GAME THEORY AND ITS APPLICATION

COURSE GUIDELINES

Dr Xu Zhang

xu.zhang@rmit.edu.au

School of Science, RMIT

Introduction

- **Game Theory:** A mathematical theory which was developed to model how rational human beings or organizations make decisions in a competitive environment.

- Applications: Statistics, Economics, Political sciences, Biology, Military actions.

- Ancient Game strategy: *The Thirty-Six Stratagems (China, BC)*

- Modern Game theory: begun in the early of last century.

- Impact works by: **E.Borel,   E.Zermelo,   J.von Neumann.**

- Pathbreaking paper by: **J.von Neumann** (1928, modern era of game theory).

- Seminal work by: **J.von Neumann & O. Morgenstern** (1944)
Theory of Games and Economic Behaviour.

Nobel Prize in Economics awarded to game theorists:

- **J. Nash, J. Harsanyi, R. Selten** (1994)

  for their contributions of game theory to rational decision making in economics, especially for analysis of non-cooperative games.

- **R. Aumann, T. Schelling** (2005)

  for having enhanced our understanding of conflict and cooperation through game – theory analysis.

- **L. Hurwicz, Eric S. Maskin, Roger B. Myerson** (2007)

  for having laid the foundations of mechanism design theory.

- **L. S. Shapley, A. Roth** (2012)

  for their contributions in theory of stable allocation and practices of market design.

MAIN OBJECTIVE

The main objective is to come up with optimal strategy for each player. The combination of these strategies, or profile, is called an

Equilibrium point.

WHAT ARE WE COVERING

- *Basic concepts of game theory, extensive and normal form of representing games.*

- *Equilibrium point concepts*

- *Two-person zero sum games*

- *Games with incomplete information*

- *Infinite Games*

- *Cooperative games*

LEARNING RESOURCES

- *Books on game theory in libraries at various universities (including RMIT).*

- *Internet contains a wealth of information on game theory.*

- *Lecture notes and other materials will be distributed on a regular basis*

RECOMMENDED REFERENCE

- *Prescribed Texts*

Game Theory: An Introduction. *Princeton University Press by Steven Tadelis (2013).*

References

• **Fun and Games: A Text on Game Theory**. *D.C. Heath and Company by Binmore, Ken (1992).*

• **Introduction to Game Theory.** *Springer-Verlag, New York, by Morris, P. (1994).*

• **Game Theory.** *(Third Edition). Academic Press, by Owen, G. (2001).*

• **Game Theory: Analysis of Conflict.** *Harvard University Press, by Myerson, R.B. (1991).*

ASSESSMENT TASKS

- **Three (3) Assignments   25%**
- **Mid-Semester Test   25%**
- **Final Exam   50%**

TEACHING SCHEDULE OUTLINES

Week 1 - 2: Basic Concepts of Game Theory

Week 3 - 4: Equilibrium point concepts of strategic form games

Week 5 - 6: Two-person zero sum games

Week 7 - 8: Games with incomplete information

Week 9 - 10: Infinite and repeated games

Week 11 - 12: Cooperative games

SCHEDULED CLASS

Wednesday

Time: 16:30 – 19:30

Venue: 057.03.002