

**Instructor:** Yann Lamontagne  
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**Office Hours:** Office hours are posted outside the office 7B.16 and on the website.  
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The solutions to the evaluations as well as announcements and additional examples are posted on the website. The material of previously taught courses is also available.

**Teacher Accessibility:** For out of class communication please see me during my office hours.  
**Term Work:** *Term work is worth 25% or 50% of final grade, see Grading Policy.*

	<i>Percent of term work grade:</i>	<i>Tentative schedule:</i>
Quizzes*	80%	<b>on every Tuesday unless announced otherwise due every Sunday at 22h00 unless announced otherwise</b>
WeBWorKs**	20%	

\* Each quiz is usually between 15 and 30 minutes in duration at the end of class. The students' two quizzes with the lowest grades do not count towards the final grade.

\*\* Additional WeBWorKs might be added to those initially posted on WeBWorKs and LEA.

**Important:**

- There will be no make-up tests or WeBWorKs. If appropriate medical documentation is presented the weight of the test or WeBWorK will be transferred proportionally to the remaining evaluations of the semester.
- WeBWorKs questions cannot be submitted late. Questions that are not answered by the due date receive a mark of zero.
- Students who will be absent for any predictable reason on a test day must inform the instructor in writing within the first two weeks of the semester of their intent to be absent so that alternative arrangements can be made. The written notice must be given even when the exact date is not known until later.
- Please note that I do **not** use Omnivox MIO, and messages sent to MIO are unfortunately ignored.

## Course Objectives

The course familiarizes students with scalars, vectors, matrices (identity and inverse), determinants, operations on vectors and matrices, and systems of linear equations in matrix form. The course also presents applications of matrix theory to linear models, including examples from the business and economic world.

## Course Competencies

This course will allow the student to fully achieve the competency:

022Z: To apply methods of linear algebra and vector geometry to the study of various phenomena of human activity.

1. To situate the historical context of the development of linear algebra and vector geometry.
2. To use matrices to solve concrete problems.
3. To apply different methods of solving systems of linear equations.
4. To use vector operations to solve concrete problems.
5. To establish connections between vector geometry and linear algebra.
6. To apply the methods of linear algebra and vector geometry to the study of line and plane geometry.
7. To solve optimization problems using methods of solving systems of linear inequations with two or more variables.

This course also contributes to the partial achievement of the competency:

022R: To thoroughly analyze a human phenomena.

1. To know and understand the facts, notions, concepts, theories, methods and other components that are part of a body of knowledge related to Social Science disciplines.
2. To analyze various aspects of cases, situations or problems.
3. To analyze a theme based on knowledge already acquired.

## Pre-requisites

High school or CEGEP Functions or equivalent.

*Note, however, that the majority of the students who take this course have already passed Calculus I and Calculus II, so they exhibit a fair degree of mathematical maturity.*

## Ponderation

3-2-3 (3 hours of lecture, 2 hours of labs, and 3 hours of work outside class for each 5 hours of class time)

## Evaluation

The Institutional Student Evaluation Policy (ISEP) is designed to promote equitable and effective evaluation of student learning and is therefore a crucial policy to read and understand. The policy describes the rights and obligations of students, faculty, departments, programs, and the College administration with regard to evaluation in all your courses, including grade reviews and resolution of academic grievance. ISEP is available on the Dawson website. <https://www.dawsoncollege.qc.ca/governance/institutional-student-evaluation-policy/>

## Term Work

A minimum of 3.5 hours of in class testing is required.

## Final Examination

The final examination will be a supervised, comprehensive examination held during the formal examination period.

## Evaluation Policy

The grading scheme will be the best of:

- Option 1:
  - 50% term work
  - 50% final examination
- Option 2:
  - 25% term work
  - 75% final examination

In order to pass the course, students must obtain a final grade of at least 60%, calculated according to the evaluation scheme above.

## Required Text and Materials

**Required text:** *Elementary Linear Algebra (2nd Custom Edition based on Twelfth Edition)* by H. Anton, C. Rorres and A. Kaul.

