THOMPSON RIVERS UNIVERSITY

Course Outline

Department of Mathematics & Statistics
Faculty of Science

MATH 1300 − 3 Credits
Linear Algebra for Engineers (3,1,0)
Fall, 2012

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Office Hours: TBA

Calendar Description

This course is designed for students in the first year Engineering Transfer program and covers vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$, linear transformations, matrices and elimination, eigenvalues and eigenvectors and their application to engineering problems. A computer lab component will be used to explore applications.

Education Objectives/Outcomes

On completion of the course, the student will be expected to:

1. understand the properties of the Vector Spaces $\mathbb{R}^2$ and $\mathbb{R}^3$,

2. understand the relationship between a linear transformation and the associated matrix,

3. be able to find eigenvalues and eigenvectors and apply these concepts to solving differential equations.

Prerequisites

Admission to the Engineering program.

Corequisites

MATH 1130 or MATH 1140

Texts/Materials

D. Poole, *Linear Algebra: A Modern Introduction*, 3rd edition, Brooks Cole, 2011.

Transferability

UBC: Math 152
UVic: Math 133

Student Evaluation

Weekly quizzes & Lab assignments 20%
Midterm exams (×2) 40%
Final exam 40%

Missed quizzes and exams will result in a mark of zero unless the student provides a valid reason and receives prior approval from the instructor.

Course Topics

1. **Vectors and Geometry**
   2D and 3D coordinates and vectors, areas of parallelograms and determinants, vector operations (including dot- and cross-products), applications of dot- and cross-products, equations of planes and lines.

2. **Linear Systems of Equations**
   Solution by row reduction, form of the general solution, applications.

3. **Matrices**
   Matrix operations, linear transformations, geometrical applications, matrix inverses, determinants, singular matrices.

4. **Eigenvalues and Eigenvectors**
   Applications leading to systems of first order linear ordinary differential equations (ODEs), eigenvalues and eigenvectors, solution of first order linear ODEs, diagonalization, complex numbers, symmetric matrices, numerical methods.

Final Exam

The final examination will cover all the material presented in the course.

The final examination will be written at a time between Dec. 3 and Dec. 15, as scheduled by the Registrar's Office. The examination could be scheduled at any time during this period. Students should plan accordingly.

For detailed information on policies and regulations regarding examinations please refer to the TRU calendar.

Methods for Prior Learning Assessment

Students wishing to demonstrate their mastery of the course syllabus may earn credit for this course by passing a challenge exam.

Use of Technology

Each student is expected to have a basic scientific calculator. Graphing and programmable calculators will be prohibited on all quizzes and exams.

There will be some lab assignments requiring students to use the computer mathematics package Matlab.