

**Math 251 Class Outline**  
**CAMOSUN COLLEGE**  
**MATHEMATICS DEPARTMENT**

**Calendar Description**

*This course is restricted to students in the Engineering Bridge (UVic) program. Topics: complex numbers, linear systems and matrices, matrix operations, determinants, vectors in 2-space and 3-space, vector spaces, linear dependence and independence, orthogonality, eigenvalues and eigenvectors and linear transformations. Engineering applications are provided throughout the course.*

**Course Information**

**Instructors:** Drs. Peter J. Trushel and Chi-Ming Leung  
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**Office hours:** by appointment or posted

**Organization**

OFFERED: 4th Quarter  
CREDIT: 3  
IN-CLASS WORKLOAD: 6 hours lecture/week  
OUT-OF-CLASS WORKLOAD: 6 hours/week

**Objectives**

To learn the concepts, techniques and applications associated with vectors and matrices.

**Text**

Howard Anton and Chris Rorres, *Elementary Linear Algebra*, Edition 8E, Wiley, 1997.

**Evaluation**

4 term tests: 50%  
Comprehensive final exam: 50%

**Percentage to Letter Grade Conversion**

Percentage	Letter Grade
95 to 100	A+
90 to 94	A
85 to 89	A-
80 to 84	B+
75 to 79	B
70 to 74	B-
65 to 69	C+
60 to 65	C
50 to 59	D
below 50	F

**Outline****System of Linear Equations and Matrices**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
1.1 (1)	<b>read</b>	Introduction to Systems of Linear Equations
1.2 (1)	1	Gaussian Elimination
1.3 (1)	1	Matrices and Matrix Operations
1.4 (1)	2	Inverses; Rules of Matrix Arithmetic
<b>1 July, 2004</b>		<b>Canada Day</b>
1.5 (2)	2	Elementary Matrices and a Method for Finding $\mathbf{A}^{-1}$
1.6 (2)	1	Further Results on Systems of Equations and Invertibility
1.7 (2)	1	Diagonal, Triangular, and Symmetric Matrices
<b>Total hours</b>	<b>8</b>	

**Determinants**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
2.1 (2)	1	The Determinant Function
2.2 (2)	1	Evaluating Determinants by Row Reduction
2.3 (3)	1	Properties of the Determinant Function
2.4 (3)	2	Cofactor Expansion; Cramer's Rule
<b>Total hours</b>	<b>5</b>	

**Vectors in 2-Space and 3-Space**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
3.1 (3)	<b>read</b>	Introduction to Vectors (Geometric)
3.2 (3)	1	Norm of a Vector; Vector Arithmetic
3.3 (3, 4)	2	Dot product; Projections
<b>16 July 2004</b>		<b>Test 1</b>
3.4 (4)	2	Cross Product
3.5 (4)	2	Lines and Planes in 3-Space
<b>Total hours</b>	<b>7</b>	

**Euclidean Vector Spaces**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
4.1 (4)	1	Euclidean $\mathbf{n}$ -Space
4.2 (5)	2	Linear Transformations from $\mathbf{R}^n$ to $\mathbf{R}^m$
<b>Total hours</b>	<b>3</b>	

**General Vector Spaces**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
5.1 (5)	1	Real Vector Spaces
5.2 (5)	1	Subspaces
5.3 (5, 6)	2	Linear Independence
<b>30 July 2004</b>		<b>Test 2</b>
<b>2 August 2004</b>		<b>BC Day</b>
5.4 (6)	2	Basis and Dimension
5.5 (6)	2	Row Space, Column Space, and Nullspace
5.6 (7)	2	Rank and Nullity
<b>Total hours</b>	<b>10</b>	

**Outline (Continued)****Inner Product Spaces**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
6.1 ( 7)	2	Inner Products
6.2 (7, 8)	2	Angle and Orthogonality in Inner Product Spaces
<b>13 August 2004</b>		<b>Test 3</b>
6.3 (8)	2	Orthonormal Bases; Gram-Schmidt Process
6.4 (8)	2	Best Approximation; Least Squares
6.5 (8, 9)	2	Orthogonal Matrices; Change of Basis
<b>Total hours</b>	<b>10</b>	

**Eigenvalues, Eigenvectors**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
7.1 (9)	2	Eigenvalues and Eigenvectors
7.2 (9)	2	Diagonalization
<b>27 August 2004</b>		<b>Test 4</b>
<b>Total hours</b>	<b>4</b>	

**Linear Transformations**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
8.1 (10)	2	General Linear Transformations
8.2 (10)	2	Kernel and Range
8.4 (10)	2	Matrices of General Linear
<b>Total hours</b>	<b>6</b>	

**Additional Topics**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
<b>6 September 2004</b>		<b>Labour Day</b>
11.1 (11)	1	Constructing Curves and surfaces through Specified Points
9.2 (11)	1	Geometry of Linear Operators on $\mathbf{R}^2$
<b>Total hours</b>	<b>2</b>	

**Complex Vector Spaces**

<b>Text(Week)</b>	<b>Hours</b>	<b>Topic</b>
10.1 (1)	1	Complex Numbers
10.2 (1)	1	Modulus; Complex Conjugate; Division
10.3 (1)	1	Polar Form; DeMoivre's Theorem
<b>Total hours</b>	<b>3</b>	

Lecture	<b>58 hours</b>
Tests	<b>4 hours</b>
Holidays	<b>4 hours</b>
<b>Total</b>	<b>66 hours</b>