

SCI2010 - Introduction to Game Theory

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Topics

Consider a real-life situation where people, who may or may not have conflicting interests, make strategic decisions. When gametheorists use the word game, they mean a model (a simplification) of such a situation that can be analyzed and solved mathematically. The branch of mathematics that does this is called Game Theory.

In the Game Theory course the students will get an introduction to various different types of games and their solution concepts. Many examples will be discussed to clarify the issues and exercises will be provided to learn how to compute solutions. More specifically, the following fundamental issues will be encountered:

1. Fairness & cooperation (in the chapters on Bankruptcy Problems and Cooperative Games)
2. Rationality & Common Knowledge (in the chapters on Extensive Form Games, Normal Form Games, Matrix Games, Repeated Games and Repeated Games with Absorbing States)
3. Expectations (in the chapters on Normal Form Games, Matrix Games and Repeated Games and Repeated Games with Absorbing States)
4. Threats & Manipulations (in the chapter on Repeated Games)
5. Nonmanipulability (in the chapter on Mechanism Design)

In most games that are discussed during the course, the strategic possibilities of the players determine what can happen. We will discuss the games in order of increasing strategic possibilities. So as the course progresses, the games and the strategies, and therefore also the mathematics, become more complex.

Prerequisites

Basic high school skills in mathematics (equations, functions, graphs,..., see also SCI-M page viii of the Course Catalogue). You must have passed an exam in mathematics in high school.

Literature

Lecture Notes "Introduction to Game Theory" by Frank Thuijsman will be provided, accompanied by some notes written by the lecturer. This is the only mandatory literature for the course. There is some nonmandatory literature as well. This includes books that discuss real-life situations that can be explained using Game Theory as well as books focussing on the underlying mathematics in the models that we discuss during the course.

Instructional format:

Lectures: There will be three 2-hour lectures per week, consisting of (1) a frontal, but interactive instruction and (2) an active training in comprehending the instructed material by spending a lot of time on problem solving, either individually or jointly with other participants.

During the lectures instruction and practice will alternate in line with the progress of the material in the lecture notes. ***There are no tutor groups for this course.***

Examination

There will be two written exams (one in the middle, in principle during the last lecture of week 4, one in the examination week) that consist of solving a number of "open" problems. Your grade will be the average of the 2 grades. If you fail the course, then in the resit-week you get the possibility to do a *3-hour resit on the full course material*. **It is not allowed to use a graphical calculator during any of the exams.** An ordinary calculator is allowed.

Attendance:

There is no attendance requirement for this course. Not following the lectures is at your own risk.