



MATH*1160 Linear Algebra I

Winter 2021

Department of Mathematics and Statistics

Credit Weight: 0.50

Course Details

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.

Pre-Requisite(s):

Prerequisite(s): 4U Calculus and Vectors or 4U Advanced Functions

Restriction(s): [ENGG*1500](#), [MATH*2150](#), [MATH*2160](#)

Method of Delivery: Online

Final Exam

There is no final exam in this course.

Instructional Support

Instructor

Dr. Nagham Mohammad

Email: naghamm@uoguelph.ca

Telephone: (519) 824-4120 Ext. 53298

Office: MacNaughton Bldg, Room 513

Teaching Assistant(s)

Name: TBA

Email: TBA

Learning Resources

Required Textbook

Title: Elementary Linear Algebra with Applications

Author(s): Bernard Kolman & David R. Hill

Edition / Year: 9th Ed. (2017)

Publisher: Pearson/Prentice Hall.

ISBN: ISBN: 9780134718538

You may purchase the textbook at the [Guelph Campus Co-op Bookstore](#) or the [University of Guelph Bookstore](#).

NOTE: Complete electronic copies of lecture PowerPoint slides will be posted on CourseLink. The materials to be covered in the lecture PowerPoints slides are mainly based on topics from Chapter 1 to Chapter 7 of the textbook and some supplement materials. The lecture notes with the textbook constitute study materials for Quizzes.

Course Website

[CourseLink](#) (powered by D2L's Brightspace) is the course website and will act as your classroom. It is recommended that you log in to your course website every day to check for **announcements**, access course materials, and review the weekly schedule and quizzes requirements.

<https://courselink.uoguelph.ca>

Learning Outcomes

Course 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.

Teaching and Learning Activities

Method of Learning

You will learn through independent study of the textbook, Lecture notes, and completing specially selected questions from the textbook. The instructor and TAs will also be available for consultation through regular office hours via Zoom and by email.

Course Structure

This course is divided into 13 units of study:

- Unit 01: **Chapter 1:** Systems of Linear Equations (section 1.1)
- Unit 02: **Chapter 1:** Systems of Linear Equations (sections 1.2 and 1.3)
- Unit 03: **Chapter 1:** Systems of Linear Equations (sections 1.4 and 1.5) and
Chapter 2: Solving Linear System (section 2.1)
- Unit 04: **Chapter 2:** Solving Linear System (sections 2.1, 2.2, and 2.3)
- Unit 05: **Chapter 3:** Determinants (sections 3.1 and 3.2)
- Unit 07: **Chapter 3:** Determinants (sections 3.3 and 3.4)
- Unit 08: **Chapter 4:** Real Vector Spaces (sections 4.1 and 4.2)
- Unit 09: **Chapter 4:** Real Vector Spaces (sections 4.3 and 4.4)
- Unit 10: **Chapter 4:** Real Vector Spaces (sections 4.5 and 4.6)
- Unit 11: **Chapter 4:** Real Vector Spaces (sections 4.7 and 4.9) and
Chapter 5: Inner Product Spaces (section 5.1)
- Unit 12: **Chapter 5:** Inner Product Spaces (section 5.3)
- Unit 13: **Chapter 7:** Eigenvalues and Eigenvectors (sections 7.1 and 7.2)

What to Expect for Each Unit

In each unit, you will find an introduction to the topics, learning outcomes for the unit, a list of unit activities, suggested exercises, and a large selection of videos in the Lecture PowerPoint slides with each topic to provide further explanations of a number of the skills presented in the textbook and the lecture notes.

Mathematics & Statistics Learning Centre

The online Mathematics & Statistics Learning Centre (M&SLC) is available to students seeking help with understanding course content. The M&SLC is set up as a Resource in CourseLink. You will be registered automatically in the M&SLC when you register for MATH*1080. You may access the M&SLC by logging into CourseLink, then clicking on the Resources tab.

N.B. You may not use the M&SLC site for assistance in answering Quiz questions.

The M&SLC will have discussion boards, chat rooms, and Virtual Classroom. Virtual Classroom will enable TAs to schedule live on-camera meetings with individual students or small groups with the use of screen sharing and a virtual whiteboard.

The M&SLC's hours for 20F will be:

- Monday & Wednesday: 9:30 AM – 3:30 PM
- Tuesday & Thursday: 10:00 AM – 4:00 PM
- Friday: 9:30 AM – 2:30 PM

Assessment Descriptions

Quizzes

There will be 9 online quizzes during this course; your **best eight quizzes** will count equally towards 100% of your grade ($1/8$ of 100% = ~12.5% each). The quizzes except Quiz (9), will be open to you from Monday 10:00 AM ET until Tuesday at 10:00 pm ET during the applicable week. Quiz (9) will be open to you from **Sunday, April 11th** 10:00 AM ET until **Monday, April 12th** at 10:00 pm ET.

