UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: September 1994
REVISED COURSE IMPLEMENTATION DATE: September 2026
COURSE TO BE REVIEWED (six years after UEC approval)**:** March 2032
Course outline form version: 29/08/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 152	**Number of Credits:** 3 Course credit policy (105)
Course Full Title: Linear Algebra for Engineering **Course Short Title:** Linear Algebra for Engineering	
Faculty: Faculty of Science	**Department/School:** Mathematics & Statistics

Calendar Description:

Intended for engineering students, this course covers basic problems and concepts of linear algebra in R^n, such as matrix algebra, solutions to linear systems of equations, determinants, and eigenvalue problems. Emphasis throughout the course is placed on applications in science and engineering.

Note: This course is offered as MATH 152 and ENGR 152. Students may take only one of these for credit.

Prerequisites (or NONE):	MATH 111.
Corequisites (if applicable, or NONE):	None.
Pre/corequisites (if applicable, or NONE):	None.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with: **ENGR 152**

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	50
Total hours	**50**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: **No**

Course Details

Special Topics course: **No**
(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**
(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **Face-to-face only**

Expected frequency: **Winter only**

Maximum enrolment (for information only)**: 36**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Transfer Credit *(See bctransferguide.ca.)*

Transfer credit already exists: **Yes**

Submit outline for (re)articulation: **Yes**
(If yes, fill in transfer credit form.)

Department approval	**Date of meeting:**	April 28, 2025
Faculty Council approval	**Date of meeting:**	May 30, 2025
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	March 27, 2026

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

Upon successful completion of this course, students will be able to:

1. Construct and solve linear systems of equations that arise in applications.
2. Determine whether a set of vectors is linearly independent.
3. Identify or construct bases for subspaces of R^n to determine their dimensions.
4. Determine whether a transformation is linear and represent linear transformations as matrix multiplication.
5. Perform operations of matrix algebra.
6. Calculate and interpret determinants.
7. Determine the eigenvalues and eigenvectors of matrices, and use them for diagonalization and applications.
8. Perform elementary algebraic operations with complex numbers.
9. Calculate the projection of a vector onto a subspace using dot products.
10. Use software to perform the calculations associated with the previous objectives in larger systems.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Final exam:	35%	Assignments:	15%		%
Quizzes/tests/midterm:	50%				%

Details:

Weight of quizzes/tests/midterm will typically be broken down into 10-15% for quizzes and 35-40% on term tests. Students must achieve at least 40% on the final exam in order to receive credit for this course.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures, with tutorial sessions.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	Book	Lay D., Lay, S., & McDonald, J.	Linear Algebra and its Applications, 6th ed., Pearson	2020
2.	Book	Strang, G	Linear Algebra and its Applications, 4th ed., Thompson	2005
3.	OER	Kuttler, K.	A First Course in Linear Algebra, LibreTexts	2017
4.				
5.				

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

The course will use open-source software such as GNU Octave or Python.

Course Content and Topics

Most examples and demonstrations will be in terms of 2- and 3-dimensions. Software will be used where appropriate

1. Linear systems of equations; row-reduced echelon form, rank; applications of linear systems.
2. The vector space R^n, dot product, and applications to 2D and 3D geometry.
3. Matrix algebra, elementary matrices, inverses, transposes.
4. Matrix representation of linear transformations; applications of linear transformations.
5. Calculation of determinants and properties of determinants.
6. Linear dependence and independence, span, dimension.
7. Orthogonal transformations, orthonormal basis.
8. Algebra of complex numbers.
9. Eigenvalues / eigenvectors, diagonalization, symmetric matrices.