COMP 460: Algorithms & Complexity (Section 803)
Fall 2003 Course Information & Syllabus

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Lectures: TuTh 4:00–5:15 pm in DH-439.
Sometimes lecture notes or a summary will be available on the web. Other than that, if you have to miss a
class, get notes from another student; mine are typically pieced together from more than one place with a lot
of metacomments, which makes it hard for anybody but me to follow them. Also get copies of any missed
handouts (available on the web site). The handouts are numbered sequentially, starting with handout 0. On
handout 0, you need to fill in some information and return it to me promptly so you can be on the email list
and get access to the web site for the course.

Office Hours: In Damen 329C: 1:15–2:20 and 5:15–6:10 on Tuesday and Thursday.
These are the guaranteed times to find me except as announced in advance. You should also be able to find
me at lots of other times; feel free to look for me or make appointments.

Course Objectives: This course will focus both on presenting general techniques for designing correct and
efficient algorithms, as well as on formal methods for proving the correctness and analyzing the complexity of
such algorithms. The course assumes some prior mathematical and algorithmic background and is intended to
broaden and deepen that knowledge. Also included will be an introduction to the theory of NP-completeness,
whereby certain computation problems can be classified as being difficult in a formal sense.

Prerequisites: Introduction to the Design and Analysis of Algorithms (COMP 363) or Foundations of
Computer Science (COMP 388 Section 031 in Fall 2001 or Section 033 in Spring 2002).


Course Requirements: There will be several homework assignments, two midterm exams, and a final.
The weightings within the semester grade will be: Homework 20%, Exam I 20%, Exam II 25%, and Final
exam 35%.

Homework: Only homework turned in by the due date is guaranteed to be graded. Any special circum-
stances that cause difficulty in meeting the deadlines should be brought to the attention of the instructor
in advance. Homework must be handed in at the beginning of class, since solutions may be handed out in
the same class on occasion. Homework turned in to my mailbox will generally not be graded, since I do not
check the box continually and cannot generally verify that homework was turned in before solutions were
distributed or discussed in class. If you cannot turn in homework in person, you should put it under the
door of my office.

Exams: The midterm exams, tentatively scheduled for week 7 and week 12, are 75 minutes long. The final
exam is scheduled for 3:00–5:00 on Tuesday, December 9.

Collaboration: No collaboration is permitted on exams. Collaboration on homework is acceptable, but
copying is not! (Safeguard your files and printouts.) You may discuss solution techniques with other students,
but you must write up your solutions independently. If you obtain a solution through research, e.g., in the
library, credit your source and write up the solution in your own words.
Tentative Course Outline and Approximate Schedule:

Recommended readings from the text are shown on a weekly basis. (When selected sections or subsections are listed, it is assumed that you will include the introduction of the corresponding chapter or section.)

(Topics not mentioned explicitly in the syllabus that you will be assumed to be mostly familiar with are Chapter 10 on Elementary Data Structures, the Appendices (excepting C.5) on summations, sets, counting, and probability, and Sections 12.1–3 on binary search trees.)

   Heapsort. Chapter 6.

2. (9/2) Quicksort. Chapter 7. Useful background is also included in Chapter 5 through page 100. Sorting in linear time. Chapter 8.

   Hashing. Sections 11.1–4 (especially after Section 11.3.2; most of the earlier material should be review).


7. (10/7) Exam I on material through week of 9/23.
   Review of elementary graph algorithms. Strongly connected components Chapter 22.

   All-pairs shortest paths. Chapter 25.


    Linear programming. Chapter 29

11. (11/6) Polynomials and the FFT. Chapter 30. (11/4 is “midterm” break.)

   Exam II on material from week of 9/30 through week of 11/6.

    NP-completeness background: polynomial time, decision problems, determinism versus nondeterminism. Section 34.1 NP-completeness: solution versus verification, reducibility and definition of NP-completeness. Sections 34.2–3.


15. (12/2) If we have stayed on schedule, we will be able to use the last class for enrichment material not to be covered on the final exam, e.g., computational geometry or approximation algorithms.