COURSE SPECIFICATION DOCUMENT

Academic School:	**Business and Economics**
Programme:	**Combined Studies**
***FHEQ* Level:**	**Level 5**
Course Title:	**Linear Algebra and Real Analysis**
Course Code:	MTH 5140
Course Leader:	**David Munyinyi**
Student Engagement Hours:	120
Lectures:	35
Seminar / Tutorials:	10
Independent / Guided Learning:	75
Semester:	Fall or Spring
Credits:	12 UK CATS credits
	6 ECTS credits
	3 US credits

Course Description:
This course provides an introduction to Linear Algebra and Real Analysis. In Linear Algebra the course will cover: Systems of linear equations, the algebra of matrices, determinants and determinant functions, inner products, canonical forms, the theory of vector spaces, linear mappings and transformations, eigenvectors and eigenvalues. In Real Analysis the course will cover: Properties of real numbers ($\mathbb{R}$), sequences and series, limits, properties of continuous functions, differentiability, The Riemann integral, Lebesgue integral, sequences of functions, infinite series, measure theory and Lebesgue measure, properties of vector, metric and topological spaces.

Prerequisites: MTH 4110

Aims and Objectives:
The course provides students with an understanding of a number of topics and concepts in linear algebra, real analysis and its applications. The course aims to encourage students to develop interest in the subject and pursue other courses that require these skills.

Programme Outcomes:

Combined Studies: Aii, Bi, Biii, Ciii, Dii

A detailed list of the programme outcomes are found in the Programme Specification.

This is located at the archive maintained by the Academic Registry and found at: http://www.richmond.ac.uk/content/academic-schools/academic-registry/program-and-course-specifications.aspx

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

- Have a sound and broad understanding of linear equations and matrix manipulation; understand the idea of limits and continuity and have the ability to calculate and apply them.

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

- Have an understanding of the principles and applications of eigenvectors and eigenvalues, measure theory and spaces.

- Be able to choose the correct method/strategy to solve business oriented problems using appropriate mathematical principles and methods.

Indicative Content:
- Systems of linear equations and matrix method
- Determinants and cofactor expansion
- Vector, metric and topological spaces
- Eigenvectors and eigenvalues
- Continuity and limits; limits of sequences and series
- Differentiability and Integrability; Riemann and Lebesgue Integrals
- Measure Theory and Lebesgue Measures
- Real analysis of functions and related spaces .g. Vector, Hilbert, Banach and Topological spaces

Assessment:

This course conforms to the MATHS Assessment Norms approved at Learning and Teaching Policy Committee found at: http://www.richmond.ac.uk/wp-content/uploads/2014/10/ALL-ASSESSMENT-NORMS-CATEGORIES-with-descriptions-Jan-2014.pdf

Teaching Methodology:
This course will be taught through a combination of lectures and problem solving-type activities, including group work, sub-group activities, and classroom discussion. The general approach to classes is informal, and discussion is viewed as an essential part of an interactive and participatory learning program. Audio-visual aids, study materials and electronic learning resources will be used as appropriate and where and when needed.

Lectures provide a framework for the course, and are designed to ensure students have an overview of main issues and concerns on a particular topic, receive clarification on the major points of debate understand the broad dimensions of core problems, and are aware of relevant literature in the specific area of concern. It is essential that lectures are supplemented with assigned readings; together, the readings and the lectures are designed to provide guidance for class discussion and directed problem-solving tasks. Students will be introduced to computer software for symbolic language manipulation e.g. Mathematica, Maple or Math World for a more robust approach to concept applications and analysis of functions.

Bibliography:

See syllabus for complete reading list

Indicative Text(s):
Richard O. Hill, "*Elementary Linear Algebra with Applications*", 5/e, Harcourt, 2010

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

Journals
AMS Mathematical Journal
LMS Mathematical Journal
IMA Mathematics and Its Applications

Web Sites

Please Note: The core and the reference texts will be reviewed at the time of designing the semester syllabus

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Change Log for this CSD:

Major or Minor Change?	Nature of Change	Date Approved & Approval Body (School or LTPC)	Change Actioned by Academic Registry