UNIVERSITY OF LONDON
External System

# Unit information 2009–10
# 118 Advanced linear algebra (half unit)

In 05b 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 unit, 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, units which must be passed before this half unit may be attempted:

05a Mathematics 1
*and*
05b Mathematics 2.

## Exclusion
May not be taken with 95 Further mathematics for economists.

## Aims and objectives
This half unit 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 units in mathematics and/or related disciplines (e.g. economics, actuarial science).

## Assessment
This half unit is assessed by a two hour unseen written examination.

## Learning outcomes
At the end of this half unit and having completed the essential reading and activities students should have:

- ☑ knowledge of the subject matter, terminology and conventions covered in the course, as well as understanding of the underlying principles
- ☑ the ability to solve problems involving understanding of the concepts.

## Essential reading
Anton, H. *Elementary Linear Algebra*. (John Wiley, 2005) ninth edition. [ISBN 9780471449034].

Lay, David C. Linear A*lgebra and its Applications.* (Addison Wesley, 2005) third edition. [ISBN 9780321287137].

Ostaszewski, A. *Advanced Mathematical Methods.* (Cambridge University Press, 1991) [ISBN 9780521289641].

Simon, C.P. and L. Blume *Mathematics for Economists.* (W.W. Norton and Company, 1994) [ISBN 9780393957334].

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 units which are being phased out and students are advised to check unit 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.