



## Course Specification

**Course Name:** [Decision and Game Theory ]

**Course Code:** DS411

### I. Basic Course Information

Major or minor element of program: Major

Department offering the course: Operations Research and Decision Support Department

Academic level: [400 Level]

Semester in which course is offered: Second (Spring) Semester

Course pre-requisite(s): [Mathematics-2 [MA113] and Statistics-2 [ST122] ]

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial*	Practical*	Total
2.5	1.5	0.0	4.0

\* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: [January 2015]

### II. Overall Aims of Course

[In this introductory course we cover the essential concepts of Game Theory covering Static and Dynamics Games with Complete Information. The application of essential Game Theoretic concepts of Nash Equilibrium and Sub game Perfect Equilibrium are discussed in the context of:

- Oligopoly
- Property Rights and Efficiency
- Voting Games
- Bargaining
- Repeated Games and Dynamic Competition ]

### III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
[K17,K20,K22 ]	[I12,I13,I14 ]	[P10,P12,P15 ]	[G4,G6,G9 ]



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### IV. Intended Learning Outcomes of Course (ILOs)

#### a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 [Explain Tragedy in Commons situations.
- K.2 View competitive behavior through the lens of Nash Equilibrium.
- K.3 Understand Game Theory in the wider context of institutional and organizational design. ]

#### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 [Realize the nature of competitive situations in general, even unquantifiable ones.
- I.2 Assess the various paradoxes associated with voting and means to resolve them.
- I.3 Read political/economic situations in light of rational and competitive behaviour and computing them in models.
- I.4 Analyse the counterintuitive outcomes of rational behaviour as embodied in prisoner dilemmas and methods of handling them. ]

#### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 [Bargain from a game theoretic perspective can be used in a number of situations involving job interviews, salary negotiation... etc.
- P.2 Vote in institutions, organizations and countries are fraught with complications that are a function of the type of voting mechanism being used.
- P.3 Realize the paradoxes that could emerge out of the various mechanisms can help in gaining some advantages in such situations, or devise fairer social choice mechanisms.
- P.4 Understand the nature threats and how to distinguish between credible and incredible ones. ]

#### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 [Use Java programming Language.
- G.2 Enhance report writing skills.
- G.3 Acquire problem solving skills. ]

### V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	[Game Theory Motivation and Background ]	[1 ]	[K1,K2,K3	[ ]	[ ]	[ ]
2-	[Rationality and different types of equilibrium concepts ]	[1 ]	[K1,K2,K3	[ ]	[ ]	[ ]
3-	[Oligopoly ]	[2 ]	[K1,K2,K3	[I1 ]	[ ]	[ ]
4-	[Property Rights and Efficiency ]	[2 ]	[K3 ]	[ ]	[ ]	[G1,G2 ]
5-	[Voting Games ]	[2 ]	[ ]	[I2,I3,I4 ]	[P2 ]	[ ]
6-	[Bargaining ]	[3 ]	[ ]	[ ]	[P1,P3 ]	[ ]
7-	[Repeated Games ]	[2 ]	[K2,K3 ]	[ ]	[P4 ]	[All ]
	<b>Net Teaching Weeks</b>	<b>13</b>				



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VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours*
1	Game Theory Background	2.5	2.5	
2	Rationality and different types of equilibrium concepts	4	2.5	1.5
3	Oligopoly	4	2.5	1.5
4	Oligopoly	4	2.5	1.5
5	Property Rights and Efficiency	4	2.5	1.5
6	Property Rights and Efficiency	4	2.5	1.5
7	<b>Midterm Exam</b>			
8	Voting Games	4	2.5	1.5
9	Voting Games	4	2.5	1.5
10	Bargaining	4	2.5	1.5
11	Bargaining	4	2.5	1.5
12	Bargaining	4	2.5	1.5
13	Repeated Games and Dynamic Competition	4	2.5	1.5
14	Repeated Games and Dynamic Competition	4	2.5	1.5
15	<b>Final Exam</b>			
<b>Total Teaching Hours</b>		<b>51</b>	<b>33</b>	<b>18</b>

\* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	<input checked="" type="checkbox"/>	[K1,K2,K3]	[I1,I2,I3,I4]	[P1,P2,P3]	[All]
Tutorials	<input type="checkbox"/>				
Computer lab Sessions	<input checked="" type="checkbox"/>				[G1]
Practical lab Work	<input type="checkbox"/>				
Reading Materials	<input checked="" type="checkbox"/>	[K1,K2,K3]			
Web-site Searches	<input checked="" type="checkbox"/>				[G2]
Research & Reporting	<input type="checkbox"/>				
Problem Solving / Problem-based Learning	<input checked="" type="checkbox"/>		[I1,I2,I3]		
Projects	<input type="checkbox"/>				
Independent Work	<input type="checkbox"/>				
Group Work	<input checked="" type="checkbox"/>			[P4]	[G2]
Case Studies	<input type="checkbox"/>				
Presentations	<input type="checkbox"/>				
Simulation Analysis	<input checked="" type="checkbox"/>			[P4]	[G1]
Others (Specify):	<input type="checkbox"/>				



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VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	✓	K1,K2,K3	[[	P1,P2,P3	[[	20%	7
Final Exam	✓	K1,K2,K3	I1,I2,I3,I4	[[	All	60%	15
Quizzes	[[	[[	[[	[[	[[	[[	[[
Course Work	✓	[[	I1,I2,I3,I4	P4	G1,G2	20%	12
Report Writing	[[	[[	[[	[[	[[	[[	[[
Case Study Analysis	[[	[[	[[	[[	[[	[[	[[
Oral Presentations	[[	[[	[[	[[	[[	[[	[[
Practical	[[	[[	[[	[[	[[	[[	[[
Group Project	[[	[[	[[	[[	[[	[[	[[
Individual Project	[[	[[	[[	[[	[[	[[	[[
Others (Specify):	[[	[[	[[	[[	[[	[[	[[

IX. List of References

<b>Essential Text Books</b>	<ul style="list-style-type: none"> <li>H. Bierman and Luis Fernandez, Game Theory with Economic Applications, 2nd ed. Addison-Wesley, 1998.</li> </ul>
<b>Course notes</b>	<ul style="list-style-type: none"> <li>Powerpoint slides</li> </ul>
<b>Recommended books</b>	<ul style="list-style-type: none"> <li>D. Fudenberg and J. Tirole, Game Theory, MIT press, 1991.</li> </ul>
<b>Periodicals, Web sites, etc....</b>	<ul style="list-style-type: none"> <li><a href="http://www.natural-computation.com/gametheory">http://www.natural-computation.com/gametheory</a></li> <li><a href="http://groups.yahoo.com/group/CUgame/">http://groups.yahoo.com/group/CUgame/</a></li> </ul>

X. Facilities required for teaching and learning

<p>List the facilities required</p> <ul style="list-style-type: none"> <li>Computer projector</li> <li>Computer labs</li> </ul>
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**Course coordinator:** Ass. Prof. Mohammed El-Beltagy

**Head of Department:** Prof. Mohamed Mostafa Saleh

**Date:** [January 2015]