Liverpool John Moores University

Title:	LINEAR ALGEBRA
Status:	Definitive
Code:	**4010MATHS** (117221)
Version Start Date:	01-08-2016
Owning School/Faculty:	Applied Mathematics
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Paul Strickland	Y

Academic Level:	FHEQ4	**Credit Value:**	24	**Total Delivered Hours:**	72
Total Learning Hours:	240	**Private Study:**	168		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	48

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Portfolio	AS1	Mathematics: this will be a portfolio of computational examples set during the year. Each student will be given distinct question sets with randomly generated numbers. This assessment regime will allow extended use of mathematical software, preparing output in a variety of formats including 3D graphics and extensive algebraic calculations.	100	

Aims

To provide the basic concepts and techniques of linear algebra.
To develop manipulative skills in matrix algebra.
To utilise appropriate software packages with linear algebra facilities, e.g. DERIVE/MATLAB/MAXIMA.

Learning Outcomes

After completing the module the student should be able to:

1	Perform matrix algebra concepts and operations.
2	Solve linear systems of linear algebraic equations, understand the conditions for the existence of solutions.
3	Calculate advanced matrix operations in application areas.
4	Use matrices and vectors to perform geometric operations.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Portfolio	1	2	3	4

Outline Syllabus

-Matrix algebra concepts. Row spaces, column space, null space, rank, nullity.
-Echelon and row-reduced echelon form. Special types of matrices: inverse, triangular, diagonal, unity symmetric, skew-symmetric, idempotent, stochastic - practical examples of the occurrence of each.
-Methods for solving Linear Systems: Row Reduction, Gaussian elimination.
-Matrix Factorisation and application to solving linear systems: LU factorisation.
-Iterative methods for solving linear systems: Jacobi and Gauss Siedel methods.
-Eigenvalues and eigenvectors, similarity transformations. Markov processes.
-Gram-Schmidt orthogonalisation.
-Power Method for evaluating Eigenvalues.
-Applications of matrix algebra in geometry, including Euclidean and projective transformations.

Learning Activities

Lectures, tutorials and laboratory based used of mathematical software to solve linear algebra problems.

Notes

This module provides students with the experience of using pencil-and-paper techniques and mathematical software to solve realistic problems in Linear Algebra.