Liverpool John Moores University

Title:	LINEAR ALGEBRA
Status:	Definitive
Code:	**5001MATHS** (103226)
Version Start Date:	01-08-2016
Owning School/Faculty:	Applied Mathematics
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Paul Strickland	Y

Academic Level:	FHEQ5	**Credit Value:**	12	**Total Delivered Hours:**	50
Total Learning Hours:	120	**Private Study:**	70		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Practical	12
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Investigate mathematical questions using computer algebra	25	
Exam	AS2	Examination	75	2

Aims

To provide the basic concepts of linear algebra.
To develop manipulative skills in matrix algebra.
To provide practical experience in the application of numerical techniques in linear algebra.
To utilise appropriate software packages, e.g. DERIVE/MATLAB.

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 Perform and use numerical methods to solve particular linear algebra problems.
4 Use the software packages DERIVE and MATLAB to solve problems in the above categories.

Learning Outcomes of Assessments

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

Computer algebra	1	2		
Exam	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.

N.B. The syllabus will be supported throughout with the software DERIVE and/or MATLAB.

Learning Activities

Lectures, tutorials and laboratory based used of mathematical software.

Notes

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