COURSE SPECIFICATION DOCUMENT

Academic School/Department:	Business and Economics
Programme:	Combined Studies
***FHEQ* Level:**	4
Course Title:	Mathematics of Argument & Reasoning
Course Code:	MTH 4140
Course Leader:	Ana Oliveira
Student Engagement Hours:	120
Lectures:	35
Seminar / Tutorials:	10
Independent / Guided Learning:	75
Semester:	Fall/Spring
Credits:	12 UK CATS credits 6 ECTS credits 3 US credits

Course Description:
This course provides an introduction to the mathematics of arguments and reasoning by introducing students to topics in logic and discrete mathematics. It examines the nature of logic, in particular propositional and deductive logic, tautologies and contradictions, algebra of sets, relations, Boolean functions, graph theory and matrix algebra. The topics covered will include propositional calculus, methods of deduction, and quantification theory, leading to an introduction to first order logic, proof by induction and recursive relations. Valid and invalid argument forms and their tests will be performed.
Applications of these concepts to logical networks, switching circuits and network analysis will be investigated.

Prerequisites: MTH3000 or MTH3110

Aims and Objectives:
This course gives a basic introduction to formal logic, the mathematics of argument, algebra of sets and the process of formal mathematical proofs and deductions. It starts by looking at some of the basic concepts of logic and discrete mathematics, and develops a specific mathematical form to analyze and test the concept of validity and mathematical proofs. The course then covers some of the basics of propositional, predicate calculus, relations, functions and some applications.

Programme Outcomes:
Ai, Aiii, Ci, Cii, Ciii, Di

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

This is maintained by Registry and located at:

http://www.richmond.ac.uk/programme-and-course-specifications/

Learning Outcomes:

- Have a broad understanding of the argument structure and its evaluation, and be able to manipulate propositional logic by use of logical operators and truth tables and analyze truth statements in a formal and logical manner.
- Have a broad understanding of the basic elements of symbolic algebra, be able to practice formal logical and deductive thinking commonly used in discrete mathematics and mathematical proofs that involves induction and recursive relations.
- Have a broad understanding of algebra of sets and first order logic, graph theory and matrix algebra and be able to apply learned concepts to logical networks, switching circuits and network analysis.

Indicative Content:

- Introduction to basic concepts, valid arguments, logical form and argument structure and evaluation
- Logical operators
- Propositional calculus and validity of arguments
- Predicate calculus
- Sets and relations
- Proof by induction
- Recursion and combinatorics
- Boolean functions
- Matrices
- Graph Theory

Assessment:
This course conforms to the University Assessment Norms approved by 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.

Bibliography:

IndicativeText(s):

Garnier, R. and Taylor, J., "*Discrete Mathematics: Proofs, Structures and Applications*". Third Edition, 3rd CRC Press, London, 2010.

Journals

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 AB)	Change Actioned by Academic Registry