

Networks and Markets

Lecture 3: Mechanism + Market Design

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Let's play a game

Last time: Game theory

- What is a game: participants, strategies, payoffs
- Best response strategies to other people's strategies
 - Dominant Strategies
- Nash equilibria: when everyone's strategy is the best response to everyone else's strategy
- Price of Anarchy: what society loses because everyone is selfish

Given a game matrix, what are player's strategies?

Game theory

Given a game, what are the equilibria?

Mechanism design

How do you design a game such that the equilibria has nice properties?

Market design

Here's a complicated marketplace. Given human behavior and real-world constraints, how do you design a component of it such good things happen?

What are examples of real-world aspects?

People don't behave "rationally"

Informational + attentional + computational constraints

Limited levers to influence behavior

Physics

Market design is a kind of economic engineering, utilizing laboratory research, game theory, algorithms, simulations, and more. Its challenges inspire us to rethink longstanding fundamentals of economic theory.

-- Paul Milgrom

Physics → Engineering at scale

Game theory → Mechanism design → Market design

Core areas and platform examples

Auctions: at what price do you sell a good?

- Auctions in ad markets
- Algorithmic pricing (and driver payments) in ride-hailing
- Price recommendations for sellers on Airbnb, Etsy, etc.

Matching: Who gets what (and why) [Without payments]

- Medical residency matching – assigning doctors to residencies
- School choice: matching students to high schools
- Matching customers to drivers in ride-hailing
- Recommending jobs to workers, workers to clients on labor platforms
- Showing sets of people to each other on dating apps

This course

We'll cover some mechanism design theory

[Today + next time] – Mechanism design intro + Auction theory

[After that] – Matching theory

Paper presentations + guest lectures will often be about “market design” – how do these core concepts play out in real life?