



## Lahore University of Management Sciences

### ECON 233 – Introduction to Game Theory

Instructor	Lyyla Khalid
Room No.	ECON WING A Room 155
Office Hours	Monday-Thursday 9:30-10:00
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Secretary/TA	TBA
TA Office Hours	TBA
Course URL (if any)	

#### Course Teaching Methodology

- Teaching Methodology: In person
- Lecture details: Slides used in class will be shared with students. There will be a break midway into the session.

#### Course Basics

Credit Hours	4			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	100 minutes
Recitation/Lab (per week)	Nbr of Lec(s) Per Week		Duration	
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

#### Course Distribution

Core	No
Elective	Elective
Open for Student Category	Sophomore, Juniors and Seniors
Close for Student Category	Freshman

#### COURSE DESCRIPTION

Course description can only be updated through dean's office.

#### COURSE PREREQUISITE(S)

- Statistics and Data Analysis
- The course assumes some familiarity with calculus and basic optimization.
- But most importantly, what is needed is willingness to engage with the material and the ability to do and sustain sophisticated thinking.

#### COURSE OBJECTIVES

- This course is an undergraduate level introduction to game theory and strategic thinking. It introduces the theory of non-cooperative games with emphasis on economic applications. Game theory is the study of multi-person decision problems where action of each decision maker (player) influences payoffs of others. In such environments, optimal decision may require strategic thinking; how one's action will influence the incentives of other players and whether others are aware of this interconnection. By the end of the course the students should be familiar with the basic tools used for modeling game theoretic situations and they should be able to structure, model and solve basic everyday strategic interactions.
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#### Learning Outcomes



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<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	<p>At the end of the course, students should be able to</p> <ul style="list-style-type: none"> <li>formulate any strategic interaction as a game form,</li> <li>understand solution concepts in normal and extensive form games, and</li> <li>develop analytical and problem-solving skills to analyze games</li> </ul> <p>Recognize and solve games of complete and incomplete information</p>
Grading break up: Component Details and weightages	
<p><b>Quiz(s): 3 Quizzes = 50%– No quiz will be dropped</b></p> <p><b>Attendance: 2%</b></p> <p><b>Presentation = 3%</b></p> <p><b>Final Examination = 45%</b></p>	
No weight of the following components:	
<p>Class Participation</p> <p>Midterm</p>	
<p><b>Important:</b></p> <p><i>If you miss a quiz, you will be awarded your average for that quiz, provided you have a valid OSA approved petition. In case you do not have an OSA approved petition, you will not be accommodated. This policy will hold to maintain class discipline. I strongly urge you to contact OSA as soon as possible if you miss an instrument.</i></p> <p><i>Once the marks for a quiz are in, you will have THREE working days to contest the quiz if you wish to. After that the marks for the quiz will be sealed for the semester. We will NOT make exceptions to this.</i></p>	

Examination Detail	
Midterm Exam	<p>Yes/No: No</p> <p>Combine Separate: Not Applicable</p> <p>Duration: Not Applicable</p> <p>Preferred Date: Not Applicable</p> <p>Exam Specifications: None</p>
Final Exam	<p>Yes/No: Yes</p> <p>Combine Separate: TBA</p> <p>Duration: 2.5 hrs</p> <p>Exam Specifications: Closed book Closed notes</p>

COURSE OVERVIEW			
Module	Topics	Recommended Readings	Objectives/ Application
1.	The Basics of Game Theory	Watson Ch. 1	
2.	<p>Concepts and Techniques</p> <ul style="list-style-type: none"> <li>• Static games</li> <li>• Normal and Extensive Forms</li> <li>• Dominance and Iterated Dominance</li> <li>• Pure Strategy Nash Equilibrium</li> <li>• Mixed Strategy Nash Equilibrium</li> </ul>	Watson Ch. 2, 3, 4, 5, 6, 7, 11	Modeling situations in a game Theoretic framework. Understanding the tools and language of Game Theory.



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3.	<p>Dynamic Games</p> <ul style="list-style-type: none"> <li>Revisiting Strategies and Extensive Forms</li> <li>Sequential Rationality and Subgame Perfection</li> </ul>	Watson Ch. 14, 15	Learning to solve sequential games using tree diagrams, backward induction and the concept of subgame perfection.
4	<p>Applications</p> <ul style="list-style-type: none"> <li>Auctions: First and Second Price Auctions</li> <li>Hoteling's Model of Electoral Competition</li> <li>War of Attrition</li> </ul> <p><i>Cournot Duopoly Model- Cournot Nash equilibrium, Cartel solution, the Stackelberg model and Bertrand Pricing</i></p>	<p>Handout- Osborne, Martin J. (2004) An Introduction to Game Theory. OUP</p> <p>Handout- Dutta, Prajit (1999) Strategies and Games: Theory and Practice. MIT Press</p>	
5	<p>Repeated Games</p> <ul style="list-style-type: none"> <li>Finitely Repeated Games</li> <li>Infinitely Repeated Game</li> <li>Reputations and Cooperation</li> </ul> <ul style="list-style-type: none"> <li>An application- Bargaining games</li> <li>An application- OPEC Model</li> </ul>	<p>Watson Ch 22, 23</p> <p>Handout- Osborne, Martin J. (2004) An Introduction to Game Theory. OUP</p> <p>Handout- Dutta, Prajit (1999) Strategies and Games: Theory and Practice. MIT Press</p>	
6	<p>Bayesian Games</p> <ul style="list-style-type: none"> <li>Incomplete Information</li> <li>Bayesian Nash Equilibrium</li> <li>Perfect Bayesian Equilibrium – Screening Games Adverse Selection</li> </ul>	Watson Ch 24,26 Handouts	

### Textbook(s)/Supplementary Readings

**Main text:** Watson, Joel. Strategy: An Introduction to Game Theory. Third Edition. W.W. Norton & Company.

**Additional Texts:**

- 1) Dutta, Prajit (1999) Strategies and Games: Theory and Practice. MIT Press
- 2) Osborne, Martin J. (2004) An Introduction to Game Theory. OUP
- 3) Avinash Dixit, Susan Skeath and David H. Reiley, Jr. Games of Strategy.

All of these texts are in our library. There are a number of other introductory game theory texts too. Each text will have a bit of notational variation, but each of them covers the basic topics we will be covering.

**Lecture Slides:** My PowerPoint lecture slides will be available to all whenever used in class.