

MAT240F: Algebra I
Fall 2022
University of Toronto

I. Instructor and Teaching Assistants

Course Instructor

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TA(s)

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II. Course Overview

Course Description

Hours: 36L/24T

A theoretical approach to: vector spaces over arbitrary fields, including \mathbb{C} and \mathbb{Z}_p . Subspaces, bases and dimension. Linear transformations, matrices, change of basis, similarity, determinants. Polynomials over a field (including unique factorization, resultants). Eigenvalues, eigenvectors, characteristic polynomial, diagonalization. Minimal polynomial, Cayley-Hamilton theorem, Jordan Canonical Form.

Prerequisite: High school level calculus

Corequisite: [MAT157Y1](#)

Distribution Requirements: Science

Breadth Requirements: The Physical and Mathematical Universes (5)

Course Objectives

This course is an introduction to linear algebra, with a focus on the conceptual structure of the subject in addition to its computational aspects.

**Text Book:* [Linear Algebra Done Right, by S. Axler] (third edition)*

This is the textbook I will refer to when assigning reading. We will

cover chapters 1 (Vector spaces), 2 (Finite-dimensional vector spaces), 3 (Linear maps), 4 (Polynomials), and 5 (Eigenvalues, eigenvectors and invariant subspaces). I will provide extra reference material for special topics.

Linear algebra is a very standardized topic; buying the textbook is not strictly necessary. With the guidance given in class, a student could use any of the following alternative references to learn the material:

- *Linear Algebra*, by Hoffman and Kunze
- *Linear Algebra*, by Friedberg, Insel and Spence
- *[Linear Algebra done Wrong]*, by Treil
- *Introduction to Linear Algebra*, by Lang
- *Linear Algebra and Its Applications*, by Strang.

[Linear Algebra Done Right, by S. Axler] <http://linear.axler.net/>

*[Linear Algebra done Wrong]
<https://www.math.brown.edu/~treil/papers/LADW/>*

How this course is organized:

This course will consist of two weekly lectures (T11-13 & R12-13) and a weekly tutorial. The plan is to conduct all course meetings via Zoom, using links that will be sent to you through Quercus.

Tutorials will start the week of Sep 19th and will be conducted in person. Students will be expected to attend the tutorial at the scheduled time for their registered section.

Please note that due to the ongoing COVID-19 pandemic, the course delivery method may change after term has started and this may alter the course organization. Students are expected to check the course site for updates as the contents of this syllabus may change:

<http://www.math.toronto.edu/mgualt/courses/22-240/>

Technical Requirements

In order to participate in this course, students will be required to have:

- Reliable internet access. It is recommended that students have a high speed broadband connection (LAN, Cable, or DSL) with a minimum download speed of 5 Mbps.
- A computer satisfying the minimum technical requirements (<https://www.viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/>)

Other recommended items include headphones, microphone, webcam.

If you are facing financial hardship, you are encouraged to contact your college or divisional registrar (<https://future.utoronto.ca/current-students/registrars/>) to apply for an emergency bursary.

III. Evaluation/ Grading Scheme

Mark Breakdown

Assignments	40%
In person term exam	20%
In person final exam	40%

Assignments

There will be 10 assignments of equal value. The assignments with the two lowest scores will be dropped. Late submissions will receive a mark of zero.

Term Exam

There will be an IN PERSON 2 hour term exam from 11-1 on Nov 1, 2022, location TBA.

Final Exam

The final assessment will be held IN PERSON during the final assessment period in December 2022 and will be scheduled by the registrar. Information about the format will be provided during the Fall semester.

IV. Course Policies

Policy on Missed Term Work

As flexibility for missed or late course assignments have been built into the marking scheme, late and missed assignments will not be accepted for any reason.

If you miss a term test or the final assessment, then you must inform your course Instructor within 72 hours of the test. No exceptions. You may receive an accommodation in the form of an oral exam, written make-up test, or a re-weighting of your assessments.

Absence Declaration

For Fall 2022, the University will be continuing use of the Absence Declaration form. Students are to complete the Absence Declaration form, available to them directly on ACORN, anytime they are absent from academic work. No additional information or documentation is required.

Email Policy

Should you have a question that is not answered on the course site (please check there first!) please note that all communications with the Course Instructor or TA's must be sent from your official utoronto email address, with the course number included in the subject line. If these instructions are not followed, your email may not be responded to.

Online Etiquette/Participation

The common sense rules of etiquette apply in our online classrooms as they do in real life. Instructors and TAs may have their own rules for interactions and asking questions and will make note of them on the Quercus page for connecting to their sections. People who are inappropriately interrupting and making it difficult to continue class or who are harassing other students will be ejected from lecture rooms and dealt with on a case by case basis. We do not anticipate having any problems with this and do not want to discourage you from participating in lecture and tutorial on this basis – all normal conduct is totally fine and welcome.

V. Institutional Policies and Support

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to your Course Instructor. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources (for example, the University of Toronto website on Academic Integrity <http://academicintegrity.utoronto.ca/>).

Copyright

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.

For questions about the recording and use of videos in which you appear, please contact your instructor.

Accessibility

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please feel free to approach your Course Instructor and/or the Accessibility Services office as soon as possible. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Link to Accessibility Services website: <https://studentlife.utoronto.ca/departments/accessibility-services/>

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Important Academic Dates & Deadlines

The academic dates include enrolment dates, drop deadlines, exam periods, petition deadlines and more. <https://www.artsci.utoronto.ca/current/dates-deadlines/academic-dates>

Other Academic and Personal Supports

- Writing Centre <https://writing.utoronto.ca/writing-centres/arts-and-science/>
- U of T Libraries <https://onesearch.library.utoronto.ca/>
- Feeling Distressed? <https://studentlife.utoronto.ca/task/support-when-you-feel-distressed/>
- Academic Success Centre <https://studentlife.utoronto.ca/departments/academic-success/>
- College/Faculty Registrars <https://future.utoronto.ca/current-students/registrars/>

VI. Plan of Assessments (*Term Test date to be confirmed)

Assessment	Due Date
A1	18 Sep
A2	25 Sep
A3	2 Oct
A4	9 Oct
A5	16 Oct
A6	23 Oct
Term Test	1 Nov*
A7	13 Nov
A8	20 Nov
A9	27 Nov
A10	4 Dec
Final Exam	TBA