

1. General Information		
Course Subject	ECON	
Course Number	4214	
Course Title	Advanced Game Theory	
Academic Years	2023-2024	
Grading Method	Letter	

2. Instructors

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4. Course Descrip	tion
Course Description	Game Theory is the standard tool to analyze the behavior of agents in strategic situation and is widely used in many fields including economics, finance, biology, political science, etc. The course is an intermediate course in game theory. It builds upon basic knowledge of game theory as in the course Games and Decisions (ECON2214), although not all material of ECON2214 is a pre-requisite. To this end, it is highly advantageous to be familiar with ideas such as Nash equilibrium, mixed strategies, dominated strategies.
	Game theory is a way of thinking about strategic situations whether they occur in economics, in politics, in relationships, in evolution, in sports, in war, in law, or in life.
	The first part of the course will delve deeper into the analysis of dynamic (also known as sequential) games, and cover topics such as hold-up problems, Stackelberg competition, reputation, bargaining, wars of attrition, and repeated games.
	The second part of the course will present further applications of game theory that have been particularly influential in the history of economic theory, such as median voter theory, matching, mechanism design, and behavioral/psychological game theory. The topics covered in the second part may be adjusted to the students' prior knowledge.
Prerequisites	ECON1210: Introductory Microeconomics MATH1009 Basic Mathematics for Business and Economics or MATH1011 University Mathematics I or MATH1013 University Mathematics II
	(Note: Games and Decisions (ECON2214) is strongly suggested. Basic knowledge of calculus (in particular: derivatives of functions) is required. We will also refer to ideas like probability and expectation.)
	Other important details: Chapters 25 & 26 of the Dutta's `Strategies and games' form a useful math primer for the course. The content from MATH1009 (Basic mathematics for business and economics) on differentiation and integration may be an equivalently useful primer for the basic calculus used in this course.

5. Course Objectives

1. To introduce students to advanced topics of game theory and prevalent strategic problems, yet in a way accessible to undergraduates.

2. To present (advanced) game-theoretic concepts and tools.

3. To present famous applications of game theory on an introductory level.

6. Faculty Learning Goals

Goal 1: Acquisition and internalization of knowledge of the programme discipline

Goal 2: Application and integration of knowledge

Goal 3: Inculcating professionalism

Goal 4: Developing global outlook

Goal 5: Mastering communication skills

Goal 6: Cultivating leadership

7. Course Learning Outcomes

Course Teaching and Learning Activities		Aligned Faculty Learning Goals				
		2	3	4	5	6
CLO1. Demonstrate ability to apply game theory. Formulate strategic problems as games and being able to solve and communicate them.	✓	✓	✓			
CLO2. Be familiar with an array of "standard" strategic problems that the game theoretic literature concerns with (e.g. hold-up, reputation building, etc.).	✓	✓	✓			
CLO3. Understand an important subset of landmark contributions of game theory.	✓	✓	✓	✓		✓
CLO4. Be familiar with concepts, methods, and terminology of game theory, as a basis for further studies.	✓	✓	✓			

8. Course Teaching and Learning Activities		
Course Teaching and Learning Activities #	Expected Study Hours	Study Load (% of study)
T&L1. Lectures will cover major concepts and their applications	36	25.7
T&L2. Problem sets will deepen the understanding of the lectures' content and practice putting the learned into use.	36	25.7
T&L3. Tutorials will help review some major concepts and understand solutions to problem sets.	18	12.9
T&L4. Self-Study	50	35.7
	Total: 140	Total: 100

9. Assessment Me	thods		
Assessment Methods	Description	Weight %	Aligned Course Learning Outcomes
A1. Individual Take-home Assignment	Problem sets There will be almost-weekly problem sets, about ten in all. Depending on course size, there will a tutorial led by a teaching assistant and the possibility to reach out to the teaching assistant to get some help if you are stuck. The exact due dates of the p-sets will be specified in a syllabus.	20%	1,2,3,4
A2. Mid-Term Test/ Assessment	Midterm examination Midterm examination is an examination of the first part of the course (Week 1- Week 6)	40%	1,2,3,4
A3. Final Exam	Final examination is a comprehensive examination of the course material.	40%	1,2,3,4

