COMP 4030/6030: Design and Analysis of Algorithms (Fall 2018)

Time, place: Tuesday/Thursday 9:40am–11:05am
FedEx Institute of Technology 227

Instructor: Thomas Watson
Dunn Hall 315
`Thomas.Watson@memphis.edu`
`http://www.cs.memphis.edu/~twwtson1/`

Office hours: Tuesday/Thursday 1:00pm–2:00pm

TAs: Diem-Trang Pham (`dpham2@memphis.edu`)
Manish Kasu (`mjkasu@memphis.edu`)

Website: `http://elearn.memphis.edu/`

Description: In this course you will learn techniques for designing, analyzing, and implementing efficient algorithms for fundamental computational problems.

Topics include: stable matchings, Python programming, asymptotic runtime analysis, priority queues, graph traversal, greedy algorithms, shortest paths, minimum spanning trees, data compression, divide-and-conquer, dynamic programming, applications to computational biology.

Prerequisites: COMP 2700 (Discrete Structures). Since COMP 2150 (Object-Oriented Programming and Data Structures) is a corequisite of 2700, it is also effectively a prerequisite of 4030/6030.

Textbook: Strongly recommended:
Algorithm Design by Jon Kleinberg and Éva Tardos

Homeworks: There will be eleven homework assignments, each covering the material of about two lectures. See the calendar at the end of this document for the schedule. You may discuss homework problems with other students, but you must write up solutions entirely on your own (and in your own words). You must submit each homework in the corresponding dropbox folder in the elearn website for the course. Collect all your solutions, including code as .py files, into a single .zip file for each homework. If you choose to handwrite solutions (rather than using software such as LaTeX), you may turn in a scan or photo (with all problems combined into a single file), as long as the image quality is good enough that the TA will have no problem reading it. If the TA finds it difficult to read one of your solutions, you will get 0 points for that problem.

Homework is due right before the beginning of lecture, and late homeworks cannot be accepted since model solutions will be distributed in class. Each

4030 student's lowest two homework scores from the whole semester, and each 6030 student's lowest one homework score, will be automatically dropped from the final grade calculation, so if extenuating circumstances prevent you from submitting a homework on time, one of these "freebies" will cover it by allowing you to take a 0 without harming your final grade.

Exams: Midterm exam 1 is on October 2nd in class (9:40am–11:05pm, FedEx Institute of Technology 227) and will cover homeworks 1–4.

Midterm exam 2 is on November 8th in class (9:40am–11:05pm, FedEx Institute of Technology 227) and will cover homeworks 5–8.

The final exam is on December 11th (10:30am–12:30pm, FedEx Institute of Technology 227) and will be cumulative but with an emphasis on homeworks 9–11.

For each of the midterms you may bring one double-sided sheet of notes, and for the final exam you may bring three double-sided sheets of notes (feel free to use your midterm sheets for two of them). Your sheets of notes may be typed. You may not use anything else during an exam; this means no calculators, textbooks, phones, earbuds, or anything else.

Grading:

4030 students	6030 students
5% each for 9 highest hw scores	4.5% each for 10 highest hw scores
16% for midterm exam 1	17% for midterm exam 1
16% for midterm exam 2	17% for midterm exam 2
21% for the final exam	21% for the final exam
2% for the Proficiency Profile	

We will calculate final letter grades in two different ways; then each student will receive the higher of the two letter grades. One way is a fixed grading scale, with the following cutoffs:

A $\geq$ 90%	A– $\geq$ 85%	B+ $\geq$ 80%	B $\geq$ 75%
B– $\geq$ 70%	C+ $\geq$ 65%	C $\geq$ 60%	C– $\geq$ 55%

The other way is a curve, with the following percentages of students receiving each grade:

A: 15%	A–: 15%	B+: 15%	B: 15%
B–: 10%	C+: 10%	C: 10%	C–: 10%

However, we will feel free to give an F to any student who clearly did not put effort into the course (or an A+ to any student with truly exceptional performance).

Cheating: Plagiarism or cheating behavior in any form is unethical and detrimental to proper education and will not be tolerated. All work submitted by a student (projects, programming assignments, lab assignments, quizzes, tests, etc.) is expected to be a student's own work. The plagiarism is incurred when any part of anybody else's work is passed as your own (no proper credit is listed to the sources in your own work) so the reader is led to believe it is therefore your own effort. Students are allowed and encouraged to discuss with each other and look up resources in the literature, but appropriate references must be included for the materials consulted, and appropriate citations made when the material is taken verbatim.

If plagiarism or cheating occurs, the student will receive a failing grade on the assignment and (at the instructors discretion) a failing grade in the course. The course instructor may also decide to forward the incident to the Office of Student Conduct for further disciplinary action. For further information on U of M code of student conduct and academic discipline procedures, please refer to: `http://www.memphis.edu/studentconduct/misconduct.htm`

Calendar:

Aug 28:	lecture 1
Aug 30:	lecture 2, hw 1 assigned
Sep 04:	lecture 3
Sep 06:	lecture 4, hw 1 due, hw 2 assigned
Sep 11:	lecture 5
Sep 13:	lecture 6, hw 2 due, hw 3 assigned
Sep 18:	lecture 7
Sep 20:	lecture 8, hw 3 due, hw 4 assigned
Sep 25:	lecture 9
Sep 27:	lecture 10, hw 4 due, hw 5 assigned
Oct 02:	midterm exam 1 (in class)
Oct 04:	lecture 11
Oct 09:	lecture 12, hw 5 due, hw 6 assigned
Oct 11:	lecture 13
Oct 16:	Fall break—no class
Oct 18:	no class
Oct 23:	lecture 14, hw 6 due, hw 7 assigned
Oct 25:	lecture 15
Oct 30:	lecture 16, hw 7 due, hw 8 assigned
Nov 01:	lecture 17
Nov 06:	lecture 18, hw 8 due, hw 9 assigned
Nov 08:	midterm exam 2 (in class)
Nov 13:	lecture 19
Nov 15:	lecture 20, hw 9 due, hw 10 assigned
Nov 20:	lecture 21
Nov 22:	Thanksgiving break—no class
Nov 27:	lecture 22, hw 10 due, hw 11 assigned
Nov 29:	lecture 23
Dec 04:	lecture 24, hw 11 due
Dec 06:	study day
Dec 11:	final exam (10:30am–12:30pm, FedEx Institute of Technology 227)

ABET outcomes:

1. Analyze the complexity of functions using Big-O, Ω, and Θ.
2. Analyze and identify the running time of iterative functions.
3. Analyze and identify the running time of recursive functions.
4. Design and evaluate algorithms using the divide and conquer strategy on linear data structures.
5. Design and evaluate algorithms using the divide and conquer strategy on tree-like structures.
6. Design solutions to store repeated computation to improve the running time efficiency of algorithms.
7. Design solutions to enumerate all possible candidates to select the correct solution.
8. Create solutions by applying the decrease-and-conquer strategy.
9. Create solutions by applying the divide-and-conquer strategy.