

**A Course in Game Theory**  
**ECON 511H**  
**Syllabus**

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## Outline

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  - Coverage
  - Noteworthy Books
  - Grading Policy
  - Media
  - Pre-requisites
- 2 **On Math**
- 3 **An Informal Talk**

# Syllabus

## Textbook

Osborne, Martin J. (2004) An Introduction to Game Theory, Oxford University Press.

- **Mathematics: Appendix**
- **Games with perfect information**
  - Nash Equilibrium: Chapter 2
  - Illustrations: Chapter 3
  - Mixed Strategies: Chapter 4
  - Rationalizability: Chapter 12
  - Extensive Games: Chapter 5
  - Illustrations and Extensions: Chapter 6 and 7
- **Games with Imperfect Information**
  - Bayesian Games: Chapter 9
  - Extensive Games of Imperfect Information: Chapter 10
- **Topics**
  - Evolutionary Equilibrium: Chapter 13
  - Repeated Games: Chapter 15

## Other (noteworthy) books

We may use material from the first two for our research assignments but you are not required to buy them.

The last one is another interesting textbook.

- Cheney, D.L. and Seyfarth, R.M. (2007): Baboon metaphysics: the evolution of a social mind, University of Chicago Press.
- Shakespeare, W. and Wells, S.W. and Taylor, G. (2005): The complete works, Oxford University Press.
- Binmore, K (1992): Fun and Games, D.C. Heath.

## Evaluation

- **February, 5th** — 1st Midterm
- **March, 7th** — 2nd Midterm
- **April, 11th** — 3rd Midterm
- **Tuesday, April 30th** at **4PM** — Final Examination
- Top two midterm grades account for 50% of the final grade.
- Final examination grade is worth 30% of the final grade.
- 10 problem sets and/or research assignments: 20%.

## Computing Grades

- Exams scores are scaled:  $\text{Score} = \text{Exam Grade} + 100 - \text{Max Exam Grade}$ .
- Course grades are computed accordingly to the table:

letter grade	min. score
A+	100
A	95
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70
D+	67
D	63
D-	60

# Policies

## Rules of the Game

- 1 New problem sets are posted on Sakai every Wednesday and are due next Tuesday **in class**.
- 2 Assignments past due will **NOT** be accepted.
- 3 You should be **prepared** to present and discuss with your peers your problem set and/or your research assignment.
- 4 There are **NO** make-up midterm examinations under **any circumstances** – you can drop-off your worst midterm grade.
- 5 Office hours: T-TR : 11AM-noon at GA 200B or by e-mail appointment, [sergiop@unc.edu](mailto:sergiop@unc.edu).
- 6 **DO NOT** sent e-mail thru Sakai and please include E511 in beginning of the subject line in any email.

## To do list for the first week

- 1 Check the final examination schedule of **ALL** classes you are enrolled. If you have more than 3 final exams in more than 24 hours and ECON511H is one of these exams then you **MUST** contact the professors of the other courses if you want to arrange for changes in your exam schedule: If they are unable to accommodate you and if you forward your e-mail communication with them in the first two weeks of class, I will try my best to comply with your request.
- 2 Place an order for the software Mathematica throughout [software.sites.unc.edu/software/mathematica/](http://software.sites.unc.edu/software/mathematica/). The **student license is free**. However, you must place an order.
- 3 If you are eligible for taking exams with disability services, I require you to schedule them in the first week of classes.



It is strongly recommended that you subscribe to at least one newspaper and read it regularly. It is expected that you will follow major current events and also pay attention to socio-economic or political events that have strategic content.

- 1 NY Times
- 2 Wall Street Journal

## Disclaimer

During this course, we shall employ additional material from TV, movies, or literature to discuss Game Theory related issues.

Sometimes, you may find the political or religious views; or the profanity contained in the additional material offensive or objectionable.

I **do not** endorse any particular views ex but ...

## Disclaimer

I believe that as part of your **university** education, it is important you should engage in **critical thinking**.

