INTRODUCTION TO COMPUTER SCIENCE - SYLLABUS

COURSE DESCRIPTION

Computer Science was once thought of as a single discipline, one which included those interested in physical and notional computers. Today, what was once a single community has grown richer and broader to include many diverse *computer sciences*. The applied and theoretical computer sciences include such areas as software engineering, algorithm theory, complexity theory, machine learning, classical artificial intelligence, natural language processing, human-computer interaction, computational biology, architecture (micro, macro, enterprise, etc), data science, and more.

It has been said that "Programming is to computer scientist what telescopes are to astronomy". In this class, we'll study some programming. But, more importantly, we'll begin exploring the computer sciences and problem solving by computer.

ASSESSMENT

Homework and Participation, Daily	10%
Quizzes, Weekly	15%
Programming Assignments, Weekly	25%
Term project (2-3 person teams)	20%
Exams	30% (15%, each)

TENTATIVE OUTLINE

Week 1

Introduction, Overview

Computational Thinking Puzzles: Group Exercise

C Programming: From hardware to "Hello world" (Human to C to Assembly)

C Programming: Data types, computation, conditionals

C Programming: Pointers, Arrays, Strings, Malloc, Free, The Heap

Week 2

C Programming: The Runtime stack, Functions, and Recursion

C Programming: Structs, Linked Lists

Sorting and Searching 1

Exam 1

Sorting and Searching (BSTs and Heaps)

Week 3

Flood-fill and Backtracking

Memoization

Dynamic Programming

Computer Organization, Memory Hierarchy, Memory Mountain

Stack discipline, revisited (Buffer bomb)

Week 4

Databases and SQL

Network programming and HTTP

Cryptography and cryptographic protocols

Exam 2