JINAN UNIVERSITY
Game Theory and Business Decision

Lecturer: TBA
Time: Monday through Friday (June 17, 2019-July 19, 2019)
Contract hours: 60 hours
Credits: 4
Location: Huiquan Building
Office: Huiquan Building 518
Office hour: By Appointment
E-mail: TBA

Course Description

This is a course on game theory and its application to business strategy. We will develop the basic tools of game theory through lectures and exercises, and we will put the tools to work by applying them to business examples and cases.

Game theory studies competitive and cooperative behavior in strategic environments, where the fortunes of several players are intertwined. It provides methods for identifying optimal strategies and predicting the outcomes of strategic interactions.

The field of game theory began around 1900 when mathematicians began asking whether there are optimal strategies for parlor games such as chess and poker, and, if so, what these strategies might look like. The first comprehensive formulation of the subject came in 1944 with the publication of the book *Theory of Games and Economic Behavior* by famous mathematician John von Neumann and eminent economist Oskar Morgenstern. As its title indicates, this book also marked the beginning of the application of game theory to economics. Since then, game theory has been applied to many other fields, including political science, military strategy, law, computer science, and biology, among other areas. In 1994 three pioneers in game theory were awarded a Nobel Prize, marking the arrival of the field. In 2005, two other prominent researchers in game theory were awarded a Nobel Prize.

Nowadays, the use of game-theory jargon—zero-sum game, Prisoner's Dilemma, win-win game, etc.—is widespread. In this course, we will go beneath the jargon to learn the underlying theory.

Philosophy of the Course
This section describes some of the "design rules" behind the course and which we shall follow in the classroom.

4.1. Role of Mathematics Game theory is a mathematical field, and we will use some mathematics in the course. But this does not mean that there will be lots of numbers or techniques. Rather, it means that we will be extremely clear about what we are assuming and about what follows from our assumptions. The ability to be clear in this way can be said, in fact, to be the essence of mathematics! So, think of what we will do as more an exercise in careful logic—with some simple calculations thrown in.
The mathematics in the course shouldn't be a hurdle for anyone. (But, for those interested there will also be additional technical readings available.)

4.2 A First or Second Course? The course presupposes no knowledge of game theory. This said, it should also be of interest to people who have already taken a course in the subject, since it contains quite a bit of theory that isn't covered in many courses. Also, most of the applications to business were developed especially for this course.

4.3 Legal and Ethical Aspects Discussions of game theory and business strategy may touch on legal issues. For example, antitrust laws determine, among other things,what types of business contracts are legal and what types are not. In this course, we will try to note some of the legal issues that can arise. This is the important domain of courses on the law and business. (A useful reference is "A Note on Antitrust and Competitive Tactics," by Dennis Yao, 9-703-493, Harvard Business School.) The Course-like any course on business-will also likely raise very basic questions about what is ethical behavior in business, what is the purpose of business, etc. These are legitimate-indeed, vital-matters for discussion.

The Course and Beyond Some of the ideas I will bring to this course I have taught many times. But some course materials will be untested, as I try out new ideas that I think are important. I hope we will have many successes together in the classroom, but there are bound to be a few failures as well. Still, I hope that even the failures will be, to use the language of the Apollo 13 mission, "successful failures."
Most important, I consider the course only the start of a conversation among us that I hope continues long after the course itself is over.

Course Format

Most classes will have the following format. I will begin by introducing the game theory we will learn that day, going over and expanding on any notes that were assigned. We will then learn the theory by working through the assigned exercises together. We will go over the exercises in detail, making sure not just to calculate but also to understand! (I will also put complete solutions on Blackboard at the end of each class.) After this, we will look at applications of the theory--to business and other areas. I will further use videos and movies to reinforce the major principles of the course and enhance the learning experience.

Required Texts

Co-opetition (by Adam Brandenburger and Barry Nalebuff, Doubleday, 1996)
The Thirty-Six Strategies of Ancient China (by Stefan Verstappen, China Books & Periodicals, 1999).
The book *The Art of Strategy* (by Avinash Dixit and Barry Nalebuff, Norton, 2008) is a good accompaniment to our classes.
A few readings are in the XanEdu coursepack.

Course Hours

The course has 25 sessions in total. Each class session is 120 minutes in length. The course meets from Monday to Friday.

Grading Policy

There will be three graded pieces of work. One is a midterm, this is designed so you will be able to test your understanding of the course concepts covered to that point. You will be asked to state definitions given in the readings, and to work through some simple exercises. The midterm will count for 25% of the overall grade.

In Class Activities	15%
Exams: Two exams	50%
Projects:	25%
Attendance: 25 points per class	10%
Total	100%

There will be a final exam handed out towards the end of the course. This will count for 25% of the overall grade. Finally, there is a research paper, which you should write in teams of four or more members. The paper will count for 25% of the overall grade. It should be a game-theoretic analysis of a real-world situation. I expect most students will write about business situations (either for-profit or non-profit), but some may choose to write about other areas. A list of recommended topics will provide during the first week of classes. All topics must be approved by the instructor.

The paper should have five sections:

(i) a short executive summary; (ii) a short description of the situation being analyzed;

(iii) a game model of the situation; (iv) a discussion of the strategies employed by the players; and (v) brief comments on issues outside the scope of the formal model.

The emphasis of the paper should be on clear logic rather than lots of calculations.

Class participation, everyone is expected to attend all classes and to participate actively in class. In class, we will go through the exercises together and discuss readings will count 10%.

Going through the exercises will be a very important part of how we learn game theory. You are expected to have prepared the exercises, and to come to class ready to try out your analyses, to ask questions, and to help all of us along. Over the course, I will make a judgment about each student's level of involvement in class discussions, and, if a student's written work falls between two grades, use this to decide the grade.

If you need to miss a class, please send me an email (in advance, if possible) letting me know. Remember that the course depends on each of us being present and participating.

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90-100
Good	B	80-89
Satisfactory	C	70-79
Poor	D	60-69
Failed	E	Below 60

Course Modules
Module 1: Introduction to Game Theory
The question of this module is: What is a game? To answer, we will introduce the basic building blocks of game theory: game matrices and methods of analysis of matrices. We will also develop a complete classification of two-by-two game matrices, and apply this scheme to a number of game situations.

Module 2: Identifying the Players
The question of this module is: Who are the players in a game? To answer, we will list the different types of players that are possible. We will also look at the multiple roles that players can occupy.
Module 3: Thinking Added Value

The question of this module is: How much does a player get in a game? To answer, we will introduce the game-theoretic concept of added value. We will look at ways in which players can change their own added values and also the added values of other players.

Module 4: Attacking

The question of this module is: How can a player win as a challenger? To answer, we will develop some more building blocks of game theory: game trees and methods of analysis of game trees. We will also examine the significance of rationality and irrationality in games. We will then study some specific strategies for attacking.

Module 5: Defending

The question of this module is: How can a player outrun rivals? To answer, we will again develop some general theory and consider some specific strategies.

Academic Honesty

Jinan University defines academic misconduct as any act by a student that misrepresents the students' own academic work or that compromises the academic work of another. scholastic misconduct includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e. misrepresenting as one's own work any work done by another; submitting the same paper, or substantially similar papers, to meet the requirements of more than one course without the approval and consent of the instructors concerned; sabotaging another's work. Within these general definitions, however, Instructors determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties ranging from lowering of their course grade to awarding a grade of E for the entire course.