes:

- WeBWork: Online quizzes.
- Gradescope: Online midterm test and assignment upload
- ProctorTrack: proctoring midterm test.

Please contact your instructor if you require 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 for any specific question regarding an accommodation: [http://academicsupport.uwo.ca/accessible\\_education](http://academicsupport.uwo.ca/accessible_education).

- **What is expected of the Students?**

- Students are expected to read the appropriate sections and to complete practice problems assigned by the instructor. Additional reading and practice problems may be assigned.
- Students are required to become accustomed to course web page on OWL and know the structure in which the course materials and the requirements are organized on the website.
- Students are responsible for being aware of all relevant information posted on the OWL web site and must pay careful attention to the course schedule and deadlines.
- Students must assume responsibility of actively viewing and learning from course videos and completing all assessments implemented in the website including In-Unit questions, quizzes and online test and exam.
- Students should log into the OWL regularly and complete all the course components and take advantage of all the tools, such as forums and sign-up tools, to communicate and facilitate their learning.
- Regular homework is an essential part of the course; it is the student's responsibility to keep up with the assigned homework and to seek additional help if and when it is needed.

- **Technical Requirements:**

- Computer or laptop able to run a recent version of web browser such as Chrome, Safari or Firefox.
- Stable, reliable and high-speed internet connection.
- Working microphone and webcam.
- Access to a printer and Document Scanner device or App.

This is in addition to the usual math hardware you will need: pencil, paper, and (if you are human) an eraser.

• **Further Course Policies:**

- All students are expected to engage online and in-person in a professional and respectful manner. This includes all interactions with peers, as well as communication between TAs or your Professor. Failure to do so will result in academic discipline.
- Recording of lectures or tutorials 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

The overall course grade will be calculated as listed below:

Lab sessions	10%
WeBWork Quizzes	10%
Midterm Test	20%
Written Assignments	15%
Final Exam	45%

- **Lab sessions:** The weekly labs will run on Zoom by your lab TAs (starting from the second or the thirs week of the term). Attendance in the labs are mandatory and 10 percent of the course grade will be calculated based on activities completed in these sessions.

• **WeBWork Quizzes :**

Online quizzes will run on WeBWork and will cover the material covered in the course after the previous quiz. Each quiz will stay open for 6 days; they will open on Fridays (9:00 p.m.), starting from May 12, and will close at midnight (11:55 p.m. EDT) on Thursday of the week after. Students can take the quiz any time during this window with no time limit. We have a quiz every week but the week in which we have the midterm test. The quiz schedule (as well as other information about the quizzes) can be found the course OWL website.

Students will have more than one attempts to complete each quiz; the questions in each attempt will be randomly generated from question pools and may differ from the others’. Of these attempts, the highest mark will be recorded as the student’s quiz grade. After dropping the two lowest quiz marks, each quiz will be counted equally to calculate the grade for the Online Quizzes component.

• **Midterm Test:**

The midterm test will consist of short answer questions as well as true/false questions. It will cover the course content covered in the first six weeks of the term. The test will take place online on Gradescope and be proctored by ProctorTrack.

Here are a tentative schedule for the midterms<sup>2</sup>

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<sup>2</sup>The dates/time will be finalized after they are reviewed by the exam central.

*Midterm Test:* Staurday, June 24th, 11:00-13:00 (London Local time)

The makeup test will take place in the week following the test date.

- **Written Assignments:**

There will be four written assignments (two before the midterm test and two after). The assignments need to be uploaded on the gradescope. For the due dates as well as instructions on how to upload the assignments on gradescope, visit the "Written Assignments" subpage of the "course overview" tab on OWL.

- **Final Exam:**

The final exam will cover all the course material with more focus on the last part of the course. It will be a three hours long exam that **is an in-person exam**. It will be scheduled by the Office of Registrars.

Midterm test 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>.

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

- **Technology Requirements:** Math 1600 is an online course and therefore it is essential that each student has access to the technology that will be used to deliver the course, including:

- Computer or laptop able to run a recent version of web browser such as Chrome, Safari or Firefox.
- Working microphone and webcam
- Stable high-speed internet connection.
- Document Scanner device or App.

This is in addition to the usual math hardware you will need: pencil, paper, and (if you are human) an eraser.

## 6 Student Absences

For work totaling 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/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

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

Students who have a direct conflict between a test and another academic requirement (i.e. test/class/lab/tutorial), and also students for whom a test conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, should contact the Academic Counselling Office in their Faculty of Registration as soon as they become aware of the conflict and not later than two weeks before the test. Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to complete a course component may submit a request for academic consideration to the Academic Counselling office of their Faculty of Registration.

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

- **Quizzes and Assignments:**

- *Medical cases:* A student who misses a WeBWork quiz or a written assignment due to a **medical reason** must contact the Academic Counseling Office of the Faculty of Registration immediately and request academic consideration covering the quiz closing date. If academic consideration is granted, a 48 hours extension will be provided for students to complete the quiz/assignment.

In cases where an extension can not be granted, the weight of the quiz will be transferred to other quizzes and the weight of the assignment will be transferred to the other assignments.

- *Non-medical cases:* Considering that each online quiz and assignment is worth less than 10% of your grade, the academic counseling units cannot offer academic consideration for absences due to non-medical reasons. There is no guarantee that you will be accommodated for a missed quiz/assignment for reasons other than medical reasons. We will dismiss excuses like "I forgot the deadline", "my computer died last night", and "my internet disconnected half an hour before the deadline". Any other extenuating circumstances should be discussed with your instructor, however, it is entirely up to your instructor to decide.

- **Midterm Test:** If you missed a midterm test due to any circumstance, you must provide an academic consideration covering the date of the test. Makeup examinations for the midterm test will be available to those who are granted an academic consideration. A makeup test is anticipated to be provided in the week following the test date.

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

- **Absences from Final Examinations:** If you miss the Final Exam, please contact the Academic Counseling 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).

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

**Note:** missed work can only be excused through one of the mechanisms above.

## 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 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)

- **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>.

## 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](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.

*Remark: No electronic devices (or any other memory aid) will not be permitted on tests and exams.*

### **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:

[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).

Remote Proctoring Software may be used in this course in the event of health lock-down. 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 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/>.

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](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](mailto: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](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/>.