Carleton UNIVERSITY
Canada's Capital University

Department of Mathematics and Statistics



BIT 1001-A: Mathematics II for NET (Linear Algebra)

Winter 2022

Instructor:	Dr. Fares Said	**Lecture:**	Posted weekly; accessible at any time
Email:	fares.said@carleton.ca	**Place:**	Online via Brightspace
Office:	Zoom, Facetime or other medium	**Office Hours:**	Wednesdays from 11:35 a.m. to 12:55 p.m. Via Class Zoom link

Course Pages:

1. https://brightspace.carleton.ca/d2l/home

Objectives: Tailored for students in the Network Technology program, this course covers systems of linear equations, vector space of n-tuples, subspaces and bases, matrix transformations, kernel, range, matrix algebra and determinants, inner products and orthogonality, eigenvalues, diagonalization and applications.

Precludes additional credit for BIT 1101, BIT 1201, ECON 1401, ECON 1402, MATH 1104, MATH 1107, MATH 1119, MATH 1401, MATH 1402.

Prerequisite: restricted to students in the B.I.T. degree program.

Blended course: Mixture of synchronous and asynchronous activities: Materials covered for each week are listed in the table below. Tutorials are live. Wednesday's lecture time will be used to review the recorded lecture material for each week and will also be used as a live drop in session/office hours using the course zoom link found on the course website.

Textbook: *Linear Algebra and Its Applications,* 6^{th} *edition, by David C. Lay, Steven R. Lay and Judi J. McDonald.* Please note, the 6^{th} edition is only available as an e-book. If you wish to have a hard copy, a 5^{th} edition is the only option.

Reference Text: *Linear Algebra and Its Applications,* 3^{rd} *edition, by Mohammad R. Sadeghi and Jabir M. Abdulrahman.* ***Publisher:*** *Carleton University, School of Mathematics and Statistics.*

Lectures: Lecture notes and pre-recorded lectures will be uploaded on Brightspace by **Monday before the scheduled class time.** They will cover the material needed for **the entire week**. The first lecture will be uploaded on Monday January 10, 2022.

Tutorials: Weekly tutorials will be held online on Mondays from 16:05 to 16:55. A link to the tutorial will be available through the Tutorial Module on the course website. Tutorials will start on Monday January 24, 2022. The following table gives more details:

Tutorial	TA name	TA email	Time	Virtual
A1	Benjamin Marriner	benjaminmarriner@cmail.carleton.ca	Mon: 16:05 to 16:55	synchronous
A2	Janani Sivathayalan	jananisivathayalan@cmail.carleton.ca	Mon: 16:05 to 16:55	synchronous

Tests: There will be four e-proctored tests held on January 31, February 28, March 21, and April 4 during the tutorial times. Students must take all four tests. **There are no make up tests!**

Note: If you miss a test and provide a self-declaration form within three business days of the missed test, the assigned weight will be added to your final exam; otherwise a mark of zero is assigned.

Final: The final exam will be an online, e-proctored, three-hour closed book exam to be held during the period of April 14-28, 2022 (including Saturdays and Sundays). Please check the link provided on Brightspace to confirm the exact date and time of the final exam as that period approaches. Students who wish to review their final examination must do so within one week from the release of final grades. This privilege is for educational purposes and not an opportunity to request grade changes. **Please note, your tests and final exam will be proctored using e-proctoring.**

E-proctoring: Please note that tests and examinations in this course will use a remote proctoring service provided by Scheduling and Examination Services. You can find more information at https://carleton.ca/ses/e-proctoring/.
The minimum computing requirements for this service are as follows:

- **Hardware:** Desktop, or Laptop
- **OS:** Windows 10, Mac OS 10.14, Linux Ubuntu 18.04
- **Internet Browser:** Google Chrome, Mozilla Firefox, Apple Safari, or Microsoft Edge
- **Internet Connection:** High-Speed Internet Connection Recommended
- **Webcam:** HD resolution recommended

