

MATH*1160 Course Outline

Course Title: Linear Algebra I

Prerequisite: 4U Calculus and Vectors or 4U Advanced Functions

Restrictions: ENGG*1500, MATH*2150, MATH*2160

Credit Weight: 0.5

Academic Department: Mathematics & Statistics

Campus: University of Guelph

Semester Offering: Fall 2020

Instructor Information

Instructor Name: Prof. David Kribs

Instructor Email: dkribs@uoguelph.ca

Office hours via Zoom: Mondays 1:00pm to 3:00pm from September 14 to December 7. Recurring Zoom meeting link listed under MATH*1160 CourseLink's Zoom module.

Teaching Assistant Information

TA Names: Harry Gaebler, Daiana Spataru, Leann Tran

TA Emails: gaeblerh@uoguelph.ca, dspataru@uoguelph, ltran08@uoguelph.ca

Office hours via Webex: Starting the week of September 14 to 18, through to the week of November 30 to December 4. Note that you can access webex as a Guelph student via: <https://www.uoguelph.ca/ccs/webex>

Leann <https://www.uoguelph.webex.com/meet/ltran08> : Tuesdays 10am - 11am.

Daiana <https://www.uoguelph.webex.com/meet/dspataru> : Wednesdays 10am - 11am.

Harry <https://www.uoguelph.webex.com/meet/gaeblerh> : Thursdays 11am - 12pm.

Course Content and Delivery

Class Schedule and Mode of Delivery: Tuesdays and Thursdays from 4:00pm to 5:20pm; Synchronous Zoom Lectures. See the Zoom module on the CourseLink site for MATH*1160 for links to the Zoom class meetings. During each class, a TA will also be present to monitor the chatroom and help me address questions that arise.

Course Notes:

- **Workbook for this course:** Students must buy the 'fillable' lecture notes for this course at the University Bookstore (cost about \$25). (No textbook required).
- **Math Preparedness Booklet:** you should work through this booklet during (or before) the first week of class. It is found under the Contents section in Courselink.
- **In-class Discoveries:** these are investigations that we do together in class, and can be found under the Contents section in Courselink.

What to have on hand during classes:

- The fillable lecture notes that you bought at the University Bookstore.
- Blank paper for the 'Discoveries', pens/pencils.
- Scientific calculator.

Course and Calendar Description: This course provides an introduction to linear algebra in Euclidean space. Topics covered include: N-dimensional vectors, dot product, matrices and matrix operations, systems of linear equations and Gaussian elimination, linear independence, subspaces, basis and dimension, matrix inverse, matrix rank and determinant, eigenvalues, eigenvectors and diagonalization, orthogonalization and projections, linear transformations. Some fundamental proofs and applications of these topics will be included.

Learning Outcomes:

- Have a basic understanding of the algebra of matrices.
- Understand how linear algebra is needed to work with systems of linear equations.
- Be familiar with some applications of linear algebra.
- Have a basic understanding of some theoretical linear algebra concepts, including proof.
- Have gained some experience in using computer software to manipulate matrices.

Lecture Content: Class schedule can be found in the Contents section of Courselink.

Attendance: Formal attendance will not be taken. However, I *strongly* encourage you to attend class (virtually) regularly. After each class I will post my hand-written additions to the workbook pages from that class in the Contents section of Courselink, but these notes will not capture the surrounding discussions on the material during class. Beyond this, IF YOU ARE UNABLE TO ATTEND CLASS, IT IS YOUR RESPONSIBILITY TO FIND OUT WHAT YOU MISSED FROM YOUR CLASSMATES.

Email Etiquette: Although I try to respond to all email messages, please don't ask me math questions by email (instead come and see me or a TA during our online office hours, or visit the Learning Centre virtually). Also, please don't ask for class notes beyond what is provided; don't tell me that you are going to miss a lesson; don't ask

me a question that you can find out for yourself. Keep your messages to the point, polite, and clearly state your question, with name, student ID, and course details.

