School of Arts & Science
Mathematics Department

MATH 261 Applied Linear Algebra
2005 Quarter 2 (January – March)

COURSE OUTLINE

The Approved Course Description is available on the web @
http://www.camosun.ca/calendar/2004/math.php

1. Instructor Information

(a) Instructor: Raymond Lai

(b) Office hours: Refer to the table on the last page (or by appointment)

(c) Location: CBA 152

(d) Phone: 370-4491

(e) E-mail: lai@camosun.bc.ca

(f) Website: http://www.camosun.bc.ca/~lai/

2. Intended Learning Outcomes

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.

3. Required Materials

(a) Text
    Linear Algebra with Applications (3/e), Otto Bretscher
(b) Other
    Supplementary notes (to be distributed in class)

4. Course Content and Schedule

ORGANIZATION

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

No class on: Friday 11 February 2005 (Reading Break)

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

Chapter 1 – Linear Equations
1.1   Introduction to Linear Systems
1.2   Matrices, Vectors, and Gauss-Jordan Elimination
1.3   On the Solutions of Linear Systems; Matrix Algebra

Chapter 2 – Linear Transformations
2.1   Introduction to Linear Transformations and Their Inverses
2.2   Linear Transformations in Geometry
2.3   The Inverse of a Linear Transformation
2.4   Matrix Products

Chapter 3 – Subspaces of R^n and their Dimensions
3.1   Image and Kernel of a Linear Transformation
3.2   Subspaces of R^n; Bases and Linear Independence
3.3   The Dimension of a Subspace of R^n
3.4   Coordinates

Chapter 4 – Linear Spaces
4.1   Introduction to Linear Spaces
4.2   Linear Transformations and Isomorphisms
4.3   The Matrix of a Linear Transformation

Chapter 5 – Orthogonality and Least Squares
5.1   Orthogonal Projections and Orthonormal Bases
5.2   Gram-Schmidt Process (and *QR* Factorization, if time permits)
5.3   Orthogonal Transformations and Orthogonal Matrices
5.4   Least Squares and Data Fitting
5.5   Inner Product Spaces (if time permits)

Chapter 6 – Determinants
6.1   Introduction to Determinants
6.2   Properties of Determinant
6.3   (Geometrical Interpretations of the Determinant, if time permits;) Cramer's Rule

Chapter 7 – Eigenvalues and Eigenvectors
7.1   Dynamical Systems and Eigenvectors: An Introductory Example
7.2   Finding the Eigenvalue of a Matrix
7.3   Finding the Eigenvectors of a Matrix
7.4   Diagonalization
7.5   Complex Eigenvalues
7.6   Stability (if time permits)

Chapter 8 – Symmetric Matrices and Quadratic Forms
8.1   Symmetric Matrices
8.2   Quadratic Forms
8.3   Singular Values (if time permits)

Chapter 9 – Linear Differential Equations
9.1   An Introduction to Continuous Dynamical Systems
9.2   The Complex Case: Euler's Formula (if time permits)
9.3   Linear Differential Operators and Linear Differential Equations

Appendix A – Vectors

5. Basis of Student Assessment (Weighting)

(a) Assignments (10%)

- Problems will be assigned each class (they will be posted at the class's website http://www.camosun.bc.ca/~lai); they are due at the beginning of the class on Tuesdays (starting 11 January 2005).
- Solutions should be presented in a neat and clear fashion and the paper should be well organized (and stapled if there is more than one page – penalty applies to "sloppy papers").
- Late assignments will be given a penalty of 25%.
- Complete solutions will be posted online at the class's website.

(b) Tests (30%)

- There will be 3 tests, tentatively scheduled on week 4 (Friday 28/1), week 7 (Friday 18/2), and week 10 (Friday 11/3); each test counts for 10% of the final mark.
- Complete understanding of the examples done in class and the exercises in the assignments will be essential for success on the tests.
- There is NO makeup. **Medical excuse must be accompanied by a physician's note**.
- Complete solutions will be posted online at the class's website.

(c) Final Exam (60%)

- The comprehensive final exam will cover the entire course and will be 3 hours long.
- As stated in the current college calendar on page 39, "students are expected to write tests and final examinations at the scheduled time and place." Exceptions will only be considered due to **emergency** circumstances as outlined in the calendar. Holidays or scheduled flights are not considered to be emergencies.
- Final examination period 21 – 29, March (specific date, time, and location TBA)

6. Grading System

To pass the course, you need to pass the final exam., and then the following percentage conversion to letter grade will be used:

A+ = 95 - 100%	B = 75 - 79%	D = 50 - 59%
A = 90 - 94%	B- = 70 - 74%	F = 0.0 - 49%
A- = 85 - 89%	C+ = 65 - 69%	
B+ = 80 - 84%	C = 60 - 64%	

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

How to do well in the course and where to get help
- Do not skip classes.
- Start working on the exercises as soon as they are assigned.
- Studying in groups is an efficient way to learn mathematics; however, make sure you can solve problems yourself.
- Extra help available from assistant at the Interurban Math Room: Technologies Centre (TEC) Room 142. This drop-in centre is freely available for your use to work on math homework and to seek help from the tutor on staff (see hours posted on door).
- Need a tutor/Want to become a tutor? Visit http://www.camosun.bc.ca/resources/ses/tutors_list.php

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at http://www.camosun.bc.ca

ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html

	Monday	Tuesday	Wednesday	Thursday	Friday
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	Math261-X01 (CBA101)	Math261-X01 (CBA101)		Math261-X01 (CBA101)	Math261-X01 (CBA101)
14:30-15:20	Math261-X01 (CBA101)	Math261-X01 (CBA101)		Math261-X01 (CBA101)	Math261-X01 (CBA101)
15:30-16:30					