CMSC 612: Game Theory and Security

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Description:

Semester course; 3 lecture hours; 3 credits.

The course will provide an introduction to game theory and mechanism design concepts. Lectures cover topics such as introduction of games, equilibrium concepts, computation of game-theoretic solution concepts, mechanism, and issues in game theory and mechanism design. The first part of the course will consist of lectures on game theory and mechanism design. The second part of the course will be seminars with students reading and presenting research papers in class.

Learning Outcome:

Students will learn how game design and analysis are applied to computer science and security related fields through studying related research papers in the literature. After the semester students are expected to know how to use game theory and mechanism design to analyze agent behavior in multi-agent systems, as well as how to design systems so that agents behave in the way we would like them to.

Tentative Course Topics:

Lecture topics include introduction of games, equilibrium concepts, and computation of game-theoretic solution concepts, and mechanism design. Seminar topics include applications of games in security domain; Cooperation/collaboration networks and Peer-to-peer networks; Reputation and trust; Social networks; Robust and incentive game design.

Prerequisites:

CMSC401

Grading:

Paper presentations 20%
Assignments 20%
Paper reviews 10%
Class Participation 10%
Course Project 40%

Final grade
A: 90% - 100%
B: 80% - 90%
C: 70% - 80%
D: 60% - 70%
F: under 60%

Assignments:

During the lecture weeks, assignments will be some practice on conducting formal mathematical proofs on game theory related topics. During the seminar weeks, assignments will be paper reviews on selected topics and preparation on paper presentation.

For paper reviews, each student will be assigned two papers for review during the semester. For each review a student should submit a 1-page (600 words) review which addresses the following points:

- A summary of the paper
- What is the main problem solved in the paper. Is it important and why?
- What is the main contribution of the paper?
- What assumptions were made and are they practical?
- What are the main strength and weakness of the paper?
- How can the results be extended?
- What was unclear to you?

Class Participation:

Class participation is an important component of this course. Before each class all students must read the paper being presented and get ready to discuss in class about the paper. Students can bring up questions and answer questions from other students. Things to think about are in the list for the paper review. Each student also evaluates the quality of each presentation.

Project:

The final project allows students to explore material not covered in class, and share that material with other students. The topic of the project can be a literature survey, a compare and contrast study of two or three influential papers, or a development of your own research ideas. The project will involve several steps; project proposal due early in the semester, a project presentation, and the final project report.

Schedule and Important Dates (Tentative):

	Date	Topic	Comments
Week 1	J	Introduction of Game Theory	
		Introduction	
		Assignment 1 posted	
Week 2		Class canceled	
		Game Formulation – Normal Form	
Week 3		Normal Form	A1 out
		Extensive Form	
Week 4		Extensive Form + NE computation	
		NE computation	
Week 5		Cancelled	
		Mechanism Design I	A1 Due; A2 out
			Paper selection due
Week 6		Mechanism Design II	
		Other Games	Proposal Due
Week 7		Assignment 1 solution Paper presentation and review guide	
		Applications of game Theory I	A2 due
Week 8		Spring Break	
Week 9		Assignment 2 solution Project presentation and write-up guide	
		Applications of game Theory II	
Week 10		Seminar: Classic games	
		(Green) names are presenters **(Purple)** names are reviewers	
Week 11		Seminar: Network Games	

		Seminar: Robust Game Design	
Week 12		Seminar: Game Theory and Cyber Security	
Week 13		Seminar: Game Theory and Cyber Security	
Week 14		Seminar: Game Theory and Social Networks	
Week 15			
Week 16		Project Presentation	
		No class	
Week 17		Project Presentation	