

Carleton University
School of Mathematics and Statistics
MATH 1119 B – FALL 2011

Linear Algebra with Applications to Business and Economics

- Instructor:** David Thomson
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<http://www.math.carleton.ca/~dthomson>
- Office Hours:** (Tentative) Wednesday 10:30-11:30 and by appointment in HP 5218
- Lectures:** Monday and Wednesday from 13:05 –14:25
LOCATION: Azrieli Theatre AT 301
- Tutorials:** Monday 9:35 -10:25
B1: Southam Hall: SA 406 - Han Chee
B2: Southam Hall: SA 402 - Ming Ming Zhang
B3: Southam Hall: SA 502 - Jordan Bell
B4: Southam Hall: SA 415 - Christopher Sauve

It is **highly** recommended that students in need of additional help with specific content or exercises related to the course visit the *Math Tutorial Centre (HP 1160)*. For more information, please see http://www.math.carleton.ca/grad/tutorial_center.html

Textbook: *Linear Algebra and its Applications*, Fourth Edition, David C. Lay.

Prerequisites: Ontario Grade 12 Mathematics of Data Management; or Ontario Grade 12 Mathematics: Advanced Functions, or MATH 0005, or equivalent, or permission of the School.

Tests: There will be four 50–minute tests administered *during the tutorials* on **September 26, October 17, October 31, and November 14**. There will be no make-up tests. If a test is missed for a legitimate and documented reason, its mark will be replaced by the final exam mark.

Final Exam: The final exam is a cumulative three hour closed book exam scheduled by the university. The exam period runs from December 8 until December 21, 2010.

Marking Scheme:	Tests	40%
	Tutorials	5%
	Final Exam	55%

Calculators: Only non-programmable calculators are allowed for tests and the final exam. I reserve the right to confiscate any calculator during a test or final exam.

Withdrawal: The last day for academic withdrawal is Monday, December 5, 2011.

Students with Disabilities: Students with disabilities requiring academic accommodations in this course must contact a coordinator at the Paul Menton Centre for Students with Disabilities to complete the necessary Letters of Accommodation. After registering with the PMC, make an appointment to meet and discuss your needs with your instructor in order to make the necessary arrangements as early in the term as possible. Please note the deadline for submitting completed forms to the Paul Menton Centre for the December final examination is Friday, November 11, 2011.

Pregnancy/Religious Accommodation: 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, see the Student Guide <http://www2.carleton.ca/equity/accommodation/academic/wp-content/ccms-files/Student-Guide-card-09.pdf>

NOTES:

1. I reserve the right to adjust any student's final mark by up to 3% (up or down) based on participation and behaviour.
2. For students who write and **pass** all four tests, the best three of the four tests will be used to determine the test component of your final mark.
3. Students who fail to achieve a term mark of at least 50% will automatically receive a letter grade of **FND (Fail, no deferral)** in the course.
4. Students who fail to achieve at least 50% on the final exam will automatically receive a letter grade of **FND** in the course.
5. I will use a combination of lecture slides and the chalkboard, and will adjust the use of each according to general consensus and the material. I **WILL NOT** make the slides available before the class (though I will afterwards): mathematics is an interactive activity – simply having slides open with Facebook or World of Warcraft in the background will not help you learn algebra (learning by osmosis is *not* a viable option), and will be distracting to those around you.

COURSE OVERVIEW:

For many of you this will comprise your first (and only) university algebra course. The goal of this course is for you to be familiar with dealing with linear equations and their solutions and otherwise be able to think critically and apply a few algorithms.

``But Dave, why should I care?''

Linear algebra is a strong tool in business and economics. In this course we will use linear algebra to solve problems phrased within the business framework. In addition, we will study the Leontief Input-Output model which relates production and demand. Leontief won the *Nobel Prize* for his work.

If one Nobel Prize winner isn't enough, how about John Nash (aka: Russell Crowe in 'A Beautiful Mind'), who won the Nobel Prize in economics for his work in Game Theory? Game theory (and Nash arbitration, particularly) relies on matrices and linear algebra at its core.

Finally, it's true: a computer can row-reduce *every single matrix* you throw at it and even give you *every single solution*. But if you don't know how to interpret and manipulate the solutions, you're ___ out of luck.

TENTATIVE LECTURE SCHEDULE

WEEK	DATES	SECTIONS	TOPICS
1	Sept 8 – 9	N/A	No class.
2	Sept 12 – 16	1.1	Introduction, Systems of Linear Equations
3	Sept 19 – 23	1.2	Row Reduction and Echelon Forms
4	Sept 26 – 30	1.3, 1.4	Vector Equations and Matrix Equations
5	Oct 3 – Oct 7	1.5, 1.7	Solution Sets of Linear Systems, Linear Independence
6	Oct 10 – 14	1.8, 1.9	Linear Transformations, Matrix Transformations
7	Oct 17 – 21	1.10, 2.1	Difference Equations, Matrix Operations
8	Oct 24 – 28	2.2, 2.3	The Inverse of a Matrix, Invertible Matrix Theorem
9	Oct 31 – Nov 4	2.6	Leontief Input-Output Model
10	Nov 7 – 11	2.8, 2.9	Subspaces of \mathbf{R}^n , Dimension and Rank
11	Nov 14 – 18	3.1	Determinants
12	Nov 21 – 25	3.2, 3.3	Properties of Determinants, Cramer's Rule
13	Nov 28 – Dec 2	4.9	Markov Chains

*As the title indicates, this schedule is only a guideline. It may move quicker or slower at times, so the best way of knowing what is on any test is to *attend class*. If you cannot attend class on any day, I strongly encourage you to “buddy-up” with someone to trade notes with. Your TA is there to deal with *specific questions* and does not know what is covered in lecture on any given day.

SUPPLEMENTAL MATERIAL:

Supplemental material (practice problems, suggested exercises, etc.) will occasionally be made available on the course website:

<http://www.math.carleton.ca/~dthomson/Teaching/MATH1119B-F11/index.html>

The website will also contain a list of important dates, and whatever other information I think needs to be there. Is something missing? Email me.