



DE LA SALLE UNIVERSITY – MANILA  
COLLEGE OF SCIENCE  
Mathematics Department

**SYLLABUS**

COURSE CODE MTH625M/D  
 COURSE TITLE Game Theory  
 CLASS DAY & TIME  
 ROOM  
 NAME OF FACULTY  
 COURSE CREDIT 3 Units  
 CONTACT NO. (DEPT) (02) 536-0270, (02) 524-4611 loc. 420/413  
 TERM/SCHOOL YEAR

**COURSE DESCRIPTION**

An introductory course on game theory which tackles both the non-cooperative and cooperative streams.

**COURSE OBJECTIVES**

The students will:

1. Be aware of the fact that game theory has many applications in real-life situations.
2. Understand game theory as an effective tool in the analysis of problems encountered in different fields such as political science, military science, economics, business, and life behavioral sciences.
3. Identify optimal strategies in a non-cooperative game.
4. Prove properties of point and set solutions to a cooperative crisp game.
5. Exhibit values like:
  - cooperation through group study;
  - honesty by claiming credit only for the work he has done;
  - zeal and seriousness of intent to learn by participating actively in class discussion, doing his homework regularly and consulting his mentor;
  - patience, perseverance and diligence by solving assigned exercises completely including the difficult ones;
  - faith by doing what is right and giving his best in performing any assigned task;
  - show concern for the community through sharing of know-how and resources during group discussion;
  - self-reliance by being able to solve problems independently.

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting
<b>1. Overview of Game Theory</b> 1.1 Introduction	Lecture-Discussions Problem Solving	Weeks 1-3

Topic/Subtopic	Learning Strategies/ Activities	Week/Meeting
1.2 Game Trees and Tree Games 1.3 Games in Extensive Forms 1.3 Normal Form of the Game 1.4 Pure Strategy Nash Equilibrium		
<b>2. Two-Person Zero Sum Games</b> 2.1 Saddle Point 2.2 Dominated Strategies 2.3 Mixed Strategy Nash Equilibrium 2.4 Solving Small Games 2.5 Symmetric Games	Lecture-Discussions Problem Solving Use of MS Excel and/or Mathematica (Wolfram Alpha)	Weeks 4-6
<b>3. Solving Matrix Games</b> 3.1 The Minimax Theorem 3.2 Analysis of Some Games	Lecture-Discussions Problem Solving Use of MS Excel and/or Mathematica (Wolfram Alpha)	Weeks 6-7
<b>MIDTERM EXAMINATION</b>		
<b>4. Nonzero noncooperative sum games</b> 4.1 Noncooperative Games 4.2 Solution Concepts for Noncooperative Games	Lecture-Discussions Individual/Group Reporting	Weeks 8-9
<b>5. Cooperative Games (Crisp Coalitions)</b> 5.1 Characteristic functions 5.2 Solution concepts 5.3 Cores and related solution concepts 5.4 Shapley value 5.5 Nash Bargaining Axioms	Lecture-Discussions Individual/Group Reporting	Weeks 10-11
<b>6. Classes of Cooperative Crisp Games</b> 6.1 Totally Balanced Games 6.2 Convex Games 6.3 Clan Games	Lecture-Discussions Individual/Group Reporting	Weeks 12-13
<b>7. Fuzzy Games*</b>		
<b>FINAL EXAMINATION</b>		Week 14

\*Optional Topic

**COURSE REQUIREMENTS**

- Midterm Examination 35%
- Final Examination 35%
- Oral Report 10%
- Written Report 10%
- Problem Set 10%

**SOURCES****BOOKS**

- Branzei, Rodica, *Models in cooperative game theory: crisp, fuzzy, and multi-choice games*, Berlin: Springer, 2005.
- Gilles, Robert P., *The cooperative game theory of networks and hierarchies*, Heidelberg: Springer, 2010.
- Kolokoltsov, Vassili N. and Oleg A. Malafeyev. *Understanding game theory: introduction to the analysis of many agent systems with competition and cooperation*, Singapore: World Scientific, 2010.
- Maschler, Michael, Eilon Solan and Samuel Zamir, *Game theory*, Cambridge: Cambridge University Press, 2013.
- von Neumann, John and Oskar Morgenstern, *Theory of Games and Economics*, 60<sup>th</sup> Anniversary Edition, Princeton University Press, 1972 (orig.).

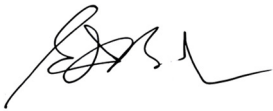
**ONLINE MATERIALS**

- [www.gametheory.net](http://www.gametheory.net)
- [oyc.yale.edu/economics/econ-159](http://oyc.yale.edu/economics/econ-159)
- <https://www.coursera.org/course/gametheory>
- [www.gametheorysociety.org](http://www.gametheorysociety.org)
- [plato.stanford.edu/entries/game-theory/](http://plato.stanford.edu/entries/game-theory/)

**RELATED WORKS OF FACULTY**

- *On Strategies of Sponsored Games*, submitted for publication.
- *Allocations in Sponsored Games* (co-authored with Ms. Karen Nocum), submitted for publication.
- *Two Option Strategies of Team Players in Sponsored Games*, DLSU Science and Technology 2014.
- *Cooperation Induced by Sponsors*, DLSU Science and Technology 2013.
- *From Solutions of Games to Codes*, DLSU Science and Technology 2012.

Noted by:



DR. ISAGANI B. JOS  
Chair, Mathematics Department

DR. JOSE SANTOS R. CARANDANG VI  
Dean, College of Science