

ECON5190
Games and Strategic Behavior (MBA & MSc Econ)
Time: 9:00am-12:20pm Thursday
Location: LSK G003

Instructor: Wooyoung Lim
Office: LSK 6080
Office Hours: by appointment
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1 Course Objective

The course demonstrates how insights of game theory can be utilized by managers to address important decisions confronting the firm. The primary focus of the analysis is on understanding how other players form their strategies and expectations in order to identify one's own best response strategy. We will utilize game theoretic reasoning to analyze issues related to entry into new markets or exit from established businesses, changing the perceptions of competitors, the extent of product differentiation and proliferation that is implied by competition, and strategies aimed at alleviating price competition among firms.

This course introduces the basic concepts of game theory. The emphasis is on the unifying perspective that game theory offers to questions in economics, business, other disciplines, and everyday life. It will enable students to view social interactions as strategic games, to use game theoretic concepts to predict behavior in these interactions and to conceive of ways in which altering the game affects social outcomes.

2 Teaching Assistant

- Victor Yip (victory@ust.hk)
- Please contact your TA when you have any questions and/or concerns about your homework grading.

3 Prerequisite

For MSc(ECON); FT-MBA and MBA Exchange students only. ECON5110 or 5130 or an approval from the instructor.

4 Required Readings

1. Harvard Business School Cases: A case pack will be provided on Canvas.
2. Lecture Notes 1-8 on Canvas

5 Reference Books on Reserve in Library

1. Dixit, Avinash, Susan Skeath, and David H. Reiley Jr. (DSR) "Games of Strategy," W. W. Norton & Company, Forth Edition 2013.

6 Course Intended Learning Outcomes

Upon completion of this course, you will be able to:

1. Explain how other players form their strategies and expectations in order to identify one's own best response strategy.
2. Model social interactions as strategic games, use game theoretic concepts to predict behavior in these interactions and conceive of ways in which altering the game affects social outcomes.
3. Explain how managers can utilize insights of game theory to address important decisions confronting the firm.
4. Construct game theoretic reasoning to analyze issues related to entry into new markets or exit from established businesses, changing the perceptions of competitors, the extent of product differentiation and proliferation that is implied by competition, and strategies aimed at alleviating price competition among firms.

7 Course Requirement and Evaluation

- Evaluation will be based upon written assignments (20%), class participation (20%), presentation (30%), and a final exam (30%).
- If you miss **two** classes without permission, your final grade will be degraded by one letter grade (for example, A- → B-). If you miss **three** or more classes without permission, your final grade will be F.
- Written assignments to be conducted individually and case presentations to be conducted in teams of minimum 3 and maximum 4 people. Late submission is not accepted in any circumstances.
- Individual assignments:

- a. Each individual needs to submit an individual solution to the problem set (due date: TBA).
- b. Each question will be graded on a check plus (20 points) / check (13 pts) / check minus (5 pts) scale.
- Group assignments:
 - a. Each group will put together and present a case study. Each presentation should last **30 minutes**, with an additional **5 minutes** of class discussion led by the group. The 35 minutes requirement will be implemented **strictly**.
 - b. Each group must discuss the case analysis with the instructor via Zoom and get some feedback, at least 2 days prior to the presentation.
- Final Exam: March 28 (Thursday) 10AM-12Noon
 - Analytical problems based on the lecture notes and problem sets
 - One question will be based on the **case presentation materials**. The best presenting team's case is more likely to be in the final.

8 Course Outline (tentative, subject to change.)

Weeks 1 (February 1): Introduction, Sequential-move Games

- Lecture Note 1: Elements of a Game, Thinking Strategically, Sequential-move Games (DSR Chapters 1,2,3).

Weeks 2 (February 15): Sequential-move Games

- Lecture Note 1: Elements of a Game, Thinking Strategically, Sequential-move Games (DSR Chapters 1,2,3).

[Classroom Experiment] Guessing Game

Week 3 (February 22): Simultaneous-move Games

- Lecture Note 2: Simultaneous-move Games (DSR Chapter 4)

[Classroom Experiment] Centipede Game, Ultimatum Bargaining, Pure-Coordination Game, Assurance Game

[Case Preview] Judo and the Art of Entry [9-794-103]

Week 4 (February 29): Best-response Curve Analysis

- Lecture Note 3: Best-response Curve Analysis (DSR Chapter 5, 6)

[Classroom Experiment] Monty Hall Game

Case Presentation 1: Judo and the Art of Entry [9-794-103]

[Case Preview] Selling Durable Goods [9-190-110]

Week 5 (March 7): Games with Incomplete Information

– Lecture Note 5: Games with Incomplete Information (DSR Chapter 9)

Case Presentation 2: Selling Durable Goods [9-190-110]

[Case Preview] Competition and Product Variety [9-190-100] & Product Proliferation and Preemption [9-190-117]

Week 6 (March 14): Repeated Interactions

– Lecture Note 6: The Prisoners' Dilemma and Repeated Games (DSR Chapter 11)

Case Presentation 3: Competition and Product Variety [9-190-100]

Case Presentation 4: Product Proliferation and Preemption [9-190-117]

[Case Preview] Competition and Compatibility: Mix and Match [9-190-112] & The Fog of Business [9-793-098] & Signaling Costs [9-793-125] & Vaccination Game