Course Homework and Grading Policies

Homework: Both the homework problems and solutions are found in the Contents section of Courselink and will (along with class examples) be the basis for the questions on midterm tests and written assignments.

Tests and Written Assignments: Tests and assignment questions are based mainly on examples done in class and homework. A minor component (up to about 15%) may involve MATLAB usage and/or applications.

- 10% Written Assignment 1: Announced in class and via email, and due Thursday, October 1 at 11:59pm.
- 30% Midterm Exam 1: Tuesday, October 20. Open book and held remotely from 4:00pm to 6:10pm, with 10 extra minutes given to submit the test via Dropbox. Test will be emailed to the class list at 4:00pm.
- 30% Midterm Exam 2: Tuesday, November 17. Open book and held remotely from 4:00pm to 6:10pm, with 10 extra minutes given to submit the test via Dropbox. Test will be emailed to the class list at 4:00pm.
- 30% Written Assignment 2: Announced in class and via email, and due Thursday, December 10 at 11:59pm.

Assignment and Test Grading and Corrections: Collaboration is allowed on the written assignments, up to a maximum of groups of 3 students, but you must write up your assignment in your own words. The tests will be open book, but no collaboration is allowed, nor is usage of websites such as CHEGG allowed. The TA's grade the assignments and midterms and can be contacted via email or office hours for corrections and answering questions about grading. TA's sign the assignments and midterms they grade so you know who graded your assignments or midterms. If you have corrections please contact the TA who graded your assignment or test (NOT YOUR PROFESSOR!) to have your score adjusted. If you find errors in grading and you miss the office hours offered by the TA then email the TA to schedule an appointment. However, as the TA's are only paid for a limited number of hours, IF YOU MISS THE TA OFFICE HOURS THERE IS NO GUARANTEE THAT A TA WILL BE ABLE TO SEE YOU TO MAKE ASSIGNMENT OR TEST CORRECTIONS. CORRECTIONS CANNOT BE MADE AFTER THE END OF CLASSES. It is in your best interests to check through your assignments and tests in a timely manner with the solutions provided.

Submission and Picking up of midterm tests and assignments: Midterm tests and written assignments will be submitted and returned electronically through the Dropbox tool on Courselink. TESTS AND ASSIGNMENTS MUST BE SUBMITTED AS PDF'S.

Academic Consideration:

- There will be NO MAKE-UP MIDTERM EXAMS. If you miss a Midterm exam due to serious illness of yourself or a death in your immediate family, or due to personal grounds, please contact me by email ASAP explaining the reason for missing the test. You do NOT need to get a doctor's note. If consideration is granted I will readjust the weight of assessed material, as described in the next section. HOWEVER, ONCE YOU HAVE TAKEN AN EXAM NO ACCOMMODATIONS CAN BE GRANTED (it is general University of Guelph procedure to NOT grant accommodations retroactively). For further details concerning Academic Consideration see <https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>
- UNDER NO CIRCUMSTANCES WILL ANY EXAM BE RE-SCHEDULED AT A DIFFERENT TIME AND/OR DATE, with the possible exception of exams taken in SAS.

Procedure used to re-adjust the weight of assessed material: If consideration is given to miss an exam (see item above) the percentage of missed material is divided evenly amongst the other graded components of the course. Please DO NOT ASK FOR ALTERNATE ARRANGEMENTS AS FOR REASONS OF FAIRNESS TO OTHER STUDENTS IT WILL NOT BE GRANTED.

Regulations regarding a grade-reassessment: If you believe that an error has been made in the determination of your final grade then you must write to the chair of the department (by the 10th class day of the new semester) requesting a grade re-assessment. This can lead to the grade staying the same, a grade increase, or a grade decrease. Please note that this should not be used as a means of 'trying to get a few extra marks', but for situations where you have grounds for believing that mistakes have been made in the determination of your final grade. For further information see:

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Disclaimer For This Semester

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via class email. All University-wide decisions will be posted on the COVID-19 website <https://news.uoguelph.ca/2019-novel-coronavirus-information/> and circulated by email.

