

**DEPARTMENT OF SCIENCE**

**COURSE OUTLINE – Fall 2024**

**MA1200 (B2): Linear Algebra I – 3 (3-1-0) 60 Hours for 15 Weeks**

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

**INSTRUCTOR:** Abdel Bensouilah      **PHONE:** (780) 539-2052  
**OFFICE:** J120      **E-MAIL:** [ABensouilah@nwpolytech.ca](mailto:ABensouilah@nwpolytech.ca)  
**OFFICE HOURS:** 10:00 AM to 12:00 PM on Tuesdays and Thursdays, or by appointment.

**CALENDAR DESCRIPTION:** Systems of linear equations, vectors in n-space, vector equations of lines and planes, matrix algebra, inverses and invertibility, introduction to linear transformations, subspaces of n-space, determinants, introduction to eigenvalues and eigenvectors, the dot product and orthogonality, applications in a variety of fields.

**PREREQUISITE(S)/COREQUISITE:** Mathematics 30-1 or equivalent

**REQUIRED TEXT/RESOURCE MATERIALS:**

- W. Keith Nicholson, Linear Algebra with Applications (free pdf available at: [www.lyryx.com](http://www.lyryx.com))
- Use of calculators is not permitted on the tests or exams

**DELIVERY MODE(S):**

Lecture: B2 13:00 – 14:20 T R (Room J226)

Seminar: BS1 13:00 – 13:50 M (Room J226)

**LEARNING OUTCOMES:**

A successful student will be able to:

- Solve systems of linear equations using Gaussian Elimination, Cramer's Rule, and inverse matrices.

- Perform matrix algebra computations, calculate matrix inverses, represent linear transformations by matrices.
- Compute determinants, find eigenvalues and eigenvectors, and diagonalize matrices.
- Find equations of lines and planes, compute dot and cross products.
- Identify subspaces of  $\mathbb{R}^n$ , find bases of subspaces, determine rank and nullity of a matrix.
- Apply these concepts to solving problems in various settings.

**TRANSFERABILITY:**

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page

<http://www.transferalberta.alberta.ca>.

**\*\* Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

**EVALUATIONS:**

Quizzes & Assignments: 20%

Assignments are held on a weekly basis.

Quizzes will be announced one lecture prior to the quiz.

Midterms: 2 × 20% (Tentatively Week 6: Thursday Oct 10, Week 11: Thursday Nov 21)

Final Exam: 40% (Cumulative and scheduled during exam period, Dec 12-19 inclusive)

It is the student’s responsibility to be available to write the final exam at the scheduled time.

Writing early is not permitted.

**GRADING CRITERIA:** Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	95-100	C+	2.3	67-69
A	4.0	85-94	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

**COURSE SCHEDULE/TENTATIVE TIMELINE:**

	Class Dates	Chapters/Sections
Week 1	Sept 3, 5	Systems of Equations (1.1)
Week 2	Sept 10, 12	Gaussian elimination, Homogeneous systems and applications (1.2, 1.3, 1.5)
Week 3	Sept 17, 19	Matrices first properties, matrix-vector multiplication (2.1, 2.2)
Week 4	Sept 24, 26	Matrix multiplication, matrix inverses and applications (2.3, 2.4, 2.8)
Week 5	Oct 1, 3	Linear transformations (2.6)
Week 6	Oct 8, 10	Determinants and cofactor expansion (3.1)
Week 7	Oct 15, 17	Determinants and matrix inverses, elementary matrices (3.2, 2.5)
Week 8	Oct 22, 24	Vector geometry, projections and planes (4.1, 4.2)
Week 9	Oct 29, 31	Cross product (4.3, 4.4)
Week 10	Nov 5, 7	Vector space in $\mathbb{R}^n$ (5.1)
Fall Break	None	
Week 11	Nov 19, 21	Linear independence and dimension in $\mathbb{R}^n$ (5.2)
Week 12	Nov 26, 28	Orthogonality in $\mathbb{R}^n$ (5.3)
Week 13	Dec 3, 5	Diagonalization and eigenvalues (3.3)
Week 14	Dec 10	Review for final exam
Finals (between Dec 12 and 19)		

**STUDENT RESPONSIBILITIES:** Students are responsible for all lecture material, seminars and readings. Students are expected to practice the material by doing problems from the textbook. Tests or seminars cannot be rescheduled. If a test or seminar is missed due to illness or an extreme misfortune the weight will be distributed evenly with the other tests or seminars. A doctor's note and/or an email with supporting documents will be required in all cases. No recording of any kind is allowed in the class, seminar or during consultation with the instructor.

**STATEMENT ON ACADEMIC MISCONDUCT:**

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

\*\*Note: all Academic and Administrative policies are available on the same page.