Assessment Rubr	ics
A1. Individual Take-home Assignment	
A+,A,A-	Respond to all or almost all of the questions clearly and accurately. All or almost all of the responses are well organized, clear, fluent, and with appropriate elaboration.
B+,B,B-	Respond to most of the questions clearly and accurately. Most of the responses are well organized, clear, fluent, and with appropriate elaboration.
C+,C,C-	Respond to some of the questions clearly and accurately. Some of the responses are well organized, clear, fluent, and with appropriate elaboration.
D+,D	Respond to few of the questions clearly and accurately. Few of the responses are well organized, clear, fluent, and with appropriate elaboration.
F	Respond to very few of the questions clearly and accurately. Very few of the responses are well organized, clear, fluent, and with appropriate elaboration.
A2. Mid-Term Test/ Assessment	
A+,A,A-	Respond to all or almost all of the questions clearly and accurately. All or almost all of the responses are well organized, clear, fluent, and with appropriate elaboration.
B+,B,B-	Respond to most of the questions clearly and accurately. Most of the responses are well organized, clear, fluent, and with appropriate elaboration.
C+,C,C-	Respond to some of the questions clearly and accurately. Some of the responses are well organized, clear, fluent, and with appropriate elaboration.
D+,D	Respond to few of the questions clearly and accurately. Few of the responses are well organized, clear, fluent, and with appropriate elaboration.
F	Respond to very few of the questions clearly and accurately. Very few of the responses are well organized, clear, fluent, and with appropriate elaboration.
A3. Final Exam	

Assessment Rubr	ics
A+,A,A-	Respond to all or almost all of the questions clearly and accurately. All or almost all of the responses are well organized, clear, fluent, and with appropriate elaboration.
B+,B,B-	Respond to most of the questions clearly and accurately. Most of the responses are well organized, clear, fluent, and with appropriate elaboration.
C+,C,C-	Respond to some of the questions clearly and accurately. Some of the responses are well organized, clear, fluent, and with appropriate elaboration.
D+,D	Respond to few of the questions clearly and accurately. Few of the responses are well organized, clear, fluent, and with appropriate elaboration.
F	Respond to very few of the questions clearly and accurately. Very few of the responses are well organized, clear, fluent, and with appropriate elaboration.

10. Course Grade	Descriptors
A+,A,A-	Candidate has consistently demonstrated a thorough grasp of the subject as evidenced by an exceptionally thorough understanding of the concepts and reasoning presented in this course; and is able to apply it creatively to the analysis and interpretation of observed economic phenomenon.
B+,B,B-	Candidate frequently demonstrated a substantial grasp of the subject as evidenced by a good understanding of the concepts and reasoning presented in this course; and is able to apply it well to the analysis and interpretation of observed economic phenomenon.
C+,C,C-	Candidate has occasionally demonstrated a general grasp of the subject as evidenced by a mostly accurate understanding of the concepts and reasoning presented in this course; and is able to apply it most of the time to the analysis and interpretation of observed economic phenomenon.
D+,D	Candidate has demonstrated a partial grasp of the subject as evidenced by a somewhat accurate understanding of the concepts and reasoning presented in this course; and is able to apply it only some of the time to the analysis and interpretation of observed economic phenomenon.
F	Candidate has demonstrated a poor grasp of the subject with evidence of largely inaccurate understanding of the concepts and reasoning presented in this course; and is largely unable to apply it to the analysis and interpretation of observed economic phenomenon

