COURSE SPECIFICATION DOCUMENT

Academic School / Department: Business and Economics

Programme: Mathematics Minor

***FHEQ* Level:** 5

Course Title: Real Analysis

Course Code: MTH 5210

Course Leader: David Munyinyi

Student Engagement Hours: 120 (standard 3- credit BA course)
Lectures: 35
Seminar / Tutorials: 10
Independent / Guided Learning: 75

Semester: Fall, Spring, Summer

Credits: 12 UK CATS credits
6 ECTS credits
3 US credits

Course Description:
This course introduces students to Real Analysis. The course cover properties of real numbers ($\mathbb{R}$), sets, sequences and series, limits, properties of continuous functions, differentiability and integrability, The Riemann integral, Lebesgue integral, sequences of functions, infinite series, measure theory and Lebesgue measures, properties of vector, metric and topological spaces.

Prerequisites:
MTH 4110

Aims and Objectives:
The course aims to provide students with an understanding of a number of topics and concepts in real analysis and transition students to the rigorous development of mathematics. The course aims to encourage students to develop interest in the subject and pursue other courses that require these skills.

Programme Outcomes:
These learning outcomes satisfy the program outcomes for Combined Studies:
Aii, Bi, Biii, Ciii, Dii; Economics: A2, B2, C4, D and Business: B4, D2, D4

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:

- Have a sound and broad understanding of the real number system and sets, including the existence of least upper and greatest lower bounds and the property of Archimedes

- Have a broad understanding sequences and series including mathematical induction, limits of sequences, Cauchy sequences, geometric series and conversion tests

- Have a broad understanding of the concepts regarding continuity, functions and processes of differentiability and integrability from a measure theoretic approach

- Be able to choose the correct method/strategy to solve problems using appropriate mathematical routines and strategies

Indicative Content:

- Construction of Real Numbers
- Sets, ordered sets, open and closed sets
- Sequences: mathematical induction limits of sequences; Sandwich Theorem; Bolzano-Weierstrass Theorem; Cauchy sequences
- Series: arithmetic and geometric series; convergence and divergence tests
- Limit of functions; Continuity and Intermediate Value Theorem
- Differentiability and Integrability of functions in spaces
- Riemann and Lebesgue Integrals in one dimension
- Measure Theory and Lebesgue Measures in spaces

Assessment:
This course conforms to the University Assessment Norms approved at Academic Board.

Teaching Methodology:
Course material is presented and analyzed in the following ways:
a) Formal presentation of topics and worked exercises.
b) Self-learning assignments and directed mathematical exercises.
c) Participation in individual and group investigations.

d) Where appropriate, students will be introduced to solution aids, such as hand-held calculators, mathematical tables and computer software.

Indicative Text(s):

Bartle, R. G. and Scherbert, D. R., "*Introduction to Real Analysis",* 4/e, John Wiley & Sons, 2011

Thomas, G.B., Weir, M.D. and Hass, J.R., "*Thomas' Calculus"*, 12/e Pearson, 2011

Journals

Web Sites

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