Problem Solving and Competition Programming

CSCI 4650 Section 001
Spring Semester 20XX

Dr. Christopher Summa
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Meets: 3:00PM - 6:00 PM Monday in Math 218

Office Hours: M 2:00PM-4:00PM, T 9AM-11AM, W 7:30-9:30PM.
Office hours will be conducted in Math 307. Other times by appointment only

Prerequisite: CSCI 2125 with a grade of C or better or consent of department; concurrent registration in CSCI 2121 **is required**.

Text: The text for the course will be Programming Challenges by Skiena and Revilla. Much use will also be made of the reference text Numerical Recipes in C by Press, Flannery Taukolsky, and Vetterling, and the online resource Project Euler (http://projecteuler.net).
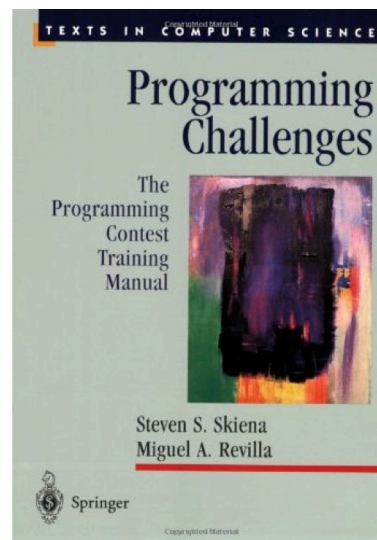
Course Content:

A problem-based approach to the introduction and implementation of advanced algorithms. Students will be provided with algorithmic tools and strategies to compete in organized programming competitions. Emphasis will be placed on group-based approaches to problem solving that require advanced algorithms under time pressure.

Course Format:

Students will meet with the instructor once per week for a three-hour session. During this session, the instructor will lecture for around 30-45 minutes on a

programming technique or a related technical topic related to a programming problem. At this point, the students will form small groups, develop an action plan for solving the programming problem, and start coding the solution under the supervision of the instructor.

Grading:

Grades for the course will be heavily weighted towards weekly quizzes (25%), to be implemented and administered in Blackboard; solutions to problem-solving in-class and homework assignments (40%); and attendance (15%). In lieu of a formal midterm and final exam, the students will have two mini-competitions, one based on the ACM compeition format, and the other based on the TeraGrid/Supercomputing format. This will be held during class time at roughly the midpoint and end of the semester. These will account for 20% of the students' final grade.

Textbook:

Topics:

Sorting and searching

Numerial integration

Monte Carlo methods

Parallel programming

        -- using OpenMPI

        -- using CUDA

Numerical ODE solvers

Graph traversal algorithms

Random walks

Optimization strategies

Problem transformation and reduction

Learning Objectives:

Upon completion of this course of study, a student be able to formulate and design efficient algorithms to solve competition-style programming problems under time pressure. The student will also gain some facility with parallel programming techniques and team-based programming.

Attendance:

The UNO Senate (Feb. 20, 2002) has made the taking of attendance a requirement for "developmental, 1000, and 2000 level courses." Attendance will be taken at each class meeting. Although not a formal component of the

computation of grades, good attendance will impact final grades in borderline cases. Important course content is often introduced outside of the published sources and/or scheduled presentations.

Academic Dishonesty:

Finally, we must call your attention to the University's policies regarding academic dishonesty (http:// http://www.uno.edu/studentaffairs/sa-docs/academicdishonestypolicy.pdf). Academic dishonesty includes cheating, plagiarism, and collusion. In particular, it includes "the unauthorized collaboration with another person in preparing an academic exercise" and "submitting as one's own any academic exercise prepared totally or in part for/by another." In the event of academic dishonesty, **the student will be assigned a grade of 0** on the exam or exercise, the student will be informed in writing of the action taken, and **a copy of this letter will be sent to the Assistant Dean for Special Student Services**.

Students with Disabilities:

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact their instructors and/or the Office of Disability Services to discuss their individual needs for accommodations.