CSE 355 Intro to theoretical computer science Fall 2005

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Class: TuTh 7:40–8:55 (SLN 33568) BYAC 150
Office Hours: 10:35–12:10 TuTh

Textbook: Thomas A. Sudkamp, *Languages and Machines*, 3rd edition, Addison Wesley

Web site: `http://thrackle.eas.asu.edu/cse355`

Homework assignments and other announcements will be given in class and on the web site.

Course description. We will study the theoretical foundation on computer science. The topics covered include regular languages, regular expressions, finite automata, context-free grammars, context-free languages, pushdown automata, Turing machines, time complexity and NP-completeness. (We will cover Chapters 2, 3, 5, 6, 7, 8, 11, and parts of 12, 14, 15 and 16.)

Two of the simplest-to-explain reasons to study this material are **(1)** it gives an overview of the historical development of computer science as a rigorous scientific discipline, and **(2)** it provides simple and elegant (but usually not obvious) solutions to many problems encountered in everyday programming practice.

The course contains a non-negligible amount of mathematics, and you will be expected to understand rigorously stated definitions, read and understand simple proofs and to solve problems related to formal languages and machines. In particular, I will assume that you have read and understood the material in Chapter 1.

Assignments and grading. There will be weekly homework assignments (14 of them) during the course, two midterms and a final exam. The breakdown of the grade will be: homework 20%, two midterms 25% each, final exam 30%. All tests and some homeworks will also contain extra-credit questions. In addition, one programming assignment will be given for extra credit.

The grades $A+, A, A-, B+, B, B-, C+, C, D,$ have standard cutoffs $100, 95, 90, 85, 80, 75, 70, 60, 50$. (For example, you need at least an average of 85 to get a $B+$.) These numbers may change—all I promise about them is that they will not be any higher.

If you achieve above 90% on the final exam, your course grade will be one full level higher than what you would normally get. (Thus, if by averaging according to the numbers above you should get a "C", but your final score is, say, 91, then you will in fact get a "B" in the course.)

Each homework will be given on Tuesday, and will be due a week later, at the **beginning** of the class. No late homeworks will be accepted. If you have concerns about arriving to class on time, you may hand in the homework early. Graded homework will be returned a week later in class.

You must solve the homework problems on your own. You may discuss the homework problems with your classmates, but you must write up your own solutions independently. Exams will be closed-book, but you will be allowed to use a sheet of paper with your own notes.

Honor Policy and ethics: The highest standards of academic integrity are expected of all students. The failure of any student to meet these standards may result in sanctions as specified in the University Student Academic Integrity Policy (for example suspension or expulsion from the University). Violations of academic integrity include (but are not limited to) cheating, fabrication, tampering, plagiarism or facilitating such activities.

It's highly unethical to bring to your instructor's attention the possible impact of your course grade on your future plans, including graduation, scholarships, jobs, etc. My job is to teach and to assess your work independently of any other consideration. I will have to withdraw you from the course if you compromise my ability to do this.

Students found to be involved in academic dishonesty will be removed from the class and a grade of "E" for the course will be submitted to the registrar. This is the least action taken. More serious actions may be taken if the situation indicates that such actions are appropriate, such as in the case of cheating during exams or on projects.

More references. Some other good textbooks on theory of computation are the following. Note: nothing on this list is required. If you think it might be useful, take a look, but I will not ask you to study anything that is not in the book, or that I haven't handed out in class. Most of what we'll cover is contained in each of these books, but usually the topics are covered in a different sequence and, of course, there are large variations in detail and rigor.

Sipser *Introduction to the Theory of Computation*, ITP.

Hopcroft, Ullman *Introduction to Automata Theory, Languages and Computation*, Addison-Wesley (This is an earlier edition of the book listed below; it's more concise and more mathematically rigorous but also in my opinion more rewarding.)

Lewis, Papadimitriou *Elements of the Theory of Computation*, Prentice-Hall.

Hopcroft, Motwani, Ullman *Introduction to Automata Theory, Languages and Computation*, Addison-Wesley.