MATH 261 Applied Linear Algebra

ORGANIZATION

IN-CLASS WORKLOAD:	8 hours/week
OUT-OF-CLASS WORKLOAD:	10 – 16 hours/week
PREREQUISITES:	Enrolled in Civil Engineering Bridge.
COREQUSITES:	Math 260

Topics: complex numbers, vectors, matrices, linear equations, determinants, orthogonality, the Gram-Schmidt process, eigenvalues and eigenvectors, linear transformations, systems of first-order linear differential equations, least squares method, quadratic forms and LU-decomposition.

TEXT:
Linear Algebra (A Modern Introduction), David Poole

TENTATIVE OUTLINE: (*Topics may not be covered in the order they are listed*)

Chapter 1 – Vectors
1.1 The Geometry and Algebra of Vectors
1.2 Length and Angle: The Dot Product
1.3 Lines and Planes
Exploration The Cross Product

Chapter 2 – Systems of Linear Equations
2.1 Introduction to Systems of Linear Equations
2.2 Direct Methods for Solving Linear Systems
2.3 Spanning Sets and Linear Independence
2.4 Applications

Chapter 3 – Matrices
3.1 Matrix Operations
3.2 Matrix Algebra
3.3 The Inverse of a Matrix
3.4 Subspaces, Basis, Dimension, and Rank
3.5 Introduction to Linear Transformations
Exploration The LU Factorization

Chapter 4 – Eigenvalues and Eigenvectors
Appendix C Complex Numbers
4.1 Introduction to Eigenvalues and Eigenvectors
4.2 Determinants
Exploration Geometric Applications of Determinants
4.3 Eigenvalues and Eigenvectors of $n \times n$ Matrices
4.4 Similarity and Diagonalization
4.6 Applications

Chapter 5 – Orthogonality
5.1 Orthogonality in $\Re^n$
5.2 Orthogonal Complements and Orthogonal Projections
5.3 The Gram Schmidt Process and the QR Factorization
5.4 Orthogonal Diagonalization of Symmetric Matrices
5.5 Applications

Chapter 6 – Vector Spaces
6.1 Vector Spaces and Subspaces
6.2 Linear Independence, Basis, and Dimension
6.3 Change of Basis
6.4 Linear Transformations
6.5 The Kernel and Range of a Linear Transformation
6.6 The Matrix of a Linear Transformation

Chapter 7 – Distance and Approximation
7.1 Inner Product Spaces
7.2 Norm and Distance Functions
7.3 Least Squares Approximation
7.4 Applications

ASSIGNMENTS:
Daily assignments will be given throughout the course. They will be posted on our website (http://www.camosun.bc.ca/~lai/). You do not need to turn them in, but complete understanding on how to solve the problems of the assignments will be essential for success on the term tests.

EVALUATION:
To pass the course, you need to pass the final exam., and then the final grade is calculated as follows.

Test (40%)	There will be 3 tests (tentatively scheduled on week 4, week 7, and week 10; they count for 13%, 13%, and 14% respectively of the final mark). There is NO makeup. **Medical excuse must be accompanied by a physician's note**.
Comprehensive Final Exam (60%)	Final exam. is held from March 22 – 26. You must be available at the scheduled time. There is NO makeup.

GRADING:

A+	95-100%	B+	80-84	C+	65-69	F	0-49
A	90-94	B	75-79	C	60-64		
A-	85-89	B-	70-74	D	50-59		

Instructor: Raymond Lai
Office: CBA 152 **e-mail:** lai@camosun.bc.ca
Phone No.: 370-4491 **Web Site:** http://www.camosun.bc.ca/~lai/
Office Hours: As posted or by appointment

	Monday	Tuesday	Wednesday	Thursday	Friday
07:30-08:20					
08:30-09:20					
09:30-10:20					
10:30-11:20					
11:30-12:20	Office Hour	Office Hour		Office Hour	Office Hour
12:30-13:20	Office Hour	Office Hour		Office Hour	Office Hour
13:30-14:20	Class	Class		Class	Class
14:30-15:20	Class	Class		Class	Class
15:30-16:30					