Introduction to Programming in C

Columbia University, Summer 2019

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Class Sessions: Monday-Friday, 11:10 am - 1:00 pm (Pupin 425),
Monday-Friday, 3:10 pm - 5:00 pm (Pupin 425)

Course Description

This is an intensive course designed to develop logic and programming skills through immersion in the fundamentals of programming in C. By taking this course, you will become familiar with fundamental computer science concepts, learn proper coding practices, and experience the core functionality of the C language. Programming projects involving mathematical problems and word games will challenge you to develop your logical reasoning, systematic thinking, and problem-solving skills. In addition to programming techniques, the course will cover an overview of more advanced computing concepts such as data structures, library design, and memory management.

Prerequisites

- No previous programming experience is required, but participants should have an aptitude for logical reasoning and systematic thinking.
- A laptop is required at every class session. All programming projects will be completed in a Linux Virtual Machine that you will install on your laptop during the first class.

Course-Level Learning Goals

By the end of this course, students should be able to…

- demonstrate computational problem solving with basic programming constructs.
- critique a C program based on its aesthetic value and correctness.
- interpret a sequence of English instructions (an algorithm) as a C program and vice versa.
- work with a team to design and implement a complex software project (e.g. a solution to a real-world problem, a usable tool or service, or video or board game)

Course Policies

- This course is **inclusive** of all participants, regardless of previous programming experience or personal identity (gender, race, sexual orientation, etc.).
- Students must have personal laptops with 8GB-10GB of free space brought to each class; all work will be done in a Linux Virtual Machine that will be set up on the first day.
- The majority of work will be done in class sessions, but external readings and mini-projects will be used to reinforce concepts.
- Programming projects will be done in pairs, groups, and alone, just as one would experience in the real world.
- Students requiring extra help (outside of the normal class sessions) will be accommodated as needed. Please contact the instructor or TA if extra help is desired/needed!

Schedule (Subject to change based on pace set by students)

Day	Topics
1	Introduction: Computer Science, Programming, and Virtual Machine Setup
2	Basic Printing, Variables, and Data Types
3	User Input and Control Flow I: Conditionals
4	Control Flow II: Loops
5	Switch and Randomness
6	Functions
7	Arrays
8	Project: Random Walk; Pointers
9	Strings; Project: Hangman
10	2D Arrays
11	Projects: Tic-Tac-Toe and Game of Life
12	Structs and Dynamic Memory Allocation
13	Project Hack-a-thon I
14	Project Hack-a-thon II