Note: *Tablets, Chromebooks and Smartphones are not supported at this time. Windows-based tablets are not supported at this time.*

Grading Scheme:

- *Tests (40%) - 4 Tests*
- *Final Examination (60%).*

Math Tutorial Centre: 3422 HP (near the Science Student Success Centre): This is a drop-in centre where students can get help in mathematics and statistics, on a first-come, first-served basis. For more information, including hours of operation, see: https://carleton.ca/math/math-tutorial-centre/

MS-LAP: Online support is available for this course through MS-LAP. You should automatically be registered in MS-LAP via Brightspace. You have access to online tutorial videos free of charge. For more information and tutorials on how to access MS-LAP, please see: https://carleton.ca/math/math-learning-assistance-program/

Policies

Covid-19: In place of a doctor's note or medical certificate, students are advised to complete the self-declaration form available on the Registrar's website to request academic accommodation for missed course work including exams and assignments. Students are encouraged to connect directly with me to discuss required accommodations arising from the COVID-19 situation. The self-declaration form is available at https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf

Academic Integrity: All tests, assignments, quizzes, and exams are to be done independently. Any instance of suspected cheating or plagiarism will not be tolerated. Suspected cheating will be reported to the Dean, according to the policies stated in General Regulations. For more information, please consult:http://www.carleton.ca/cu0607uc/regulations/acadregsuniv14.html

Academic Accommodations: You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy or religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website https://carleton.ca/equity/focus/discrimination-harassment/religious-spiritual-observances/

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at +1613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

Tentative Course Outline: The weekly coverage might change as it depends on the progress of the class. However, you must keep up with the reading assignments.

Week	Content
Week 1 January 10, 12	• 1.1 Systems of Linear Equations • 1.2 Row Reduction and Echelon Forms
Week 2 January 17, 19	• 1.2 Row Reduction and Echelon Forms • 1.3 Vector Equations
Week 3 January 24, 26	• 1.3 Vector Equations • 1.4 The Matrix Equation • 1.5 Solution Sets of Linear Systems
Week 4 Jan 31, Feb 2	• 1.6 Applications of Linear systems • 1.7 Linear Independence
Week 5 February 7, 9	• 1.8 Introduction to Linear Transformations • 1.9 The Matrix of Linear Transformations • 2.1 Matrix Operations
Week 6 February 14, 16	• 2.2 The Inverse of a Matrix • 2.3 Characterizations of Invertible Matrices • 2.8 Subspaces • 2.9 Dimension and Rank
Week 7 February 22, 24	• **WINTER BREAK**
Week 8 Feb 28, Mar 2	• 3.1 Introduction to Determinants • 3.2 Properties of Determinants
Week 9 March 7, 9	• 3.3 Cramer's Rule, Volume • 5.1 Eigenvectors and Eigenvalues
Week 10 March 14, 16	• 5.2 The Characteristic Equation • 5.3 Diagonalization
Week 11 March 21, 23	• 5.5 Complex Eigenvalues • Appendix B Complex Numbers
Week 12 March 28, 30	• 6.1 Inner Product, Length and Orthogonality • 6.2 Orthogonal Sets
Week 13 April 4, 6	• 6.3 Orthogonal Projections • 6.4 Gram-Schmidt Process
Week 14 April 11	• 6.5 Least Squares Problems • Review and Exam prep

Important Dates:

January 10 ..... First class
January 24 ..... Last day for registration
January 31 ..... Last day to withdraw from winter term with full fee adjustment
January 31 ..... Test 1
February 21 ..... Statutory holiday
February 22-25 ..... Winter break. Classes are suspended
February 28 ..... Test 2
March 16 ..... Exam accommodation request
March 21 ..... Test 3
April 4 ..... Test 4
April 12 ..... Last day to withdraw from the course
April 12 ..... Last day of classes
April 14-28 ..... Final Exam

For more information please visit https://calendar.carleton.ca/academicyear/