

COURSE SPECIFICATION DOCUMENT

NOTE: ANY CHANGES TO A CSD MUST GO THROUGH ALL OF THE RELEVANT APPROVAL PROCESSES, INCLUDING LTTC.

Academic School/Department:	Business and Economics
Programme:	Combined Studies
FHEQ Level:	5
Course Title:	Game Theory and Decision Methods
Course Code:	MTH 5130
Course Leader:	David M Munyinyi
Student Engagement Hours:	120
Lectures:	35
Seminar / Tutorials:	10
Independent / Guided Learning :	75
Semester:	Fall
Credits:	12 UK CATS credits 6 ECTS credits 3 US credits

Course Description:

This Course provides an introduction to game theory and its relation to decision methods in business. The course will cover the core principles of game theory and its role in the process of decision making in business. The use of game algebra and the analyses of the structure of various types of practical statistical decision problems as applied to business will be emphasized. The areas to be studied will include decision making under uncertainty, risk analysis, Baye's strategies, decision trees, linear programming, Markov Processes, game strategies, classification of games, game trees, the Nash equilibrium, zero-sum games, mixed strategy games, the prisoner's dilemma and repeated games, collective action games and evolutionary games in the context of hawk-dove games. Applications to specific strategic situation such as in bargaining, bidding and market competition will be explored.

Prerequisites: MTH4110 or MTH4120

Aims and Objectives:

This Course aims to provide students with an understanding of the issues concerned with applying approaches of decision methods and game theory to different strategies employed in

decision making in business and social science. The course aims to encourage students to develop interest in the subject and pursue other courses that require skills in decision methods and game theory.

Programme Outcomes:

Combined Studies: Aii, Bi, Ci, Cii, Ciii, Di, Dii

Economics: A2, B2, C4, D

Business: B4, D2, D4

A detailed list of the programme outcomes are found in the Programme Specification. This is located at the Departmental/Schools page of the portal.

Learning Outcomes:

- Understand the main ingredients of what constitutes game theory and differentiate different types of games that are appropriate for different situations.
- Identify game theory as a generalization of decision methods, and to think critically about potential applications of game theory to decision problems in business and social science.
- Be able to apply linear programming, Baye's Theorem, Markov Processes and Game Theory in analyzing decision problem and arriving at the optimal decision strategy and to explore and use data to make decisions using linear programming and simplex methods.
- Be able to select appropriate game theory methods such as Nash equilibrium, repeated games, evolutionary games and their applications in different scenarios such as in markets and competition, bidding strategy and auctions, bargaining and negotiations.

Indicative Content:

- Linear programming and simplex method.
- Statistical decision theory, decision making under uncertainty and Baye's strategies.
- Use of sample data in decision making incorporating prior and posterior probability distributions, Markov process and related states and fundamental matrices.
- Basic ideas of games theory, strategic games and how to think about strategic games.
- Characteristics of two-person zero-sum game, the game matrix, mixed strategies and graphical solution of $2 \times n$ games.
- The Nash Equilibrium and its applications.
- Repeated and evolutionary games and the principles and applications of the prisoners dilemma, collective-action games, the hawk-dove games, cooperative games, bidding strategy and bargaining and applications to markets and competition.

Assessment:

This course conforms to the Richmond University Special Programme Assessment Norms for Mathematics approved by Academic Council on 28 June 2012.

