

**Course description:** This course is an introduction game theory and its application to online networked markets. We will begin by introducing fundamental concepts in game theory and use these tools to analyze networked markets. We will then discuss auctions and mechanism design theory to learn how to reason about modern sponsored search auctions and crowdsourcing markets.

**Course goals:** There are two main goals for this course. Our first goal will be to develop an understanding of fundamental concepts in game theory and mechanism design through a rigorous introduction to this theory. The second goal of the course will be to learn how to apply the theory for modeling, analysis, and design of real-world internet markets.

**List of topics:** We will cover the following topics in the course:

1. Game theory basics
  - Games, dominant strategies, Nash equilibrium
  - Mixed strategies and equilibria
2. Networked markets
  - Selfish routing in networks
  - Matching markets
3. Auctions
  - Mechanism design basics
  - Iterative and sealed-bid auctions
4. Sponsored search and crowdsourcing markets
  - Keyword matching, keyword auctions
  - Procurement auctions and budget feasible mechanism design

**Readings.** The recommended textbook for the course is:

- “*Networks, Crowds, and Markets: Reasoning about a Highly Connected World*”, by David Easley and Jon Kleinberg. The book is available for free online here:  
<http://www.cs.cornell.edu/home/kleinber/networks-book/>

Additional material:

- “*Algorithmic Game Theory*”, edited by Noam Nisan, Tim Roughgarden, Eva Tardos, and Vijay Vazirani. Chapters can be downloaded for free:  
[http://www.cambridge.org/journals/nisan/downloads/Nisan\\_Non-prinable.pdf](http://www.cambridge.org/journals/nisan/downloads/Nisan_Non-prinable.pdf)
- “*A Course in Game Theory*” by Martin J. Osborne and Ariel Rubinstein.

**Prerequisites** We will require basic calculus, comfort with proofs, and mathematical maturity.