

## Syllabus

### Game Theory

#### COURSE DESCRIPTION

A course for the undergraduate students of educational program “Journalism”

**Course type:** elective (blended)

**The part of course:** <https://www.coursera.org/learn/game-theory-1>

**Abstract:**

Popularized by movies such as "A Beautiful Mind," game theory is the mathematical modeling of strategic interaction among rational (and irrational) agents. Beyond what we call 'games' in common language, such as chess, poker, soccer, etc., it includes the modeling of conflict among nations, political campaigns, competition among firms, and trading behavior in markets such as the NYSE. How could you begin to model keyword auctions, and peer to peer file-sharing networks, without accounting for the incentives of the people using them? The course will provide the basics: representing games and strategies, the extensive form (which computer scientists call game trees), Bayesian games (modeling things like auctions), repeated and stochastic games, and more. We'll include a variety of examples including classic games and a few applications.

#### COURSE PLAN

##### Introduction

Introduction, overview, uses of game theory, some applications and examples, and formal definitions of: the normal form, payoffs, strategies, pure strategy Nash equilibrium, dominant strategies.

##### Mixed-Strategy Nash Equilibrium

pure and mixed strategy Nash equilibria.

##### Alternate Solution Concepts

Iterative removal of strictly dominated strategies, minimax strategies and the minimax theorem for zero-sum game, correlated equilibria.

##### Extensive-Form Games

Perfect information games: trees, players assigned to nodes, payoffs, backward Induction, subgame perfect equilibrium, introduction to imperfect-information games, mixed versus behavioral strategies.

#### Repeated Games

Repeated prisoners dilemma, finite and infinite repeated games, limited-average versus future-discounted reward, folk theorems, stochastic games and learning.

#### Bayesian Games

General definitions, ex ante/interim Bayesian Nash equilibrium.

#### Coalitional Games

Transferable utility cooperative games, Shapley value, Core, applications.

### **READING LIST**

#### Required:

- Barron E. N. Game Theory: An Introduction. John Wiley & Sons, Incorporated, 2013 — URL: <https://ebookcentral.proquest.com/lib/hselibrary-ebooks/detail.action?docID=1157719&query=Essentials+of+Game+Theory> — ProQuest Ebook Central

#### Optional:

- Matthew O. Jackson. Matching, Auctions, and Market Design. EOLSS Publishers: Oxford UK, 2013 — URL: [https://papers.ssrn.com/sol3/papers.cfm?Abstract\\_id=2263502](https://papers.ssrn.com/sol3/papers.cfm?Abstract_id=2263502) — SSRN
- Matthew O. Jackson. A Brief Introduction to the Basics of Game Theory. EOLSS Publishers: Oxford UK, 2017 — URL: [https://papers.ssrn.com/sol3/papers.cfm?Abstract\\_id=1968579](https://papers.ssrn.com/sol3/papers.cfm?Abstract_id=1968579) — SSRN

### **GRADING SYSTEM**

Cumulative grade according to 10-point system includes all the for required assignments. The cumulative grade will be determined in advance of the final exam. It includes percentages for the various activities as follows:

Test Problem Set 1 — 10%

Test Problem Set 2 — 10%

Test Problem Set 3 — 10%

Test Problem Set 4 — 10%

Test Problem Set 5 — 10%

Test Problem Set 6 — 10%

Test Problem Set 7 — 10%

Final Exam — 30%

Your grade in the course will be based solely on the problem sets (70 percent of your grade) and the final exam (30 percent of your grade).

You are free to follow the course without completing the problem sets or final, but then will not receive a certificate of completion.

**When converting the grade into a 10-point GRADING SYSTEM to determine the final result, the following formula will be applied.**

Final grade is formed as follows:

- Cumulative grade — 80%;
- Final exam — 20 %.
- The final exam contains questions studied during online course.

The final grade is rounded up by arithmetic rules.

### **SPECIAL EQUIPMENT AND SOFTWARE SUPPORT**

A personal computer with the Office suite, a sound system and a monitor for demonstration purposes.