

## **ECO4320: Game Theory and Strategic Behaviour**

|                                 |   |                                                                                               |
|---------------------------------|---|-----------------------------------------------------------------------------------------------|
| <b>Recommended Study Year</b>   | : | 3 and 4                                                                                       |
| <b>No. of Credits/Term</b>      | : | 3                                                                                             |
| <b>Mode of Tuition</b>          | : | Lecture-Tutorial                                                                              |
| <b>Class Contact Hours</b>      | : | 3 hours per week                                                                              |
| <b>Category in Major Prog.</b>  | : | Major in Economics, (Elective Course), IEP Stream<br>(Elective Course), GEB (Elective Course) |
| <b>Discipline</b>               | : | Economics                                                                                     |
| <b>Prerequisite(s)</b>          | : | N/A                                                                                           |
| <b>Co-requisite(s)</b>          | : | N/A                                                                                           |
| <b>Exclusion(s)</b>             | : | N/A                                                                                           |
| <b>Exemption Requirement(s)</b> | : | N/A                                                                                           |

**Instructor: WONG Chi Leung (Adam)**

Office: WYL 226

Phone: 2616-7149

Email: adamwong@ln.edu.hk

Office Hours: TBA

### **Brief Course Description**

Game theory studies conflicts and cooperation between intelligent rational decision-makers. It offers insights of fundamental importance for students/scholars in all branches of social sciences. This course covers the basic theories of modern game theory, including simultaneous-move and sequential games. Applications to such fields as economics, business, political science, sociology, international relations, etc. will be covered.

### **Aims**

This course enables students to understand and grasp the basic concepts and techniques of modern game theory, trains them to think strategically, and demonstrates how game theory can be applied to real-life situations.

### **Learning Outcomes (LOs)**

Upon completion of this course, successful students should be able to:

1. demonstrate an understanding of the basic approach of game theory;
2. analyse well-formulated strategic games;
3. identify certain ways of thinking in real life that are not consistent with the general principles of game theory; and
4. demonstrate how game theory can be applied to real-life situations.

### **Indicative Contents**

1. Introduction and general principles
  - a. Basic ideas and examples
  - b. How to think about strategic games
2. Games with sequential moves
  - a. Solving games by using game trees
  - b. Order advantages
3. Simultaneous-move games: discrete strategies
  - a. Payoff tables
  - b. Nash equilibrium
  - c. Dominance
  - d. Best-response analysis
  - e. Multiple equilibria in pure strategies
  - f. No equilibrium in pure strategies
4. Continuous strategies and applications
  - a. Best-response curves
  - b. Some economics of oligopoly
  - c. Some other applications
5. Simultaneous-move games: mixed strategies
  - a. Mixed strategies
  - b. Mixing in zero-sum games
  - c. Mixing in non-zero-sum games
6. Combining sequential and simultaneous moves
  - a. Subgames and subgame-perfect equilibrium
  - b. Changing the order of moves in a game
  - c. Change in the method of analysis
7. The prisoners' dilemma and repeated games
  - a. Finite repetition
  - b. Infinite repetition
8. Strategy and voting
  - a. Voting rules and procedures
  - b. Voting paradoxes

- c. Strategic manipulation of votes
  - d. The median voter theorem
- 9. Auction and bidding strategies
  - a. Auction rules and auction environments
  - b. The winner's curse
  - c. Bidding strategies
- 10. Bargaining
  - a. Nash's cooperative solution

### **Measurement of Learning Outcomes**

1. Students' participation in the presentations and discussions will be assessed in tutorials. (LOs 1-3)
2. A mid-term test will be used to assess students' understanding and comprehension of the course materials. (LOs 1-4)
3. A final exam (50%) covering all the taught topics will measure students' overall understanding and synthesis of knowledge and applications of game theory and strategic behaviour. (LOs 1-4)

### **Teaching Method**

Lectures combined with tutorials involving presentations and discussion. Classroom experiments will be discussed in tutorials to help students apply the game theory to real life situations.

### **Assessment**

|                        |     |
|------------------------|-----|
| Tutorial Participation | 5%  |
| Presentation           | 15% |
| Mid-term test          | 30% |
| Final examination      | 50% |

### **Good Practices**

1. An on-line CTE course teaching and learning evaluation is conducted about 6 weeks after the term begins. Students can give early feedback regarding the course.
2. A midterm test provides timely feedbacks to students in addition to tutorial meetings.
3. Homework assignments and/or quizzes will be used to monitor student learning outcomes and provide them with timely feedbacks.
4. All necessary course materials and readings are uploaded on Moodle at the beginning

of the term. Students are trained to read the lecture notes beforehand and being well prepared for classes and presentations.

