Course Information

15th Jan, 2008

Introduction to Computational Complexity Theory
(CSCE 424/824, Spring 2008)
URL: http://www.cse.unl.edu/∼vinod/824s08/index.html
Handout 1

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	and by appointment
TA	TBA

Venue	112 Avery Hall
Time	TuTh 09:30am-10:45am

Introduction: Certain computational problems like Graph Reachability and Matching admit very fast algorithms to solve them using a computer. On the other hand problems like Boolean Formula Satisfiability and Traveling Salesman Problem, till today, defy such fast solutions. Complexity theory investigates the reasons behind this important phenomenon. Computational problems are at the heart of computer science; and since complexity theory studies the nature of computational problems, it is a foundational area of computer science. In particular, complexity theory has applications to various subareas of computer science including machine learning, computer security, distributed computing, and bio-informatics.

This course will introduce students to the area of computational complexity theory. We will focus on topics including complexity classes, lower bounds, the role of randomness in computations. This will be a theoretical course: we will take a pen-and-paper approach and avoid computer implementations and other empirical studies. That is, we establish results in the form of mathematical theorems.

Prerequisites: CSCE 235 and 310 are prerequisites for the course. In particular a good knowledge of basic combinatorial techniques and probability theory is necessary. Familiarity with algorithms (CSCE 423/823 or equivalent) and automata theory (CSCE 428/828 or equivalent) are recommended for understanding the course material faster. But students with certain level of mathematical maturity will be able to make very good use of the course without the knowledge of algorithms or automata.

Textbook:

We will not be using any specific textbook as there are plenty of materials on the topics that we plan to cover available on the web. In particular, the web draft of the forthcoming book (title: Complexity Theory: A Modern Approach) due to Professors Sanjeev Arora and Boaz Barak of Princeton University, available on Prof. Sanjeev Arora's personal web-page, gives a very comprehensive treatment of complexity theory.

Grading: Grading will be based on homeworks and scribing lecture notes. A scribe will be assigned for each lecture. The scribe should take notes and typeset it in LaTex and submit it within a week.

Homework Collaboration Policy: You may discuss approaches to solving the problems with your classmates. But, all the details should be worked out and written up by yourself, with due acknowledgments to those with whom you discussed the problems. This policy will be strictly enforced. The instructor may ask you critical questions on your explanations so as to make sure that you have understood what you have written, and not copied the solutions from other sources. Violation of any of the above rules as well as any other academic dishonesty will be dealt with harshly.

Academic Dishonesty: The department of Computer Science and Engineering adopted an Academic Integrity Policy on May 3, 2001. Students enrolled in any computer science course are bound by the policy. I strongly recommend every student to read and understand it. Any violation of the policy will be dealt with severely. You can read the policy at

`http://cse.unl.edu/ugrad/academic_integrity.php`

Web Page: We will maintain a course page at

`http://www.cse.unl.edu/~vinod/824s08/index.html`.

All the relevant and most recent course information will be available from the page.