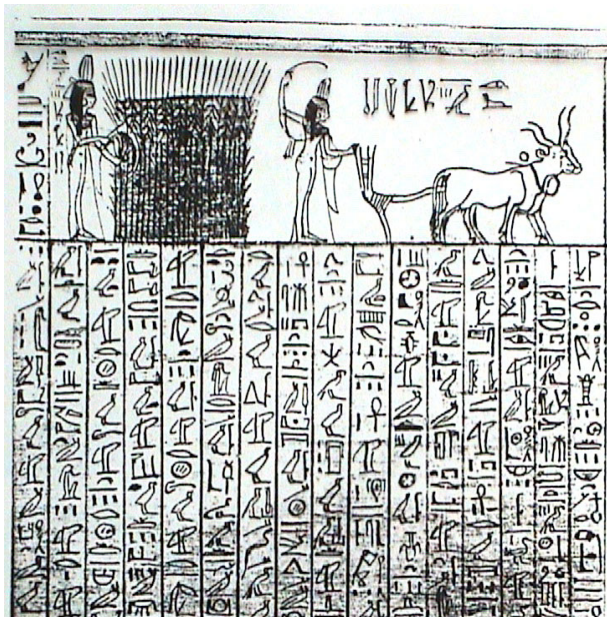


## Some words about math.

We will cover bits of optimization, set theory and proof reasoning but I expect you will read the entire mathematical appendix (**required reading**) and report **any** doubts to me in class in the **first** week of the course.

- Language of Set Theory
- Basic Calculus (derivation and integration).
- Basic Probability (expectation of discrete and continuous random variables.
- Reading Proofs.
- Finding Maxima and Minima.

# Mathematics is a tool (language)



## Mathematics is a tool (language)

If  $f : [a, b] \rightarrow \mathbb{R}$  satisfies  $[\forall x \in [a, b]$  and  $\forall \varepsilon > 0, \exists \delta > 0;$   
such that  $|x - y| < \delta \Rightarrow |f(x) - f(y)| < \varepsilon]$   
 $\Rightarrow \exists z \in [a, b]; \forall x \in [a, b] f(z) \geq f(x).$

If a real-function defined on a closed interval on the real line is continuous then it attains a maximum on the interval which it is defined.

# Game Theory

What is Game Theory ? Or what GT ought to be about?

- 1 rational decision making
- 2 study players and not markets
- 3 ?

## Questions & Answers

*This course is called Game Theory. I like games!  
The course sounds/looks fun !!  
Should I take this class?*

Sorry for curbing your enthusiasm...  
The fun part is true only if you enjoy math. 😊



## Questions & Answers

*I am about to graduate. I need an upper level requirement course.*

*This course is the only one that fits my schedule.*

*Should I take this class?*

It depends on your degree of risk-aversion.

The variance of grades sometimes is high.

Many students receive A grades (in particular in the Honors version of the course) But due to its mathematical content, grades C<sub>-</sub>, D or F are not unheard of.

## Is this course useful? for an Econ PhD

*I want to go to grad school in Economics. Game Theory is very important for Economics, should I take this course?*

No. In grad school, you will have several opportunities to take Game Theory classes. If you want to increase your chances of being accepted by a top program, you should take more classes at the Mathematics Department.

## Is this course useful?

### Econ and other fields

*Would you recommend this course to any Econ, CS or Poli Sci major or PPE minor?*

Of course: if you are comfortable with mathematical modeling and want to learn more about incentives in strategic environments, this is a good course for you. If you plan to go to Law School, grad school in Public Policy, Political Science, etc ... or if you just want to learn for the sake of learning, I think this is a terrific course for you.

## Is this course useful? outside academia

*I do not want to pursue (at the moment) any other future academic degree after my graduation, I want to find a job related to economics or business: industry, commerce or in the financial sector. But in real life people are not fully rational, will I be able to use any of the “equations” I learn in this class? What is the use of learning the equilibria of these artificial models?*

Rarely will you write down a game theoretic model of a concrete real-life situation, solve for its equilibrium and make accurate predictions based on it. But that does not mean that models are useless for you. To exaggerate a bit, you should see our models and their conclusion as respectively as fables and their morals. Fables are not “realistic” at all but that does not mean their morals have no value.