

# **Game Theory with Applications to Finance and Marketing, I**

The Course Syllabus, Fall 2021

Class meet: Room 203, Management Building 1, 6:30pm-9:20pm,  
Wednesday

**Because of Covid-19 we shall go virtual since September 22, 2021!  
Enrolled students can view pre-recorded lectures at NTU COOL.  
Others can take a peek at our first meeting by downloading files  
from:**

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This course introduces the modern non-cooperative game theory to senior undergraduate students and graduate students. A game may or may not involve asymmetric information, and may be static or dynamic in nature. Thus we can classify games into four categories, and define four associated equilibrium concepts, which are Nash equilibrium (NE), subgame perfect Nash equilibrium (SPNE), Bayesian equilibrium (BE), perfect Bayesian equilibrium (PBE), and other refined equilibrium concepts. We shall first talk about these equilibrium concepts, and in particular the Cho-Kreps refinement on PBE's, and then give applications regarding auctions, asset trading, bilateral monopoly, bargaining, and strategic firms' imperfect competition in price, quantity, and location. The emphases will be on signalling, screening, and reputation games that are particularly useful in modelling securities trading and corporate agency problems.

Then the course considers many applications in respectively finance and marketing. These applications will be useful for students who are interested in writing master theses using a game-theoretic approach. The applications in finance may include financial signaling, financial contract design, stock trading with information asymmetry, the strategic roles of forward and option

contracts. The applications in marketing may include optimal product line design, the coordination problem of a non-integrated distribution channel, the optimal targeting strategy when the marketer can serve both online and offline markets, the optimal promotion mix design (coupon versus rebate, and trade dealing) for an integrated or non-integrated channel with or without coupon resale, optimal informative advertising policy with mass or targeted media, and competitive mobile targeting strategies.

Students will be responsible for solving problem sets and presenting an assigned paper, which, together with an in-class midterm examination, would determine a student's course grade. A tentative schedule now follows.

Week No.	Contents
1	Some Examples
2	Static Games with Complete Information, I
3	Static Games with Complete Information, I (continued)
4	Static Games with Complete Information, II
5	Static Games with Complete Information, II (continued)
6	Multistage Games and Repeated Games
7	Multistage Games and Repeated Games (continued)
8	Static Games with Incomplete Information
9	Screening Games
10	Signaling and Reputation Games
11	Perfect Bayesian Equilibrium and Refinements
12	Midterm Exam
13	Perfect Bayesian Equilibrium and Refinements (continued)
14	(Presentation starts.) Interactions between Financial and Product Markets
15	Financial Signaling
16	Product Line Design, Branding and Return Policy
17	Distribution Channels and E-commerce
18	Promotion and Advertising