Outline

1. Introduction
   - Introduction
   - Two Communities

2. This Course
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Introduction

Kate Larson
- Faculty Member in CS
- Member of the AI research group

Research Interests: Multiagent Systems
- Strategic Reasoning
  - bounded rationality/limited resources
  - argumentation
- Electronic market design
Introduction

Focus of this course is *self-interested* Multiagent Systems
- aka competitive Multiagent Systems

Study of autonomous agents
- Diverging information
- Diverging interests

Issues
- Cooperation
- Coordination
- Overcoming self-interest of agents in order to achieve system-wide goals
Introduction

- Growth in settings where there are multiple *self-interested* interacting parties
  - Networks
  - Electronic markets
  - Game playing...

- To act optimally, participants must take into account how other agents are going to act
- We want to be able to
  - Understand the ways in which agents will interact and behave
  - Design systems so that agents behave the way we would like
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Two Communities

Economics
- Traditional emphasis on game theoretic rationality
- Describing how agents should behave
- Multiple self-interested agents

Computer Science
- Traditional emphasis on computational and informational constraints
- Building agents
- Individual or cooperative agents
New Research Problems

- How do we use game theory and mechanism design in computer science settings?
- How do we resolve conflicts between game-theoretic and computational constraints?
- Development of new theories and methodologies
Explosion of Research

Explosion of research in the area (Algorithmic game theory, computational mechanism design, Distributed algorithmic mechanism design, computational game theory,...)

- Papers appearing in AAAI, AAMAS, UAI, NIPS, PODC, SIGCOMM, INFOCOMM, SODA, STOC, FOCS, ...
- Papers by CS researchers appearing in Games and Economic Behavior, Journal of Economic Theory, Econometrica,...
- Numerous workshops and meetings,...
This Course

- Introduction to game theory, social choice, mechanism design
- Study how they are used in computer science (in particular in AI)
- Study computational issues that arise

Course structure
- Lectures
- Current research papers
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Course structure
- Lectures
- Current research papers
Prerequisites

- No formal prerequisites
- Students should be comfortable with mathematical proofs
- Some familiarity with probability
- Ideally students will have an AI course but I can provide background material when needed
- I will cover the game theory and mechanism design required
Grading

- Assignments on game theory and mechanism design: 15%
- In class presentation(s): 15%
- Class participation: 10%
- Paper reviews: 20%
- Research project: 40%
Presentations

Every student is responsible for presenting a research paper in class

- Short survey + a critique
- Everyone in class will provide feedback on the presentation
- Marks given on coverage of material + organization + presentation
Class Participation

You must participate!

- Before each class (before 6:00 am the day of the presentation) you must submit a review of one of the papers being discussed
  - What is the main contribution?
  - Is it important? Why?
  - What assumptions are made?
  - What applications might arise from the results?
  - How can it be extended?
  - What was unclear?
  - ...
Projects

The goal of the project is to develop a deep understanding of a topic related to the course.

- The topic is open
  - Theoretical, experimental, *in-depth* literature review,...
  - Can be related to your own research
  - If you have trouble coming up with a topic, come and talk to me

- Proposals due February 24th
- Final projects due April 5th
- Students will present projects in class

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1 I will be flexible with this.
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Other Information

- Class times: Monday-Wednesday 10:00-11:30
- Office Hours: By appointment (just send me email or talk to me after class to set up an appointment)
- Course website