Illness Verification For This Semester

The University will not require verification of illness (doctor's notes) for the fall 2020 or winter 2021 semesters.

Other Course Resources

The Math & Stats Learning Centre: The Mathematics & Statistics Department operates a learning centre (LC), running virtually this semester, where you'll find a team of TA's that can help you understand and solve problems in MATH*1160. The LC is located on the third floor of the McLaughlin Library in the Science Commons, but this semester you can access it by clicking the Resources tab on your Courselink homepage. The LC will have discussion boards, chat rooms, as well as Virtual Classroom activated. Virtual Classroom will allow the TA's to start a meeting with an individual student (or group of students) to have a live voice chat and make use of screen sharing and a virtual whiteboard. The hours of operation are as follows:

Monday	Tuesday	Wednesday	Thursday	Friday
9:30-15:30	10:00-16:00	9:30-15:30	10:00-16:00	9:30-14:30

Outlines for the midterm tests: Found in the Contents section of Courselink.

Solutions to past midterm tests: Found in the Contents section of Courselink.

Tests, assignments, and solutions for this semester (announced when ready):
Found in the Contents section of Courselink.

Texts recommended for background reading: There are MANY books you can consult for background reading on Linear and Matrix Algebra. For example:

- The following textbook is recommended: Bernard Kolman & David R. Hill: *Elementary Linear Algebra with Applications*, Pearson/Prentice Hall, 9th Edition, ISBN-13: 978-0- 13-229654-0.
- etc., etc.

MATLAB Access: To use MATLAB there are a few options:

- Use your own account at your own department if your department has the MATLAB license.
- Buy a Student Version of MATLAB.
- Install *Octave* system on your own PC, which is free software and emulates MATLAB. Caution: Most likely you can do all the (numerical) homework exercises, but I have not tested all the exercises yet. Visit the official web site of Octave at <http://www.octave.org>. To download Octave 2.1.72 for Windows go to http://sourceforge.net/project/showfiles.php?group_id=2888.

MATLAB Tutorials: In class we will discuss the basic MATLAB commands. There are many free MATLAB tutorials posted online; for example, this one posted on Youtube seems reasonable (I also added this link under Contents of CourseLink):

<https://www.youtube.com/watch?v=qGiKv3-02vw>. For additional details, the official MATLAB manual is available from

<http://www.mathworks.com/access/helpdesk/help/helpdesk.shtml>

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Mental Health Services

One in five students in Canada experiences some sort of mental health issue at some point in their academic career. If you find yourself facing a mental health crisis, or just need to talk to someone, please consider taking advantage of one of the following resources available to University of Guelph students:

- **Counselling Services (x53244)** is located at Health Services (J.T. Powell Building) and offers individual and group counselling sessions by appointment or walk-in.
- **Student Support Network** is located in Raithby House (across from the cannon and offers confidential, peer-based, drop-in support.
- **Good2Talk (1-866-925-5454)** is a free, 24/7 student hotline that provides professional counselling and referrals for mental health, addictions and well-being.
- **Here 24/7 (1-844-437-3247)** specializes in assessment, referral and appointment booking and is available 24/7 for crisis support.

You are not alone and you will not be judged for asking for help.

Standard Statements

The following are standard statements for inclusion on all course outlines. Some departments or colleges may also elect to post this information on a common website and link to such sites in the course. However, it is strongly recommended that statements on academic misconduct and links to the academic misconduct section of the academic calendars are included on all course outlines.

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person,

such as a teaching assistant) in writing, with your name, id#, and e-mail contact. [See the undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

Drop Date

To avoid academic penalty, courses that are one semester long must be dropped by the end of the last day of classes; in the Fall 2020 semester this day is December 4, 2020. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is

not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

[The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.