COURSE SPECIFICATION DOCUMENT

Academic School / Department: Science, Innovation & Technology

Programme: Year 1 Programme

***FHEQ* Level:** 3

Course Title: Fundamentals of Mathematics

Course Code: MATH 3101

Total Hours:	160
Timetabled Hours:	45
Guided Learning Hours:	15
Independent Learning Hours:	100

Credits: 16 UK CATS credits
8 ECTS credits
4 US credits

Course Description:

This course is designed to be a foundation in mathematics that will provide students with the necessary mathematical background for courses in calculus and its applications, discrete mathematics, linear algebra, and data science and data analysis courses. The course will cover essentials of number theory, solving equations of real-valued functions to include polynomials, rational, exponential, and logarithmic functions. It will also include trigonometry and analytic geometry, systems of linear equations and inequalities, matrices and determinants, sequences and series, and mathematical induction.

Prerequisites:

None

Aims and Objectives:

The module aims to

- Provide the necessary foundations in mathematical skills for more advanced mathematics courses.
- Develop student's ability to distinguish different forms of mathematical problems and on how to solve them in a structured manner.
- Enable students to translate word problems into symbolic formulation and solve such problems.
- Develop students' ability to think critically, analyse mathematical problems and obtain solutions.
- Enhance the student's problem-solving skills and inductive reasoning.

Programme Outcomes:

A3I, B3I

A detailed list of the programme outcomes is found in the Programme Specification. This is maintained by Registry and located at: https://www.richmond.ac.uk/programme-and-course-specifications/

Learning Outcomes:

By the end of this course, successful students should be able to:

- Understand the fundamental concepts of numbers and algebra to include exponents and radicals, factorising polynomials and solving inequalities.
- Understand real-valued functions and be able to solve standard problems using a variety of methods.
- Understand concepts of trigonometry and analytic geometry to include graphical approaches.
- Understand how to solve problems involving matrices and geometrical interpretations of matrix formulation.
- Understand how to solve systems of linear equations from analytic approaches or matrix manipulations.
- Understand the concepts of sequences and series and solving related problems.
- Understand the principle of mathematical induction and how to conduct proof by induction.

Indicative Content:

- Theory of numbers and general properties.
- Exponents and radicals; factoring and simplifying equations.
- Solving linear and non-linear equations and non-linear inequalities.
- Functions: transformation; combination; composition and inverse.
- Graphing of real-valued functions and trigonometric functions.
- Quadratic, rational, exponential, logarithmic, and trigonometric functions.
- Simple models of exponential, logarithmic, and trigonometric equations.
- Systems of linear equations and their analytic solutions.
- Matrices and determinants, and applications in solving equations.
- Connection between sequences and series and general properties.
- Fundamentals of mathematical induction to proofs.

Assessment:

This course conforms to the University Assessment Norms approved at Academic Board and located at: https://www.richmond.ac.uk/university-policies/

Teaching Methodology:

This course will be delivered face to face through a combination of lectures and interactive sessions. In addition to classroom activities, there are guided learning elements that are tutor led and arranged through Blackboard. These activities can be asynchronous online sessions, flipped classrooms, set readings with discussion boards or set guest lectures for example. Set activities are monitored by the instructor to ascertain student engagement. Students are encouraged to prepare for class and to play an active part, to raise questions, following-up ideas and interact with a wide range of provided material.

Indicative Text(s):

Abramson, J. (2021) *Precalculus.* 2nd edn. Houston, TX: RICE University. https://openstax.org/details/books/precalculus-2e

Kirk, D. (2023) *Contemporary mathematics*. Houston, TX: RICE University. https://openstax.org/details/books/contemporary-mathematics

Larson, R. (2021) *Precalculus.* 11th Edition. USA: CENGAGE Learning.

Stroud, K.A. and Booth, D. (2009) *Foundations of Mathematics.* UK: Red Globe Press.

See syllabus for complete reading list.

Change Log for this CSD:

Nature of Change	Date Approved & Approval Body (School or AB)	Change Actioned by Registry Services
First edition	Nov 2024	
Updated Programme and course title	Feb 2025	