CPSC-433 Formal Languages and Automata

Fall 2002

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Course Website:  http://faculty.cs.tamu.edu/chen/courses/cpsc433/f2002

Textbook:


Grading:  Homework 42%, Two Midterm Exam (14% each), and Final Exam 30%.

Course Description: Computer science deals with machines and data. This course contains the fundamental study of the theory of computational machines and of the data that computational machines can deal with. Our discussion will be focused on the following basic questions what everybody working in computational science should be aware of:

- What is a computer, and what are data?
- What can be done by a computer in principle, and what can be done by a computer practically?
- What cannot be done by a computer in principle, and what cannot be done by a computer practically?
- What kind of data can be processed by what kind of computers, and what kind of data cannot be processed by what kind of computers?
More specifically, the study of this course contains three parts: computability theory, automata theory, and NP-completeness theory. In computability theory, we discuss what can and what cannot be done by a computer in principle; in automata theory we study what kind of data can and what kind of data cannot be processed by what kind of computers; and in NP-completeness theory, we consider from a practical point of view what can and what cannot be done by a computer.

The most important prerequisite for this course is not any specific topics taught in previous computer science courses, but the mathematical maturity of the student. Students who have good knowledge in one or more of the following previous courses should not have much difficulty in this course: discrete mathematics, algorithm analysis, and abstract mathematics. The least requirement is that you should be very comfortable with mathematical induction. We will review necessary mathematics when we need it in our discussion.

We are not going to follow the textbook very closely. Moreover, our notations and definitions could be slightly different from the ones given in the textbook. Of course, if you have a very good understanding of the textbook, you should have no trouble in doing our homeworks and examinations. Otherwise, attending the classes and following the lectures closely should help you a lot in understanding the course materials.

Roughly, we will start from chapters 8-9 of the textbook and study the computability theory. Then we move back to chapters 1-7 to discuss different kinds of machines and different kinds of languages and the relationship between them. Finally, we study chapters 10-11 for NP-completeness theory.

Doing homework exercises is extremely important and useful to this course. There will be six homework assignments. Homework is due on the designated due date at the beginning of class. No late submissions will be accepted. Discuss unusual circumstances in advance with the instructor.

There are two midterm examinations and a final examination. The two midterm exams are on October 4 and November 8, respectively, and the final examination is on Dec. 17.