Strategic Computation:
Games, Mechanisms, and Information

Instructor: Alireza Fallah

Spring 2026: Mon/Wed 2:00–3:15 PM

Location: Online over Zoom
Office Hours: By appointment (email to schedule)

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Course Overview and Objectives

This course introduces the foundations of game theory and mechanism design, with a focus on their computational aspects. We study key equilibrium concepts in a variety of settings, including games with incomplete information and repeated interactions. We also explore algorithmic mechanism design and contract design, as well as applications in engineering, computer science, and machine learning.

Grading Policy

This course has no exams, but includes three or four homework assignments and a final project, each constituting 50% of the final grade.

You may interact with fellow students when preparing your homework solutions. However, at the end, you must write up solutions on your own. The use of AI software (including large language models) to "solve" homework problems is strictly prohibited. However, students may use such tools for proofreading their own solutions or for assistance in understanding relevant course materials. In other words, students should not copy and paste homework questions into an AI system to obtain solutions, but may interact with these tools to refine their own ideas or improve clarity.

The project may be either a short research project or a high-quality summary of three or four relevant papers. All students must contact the instructor by the end of January to schedule a meeting in which the project will be defined, goals will be set, and milestones established.

Prerequisites

This is a theory-focused course. Students should have a solid grasp of mathematical proofs and be familiar with probability theory.

Course Materials

Here is a tentative list of the topics to be covered. This list is subject to change with advance notice.

- Strategic form games and Nash equilibrium
- Existence of a Nash equilibrium
- Supermodular games
- Computation of Nash equilibrium in finite games
- Learning in games
- Extensive form games
- Repeated games
- Games with incomplete information: Bayesian Nash equilibria
- Mechanism design
- Contract design
- Special topic: Data markets

References

- Game Theory, by D. Fudenberg and J. Tirole, MIT Press, 1991.
- Algorithmic Game Theory, edited by N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani, Cambridge University Press, 2007.
- A Course in Game Theory, by M. J. Osborne and A. Rubinstein, MIT Press, 1994.

Rice Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Disability Resource Center

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with the Disability Resource Center (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Mental Health Statement

The wellbeing and mental health of students is important; if you are having trouble completing your coursework, please reach out to the Wellbeing and Counseling Center. Rice University provides cost-free mental health services through the Wellbeing and Counseling Center to help you manage personal challenges that threaten your personal or academic well-being. If you believe you are experiencing unusual amounts of stress, sadness, or anxiety, the Student Wellbeing Office or the Rice Counseling Center may be able to assist you. The Wellbeing and Counseling Center is located in the Gibbs Wellness Center and can be reached at 713-348-3311 (available 24/7).

Title IX Responsible Employee Notification

At Rice University, unlawful discrimination in any form, including sexual misconduct, is prohibited under Rice Policy on Harassment and Sexual Harassment (Policy 830) and the Student Code of Conduct.

Please be aware that all employees of Rice University are "mandatory reporters," which means that if you tell me about a situation involving discrimination, sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must share that information with someone, including the University's Title IX Coordinator (titleix@rice.edu). Although I have to make that notification, you will control how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

To explore supportive measures and other resources that are available to you, please visit the Office if Interpersonal Misconduct Prevention and Support at safe.rice.edu.