U n i v e r s i t y *of* L i m e r i c k
Module Description

1. Module Code - Title:	MS4315 - OPERATIONS RESEARCH 2					
2. Hours Per Week:	**Lecture**	**Lab**	**Tutorial**	**Other**	**Private**	**ECTS Credits**
	2	0	1	0	7	6
3. Grading Type:	N					
4. Prerequisite Modules:	MS4303					

5. Rationale and Purpose of the Module
This module introduces further OR techniques for decision-making. The student will be able to apply these techniques to real life problems.

6. Syllabus
Integer programming - pure integer programming algorithms, branch & bound solutions to mixed integer programming. Deterministic dynamic programming - forward and backward recurrence formulations. Probabalistic dynamic programming - finite and infinite stage problems. Game Theory - Concepts of equilibrium, matrix games, extensive form games and repeated games. Applications of game theory - models of economic competition (Cornot, Bertrand), evolutionary game theory.

7. Learning Outcomes

Cognitive (Knowledge, Understanding, Application, Analysis, Evaluation, Synthesis)
1. Formulate real life problems as integer programming problems -written examination 2. Apply the branch and bound method to solving integer programming problems - written examination. 3. Use recursion to solve finite horizon deterministic and stochastic dynamic programming problems. 4. Solve infinite horizon problems (using both the average cost and discounted cost criteria). 5. Find the Nash equilibria of the following types of game: matrix, extensive form, repeated. 6. Find evolutionarily stable strategies for simple matrix games. 7. Find equilibrium strategies for games derived from simple economic models.

Affective (Attitudes and Values)
1. Use game theoretical models to understand and qualitatively predict behaviour of individuals in simple interactions.

Psychomotor (Physical Skills)
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8. How the module will be taught and what will be the learning experiences of the students
The lectures will be used to present the necessary theory and examples taken from

real life problems. The tutorials will present examples that develop the concepts presented in the lecture, give the students opportunities to solve problems and discuss some of the philosophical issues involved (particularly for the game theoretic models presented).

9. Research Findings incorporated into the syllabus (If relevant)

10. Prime Texts

Taha H. A. (2003) *Operations Research 7th Ed.* , Prentice Hall

11. Other Relevant Texts

Thie P. R. (1988) *An introduction to linear programming and game theory, 2nd Ed.* , Wiley

Bather J. (2000) *Decision theory: an introduction to dynamic programming and sequential decisions* , Wiley

Bierman H. S. (1998) *Game theory with economic applications, 2nd Ed.* , Addison-Wesley

Nemhauser G. L. (1999) *Integer and combinatorial optimization* , Wiley

Whittle P. (1982) *Optimization over time: dynamic programming and stochastic control* , Wiley

Ahuja R. K. (1993) *Network flows: theory, algorithms and applications* , Prentice Hall

Maynard Smith J. (1982) *Evolution and the theory of games* , Cambridge University Press

12. Programme(s) in which this Module is offered

13. Semester-Year to be first offered

Autumn-08/09