1. KentVision Code and title of the module

MAST4006 - Mathematical Methods

## Division and School/Department or partner institution which will be responsible for management of the module

Division of Computing, Engineering and Mathematical Sciences (CEMS)

School of Mathematics, Statistics and Actuarial Science

## The level of the module (Level 4, Level 5, Level 6 or Level 7)

## Level 4

## The number of credits and the ECTS value which the module represents

15 credits (7.5 ECTS)

## Which term(s) the module is to be taught in (or other teaching pattern)

Autumn

## Prerequisite and co-requisite modules and/or any module restrictions

Pre-requisite: None

Co-requisite: MAST4009 (Probability)

## The course(s) of study to which the module contributes

Compulsory to the following courses: BSc Data Science (and with a year in industry), BSc Data Science with a Foundation Year.

## The intended subject specific learning outcomes. On successfully completing the module students will be able to:

8.1 demonstrate knowledge of the underlying concepts and principles associated with basic mathematical methods for functions of a single variable, and algebraic operations with matrices and vectors.

8.2 demonstrate the capability to make sound judgements in accordance with the basic theories and concepts for single-variable calculus, vectors, and matrices, whilst demonstrating a reasonable level of skill in calculation and manipulation of the material;

8.3 apply the underlying concepts and principles associated with basic single-variable calculus techniques and matrix operations in several well-defined contexts, showing an ability to evaluate the appropriateness of different approaches to solving problems in this area.

## The intended generic learning outcomes. On successfully completing the module students will be able to:

Demonstrate an increased ability to:

9.1 manage their own learning and make use of appropriate resources;

9.2 understand logical arguments, identifying the assumptions made and the conclusions drawn;

9.3 communicate straightforward arguments and conclusions reasonably accurately and clearly;

9.4 manage their time and use their organisational skills to plan and implement efficient and effective modes of working;

9.5 solve problems relating to qualitative and quantitative information;

9.6 make use of information technology skills such as online resources (Moodle) and Maple;

9.7 communicate technical and non-technical material competently.

9.8 demonstrate an increased level of skill in numeracy and computation.

## A synopsis of the curriculum

This module introduces widely-used mathematical methods for functions of a single variable. The emphasis is on the practical use of these methods; key theorems are stated but not proved at this stage.

Basic notation for sets and number systems including complex numbers (a+ib representation only). Standard functions: trig functions, polynomials, rational functions, exponentials and logarithms.

Single variable calculus: Differentiation, including product and chain rules; Fundamental Theorem of Calculus (statement only), elementary integrals, change of variables, integration by parts, differentiation of integrals with variable limits.

Curve sketching: graphs of elementary functions, maxima, minima and points of inflection, asymptotes.

Algebra of matrices and vectors; addition, multiplication, transposes, inner-products.

Row reduced echelon form, solving linear systems (homogeneous and inhomogeneous).

Inverse of a matrix.

## Reading list

The University is committed to ensuring that core reading materials are in accessible electronic format in line with the Kent Inclusive Practices.

The most up to date reading list for each module can be found on the university's [reading list pages](https://kent.rl.talis.com/index.html).

## Contact Hours

Contact hours: 44

Private study: 106

Total: 150

## Assessment methods

* 1. Main assessment methods

Assessment 1 Exercises, requiring on average between 10 and 15 hours to complete 20%

Assessment 2 Exercises, requiring on average between 10 and 15 hours to complete 20%

Examination 2 hours 60%

The coursework mark alone will not be sufficient to demonstrate the student’s level of achievement on the module.

13.2 Reassessment methods

Like-for-like

## Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section 12) and methods of assessment (section 13)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  | **x** |  |
| Terminal classes |  |  | **x** |  |  |  |  |  | **x** |  | **x** |
| Tutorials | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  | **x** |  |
| Revision classes | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  | **x** |  |

**Module learning outcomes against assessment methods:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 | 9.7 | 9.8 |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

## Inclusive module design

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

## Campus(es) or centre(s) where module will be delivered

Canterbury

## Internationalisation

Mathematics is an international language with techniques developed and refined by mathematicians across the globe. Mastery of the subject-specific learning outcomes, 8.1 to 8.3, will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Mathematics, Statistics and Actuarial Science, which includes many members of staff with international experience of teaching and research collaboration.

In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material.

The support SMSAS provides to its students is also internationally attuned given our international student body.

**DIVISIONAL USE ONLY**

**Module record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

| Date approved | New/Major/minor revision | Start date of delivery of (revised) version | Section revised  (if applicable) | Impacts PLOs (Q6&7 cover sheet) |
| --- | --- | --- | --- | --- |
| July 2023 | Minor | September 2023 | 13 | No |
|  |  |  |  |  |