Week 7 (March 21): Case Presentations

Case Presentation 5: Vaccination Game

Case Presentation 6: Competition and Compatibility: Mix and Match [9-190-112]

Case Presentation 7: The Fog of Business [9-793-098]

Case Presentation 8: Signaling Costs [9-793-125]

Week 8 (March 28): Final Exam (Venue: TBA)

9 HBS Cases for Presentations and Some Key Words

- Judo Economics (**200** points): Backward Induction, Game Tree, Market Entry
- Selling Durable Goods (**220** points): Backward Induction, Game Tree, Dynamic Inconsistency
- Product Proliferation and Preemption (**200** points): Backward Induction, Game Tree, Application to Law and Economics, Monopolistic Competition with Horizontal Differentiation
- Competition and Product Variety (**200** points) : Simultaneous-Move Game, Best Response Analysis, Monopolistic Competition with Horizontal Differentiation

- Competition and Compatibility: Mix and Match (**200** points): Simultaneous-Move Game, Best Response Analysis
- Fog of Business (**220** points): Backward Induction, Game Tree, Asymmetric Information
- Vaccination Game (**220** points): Simultaneous-Move Game, Mixed-strategy, Externality
- Signaling Costs (**220** points): Backward Induction, Game Tree, Asymmetric Information

10 Schedule of Group Presentations (Tentative)

Week 4 Group1 (Judo Economics)

Week 5 Group2 (Selling Durable Goods)

Week 6 Group3 (Competition and Product Variety), Group4 (Product Proliferation and Preemption)

Week 7 Group5 (Competition and Compatibility), Group 6 (Fog of Business), Group7 (Vaccination Game), Group8 (Signaling Costs)

11 Learning Environment

Matured conduct in classroom is the requirement for this course. Distractive behaviors such as use of cell phone, instant messaging and chatting are not tolerated. Violation of this rule will result in significant deduction of points from student's grade. Please refer to following website for the guideline for good learning environment:

http://www.ust.hk/vpao/conduct/good_learning_experience.pps.

12 Academic Integrity Policy

Honesty and Integrity is central value in HKUST. Please be aware of the importance and maintain high standard of honesty in the problem sets and examinations in this course. Familiarize yourself to the university rules and the HKUST academic honor code by visiting following website: <http://www.ust.hk/vpao/integrity/>.

A Guideline for Case Analysis

1. Judo Economics

- (a) Suppose that: (i) each buyer has a willingness-to-pay of \$200 for one unit of either the incumbent's or the entrant's product; and (ii) both incumbent and entrant have a \$100 unit cost of serving buyers. Formulate a strategy for the entrant. How much money can the entrant make?
- (b) Now suppose that: (i) each buyer has a willingness-to-pay of \$200 for one unit of the incumbent's product and \$160 for one unit of the entrant's product; and (ii) the incumbent has a \$100 unit cost and the entrant a \$120 unit cost. Formulate a new strategy for the entrant. How much money can the entrant now make?

2. Selling Durable Goods

- (a) What is the pricing policy of the monopoly supplier of the durable good to maximize the profit?
- (b) What are the respective sales for January and July under the profit-maximizing pricing policy?
- (c) What if there are two identical suppliers competing each other? (Assume that two suppliers simultaneously choose the prices in January and July.)

3. Competition and Product Variety

- (a) Which product types will firms A and B choose to make?
- (b) Now suppose that firm A enters the market first and wishes to try to deter subsequent entry by firm B. Which product type should A decide to make?
- (c) Now assume that there is only one firm, A for instance, in the market. Which product type will A decide to make?
- (d) Suppose that the marginal psychic costs of the consumers rise. Which product types will the firms now choose? Will the resulting prices and profits be lower, higher, or the same as before?

4. Product Proliferation and Preemption

In order to verify that a firm is engaging in product proliferation as a means of entry deterrence FTC has to demonstrate the following facts:

- (a) The incumbent is making more products than it would in the absence of the threat of entry;
- (b) Given the number of products made, entry is indeed unprofitable;

- (c) The number of products which would be made in the absence of the threat of entry would not deter entry; and
- (d) Deterring entry is more profitable for the incumbent than is accommodating entry.

Can you establish these four facts?

5. Competition and Compatibility: Mix and Match

Separately consider the following two cases

- (a) the systems are compatible;
- (b) the systems are not compatible,

and discuss whether firms prefer to make compatible or incompatible systems. Explain intuitively why the firms' profit in one situation is larger than the other situation.

6. The Fog of Business

- (a) Should player E1 enter market 1?
- (b) In answering 1 above, what assumptions are you making as to what E1 believes about the players' rationality, about what the players believe about one another's rationality, and so on?
- (c) Now assume that the incumbent is of an irrational type who always fights with probability $p > 0$ and of a rational type who behaves optimally with probability $(1 - p) > 0$. Whether or not the incumbent is rational or not is its private information. Under what condition on p you can find an equilibrium in which even the rational type incumbent fights?

7. Vaccination Game

- (a) Details are provided in the case.

8. Signaling Costs

- (a) Might player A want to signal its cost to player B?
- (b) Is there a way for it to do so? In answering, pay particular attention to the question of the credibility of any signal that A might send B. (**Hint:** Note that if both firms are established in the market it is the firm with the lower unit cost that will dominate the market. It sets a price slightly lower than the unit cost of the higher cost producer.)