2024 SI@UCF Introduction to Competitive Programming Syllabus

Course Description: This course will teach the basics of C++, mostly from the ground up, with an emphasis on syntax necessary for competitive programming, along with the following topics that often appear in programming competitions: Vectors, Strings, use of built in custom sorting, Vector of Vectors, Sets, Maps, Number Theory, Recursion, Brute Force and Binary Search. In addition, we'll introduce students to the two most common online platforms that high school students compete in for online competitions: USACO and Codeforces.

Course Web Page: http://www.cs.ucf.edu/~dmarino/ucf/bhcsi/2024/compprog

Grading: Homework 0 – 1%
Homework 1 – 11: 5% each (55% total)
Contest 1: 12% (upsolving allowed)
Contest 2: 12% (upsolving allowed)
Final Contest: 20% (no upsolving)

Day	Topic(s)	Homework/Contest
6/3	Intro C++ (Vars, Asgn)	H0, H1
6/4	If, For, While, Break, Continue	H2
6/5	Functions	H3
6/6	Vectors	H4
6/7	Strings	Contest #1
6/10	Sorting, Custom Sorting	H5 (String Hmk)
6/11	Two Dimensional Vectors	H6 (Sorting Hmk)
6/12	Sets and Maps	H7 (2D Vector Hmk)
6/13	Number Theory	H8 (Set/Map Hmk)
6/14	Recursion	Contest #2
6/17	Brute Force	H9 (Brute Force loop)
6/18	Binary Search	H10 (Brute Force combo/perm)
6/19	Use of USACO	H11 (usaco problems)
6/20	Use of Codeforces, Contest Strategy	None – FIEA Field Trip
6/21	Final Contest	

Typical Day

In a typical class day, in the morning, students will have lecture and recitation, where they will be taught some new C++ syntax, along with corresponding problem-solving techniques typically used with that syntax. Most lectures will involve some live coding as well as covering solutions to some competitive programming problems that utilize the topic for the day. In the afternoon, students will be given several homework problems from Kattis that utilize the day's topic to solve. On homework assignments, students will primarily be graded on correctness (via upload of a problem's accepted status on Kattis and source code), and secondarily on programming style for contests.

Friday Contests

Each Friday we'll have a competition for students run on Kattis with new problems, most of which can be solved using previously taught techniques. Last year each competition had 10 questions and ran a length of 3 hours. I am planning to stick to this design this year unless I find a good reason to change it. In the first two contests, any problem solved during the three-hour time limit will be given full credit (3 points). Any problem from these contests solved afterwards (by the next Monday afternoon at 5 pm) will receive partial credit (2 points). For the Friday contest, the only thing that matters is correctness. For the last Friday contest, we'll treat it as a real contest and students will earn 1 point for each problem correctly solved during the contest time limit.