Summer 2013
EE360C Algorithms (Unique: 77500)
MWF 11:30am to 1:00pm, ENS 116

Instructor

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Teaching Assistants

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Catalog Entry

Advanced problem solving methods; algorithm design principles; complexity analysis; study of the nature, impact, and handling of intractability; study of common algorithmic classes and their applications.

Prerequisites (from Course Catalog)

Computer Science 312 or Electrical Engineering 312 with a grade of at least C-; and Computer Science 313K or Mathematics 325K with a grade of at least C-.

Course Description

In this course, we will study the design and analysis of efficient algorithms. The focus will be on fundamental design techniques such as greedy approaches, divide and conquer, dynamic programming, network flow, and randomized algorithms. We will study measuring program performance using asymptotic notation.

The principle focus of the lectures will be theoretical. In addition to the lectures and their associated homework assignments, there will be a number of programming assignments, in which you will be required to implement algorithms.

Textbook

Required text. *Algorithm Design* by Jon Kleinberg and Eva Tardos. Addison-Wesley.

Optional text. *Introduction to Algorithms* by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. The MIT Press; third edition.

Deliverables and grading

There will be 8 homework assignments, 4 programming assignments, 3 mid-term exams, and a final exam. All exams are comprehensive.

The 8 homework assignments will account for 24% of the overall grade, and the 4 programming assignments will account for 16% of the overall grade. Mid-term exams 1, 2, and 3 will account for 10%, 15%, and 15% respectively of the overall grade. The final exam will account for 20% of the overall grade.

Collaboration

Students must solve the homework problems individually and submit their own work.

ECE's academic honesty statement

Faculty in the ECE Department are committed to detecting and responding to all instances of scholastic dishonesty and will pursue cases of scholastic dishonesty in accordance with university policy. Scholastic dishonesty, in all its forms, is a blight on our entire academic community. All parties in our community—faculty, staff, and students—are responsible for creating an environment that educates outstanding engineers, and this goal entails excellence in technical skills, self-giving citizenry, an ethical integrity. Industry wants engineers who are competent and fully trustworthy, and both qualities must be developed day by day throughout an entire lifetime. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, or any act designed to give an unfair academic advantage to the student. The fact that you are in this class as an engineering student is testament to your abilities. Penalties for scholastic dishonesty are severe and can include, but are not limited to, a written reprimand, a zero on the assignment/exam, re-taking the exam in question, an F in the course, or expulsion from the University. Don't jeopardize your career by an act of scholastic dishonesty. Details about academic integrity and what constitutes scholastic dishonesty can be found at the website for the UT Dean of Students Office and the General Information Catalog, Section 11-802.

Students with disabilities

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities (Tel: 512-471-6259; online: http://www.utexas.edu/diversity/ddce/ssd/).

Calendar (tentative)

Week 1	6/7	Foundations – Introduction, Administrivia	
Week 2	6/10	Foundations – Stable Matching (Book section: 1.1)	
	6/12	Foundations – Stable matching analysis and implementation (Book sections: 1.1, 2.3)	
	6/14	Foundations – Asymptotic growth (Book sections: 2.1, 2.2)	
Week 3	6/17	Graphs – Basic concepts and traversal (Book sections: 3.1, 3.2, 3.3)	
	6/19	Graphs – Directed graphs (Book sections: 3.4, 3.5, 3.6)	HW1 out, Prog1 out
	6/21	Exam I - 10% - CPE 2.208	

Week 4	6/24	Greedy Algorithms – Interval scheduling (Book section: 4.1)	
	6/26	Greedy Algorithms – Shortest path algorithm (Book section: 4.5)	HW1 due, HW2 out
	6/28	Greedy Algorithms – Minimum spanning trees (Book section: 4.6)	
Week 5	7/1	Greedy Algorithms – Implementing Kruskal's algorithm (Book section: 4.7)	
	7/3	Divide and Conquer – Mergesort (Book section: 5.1)	HW3 out, Prog2 out, HW2 due, Prog1 due
	7/5	Divide and Conquer – Recurrence relations (Book section: 5.2)	
Week 6	7/8	Divide and Conquer – Integer multiplication (Book section: 5.5)	
	7/10	Divide and Conquer – Fast fourier transform (Book section: 5.6)	HW3 due, HW4 out
	7/12	No class (First-term examinations)	
Week 7	7/15	Exam II - 15% - CPE 2.208	
	7/17	Dynamic Programming – Weighted interval scheduling (Book sections: 6.1, 6.2)	HW4 due, Prog2 due, HW5 out, Prog3 out
	7/19	Dynamic Programming – Knapsack (Book section: 6.4)	
Week 8	7/22	Dynamic Programming – Sequence alignment (Book sections: 6.6, 6.7)	
	7/24	Dynamic Programming – Shortest Paths (Book section: 6.8)	HW5 due, HW6 out
	7/26	Network Flow – Maximum-flow problem (Book section: 7.1)	
Week 9	7/29	Network Flow – Flows and Cuts (Book section: 7.2)	
	7/31	Network Flow – Bipartite matching (Book section: 7.5)	HW6 due, Prog3 due, HW7 out, Prog4 out
	8/2	Exam III - 15% - CPE 2.208	
Week 10	8/5	Randomized algorithms – Min cut (Book section: 13.2)	
	8/7	Randomized algorithms – Randomized quicksort (Book section: 13.5)	HW7 due, HW8 out
	8/9	Randomized algorithms – Hashing (Book section: 13.6)	
Week 11	8/12	NP-Completeness – Undecidability and hardness	
	8/14	NP-Completeness – Reductions	HW8 due, Prog4 due
	8/16	NP-Completeness – Beyond NP-Completeness	
Week 12	TBD	Final - 20%	