

Course Syllabus
COMP 750 – Algorithm Analysis
Fall 2011

Meeting Place: SN011

Meeting Time: 11:00 - 12:15, MW

Course Web Page: <http://www.cs.unc.edu/~anderson/teach/comp750>

Powerpoint Slides: In the public folder comp750 on my PC, ANDERSON1

Instructor: Prof. Jim Anderson

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Office Hours: 11:00 - Noon, TuTh

Grader: Jeremy Erickson

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Note: Jeremy is *not* a TA; please contact him only about grading matters (relating to homeworks)

Goal of the Course: To study issues related to the design and analysis of algorithms. This is a graduate course that picks up where most typical undergraduate courses leave off.

Text: *Introduction to Algorithms*, Third Edition, Cormen, Leiserson, Rivest, and Stein, McGraw Hill, 2009.

Prerequisites: COMP 550 and COMP 455. Material from probability theory and discrete math will be used heavily. You are advised to review this material, because it will not be extensively covered in class. See Chapters 1-5 and the appendices of CLRS.

You should not register for COMP 750 if you do not know the material covered in COMP 550. As for COMP 455, it is required so that you already know how to do proofs and have seen Turing machines before. (See the web for syllabi.)

Grading: Homework	30%
Two Midterm Exams	35%
Final Exam	35%

Homework assignments will be given approximately every two weeks. Students can expect most homework assignments to be rather time-consuming. Students are encouraged to work together on the problem sets. Note that this says *work together* — copying homework solutions from another student, from the Internet, solution sets of friends who have taken this course or one similar to it previously, or other sources will be considered cheating and referred to the student attorney general. *You must include a signed honor statement with each submission explicitly listing the people you worked with and stating that you completed the assignment in accordance with these rules.* A more comprehensive statement on allowable collaboration will be distributed with the first homework.

Homework assignments are due *in class* on the due date given. *No late homeworks will be accepted.* However, in calculating your homework average, your lowest score will be dropped.

Each midterm exam will be 1 hour and 15 minutes in duration. The final exam will be 3 hours in duration. The final exam will cover the entire course. Each of these exams will be administered in class.

Note: I do re-use old homeworks and exam questions. Any attempts to access old homeworks and exams from the files of students who have taken this course previously, or from other sources, will be considered an honor code violation.

Class Etiquette: You are expected to maintain proper etiquette in class. This includes:

- not making a habit of arriving late, or leaving in the midst of class,
- not talking, sleeping, reading newspapers, eating, etc. in class,
- keeping cellphones, pagers, etc. off,
- and not using your laptop to browse the web.

Class Participation: This class will be far more enjoyable for everyone if all students come to class ready and willing to discuss the material to be covered. I plan to reward those who participate in class by increasing their final grade by up to half a letter grade. I also reserve the right to add a similar negative “reward” for those who do not observe appropriate etiquette in class.

Topics: The list of topics I plan to cover is given below. Chapters 1-17 and 22-24 are considered to be background material. If a few of these topics look unfamiliar, then you should probably review them during the first few weeks of the semester. If more than a few look unfamiliar, then you should probably consider taking COMP 550 before taking COMP 750.

Topics Covered =====	Classes =====
Administrivia Introduction to the course Bullet-list overview of 550 and 455 material	1
RANDOMIZED ALGORITHMS AND PROBABILISTIC ANALYSIS Better brush up on your probability theory! Handout -- Skiplists Chapter 7 -- Quicksort We concentrate on the analysis; you should know how Quicksort works.	3
ADVANCED DATA STRUCTURES Handout -- Binomial Heaps The handout is Chapter 19 from an older version of the book Chapter 21 -- Data Structures for Disjoint Sets Chapter 18 -- B-Trees Handout -- Splay Trees	5
GRAPH ALGORITHMS Knowledge of Chapters 22-24 is assumed. Chapter 24 -- Quick review of Dijkstra’s Algorithm and the Bellman-Ford Algorithm Chapter 25 -- All-Pairs Shortest Paths Chapter 26 -- Maximum Flow (will skip 26.4 and 26.5) Handout -- Irrational Flows	3
INTRACTABILITY THEORY Chapter 34 -- NP-Complete and Related Problem Classes I will present Turing machine-based proofs from another text, rather than the proofs given in Chapter 36. Knowledge of Turing machines is assumed. Handout -- Strong NP-Completeness and Pseudo-Polynomial-Time	5

Algorithms

MISCELLANEOUS TOPICS

Chapter 35 -- Approximation Algorithms	1
Chapter 32 -- String Matching	2
Chapter 31 -- Introduction to Number-Theoretic Algorithms	2
Chapter 29 -- Linear Programming	2
Chapter 30 -- Polynomials and the FFT	1
If any topic has to be sacrificed because of time constraints, it will be Chapter 30, because FFTs are covered in other classes.	
TOTAL	25

We have 28 classes total. Two will be used for exams.