1. **KentVision code and title of the module**

MAST3001 - Foundation Mathematics 1

1. **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

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 3

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

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

Autumn

1. **Prerequisite and co-requisite modules and/or any module restrictions.**

Pre-requisite: None

Co-requisite: None.

1. **The course(s) of study to which the module contributes**

Compulsory to the following courses: BSc Mathematics with a Foundation Year, BSc Actuarial Science with a Foundation Year, BSc Data Science with a Foundation Year.

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

8.1 demonstrate understanding of the basic body of knowledge associated with functions of a single variable;

8.2 demonstrate the capability to solve problems in accordance with the basic theories and concepts in the following areas, whilst demonstrating a reasonable level of skill in calculation and manipulation of the material: functions, differentiation of functions of a single variable and elementary curve sketching;

8.3 apply the basic techniques associated with single variable calculus in several well-defined contexts;

8.4 demonstrate a mathematical proficiency suitable for stage 1 entry.

1. **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 demonstrate an increased level of skill in numeracy and computation.

1. **A synopsis of the curriculum**

Functions: Functions, inverse functions and composite functions. Domain and range.

Elementary functions including the exponential function, the logarithm and natural logarithm functions and a for positive real numbers a. Basic introduction to limits and continuity of a function, without epsilon-delta proofs.

The derivative: The derivative as the gradient of the tangent to the graph; interpretation of the derivative as a rate of change. The formal definition of the derivative and the calculation of simple examples from first principles. Elementary properties of the derivative, including the product rule, quotient rule and the chain rule; differentiation of inverse functions; calculating derivatives of familiar functions, including trigonometric, exponential and logarithmic functions. Applications of the derivative, including optimisation, gradients, tangents and normal. Parametric and implicit differentiation of simple functions. Additional material may include L’Hopital’s Rule and Taylor series.

Graphs: Curve sketching including maxima, minima, stationary points, points of inflection, vertical and horizontal asymptotes and simple transformations on graphs of functions. Additional material may include parametric curves and use of Maple to plot functions.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Core Maths for Advanced Level, L Bostock and S Chandler, Nelson Thornes Ltd, 2013.

Calculus of One Variable, K.E.Hirst, Springer-Verlag (2006) (available through SpringerLink)

1. **Contact Hours**

Contact hours: 44

Private study: 106

Total: 150

1. **Assessment methods**
   1. Main assessment methods

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

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

Examination 2 hours 80%

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

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 | 9.6 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures and example class activity | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** |
| Revision sessions and review sessions | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |
| Examination | **x** | **x** | **x** | **x** |  | **x** | **x** |  | **x** | **x** |
| Coursework | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **Inclusive module design**

The School 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

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **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 OFFICE USE ONLY**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 17/11/2021 | Minor | Term 1 2022/23 | 7, 12 | No |
| 11/04/2022 | Minor | September 2022 | 12 | No |