CS 593: Topics in Computational Complexity

Fall 2024

1 Basic information

Instructor: Simina Brânzei. E-mail: simina@purdue.edu.

Required Textbook:

- Computational Complexity: A Modern Approach, by Sanjeev Arora and Boaz Barak, Cambridge University Press.

  Additional materials will be used as needed.

2 Description

This is a graduate level course on computational complexity. The course will explore topics such as randomness and interaction in proofs, circuit lower bounds, communication complexity, query complexity, pseudo-randomness and randomness extraction, and connections with cryptography, game theory, and learning theory.

Prerequisites:

- Grade of A- or better in CS 584 or CS 483 or CS 588 or instructor approval.

- Mathematical maturity: Familiarity with proofs, discrete math, probability, and algorithms.

3   Grading

- Homework: 20%.

- Midterm: 20%.

- Final: 30%.

- Project: 30%.

Although the default credit for the project is 30%, its value can be significantly higher. For example, if the project makes a new contribution to computational complexity or a related topic in theoretical computer science, it can be worth up to 100% of the course grade.

4   Homework information

The homework must be typeset in LaTeX . Try to be as concise as possible in presenting your solution. There may be some bonus problems.

Study groups: You must form a study group with one or two other students and send this information to the instructor on Piazza cc-ed to all the group members. The study group is meant to give you a group of students you can study and discuss the material with, prepare for exams. Before asking a question about the material you are expected to check it with your study group.

Collaboration policy for homework: You may discuss the problem sets with other students in the class, however you must write up the solutions individually. If you collaborate, specify the names of the people that you talked with. No other solution sources are allowed. No collaboration is allowed on the optional problems. Cheating/plagiarism on homework or exams will result in a score of zero and will be subject to Purdue's academic integrity policies `http://www.purdue.edu/odos/aboutodos/academicintegrity.php`.