11. Course Content and Tentative Teaching Schedule					
Topic/ Session	Content	Assignments	Other information		
1	Week 1: Intro to Sequential Games: Backward Induction; Commitment, Hold-up, Stackelberg commitment-++++		Basic Theory and Applications		
2	Week 2: First-and second-mover advantages, Zermelo; Duels		Basic Theory and Applications		
3	Week 3: Strategies, Subgame perfection, Entry, Credibility, Reputation		Basic Theory and Applications		
4	Week 4: Ultimatums and Bargaining; Introduction to imperfect information,		Basic Theory and Applications		

11. Course Content and Tentative Teaching Schedule

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	information sets			
5	Week 5: Imperfect information continued, Strategic moves; War of Attrition		Basic Theory and Applications	
6	Week 6: Repeated Games		Basic Theory and Applications	
7	Week 7: Cournot Duopoly Game; Extension: Relative Performance Contracts		Further Applications	
8	Week 8: Median Voter Theory, Downsian Competition; Parliaments (and historic votes)		Further Applications	
9	Week 9: Matching: Marriage markets; School Choice		Further Applications Some of the course material of the last weeks (Week 10 – Week 12) may be omitted due to time issues and to give each topic covered the time and discussion that is appropriate.	
10	Week 10: Mechanism Design Intro: Auctions (Ebay and more)		Further Applications Some of the course material of the last weeks (Week 10 – Week 12) may be omitted due to time issues and to give each topic covered the time and discussion that is appropriate.	
11	Week 11: Mechanism Design: Public good provision (the ``Bridge problem'')		Further Applications Some of the course material of the last weeks (Week 10 – Week 12) may be omitted due to time issues and to give each topic covered the time and discussion that is appropriate.	
12	Week 12: Behavioral/Psychological Game Theory		Further Applications Some of the course material of the last weeks (Week 10 – Week 12) may be omitted due to time issues and to give each topic covered the time and discussion that is appropriate.	

12. Required/Reco	ommended Readings & Online Materials
Reading	P.K Dutta: Strategies and Games: Theory and Practice, MIT 1999, ISBN. 978-0262041690.
	A Dixit & B. Nalebuff: The Art of Strategy, Norton 2010. ISBN. 978-0393337174
	J. Watson: Strategy: An introduction to game Theory, Norton 2013 ISBN. 978- 0393918380
	The instructor will give detailed instructions on recommended readings for each week on a separate syllabus.
	For the first part of the course, the readings will be from the above three text book. As the second part of the book presents introductions to various applications, references will be given but those references typically largely extend beyond the course material. E.g., for the lectures on matching, the non-technical presentation by AI Roth in his book is useful and interesting:
	Roth, A. E: Who gets whatand why: the new economics of matchmaking and market design, Houghton Mifflin Harcourt 2015. ISBN 978-0544705289
	None of the readings are compulsory, but they will help back up the class material. Use the readings to re-enforce your understanding of the material, and to see other examples, applications and broader discussions of the ideas we develop in class.

13. M	13. Means / Processes for Student feedback on Course		
	Conducting mid-term survey in additional to SETL around the end of the semester		
✓	Online response via Moodle site		
✓	Others		
	Direct response via lectures, tutorials, and consultation		

14. Course Policy

Learning happens only if we engage in the learning activities ourselves. Intended learning outcomes cannot be achieved if we simply copy the work of others. The act of copying the work of others is considered serious misconduct.

Plagiarism and copying of copyright materials are serious offences and may lead to disciplinary actions. You should read the chapters on "Plagiarism" and "Copyright" in the Undergraduate/Postgraduate Handbook for details. You are strongly advised to read the booklet entitled "What is Plagiarism?" which was distributed to you upon your admission into the University, a copy of which can be found at www.hku.hk/plagiarism. A booklet entitled "Plagiarism and How to Avoid it" is also available from the Main Library.

You are required to attend all the classes on time. In case you cannot attend a class, you should inform the instructor beforehand.

Note the following regulation for the problem sets: Each student must upload a PDF of an individually written answer to each assignment, but group discussion is encouraged.

15. Additional Course Information

Course management is done via MOODLE (http://moodle.hku.hk/, HKU portal login required)