

The Australian National University  
School of Economics

ECON2141/2142/8053

***Strategic Thinking: An Introduction to Game Theory***

Semester 2, 2009

**Course description**

Game theory is sometimes referred to as the study of conflict and cooperation between rational decision-makers. The objective of the theory is to help us understand situations where many agents interact in a strategic setting, where each agent's well-being depends on the behavior of the other agents. Game theory is a collection of analytic techniques widely used in many sciences. It has provided powerful tools that have successfully been applied in almost every field of economics, including macroeconomics, industrial organization, public economics, and many others. In addition, recent applications of game theory have yielded important insights in many other disciplines, such as political science, law, biology, and computer science. Therefore, game theory should be of interest to anyone working in any of the above mentioned fields.

The aim of this course is to introduce the main ideas of game theory. The theory will be illustrated by way of examples, which will primarily be drawn from economics and political science. While the level of the course will be introductory, and mathematical prerequisites are minimal, the presentation of the material will rely on precise logical arguments. Prior acquaintance with economic modeling is helpful, but is not a requirement for the course.

**Learning outcomes**

In order to satisfy the requirements of this course, students will need to acquire a thorough understanding of the concepts introduced during the semester, and will need to demonstrate that they can apply the corresponding tools and ideas to unfamiliar problems. Note that just memorising the steps used to solve examples discussed in lecture and assigned tutorial problems will not lead to a clear understanding of these concepts, and will not prepare students to tackle the problems they will be required to solve in the exams.

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the theory. When doing so, *you should always think carefully about how the problems relate to the theory, and how the theory is applied in every particular example.*

Some additional suggestions that should improve your performance are to always do a preliminary reading of the respective textbook sections before lectures, work carefully through your slides, notes and textbook after the lectures, and work on tutorial problems before attending the tutorials. Do not get discouraged if things get difficult, and ask for help if you do not understand something. The lecturer and tutor are happy to answer your questions, provided that you keep up with the material, attend lectures, do the reading, and make a serious attempt at answering the tutorial problems. Note that the material is getting more difficult progressively throughout the semester, and that each new topic builds upon previously discussed topics. Thus, if you do not keep up with the course, you will fall behind and will have no chance to catch up.

### **Required Textbook**

Martin Osborne, *An Introduction to Game Theory*, Oxford University Press, 2004

You are expected to own a copy of the textbook, and work through all the covered sections conscientiously until you understand the respective material. Students who do not study the textbook should not expect to pass the course.

### **Supplementary References**

Ken Binmore, *Rational Decisions*, Princeton University Press, 2009

Joel Watson, *Strategy: An Introduction to Game Theory*, 2<sup>nd</sup> edition, W.W. Norton, 2008

M. Osborne and A. Rubinstein, *A Course in Game Theory*, MIT Press, 1994

### **Course outline**

1. Strategic games and Nash equilibrium
2. Nash equilibrium in mixed strategies
3. Extensive games with perfect information
4. Bayesian games (games with incomplete information)
5. Extensive games with imperfect information
6. Signaling games

### **Advanced topics for ECON2142/8053**

1. Knowledge and correlated equilibrium
2. Repeated games
3. Mechanism design and optimal auctions
4. Sequential equilibrium

### **Assessment**

- Problem sets (10%)
- Midterm Exam 1 (15%)

- Midterm Exam 2 (15%)
- Final Exam (60%)

Five assessable problem sets will be assigned during the semester. You may hand in solutions to the assessable problem sets in groups of up to three students. *The solutions must be placed in one of the assignment drop boxes next to the School of Economics main offices by noon on the due date. Since answers will be discussed in the tutorials on the day the solutions are due, no late solutions will be accepted.* Your solutions will not be corrected and returned to you, so you should make a copy before handing them in. If you do not understand the solutions to the problems sets when/after they are discussed in the tutorials, and are not sure whether your answers are correct, it is your responsibility to ask questions during the tutorials, or discuss the solutions with the lecturer or tutor in their office hours.

The two one-and-a-half-hour midterm exams will take place during lecture times on 21 August and 25 September. The midterm exams will not be redeemable, and no make-up exams will be offered in case you miss an exam. If you miss an exam for an approved reason (e.g., illness), and you provide sufficient evidence in support of your absence, the weight of the missed exam will be transferred to the final exam. As noted before, the material will increase in difficulty as the semester progresses. You should therefore prepare carefully for the midterm exams, and should not expect to be able to catch up in time for the final if you did not take the midterms seriously.

The problem sets and midterm exams will be the same for all students. The final exam will cover all the topics discussed during the semester, and will include additional problems for students enrolled in ECON2142 and ECON8053. These problems will cover the advanced topics discussed in the additional lectures starting in week 6. Students enrolled in ECON2142 and ECON8053 will also be required to present solutions to additional assigned problems, and to prepare a presentation on an assigned topic based on independent reading. Students whose performance in these presentations is not satisfactory may have up to 5 marks deducted from their final grade.

Students who achieve an overall mark for the course between 45% and 49% will have the option of taking a supplementary exam. The date, time, and location of this exam will be announced on the School of Economics website later in the semester. A student who passes the supplementary exam will be regarded as having passed the course with a result of PS or 50%. A student who fails the supplementary exam will be regarded as having failed the course with a result of N plus the original mark.

### **General information and codes of conduct**

It is your responsibility to familiarise yourself with the various University policies, procedures, and rules. For more information please refer to the following URLs and the additional links therein:

[http://cbe.anu.edu.au/schools/eco/General\\_information.html](http://cbe.anu.edu.au/schools/eco/General_information.html)

<http://academichonesty.anu.edu.au/>