



Course information 2011–12

MT2118 Advanced linear algebra (half course)

In MT1005b Mathematics 2, students have learned about diagonalisation of 2 by 2 matrices, and in Mathematics 1 and 2 students will have learned about solving systems of linear equations. In this course, the theoretical underpinning to these techniques is given, together with some applications, and some new ideas and techniques.

Prerequisite

If taken as part of a BSc degree, courses which must be passed before this half course may be attempted:

MT1174 Calculus *or*
MT105a Mathematics 1 *and* MT105b Mathematics 2.

Exclusion

May not be taken with MT3095 Further mathematics for economists.

Aims and objectives

This half course is designed to:

- enable students to acquire further skills in the techniques of linear algebra, as well as understanding of the principles underlying the subject
- prepare students for further courses in mathematics and/or related disciplines (e.g. economics, actuarial science).

Assessment

This half course is assessed by a two hour unseen written examination.

Learning outcomes

At the end of this half course and having completed the essential reading and activities students should have:

- ✓ have knowledge of the concepts, terminology, techniques and conventions covered in the half unit.
- ✓ be able to demonstrate an understanding of the underlying principles of the subject.
- ✓ be able to demonstrate the ability to solve unseen mathematical problems involving an understanding of the concepts.

Essential reading

For full details, please refer to the reading list

Anton, H. *Elementary Linear Algebra*. (John Wiley)
Lay, David C. *Linear Algebra and its Applications*.
(Addison Wesley)

Ostaszewski, A. *Advanced Mathematical Methods*.
(Cambridge University Press)

Simon, C.P. and L. Blume *Mathematics for Economists*. (W.W. Norton and Company)

Students should consult the *Programme Regulations for degrees and diplomas in Economics, Management, Finance and the Social Sciences* that are reviewed annually. The Prerequisites, Exclusions, and Syllabus are subject to confirmation in the *Regulations*. Notice is also given in the *Regulations* of any courses which are being phased out and students are advised to check course availability.

Syllabus

This is a description of the material to be examined, as published in the *Regulations*. On registration, students will receive a detailed subject guide which provides a framework for covering the topics in the syllabus and directions to the essential reading.

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Topics covered are:

Vector spaces, linear independence, basis, dimension, linear transformations, similarity, eigenvalues and eigenvectors, diagonalization, systems of difference and differential equations, powers of matrices, Markov chains, inner products, orthogonality, quadratic forms, orthogonal diagonalization, complex matrices, direct sums and projections, least squares, spectral theory.