

# MATH0014 Algebra 3: Further Linear Algebra

<i>Year:</i>	2021–2022
<i>Code:</i>	MATH0014
<i>Level:</i>	5 (UG)
<i>Normal student group(s):</i>	UG: Year 2 Mathematics degrees and Year 3 Mathematics and Statistical Science degrees
<i>Value:</i>	15 credits (= 7.5 ECTS credits)
<i>Term:</i>	1
<i>Assessment:</i>	85% examination, 10% coursework, 5% mid-term problem sheet
<i>Normal Pre-requisites:</i>	MATH0006
<i>Lecturer:</i>	Dr I Strouthos

## *Course Description and Objectives*

In this course, we will aim to further the study of some key concepts of linear algebra, through the study of notions related to polynomial rings over fields, matrix diagonalisability and the Jordan normal form, linear and bilinear forms, and inner product spaces.

## *Recommended Texts*

There is a number of textbooks covering the subject area(s) studied in this course. We will aim to make the course quite self-contained, but please feel free to contact the lecturer if you would like to obtain some further information regarding suitable textbooks for the course.

## *Detailed Syllabus*

**Polynomial rings:** A description of some of the basic objects of abstract algebra and an introduction to the theory of polynomial rings (over fields), including the presence of a Euclidean algorithm and associated results.

**Linear maps and the Jordan normal form:** A review of more basic parts of the theory of linear maps, including the notion of matrix diagonalisability, and a study of the Jordan normal form, including theory leading to the Primary Decomposition Theorem and methods of computation.

**Linear and bilinear forms, and inner product spaces:** An introduction to the theory of linear forms, including notions related to quadratic forms and canonical forms, as well as an introduction to the theory of real and complex inner product spaces.