

Computer Science 511

Design and Analysis of Algorithms

Fall 2009

General Information

Description. A study of basic algorithm design and analysis techniques. Emphasis is on learning to formulate algorithmic problems and on developing problem-solving skills

Prerequisites. CS 311 (undergraduate design and analysis of algorithms) or equivalent. A strong background in programming and discrete mathematics is essential.

Time and Place. MWF 11:00–11:50 a.m., Gilman 1652

Web Page. www.cs.iastate.edu/~cs511

Instructor. David Fernández-Baca, ✉ fernande@cs.iastate.edu, ☎ 294-2168, 111 Atanassoff. Office Hours: By appointment; students are also encouraged to drop in whenever the instructor's door is open.

Teaching Assistant. TBA.

Textbook. Jon Kleinberg and Éva Tardos, *Algorithm Design*, Addison-Wesley, 2006.

Supplementary Reference. Sanjoy Dasgupta, Christos Papadimitriou, and Umesh Vazirani, *Algorithms*, McGraw-Hill 2007. A near-final version of this text is available at <http://www.cs.berkeley.edu/~vazirani/algorithms.html>

Topics

All chapter references below are to the Kleinberg-Tardos text.

1. Network flow (2 weeks; Chapter. 7)
2. Linear programming¹ (2 weeks)
3. NP-Completeness (3 weeks; Chapter 8)
4. PSPACE (1 week; Ch. 9)
5. Tractable special cases of NP-hard problems (1 week, Chapter 10)
6. Approximation algorithms (2 weeks; Chapter 11)

¹The instructor will provide supplementary material on this topic.

7. Local search (1 week, Chapter 12)
8. Randomized algorithms (2 weeks; Chapter 13)

Grading

Final grades will be based on scores on homework assignments, 2 midterm exams, and a final. The weights of these are as follows:

Homework	13%
Exam 1	29%
Exam 2	29%
Final	29%

Midterm exams will be 2-hours long and held in the evening. Exams 1 and 2 are tentatively scheduled for the weeks of September 28th and November 2nd, respectively. The Final is tentatively scheduled for 9:45–11:45 a.m., Wednesday, December 16th.

Policy on Academic Honesty²

Students enrolled in Computer Science courses at ISU are expected to maintain the highest standards of academic integrity. Suspected cases of academic misconduct will be pursued fully in accordance with university policies. Here we provide information to help students avoid unintentional misconduct. For more details, students are strongly urged to consult ISU's policy on academic dishonesty³.

Problem Sets. The primary purpose of assignments is to clarify and enhance the understanding of the concepts covered in the lectures. It is expected that students have independently arrived at solutions that they turn in for problem sets. Nevertheless, past experience has shown that the learning experience is aided by interaction among classmates. Thus, discussion of general concepts and questions concerning the homework assignments among students is encouraged.

Examples of *allowed* collaboration are the following:

- Discussing the material presented in class or included in the assigned readings that is needed for solving assigned problems.
- Assisting other students in understanding the statement of the problem (e.g., by translating some English phrases unfamiliar to that student).

The following are examples of activities that are *prohibited*:

²This section is an abridged and adapted from a statement written by Professor Vasant Honavar for Computer Science 572. Thanks to Professor Honavar for allowing us to use this material.

³<http://www.public.iastate.edu/~catalog/2005-07/geninfo/dishonesty.html>

- Sharing solutions or fragments of solutions (via email, whiteboard, handwritten or printed copies, etc.).
- Posting solutions or fragments of solutions in a location that is accessible to others.
- Using solutions or fragments of solutions provided by other students (including students who had taken the course in the past).
- Using solutions or solution fragments obtained on the Internet or from solution manuals for text books.
- Using material from text books, reference books, or research articles without properly acknowledging and citing the source.

Exams. The primary purpose of exams is to test the understanding of the concepts covered in class. Exam solutions are expected to be entirely the work of each student. The following is a non-exhaustive list of activities that amount to *cheating* on an test.

- Copying someone else's solutions.
- Using notes or reference materials (unless instructed otherwise).
- Altering an exam for re-grading.
- Getting an advance copy of the examination.
- Having someone else write the exam.