CB2041: APPLICATIONS OF GAME THEORY TO BUSINESS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Applications of Game Theory to Business

Subject Code
CB - College of Business (CB)
Course Number
2041

Academic Unit
Economics and Finance (EF)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
GE2256 Applications of Game Theory to Business

Part II Course Details

Abstract

This course focuses on strategic decision-making in interactive situations where different individuals must anticipate what others are going to do. Game theory offers a systematic way to study environments with strategic interactions. The ultimate goal of this course is to enhance the student's ability to think strategically in complex, interactive situations. This course also encourages discovery learning, which takes place when students apply their knowledge and skills in game theory to discover solutions to problems in business and life. An introduction of the main ideas and techniques of game-theoretic analysis related to cooperation, coordination, pricing, location choice, bargaining, conflict, negotiation, bidding in auctions, cheap talk and other strategic interactions in business will be presented. We will adopt a problem-centred approach and use equilibrium analysis in a variety of settings.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Recognize, identify and assess standard strategic situations in business and other social settings.		x	x	x
2	Formalize real-life economic and business situations using game-theoretic models and be able to make decisions under uncertainty.		x	x	
3	Apply game-theoretical analysis, both formally and intuitively, to strategic business scenarios.		x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	The lectures introduce fundamental concepts in game theory to students and encourage them to think critically and logically, with the aim to train students to identify strategic interactions prevalent in business activities and develop their ability to solve new business problems by themselves.	1, 2, 3	3 hours

2	In-class exercises	Throughout the semester, in-class exercises in the form of 'learning by doing' problems and simple experiments will be conducted. This will form a part of the lectures.	1, 2, 3	
3	Discussion of Experimental Results or Case Studies	Experimental results or case studies will be discussed in the lectures. Students will be encouraged to apply the various theories of game theory to analyse specific industry problems and business practices.	2, 3	
4	Problem sets	Problems sets will be assigned regularly. Students will be asked to find solutions to problems utilizing the methods taught in the lectures.	2, 3	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Midterm Exam	1, 2, 3	20	
2	Problem Sets	2, 3	10	
3	Group project	1, 2, 3	20	Students need to write a short paper on a real-life application of game theory

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Mid-term Exam

Criterion

1.1 Ability to apply various concepts learnt in class to different applied problems
1.2 Ability to solve problems of strategic interaction

Excellent (A+, A, A-)

High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Problem Sets

Criterion
2.1 Ability to apply various concepts learnt in class to different applied problems
2.2 Ability to solve problems of strategic interaction

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Group project

Criterion
3.1 Ability to identify a strategic interaction in a business activity
3.2 Apply knowledge of game theory learnt in lectures to a problem in business interaction
3.3 Novelty of the idea
3.4 Ability to communicate clearly, concisely and effectively through write-up of the project

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Final Examination

Criterion
4.1 Ability to apply various concepts learnt in class to different applied problems
4.2 Ability to solve problems of strategic interaction

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

1. Overview of Game Theory (Rationality, Common Knowledge; Look forward, Reason back)
2. Static Games and Nash Equilibrium: Simultaneous moves, discrete strategies, continuous strategies, applications to industrial organization (price setting; quantity setting; location choice)
3. Dominant Strategies; Rationalizability; Mixed strategies
4. Public Choice and Free Rider Problem
5. Extensive-form games, subgame-perfect Nash equilibrium, solving via backward induction
6. Tacit coordination, threats and promises for cooperation; Limits to cooperation
7. Bargaining; Trust; Reciprocity
8. Static Games with Incomplete Information; Bayes-Nash equilibrium; Auctions
9. Information Transmission and Cheap Talk
There will be in-class exercises that will be conducted throughout the semester. Some of them will be in the form of simple experiments.

Reading List

Compulsory Readings

	Title
1	Dixit, A., S. Skeath and D. Reiley, 2009. Games of Strategy. 4th edition. W.W. Norton.

Additional Readings

	Title
1	Watson, J, 2013: Strategy: An Introduction to Game Theory, 3rd edition. W. W. Norton)
2	Dixit, A. K., & Nalebuff, B. J. (1993). Thinking strategically: The competitive edge in business, politics, and everyday life. WW Norton & Company.
3	Vohra, R. V., & Krishnamurthi, L. (2012). Principles of Pricing: an analytical approach. Cambridge University Press.