CS 411 Competitive Programming

Spring 2018

Instructor: Dr. Duc A. Tran, duc.tran@umb.edu, (617) 287-6452
Class meeting: Tue Thu 4PM – 5:15PM, M-02-0209

OPEN to both Undergraduate and Graduate Students as an ELECTIVE course counted towards your degree (BS, MS, PhD).

Objectives

Computer Science is more about Algorithms than Programming. You don't need a college degree to be good at programming. As a Computer Science graduate, you should be good at algorithms! This course is for those who want to excel at *algorithms*. You will learn and practice with a set of classic algorithms that are crucial for solving real-world computing challenges. Most of these algorithms are not covered in any other CS course.

We will practice programming most of the time, doing problems in previous ACM/ICPC contests. All students will be invited to try the Boston Algorithm Festival in Spring 2018. At semester's end, I will choose 6 students to train over the summer for the ACM/ICPC Programming Contest (BOSPRE) to compete with MIT, Harvard, and other schools in the Boston region in Oct 2018.

Programming language for the class: any language of your choice (being very good at one language with good algorithm knowledge is MORE VALUABLE than knowing many languages with limited algorithm knowledge!)

Prerequisites

- CS310 or PERMISSION of the instructor
- Good programming skills in at least one programming language.

Textbook

- Kleinburg and Tardos. *Algorithm Design*
- S. Skiena, *The Algorithm Design Manual*, second edition, Springer-Verlag, 2008.
- S. Skiena and M. Revilla, *Programming Challenges: The Programming Contest Training Manual*, Springer-Verlag, 2003.

Topics

We will work on a set of 50 interesting programming problems selected from well-known programming contests. We will discuss important algorithms and practice programming, which fall into the following topics:

- Data Structures
- Strings
- Sorting
- Counting
- Dynamic Programming
- Divide and Conquer
- Backtracking
- Tree/Graph Algorithms
- Other special topics (if time permits):

Grading

Students are given a set of 50 problems: 25 easy, 20 moderate, 5 difficult. You have the entire semester to solve them. Your grade is

MIN(100, 10 * (number of problems solved by YOURSELF)) - 2 * (num of class absences without justification)

regardless of difficulty level. The difficult level is only considered for choosing the Programming Team.

In addition, not for grading, there are 3 mock contests (1 hour 15 minutes each) and 1 big contest (3 hour, at semester's end), whose results are used to (1) select members for the Programming Team, (2) improve your grade if you do well (if you don't do well that won't hurt your grade). The bottom line is that if you solve 10 problems indeed by yourself and don't miss more than 3 classes, you will get an A.

Letter grades are assigned at the end of the course following the guideline below

Threshold (%)	93	90	87	83	80	77	73	70	67	63	60	<60
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Late Homework and Makeup Policy

N/A

Accommodations

Section 504 of the Rehabilitation Act of 1973 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If you have a disability and feel you will need accommodations in order to complete course requirements, please contact the Ross Center for Disability Services (Campus Center, Upper Level, Room 211) at 617.287.7430. Each eligible student must present and discuss these recommendations with each professor within the first two weeks of class, preferably by the end of the Drop/Add period. If you need special accommodations, please let the professor know your situation within the first two weeks of class.

Code of Conduct and Academic Integrity

The University presupposes that any submission of work for academic credit indicates that the work is the student's own and is in compliance with University policies, including its policies on appropriate citation and plagiarism. These policies are spelled out in the Code of Student Conduct. Students are required to adhere to the Code of Student Conduct, including requirements for academic honesty, as delineated in the University of Massachusetts Boston Graduate Studies Catalogue and relevant program student handbook(s).