

CSCI 2190: Computational Problem Solving

1 Overview

Each year the Association for Computing Machinery (ACM) sponsors the International Collegiate Programming Contest (ICPC). Last year's contest involved over 46,381 students from over 2,948 universities in 103 countries. In the Fall, teams compete in one of 530 different regional competitions; the top 133 teams in the world advance to the World Finals in the Spring. (The 2017 World Finals was held in Rapid City, South Dakota; the 2018 World Finals will be held in Beijing, China.)

Saint Louis University competes as part of the Mid-Central Region, which includes Missouri, Illinois, Kentucky, Tennessee, Arkansas, and parts of Indiana. This year's regional contest will be held on **Saturday, 4 November 2017**; we will compete at Webster University.

2 Contest Logistics

Students compete in teams of three; SLU typically enters two such teams to the regional competition. Each team shares a single computer and is presented with 6–9 programming challenges to solve during a five-hour time period. The available programming languages for the contest are C++ and Java.

Each challenge is structured such that there is a prescribed input format and a well-defined expected output. Teams are given sample inputs and outputs, but the judges retain an additional set of test cases that are not known to the competitors. During the contest, teams may submit source code to solve a particular problem. The solution will be deemed correct if they produce precisely the correct output on the entire judge's suite of tests; incorrect submissions are returned to the team. The goal is to solve as many problems as possible during the five-hour time period.

3 Team Website

<http://cs.slu.edu/~goldwasser/icpc>

4 CSCI 2190 Logistics

CSCI 2190 is a 1-credit hour course, offered only under the P/NP grading scheme. Intended primarily to train students for the International Collegiate Programming Contest (ICPC), this course covers data structures, algorithms, and programming techniques that apply to typical programming challenges.

Meetings of the course are intentionally coordinated with weekly practices for the programming competition. With that said, **students who wish to compete in the programming competition need not register for CSCI 2190, and students may register and receive credit for CSCI 2190 even if they do not compete in the programming contest.**

4.1 Prerequisites

Given the nature of typical problems, students should have previously completed CSCI 2100 (Data Structures) or equivalent.

4.2 Instructor

Instructor: Dr. Michael Goldwasser
Email: michael.goldwasser@slu.edu
Web: <http://cs.slu.edu/~goldwasser/>
Office: Ritter Hall 355
Phone: (314) 977-7039

Office hours: Monday 1:00–2:00pm
Tuesdays 10:00–10:50am
Fridays 2:00–3:00pm
or by appointment

4.3 Class Meetings

The group will meet once a week for two hours, from the beginning of the semester until a final postmortem session just after the contest occurs during the first week of November. Meetings will be held on Tuesdays, 4:10–6:00pm in Ritter Hall 117.

4.4 Textbook

There is not required textbook for this class, and we will distribute a lengthy document that serves as a “crib sheet” for our team on the day of the contest. Two very valuable readings for contest participants is the following:

Title: *Competitive Programming, Third Edition*
Authors: Steven Halim and Felix Halim
Publisher: Lulu, 2013
ISIN: B00FG8MNN8

Title: *Programming Challenges: The Programming Contest Training Manual*
Authors: Steven S. Skiena and Miguel A. Revilla
Publisher: Springer, 2003
ISBN: 978-0387001630

4.5 Learning Outcomes

At the completion of this course, students will be able to:

- Read a problem statement and recognize the necessary algorithmic approach to solve the problem.
- Convert a high-level approach into complete code for solving the problem in C++, Java or Python.

4.6 Topical Outline

- Parsing Input
- Generating Output
- Sorting/Searching Algorithms
- String Manipulation
- Brute-Force Enumeration
- Search Spaces
- Mathematical Fundamentals
- Grid and Lattice Problems
- Dynamic Programming
- Graph Algorithms

4.7 Requirements for a Passing Grade

Students will receive a passing grade in the course by attending at least 80% of the class meetings, and by successfully completing at least 5 past contest problems of varying difficulty as practice.

4.8 Academic Integrity

This course is extremely collaborative by nature, given the need for developing effective teamwork. The only expectation is that solutions to practice problems that are submitted for course credit be genuinely authored by that student (or team of students).

4.9 Title IX Statement

Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX coordinator, Anna R. Kratky (DuBourg Hall, room 36; akratky@slu.edu; 314-977-3886) and share the basic fact of your experience with her. The Title IX coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you wish to speak with a confidential source, you may contact the counselors at the University Counseling Center at 314-977-TALK. To view SLU's sexual misconduct policy and for resources, please visit the following web address: www.slu.edu/here4you.

4.10 Supporting Student Success

In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. The Student Success Center, a one-stop shop, which assists students with academic and career related services, is located in the Busch Student Center (Suite 331) and the School of Nursing (Suite 114). Students can visit www.slu.edu/success to learn more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring services, university writing services, disability services, academic coaching, career services, and/or facets of curriculum planning).

4.11 Disability Services

Students with a documented disability who wish to request academic accommodations **must** contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also **must** notify the course instructor that they wish to access accommodations in the course.

Please contact Disability Services, located within the Student Success Center, at Disability_services@slu.edu or 314-977-3484 to schedule an appointment. Confidentiality will be observed in all inquiries. Once approved, information about academic accommodations will be shared with course instructors via email from Disability Services and viewed within Banner via the instructor's course roster.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact Disability Services.