You will have one attempt for each quiz counts towards the eight quiz grades.

Each quiz will consist of different number of multiple-choice or T/F questions. Each of the questions will be drawn at random from a selection of questions of equivalent difficulty. Each question is worth one point towards your quiz grade.

Each of the quizzes covers the material studied in the previous one or two weeks (i.e., Quiz 1 in Week 3 will test you on material covered in Week 1 and Week 2, or Quiz 3 in Week 7 will test you on material covered in Weeks 5).

Assessments

The grade determination for this course is indicated in the following table. A brief description of each assessment is provided below.

Table 1: Course Assessments

Assessment Item	Weight	Learning Outcomes
Quiz 1	12.5%	1, 2
Quiz 2	12.5%	3,4
Quiz 3	12.5%	5
Quiz 4	12.5%	7
Quiz 5	12.5%	8
Quiz 6	12.5%	9
Quiz 7	12.5%	10
Quiz 8	12.5%	11
Quiz 9	12.5%	12, 13
**Total	100% **	

****Note:** Your best 8 quizzes will be count toward your final grade of the course.

Course Technology Requirements and Technical Support

CourseLink System Requirements

You are responsible for ensuring that your computer system meets the necessary [system requirements](#). Use the [browser check](#) tool to ensure your browser settings are compatible and up to date. (Results will be displayed in a new browser window).

<http://spaces.uoguelph.ca/ed/system-requirements/>

<https://courselink.uoguelph.ca/d2l/systemCheck>

Zoom Requirements

This course uses **Zoom** as a video communication tool. You are responsible for downloading a free copy of Zoom from www.zoom.us. A Webcam, a microphone to record audio, and headphones/speakers to play back the recording are also needed.

System Requirements:

1. An internet connection – broadband wired or wireless (3G or 4G/LTE)
2. Speakers and a microphone – built-in or USB plug-in or wireless Bluetooth
3. A webcam or HD webcam - built-in or USB plug-in

Technical Skills

As part of your online experience, you are expected to use a variety of technology as part of your learning:

- Manage files and folders on your computer (e.g., save, name, copy, backup, rename, delete, and check properties);
- Install software, security, and virus protection;
- Use office applications (e.g., Word, PowerPoint, Excel, or similar) to create documents;
- Be comfortable uploading and downloading saved files;
- Communicate using email (e.g., create, receive, reply, print, send, download, and open attachments);
- Navigate the CourseLink learning environment and use the essential tools, such as **Quizzes** and **Grades** (the instructions for this are given in your course);
- Access, navigate, and search the Internet using a web browser (e.g., Firefox, Chrome); and
- Perform online research using various search engines (e.g., Google) and library databases.

Technical Support

If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.

CourseLink Support

University of Guelph

Day Hall, Room 211

Email: courselink@uoguelph.ca

Tel: 519-824-4120 ext. 56939

Toll-Free (CAN/USA): 1-866-275-1478

Walk-In Hours (Eastern Time):

Monday thru Friday: 8:30 am–4:30 pm

Phone/Email Hours (Eastern Time):

Monday thru Friday: 8:30 am–8:30 pm

Saturday: 10:00 am–4:00 pm

Sunday: 12:00 pm–6:00 pm

Course Specific Standard Statements

Acceptable Use

The University of Guelph has an [Acceptable Use Policy](#), which you are expected to adhere to.

<https://www.uoguelph.ca/ccs/infosec/aup>

Communicating with Your Instructor

During the course, your instructor will interact with you on various course matters on the course website using the following ways of communication:

- **Announcements:** The instructor will use **Announcements** on the Course Home page to provide you with course reminders and updates. Please check this section frequently for course updates from your instructor.
- **Email:** If you have a conflict that prevents you from completing course requirements, or have a question concerning a personal matter, you can send your instructor a private message by email. The instructor will respond to your email within 48 to 72 hours. Although I try to respond to all email messages, please don't ask me math questions by email (instead come and see me or TAs during our online office hours, or visit the Learning Centre virtually).

- **Zoom Office Hours:** If you have a complex question you would like to discuss with your instructor or TA, you may attend one of several weekly scheduled office hours using Zoom.

Netiquette Expectations

The course website is considered the classroom and the same protections, expectations, guidelines, and regulations used in face-to-face settings apply, plus other policies and considerations that come into play specifically because the course is online.

Inappropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students;
- Using obscene or offensive language online;
- Copying or presenting someone else's work as your own;
- Adapting information from the Internet without using proper citations or references;
- Buying or selling term papers or assignments;
- Posting or selling course materials to course notes websites;
- **Having someone else complete your quiz or completing a quiz for/with another student;**
- **Stating false claims about lost quiz answers or other assignment submissions;**
- Threatening or harassing a student or instructor online;
- Discriminating against fellow students, instructors, and/or TAs;
- Using the course website to promote profit-driven products or services;
- Attempting to compromise the security or functionality of the learning management system;
- Sharing your username and password; and
- Recording lectures without the permission of the instructor.

Late Policy

For late submissions to the **Quizzes** tool, your attempt will be flagged as late, and you will be prevented from making further changes to your attempt once your time ends. Make sure you save all your responses to the exam questions. The **Quizzes** tool counts down your time in the upper-left hand corner. Please pay close attention to this countdown and save your answers frequently.

Extensions will be considered for medical reasons or other extenuating circumstances. If you require an extension, discuss this with the instructor as soon as possible and well before the due date. Barring exceptional circumstances, extensions will not be granted once the due date has passed. These rules are not designed to be arbitrary, nor are they inflexible. They are designed to keep you organized, to ensure that all students have the same amount of time to work on quizzes, and to help to return marked materials to you in the shortest possible time.

Obtaining Grades and Feedback

Unofficial assessment marks will be available in the **Grades** tool of the course website.

Once your Quizzes are marked you can view your grades on the course website by selecting **Grades** from the **Tools** dropdown menu on the navbar. Your course will remain open to you for seven days following the last day of the final exam period.

University of Guelph degree students can access their final grade by logging into [WebAdvisor](#) (using your U of G central ID).

University Standard Statements

University of Guelph: Undergraduate Policies

As a student of the University of Guelph, it is important for you to understand your rights and responsibilities and the academic rules and regulations that you must abide by.

If you are a registered **University of Guelph Degree Student**, consult the [Undergraduate Calendar](#) for the rules, regulations, curricula, programs and fees for current and previous academic years.

Email Communication

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

When You Cannot Meet Course Requirements

When you find yourself unable to meet an in-course requirement due to illness or compassionate reasons, please advise your course instructor **in writing**, with your name, ID number and email contact.

University of Guelph Degree Students

Consult the [Undergraduate Calendar](#) for information on regulations and procedures for Academic Consideration.

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

Drop Date

University of Guelph Degree Students

Students will have until the last day of classes to drop courses without academic penalty. [Review the Undergraduate Calendar for regulations and procedures for Dropping Courses.](#)

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

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment.

University of Guelph Degree Students

Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Accessibility Services as soon as possible.

For more information, contact Accessibility Services at 519-824-4120 ext. 56208, [email Accessibility Services](mailto:accessibility@uoguelph.ca) or visit the [Accessibility Services website](https://wellness.uoguelph.ca/accessibility/).

accessibility@uoguelph.ca

<https://wellness.uoguelph.ca/accessibility/>

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.

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

Copyright Notice

Content within this course is copyright protected. Third party copyrighted materials (such as book chapters and articles) have either been licensed for use in this course, or have been copied under an exception or limitation in Canadian Copyright law.

The fair dealing exemption in Canada's Copyright Act permits students to reproduce short excerpts from copyright-protected materials for purposes such as research, education, private study, criticism and review, with proper attribution. Any other copying, communicating, or distribution of any content provided in this course, except as permitted by law, may be an infringement of copyright if done without proper license or the consent of the copyright owner. Examples of infringing uses of copyrighted works would include uploading materials to a commercial third party web site, or making paper or electronic reproductions of all, or a substantial part, of works such as textbooks for commercial purposes.

Students who upload to CourseLink copyrighted materials such as book chapters, journal articles, or materials taken from the Internet, must ensure that they comply with Canadian Copyright law or with the terms of the University's electronic resource licenses.

For more information about students' rights and obligations with respect to copyrighted works, review [Fair Dealing Guidance for Students](#).

http://www.lib.uoguelph.ca/sites/default/files/fair_dealing_policy_0.pdf

Plagiarism Detection Software

Students should be aware that faculty have the right to use software to aid in the detection of plagiarism or copying and to examine students orally on submitted work. For students found guilty of academic misconduct, serious penalties, up to and including suspension or expulsion from the University can be imposed.

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.

Disclaimer

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 CourseLink and/or 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.

<https://news.uoguelph.ca/2019-novel-coronavirus-information/>

Illness

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

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.