**References:** *Linear Algebra with Applications* by W. K. Nicholson, *Linear Algebra* by S. Grossman, *Elementary Linear Algebra* by B. Kolman, *Linear Algebra - Ideas and Applications* by R.C. Penney.

**Additional Sources:** *Elementary Linear Algebra* by R. M. McKenzie, *Problem Assignments* by S. Phull, *Linear Algebra Problem Sets Plus* by I. Gombos.

**Calculators:** Students are only permitted to use the Sharp EL-531\*\* calculator during tests and examinations.

## Teaching Methods

Lectures and problem sessions.

## Attendance & Course Participation Requirements

Attendance is recommended for the successful completion of the course.

For additional information regarding attendance, students should refer to the Institutional Student Evaluation Policy (ISEP section IV-C).

## Literacy Standards

Problem solving is an essential component of this course. Students will be expected to analyze problems stated in words, to present their solutions logically and coherently, and to display their answers in a form corresponding to the statement of the problem, including appropriate units of measurement. Marks will be deducted for work which is inadequate in these respects, even though the answers may be numerically correct.

## Student Obligations

Everyone has the right to a safe and non-violent environment. Students are obliged to conduct themselves as stated in the Student Code of Conduct and in the ISEP section on the roles and responsibilities of students (ISEP section II-D).

1. Students have an obligation to arrive on time and remain in the classroom for the duration of scheduled classes and activities.
2. Students have an obligation to write tests and final examinations at the times scheduled by the teacher or the College. Students have an obligation to inform themselves of, and respect, College examination procedures.
3. Students have an obligation to show respectful behavior and appropriate classroom deportment. Should a student be disruptive and/or disrespectful, the teacher has the right to exclude the disruptive student from learning activities (classes) and may refer the case to the Director of Student Services under the Student Code of Conduct.
4. Electronic/communication devices (including cell phones, mp3 players, etc.) have the effect of disturbing the teacher and other students. All these devices must be turned off and put away. Students who do not observe these rules will be asked to leave the classroom.

## **Academic Integrity**

***Cheating in Examinations, Tests, and Quizzes:*** Cheating includes any dishonest or deceptive practice relative to formal final examinations, class tests, or quizzes. Such cheating is discoverable during or after the exercise in the evaluation process by the instructor. Such cheating includes, but is not limited to:

1. copying or attempting to copy another's work.
2. obtaining or attempting to obtain unauthorized assistance of any kind.
3. providing or attempting to provide unauthorized assistance of any kind.
4. using or possessing any unauthorized material or instruments which can be used as information storage and retrieval devices.
5. taking an examination, test, or quiz for someone else.
6. having someone take an examination, test, or quiz in one's place.

***Unauthorized Communication:*** Unauthorized communication of any kind during an examination, test, or quiz is forbidden and subject to the same penalties as cheating.

***Plagiarism on Assignments and the Comprehensive Examination:*** Plagiarism is the presentation or submission by a student of another person's assignments or Comprehensive Examination as his or her own. Students who permit their work to be copied are considered to be as guilty as the plagiarizer.

***Penalties:*** Cheating and plagiarism are considered extremely serious academic offences. Action in response to an incident of cheating and plagiarism is within the authority of the teacher. Penalties may range from zero on a test, to failure in the course, to suspension or expulsion from the college.

According to ISEP, the teacher is required to report to the Sector Dean all cases of cheating and plagiarism affecting a student's grade. (See ISEP section V-A.)

## **Intensive Course Conflicts & Policy on Religious Observance**

If a student is attending an intensive course, the student must inform the teacher, within the first two weeks of class, of the specific dates of any anticipated absences.

Students observing religious holidays must inform each of their teachers, in writing, of the specific dates as soon as possible, but no later than the end of the second week of the impacted semester or term. Alternative arrangements convenient to both the student and the teacher must be made at the earliest opportunity. In the event that the date of a religious observance has yet to be determined, students must submit the name of the observance to their teachers and provide them with the specific date(s) as soon as it becomes available. This applies both to the semester or term, as well as to any final examination period. Students who make such arrangements will not be required to attend classes or take examinations on the designated days, nor be penalized for their absence.

