IE172: Algorithms for Systems Engineering

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Description: Modern engineering requires advanced use of computational software. At the heart of any software package is a set of data structures and algorithms that must be utilized and manipulated to solve a given problem robustly and efficiently. This course focuses on the most important data structures and algorithms for solving problems in engineering. You will learn to analyze a given problem, model it, and choose the appropriate data structures and algorithms to solve it. A major component of the course is labwork, all of which will be conducted in the C++ programming language.

Prerequisite: CSE 17 or CSE 18.

Lectures and Labs: Lectures will be held Mondays, Wednesdays, and Fridays from 11:10am-12:00pm in Mohler, Room 453. The lab section will be held on Mondays from 1:10pm-4:00pm in Mohler, Room 121.

Office Hours: I have reserved Fridays from 9:00am-11:00am for office hours. I am also available through e-mail (always) and on Google Talk (often). If I do not respond to an e-mail within 24 hours, then please send a reminder/follow-up e-mail. If I do not respond on Google Talk, then I am either busy or you are contacting me too late in the day, in which case you can either try again the next day (during work hours) or send an e-mail instead. I am also willing to schedule other times to meet in my office, but please e-mail me in advance to set up a time.

Teaching Assistant: Hao Wang, `haw309@lehigh.edu`

Textbook: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, *Introduction to Algorithms*, Second Edition, McGraw-Hill, 2003. Everyone is expected to read the chapters in the book corresponding to the material covered in lectures.

Grading: Your grade will be calculated as follows:

Homeworks:	25%
Labs:	25%
Midterm Exam:	20%
Final Exam:	25%
Participation:	5%

Labwork and Homework: Each lab session will involve implementing a piece of software to solve a series of problems. Everyone is required to post their labwork on Coursesite at the end of the lab session. All code *must* be submitted as a single zipped file (even if the assignment involves only one file, please zip it!) named *lehighID.zip*. A homework will be assigned following each lab, and code for any homework assignment must be submitted via Coursesite in the same format as the labwork.

- *No credit* will be given for any late assignment.
- You are free to consult with other students and online materials when working on homework. However, *the work you turn in must be your own.* Please cite any references you use, including fellow students.
- You *can and will* lose credit for illegible work.

Midterm Exam: The midterm exam will be in-lab, cumulative, closed-book, and closed-notes.

Final Exam: The final exam will be cumulative, closed-book, and closed-notes.

Participation: Everyone is expected to attend lecture, ask and respond to questions, and provide feedback about the lectures and assignments. My hope is that everyone will receive all of the possible credit for this part of the grade, but, if by the end of the semester I have no idea who you are, then your participation grade will suffer. In short, you are expected to communicate with me during the semester!

Regrade Requests: If you disagree with a grade you receive on a homework or exam, then you may submit a regrade request. This request must be *submitted no more than 48 hours after you receive the grade.*

Absences: Class attendance will not be recorded. However, everyone is expected to attend lecture and so everyone will be responsible for all material covered and announcements made in lecture. *It is your responsibility to contact me about any important information you might have missed in class if you were unable to attend.* If you believe you will miss numerous lectures due to illness, family emergencies, etc., then please contact me as early as possible. *Under no circumstances will I give credit for a missed homework, quiz, or exam unless you have discussed your absence with me in advance.*

Coursesite: Lecture notes will be posted on Coursesite for each lecture. Homework assignments, solutions, announcements, and other important material will also be posted on Coursesite. Important information, comments, corrections, and updates about the course may also be sent by e-mail (via Coursesite). Therefore, please let me know if you do not receive mass e-mails sent through Coursesite.

Recording Devices: Voice and/or video recording devices may be used only with the approval of everyone in the classroom. Please let me know in advance if you wish to use these types of devices.

Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact me and the Office of Academic Support Services, University Center C212 (610.758.4152) as early as possible in the semester. You must have documentation from Academic Support Services before accommodations can be granted.

Tentative Schedule:

Week	**Topic(s)**	**Reading**	**Lab**
1	Intro and C++ Basics	Chapters 1-2	(No lab)
2	Analyzing Algorithms	Chapter 3	Eclipse
3	Recursion	Chapter 4	Search
4	Heaps and Quicksort	Chapters 6-7	Selection
5	Binary Search Trees	Chapter 12	Stacks, Queues
6	Hash Tables	Chapter 11	Sorting
7	Review		Binary Search Trees
8	Graph Algorithms	Chapter 22	Midterm
9	Shortest Paths	Chapter 24	Hash Tables
10	Minimum Spanning Trees	Chapter 23	Shortest Paths
11	String Matching	Chapter 32	Graph Search
12	Cryptography	Chapter 31	Shortest Paths
13	Matrix Operations	Chapter 28	String Matching
14	Systems of Equations	Chapter 28	Cryptography