### **Required/ Essential Reading**

Dixit, A., S. Skeath, and D. McAdams, *Games of Strategy*, 6<sup>th</sup> Edition, W.W. Norton, 2025.

### **Recommended/ Supplementary Readings**

Harrington, J, *Games, Strategies, and Decision Making*, 2<sup>nd</sup> Edition, Worth Publishers, 2015.

Dixit, A. and B. Nalebuff, *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life*, W.W. Norton & Company, 2008.

### **Warning against plagiarism**

Sources of quotations should be spelled out clearly. Taking others' writings as one's own is plagiarism and will be taken seriously and punished accordingly.

**Rubrics for Midterm Test and Final Exam (30% and 50%)**

| <b><u>Dimenions</u></b>                    | Excellent<br>A-, A                                                                                       | Good<br>B- to B+                                                                                     | Fair<br>C- to C+                                                                                     | Pass<br>D, D+                                                                                               | Failure<br>F                                                                                                                   |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Comprehension of concepts<br>(12% and 20%) | Demonstrates a thorough understanding of the relevant concepts, reasoning and methodology of game theory | Demonstrates a good understanding of the relevant concepts, reasoning and methodology of game theory | Demonstrates a fair understanding of the relevant concepts, reasoning and methodology of game theory | Demonstrates a superficial understanding of the relevant concepts, reasoning and methodology of game theory | Demonstrates insufficient understanding or misunderstanding of the relevant concepts, reasoning and methodology of game theory |
| Application of concepts<br>(12% and 20%)   | Always able to apply the relevant concepts of game theory correctly                                      | Usually able to apply the relevant concepts of game theory correctly                                 | Able to apply the relevant concepts of game theory but there are some minor mistakes                 | Sometimes able to apply the relevant concepts of game theory but there are some major mistakes              | Not able to apply the relevant concepts of game theory                                                                         |
| Clarity<br>(6% and 10%)                    | consistently accurate, logical and clear                                                                 | generally accurate, logical and clear                                                                | comprehensible and clear with some minor lapses                                                      | comprehensible but there are some major lapses                                                              | largely incomprehensible                                                                                                       |

**Rubrics for Presentation (15%)**

| <b><u>Dimenions</u></b>               | Excellent<br>A-, A                                                                                                  | Good<br>B- to B+                                                                                         | Fair<br>C- to C+                                                                   | Pass<br>D, D+                                                                                 | Failure<br>F                                                                                        |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Content<br>(8%)                       | Shows excellent grasp of the topics; incorporates ample relevant and useful information                             | Shows good grasp of the topics; incorporates much relevant and useful information                        | Shows fair grasp of the topics; incorporates a fair amount of relevant information | Shows acceptable grasp of the topics; incorporates some relevant and useful information       | Shows little or no grasp of the topics; includes little or no relevant or useful information        |
| Organization and Articulation<br>(7%) | Organizes and presents materials in a logical and appealing way that is easy to understand and interesting to watch | Organizes and presents materials in a generally logical way that is understandable and somewhat engaging | Organizes and presents materials in an understandable and fairly interesting way   | Organizes and presents materials in a way that is understandable but not interesting to watch | Organizes and presents materials in an illogical way that is hard to understand and boring to watch |

**Rubrics for Tutorial Participation (5%)**

| <b><u>Dimenions</u></b> | Excellent<br>A-, A                                                    | Good<br>B- to B+                                                 | Fair<br>C- to C+                                           | Pass<br>D, D+                                        | Failure<br>F                             |
|-------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------|------------------------------------------|
| Participation<br>(5%)   | Frequently raises good questions and/or eagerly responds to questions | Often raises good questions and/or eagerly responds to questions | Occasionally raises questions and/or responds to questions | Rarely raises questions and/or responds to questions | Fails to fulfill satisfactory attendance |

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations. In particular, plagiarism, being a kind of dishonest practice, is “the presentation of another person’s work without proper acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student’s own work”. Students are required to strictly follow university regulations governing academic integrity and honesty.
- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students’ understanding of plagiarism, a mini-course “Online Tutorial on Plagiarism Awareness” is available on <https://pla.ln.edu.hk/>.
- (5) Students must adhere to the University’s guidelines and practices when using Generative Artificial Intelligence (AI) tools. The official documents “Guidelines for Using GAI Tools at Lingnan University” and “Best Practices for Ethical and Responsible Use of GAI Tools in Course Assessments” can be found here: <https://www.ln.edu.hk/tlc/generative-artificial-intelligence/gai-guidelines-best-practices>.