

## Game Theory Course Information

Time and Room: TBA

**Instructor:** Patroklos Benatos

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**Office hours:** By appointment, usually after class.

**Course page:** <https://pbenatos.web.elte.hu>

All details (including what you find on this page) and a blog to discuss matters during the semester are on this site. Please visit the site.

**Prerequisites:** You need to be familiar with the style of *rigorous* and *precise* arguments.

The mathematical tools needed for this course, together with some explanation, are listed on a separate page. In brief: the core requirements is that you be familiar with Naïve Set Theory. Additionally, you will need elementary Probability Theory, some basic elements of (finite dimensional real) Vector Spaces and some basic elements of Real Analysis.

**Approach:** The overall key characteristic of the course is the emphasis on the *depth of understanding* rather than on the quantity of material. In addition to your knowledge of the field, the class also aims at contributing to your *ability to work in a team* and to your *presentation skills* (see Format).

**Format:** The class combines the lecture and the problem solving seminar format. Lectures are PowerPoint presentations that will be downloadable. Problem solving seminars are teamwork-based with students presenting solutions. This way, in addition to your understanding of game theory, you practice your ability to work in a team and improve your presentation skills. There is approximately one problem solving seminar every two weeks.

**Text:** The course does not follow any textbook but rather it is a mesh of several textbooks combined with the instructor's own approach as to how the material can be structured and explained. Textbooks useful for background reading are listed on the course homepage under [Literature and Web](#).

**Exams:** There are no exams in the traditional sense in this course (see Grading).

**Grading:** Your grade is determined by homework assignments (60%) and a final paper (40%) (see next page for details). In addition, I also consider class activity as a contribution.

**Syllabus:** The syllabus can be found on the website under Course Description. I consider the syllabus as a tentative plan that can be adjusted based on how we progress in accordance with the aim that depth of understanding is more important than quantity of material.

## Game Theory Requirements and Grading Policy

### Requirements

#### 1. Homework assignments

There will be  $8 \pm 1$  problem sets handed out during the semester. We solve these problems together at the problem-solving seminar, but you have to write the solutions up for submission *individually*. The problem sets will be downloadable in advance and you will need to do some preparation prior to the seminar. Credit is given for how *you show your understanding* of a solution and not to some (numeric) result being correct or not.

**Submission format:** The default requirement is to submit your homework is *electronic*. If you are not yet familiar with the technical tools to create documents with mathematical symbols and diagrams (which, if you plan on a career in a technical field, will definitely be necessary at some point), this might be your chance to get started. Nevertheless, you should ***carefully consider the potential (possibly significant) overhead this might add to the time needed to prepare your homework***. If you feel that this is not the semester you want to get started with this, you can write up your solutions by hand and scan it in as a pdf document. If you do not have an immediate access to a scanner, as a final option you can hand it in physically. Please see me if you want to be exempt from the electronic submission format requirement.

File format: pdf

File name template: LasnameFirstname\_GThP#\_BSM2014S.pdf, where # is the problem set number.

Deadline: Usually 3-4 days (quite short) after the problem-solving seminar.

#### 2. Midterm Paper

The midterm paper only serves as the preparation for your final paper. Although I will grade it as normal so you get feedback on writing it, I will *not count it* as a grade. See the guidelines on the next page on how to prepare for writing this paper.

#### 3. Final Paper

You will need to summarize the key concepts and their relationships we learn during the semester in your own words. This counts as your final exam.

Deadline: Last day of classes.

### Grading Policy

Generally, a problem set will be worth 100 points. Your total points for the problem sets will be projected to a 100 scale. You will also receive grade points on a 100 scale for your final paper. These two results will be added up with weights **0.6** and **0.4** respectively to produce your result for the course on a 100 scale. Grades are then assigned as follows:

$85 \leq A$

$75 \leq B < 85$

$65 \leq C < 75$

$55 \leq D < 65$

$F < 55$

If your points fall within **plus or minus 2 points** of these limit points, there is **fine structure** with + and - (exceptions: above 96 is A+ and under 55 there is no F+).

## Game Theory

### Final Paper Preparation Guidelines

#### Overview

We practice solving problems with the problem sets throughout the semester. Your final paper is a *different way* of exercising your understanding of the material: explaining to an uninitiated person what the basics of (competitive) game theory are.

The ability you are developing with this exercise will serve you well in a multitude of situations: as a teacher, who has to explain new things to students, as a researcher, who has to prepare a paper for publication and, in general, just being able to properly talk to other people about what you learned.

#### Overall requirement

You need to convince me that you have a coherent mental picture of the concepts and their relationships we cover in the course. You have to write about the material *we cover* and somewhere *close the way we cover it* in *sufficient detail*; writing something in general about game theory, if otherwise well done, will not be honored with a grade better than C.

#### Preparing

You are unlikely to be very successful at this unless you are *actively engaged* with the material *throughout the semester*. Working on the problem sets alone, though a very important contribution in your understanding of the material, will not suffice to properly write such a paper. This exercise is *different* and *hard*; make no mistake about it.

#### Basic setup

Imagine that you are talking to a *mathematically educated*, intelligent person who has *no prior knowledge* of game theory.

This implies several things:

- You do *not* need to worry about *explaining any mathematical tools* you are using,
- You need to *properly introduce* (explain) any game-theoretic notion you are using *first in English* (including what game theory is about),
- You have to be *concrete* to a sufficient degree,
- You eventually have to express what you are talking about *mathematically*.

#### Things to note

- There are *many good ways* to write such a paper; I am simply looking for the indication that you have *understood* the material in *sufficient detail*.
- I am aware that you have just started learning this, so I am not looking for some completely original work. It can be seen quite easily whether you have a good understanding of what you are using from the class notes or you are just copying things verbatim. You are welcome to use diagrams from the class notes.

#### Technical details

Page limit: 20 pages.

File format: pdf.

Filename: LastnameFirstname\_GThFinal\_BSM2014S