It must be emphasized, however, that this College policy should not be interpreted to mean that a student can receive credit for work not performed. It is the student's responsibility to fulfill the requirements of the alternative arrangement. (ISEP Section IV-D)

A form for this purpose is available here: [https://www.dawsoncollege.qc.ca/mathematics/religious\\_observance\\_and\\_intensive\\_courses\\_form/](https://www.dawsoncollege.qc.ca/mathematics/religious_observance_and_intensive_courses_form/)

## **Mathematics Tutorial Room**

Volunteer math teachers are available for help in room 7B.1 from 10:00 to 16:00 (Monday through Friday) and from 17:00-18:00 (Monday through Thursday).

## **COVID-19**

For all Covid-related questions, please refer to Dawson College's FAQ page at <https://www.dawsoncollege.qc.ca/current-semester/return-to-campus-fall-2021/>

## Course Content & Tentative Schedule

(Number of classes listed is approximate, Individual instructors will provide a detailed outline for the Supplementary part of the course.)

<b>TOPICS</b>	<b>SPECIFIC COMPETENCY</b> (*indicates the topic is not covered in the text)	<b>LEARNING ACTIVITIES</b> (Chapter, sections & problems in text)	<b>TIME</b> (In weeks)
Systems of Linear Equations	Solving systems of linear equations using Gaussian elimination and Gauss-Jordan elimination Properties of matrices and matrix algebra Definition of matrix inverse and more matrix algebra Properties of elementary matrices, finding inverse matrices Theorems on invertibility and solutions of systems Diagonal, triangular and symmetric matrices	1.1 prob 1, 2, 5-14, 17-20, 1.2 prob 1-30 1.3 prob 1-6, 11-16, 23-26 1.4 prob 1-8, 11-22, 25-28, 33, 39-40, 42, 43,45- 47, 49, 50  1.5 prob 1- 13, 15-17, 19, 20, 23-26, 27 1.6 prob 1-10, 13-18, 19, 20 1.7 prob 1, 2, 7-10, 13, 14, 17- 22, 25-28, 30-35, 41-43, 45 Supp. Ex 9- 11, 13(a, b), 14(a)	5
The Determinant Function	Evaluating determinants by cofactor expansion Evaluating determinants by row reduction Investigating properties of the determinant function the adjoint of a square matrix; finding inverses using the adjoint solving systems of linear equations using Cramer's Rule.	2.1 prob 1-32 2.2 prob 1--24 2.3 prob 1-13, 15-27, 29, 33-37  Supp. Ex. 1-8, 13-16	4
Vectors	The geometric definition of a vector, component notation for a vector Norm of a vector, vector arithmetic, the dot product Vector projections and applications The Cross Product and its properties and applications The Scalar Triple Product and applications  Lines and Planes in Space (the following problems are covered). - Point-normal and general forms for the equation of a plane. - Symmetric, parametric & vector equations for a line. - Distance problems: From a point to a plane, from a point to a line, between 2 parallel planes, - Intersection problems: A line and a plane, two lines, two planes.	3.1 prob 1-7, 9, 10, 16 3.2 prob 1(a), 2(a), 3, 4, 9(a), 15-16 3.3 prob 1(a, b), 2(a, b, c), 13-18, 21-24, 29- 33  3.5 prob 1, 2, 7-30, 33-35  3.3 prob 3-12, 25-28 3.4 prob. 1-8, 13,14 plus supplementary problems  Supp. Ex. 1(a, b, d, e, f), 2, 7, 11, 12, 14-15, 17, 19-21, 23	4
Linear Programming Networks (Traffic Flow),	Simplex method, dual problem The Leontief Input-Output Model (Supplementary problems)	Class note plus supplementary problems	2