UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	September 1994
COURSE REVISED IMPLEMENTATION DATE:	January 2002
COURSE TO BE REVIEWED:	January 2006
(Four years after implementation date)	(MONTH YEAR format)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **MATHEMATICS AND STATISTICS**

MATH 152		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

LINEAR ALGEBRA FOR ENGINEERING
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course covers the solutions to linear systems of equations, vector spaces, applications to 2D and 3D geometry, linear dependence and independence, matrix algebra, determinants, orthogonal transformations and bases, application to Fourier series, eigenvalues, diagonalization, symmetric matrices, the algebra of complex numbers, the differential equations of vibrational models and linear systems of differential equations. This course is designed for students seeking a career in engineering; students intending on a BSc or BA degree are recommended to take MATH 221 instead of ENGR/MATH 152.

NOTE: UCFV math degrees require MATH 221, not Math 152. Credit cannot be obtained for both MATH 152 and ENGR 152. This course is also listed as ENGR 152.

PREREQUISITES: **Pre- or Corequisite: MATH 112**
COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: **N/A**
(Course #)
(b) Cannot take: **ENGR 152** for further credit.
(Course #)

SERVICE COURSE TO:
Physics/Engineering
(Department/Program)

(Department/Program)

TOTAL HOURS PER TERM: **60**

STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:		Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE:
HOURS PER DAY:

MAXIMUM ENROLLMENT:	**36**	
EXPECTED FREQUENCY OF COURSE OFFERINGS:	**every Winter semester**	
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☒ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☒ Yes	☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Math Department/Barry Garner - update

Chairperson: *(Curriculum Committee)*

Department Head: Greg Schlitt

Dean: Jackie Snodgrass

PAC Approval in Principle Date:

PAC Final Approval Date: November 28, 2001

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

The successful student will be able to:

1. Solve systems of linear equations;
2. Perform appropriate calculations to test for the existence of a vector space, for linear dependence and independence, construct a basis for a vector space and calculate its dimension;
3. Find eigenvalues and eigenvectors, especially of symmetric matrices of small dimension, and reduce to diagonal form;
4. Perform the usual calculations with complex numbers including conjugacy manipulations and applications of DeMoivre's theorem;
5. Apply the previous techniques to the solution of differential equations;
6. Be able to derive the vibrational solutions to second-order linear differential equations with constant coefficients;
7. Use the appropriate technology to perform the calculations associated with these mathematical methods.

Note: this course concentrates on Euclidean N-spaces and sub-spaces thereof.

METHODS:

Lectures, with tutorial sessions.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check :) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Course challenge

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]
The text is chosen by a departmental curriculum committee.

Recent texts:
Kreyzig, E. and Wiley, J. *Advanced Engineering Mathematics.* 8^{th} edition.
Zill, D. and Kent, PWS. *A First Course in Differential Equations with Applications.* (Chapter 5, Vibrational Models)
Anton, H. and Wiley, J. *Elementary Linear Algebra.* 8^{th} edition.

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Assignments & quizzes	25%
Mid-term examinations (2)	30%
Final examination	45%

Students must achieve at least 40% on the final exam in order to receive credit for this course.

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

Use of graphing calculator and/or C.A.S. expected.
Most examples and demonstrations will be in terms of 2- and 3-dimentions.

1. Linear systems of equations; row-reduced echelon form, rank.
2. Vector space, dot product, vector product (in 3D); applications to 2D and 3D geometry.
3. Matrix algebra, elementary matrices, inverses, transposes.
4. Matrix form of geometrically defined linear transformations.

5. Properties of determinants.
6. Linear dependence and independence, span, dimension.
7. Orthogonal transformations, orthonormal basis.
8. Algebra of complex numbers, De-Moivre's theorem, exp(z), In(z), principal value, exp(w In(z)).
9. Eigenvalues/ - vectors, diagonalization, symmetric matrices.
10. Second order linear differential equations with constant coefficients, vibrational models.
11. Linear systems of differential equations, diagonizable case, 2 x 2 nondiagonalizable case.
12. Fourier series.