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

Assignments	10%
Two term tests:	40%
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

Complex Vector Spaces

Text(Week)	Hours	Topic
10.1 (1)	1	Complex Numbers
10.2 (1)	1	Modulus; Complex Conjugate; Division
10.3 (1)	2	Polar Form; DeMoivre's Theorem
Total hours	**4**	

System of Linear Equations and Matrices

Text(Week)	Hours	Topic
1.1 (1)	**read**	Introduction to Systems of Linear Equations
1.2 (2)	2	Gaussian Elimination
1.3 (2)	1	Matrices and Matrix Operations
1.4 (2)	2	Inverses; Rules of Matrix Arithmetic
1.5 (2, 3)	2	Elementary Matrices and a Method for Finding $\mathbf{A}^{-1}$
1.6 (3)	1	Further Results on Systems of Equations and Invertibility
1.7 (3)	1	Diagonal, Triangular, and Symmetric Matrices
Total hours	**9**	

Determinants

Text(Week)	Hours	Topic
2.1 (3)	1	The Determinant Function
2.2 (3)	1	Evaluating Determinants by Row Reduction
2.3 (3)	1	Properties of the Determinant Function
2.4 (4)	1	Cofactor Expansion; Cramer's Rule
Total hours	**4**	

Vectors in 2-Space and 3-Space

Text(Week)	Hours	Topic
3.1 (4)	1	Introduction to Vectors (Geometric)
3.2 (4)	1	Norm of a Vector; Vector Arithmetic
3.3 (4)	2	Dot product; Projections
3.4 (4, 5)	2	Cross Product
3.5 (5)	2	Lines and Planes in 3-Space
Total hours	**8**	

Euclidean Vector Spaces

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

OUTLINE (continued)

General Vector Spaces

Text(Week)	Hours	Topic
5.1 (6)	1	Real Vector Spaces
5.2 (6)	1	Subspaces
5.3 (6)	2	Linear Independence
5.4 (6, 7)	2	Basis and Dimension
5.5 (7)	2	Row Space, Column Space, and Nullspace
5.6 (7)	2	Rank and Nullity
Total hours	**10**	

Inner Product Spaces

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

Eigenvalues, Eigenvectors

Text(Week)	Hours	Topic
7.1 (9)	2	Eigenvalues and Eigenvectors
7.2 (9, 10)	2	Diagonalization
Total hours	**4**	

Linear Transformations

Text(Week)	Hours	Topic
8.1 (10)	1	General Linear Transformations
8.2 (10, 11)	2	Kernel and Range
8.4 (11)	2	Matrices of General Linear Transformations
Total hours	**5**	

Additional Topics

Text(Week)	Hours	Topic
11.1 (11)	1	Constructing Curves and sufaces through Specified Points
9.2 (11)	1	Geometry of Linear Operators on $\mathbf{R}^2$
9.3(11)	1	Least Squares Fitting to Data
Total hours	**3**	

Lecture	**60 hours**
Holidays	**4 hours**
2nd Midterm	**2 hours**
Total	**66 hours**