



Hunan University CS11: Computer Science and Programming

Professor: To be announced
Total contact hours: 54 hours
Credit: 4

Course Description

This subject is aimed at students with little or no programming experience. It aims to provide students with an understanding of the role computation can play in solving problems. It also aims to help students, regardless of their major, to feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals. The class will use the Python programming language.

This course will help students to achieve the following six major objectives:

- Learning a language for expressing computations—Python;
- Learning about the process of writing and debugging a program;
- Learning about the process of moving from a problem statement to a computational formulation of a method for solving the problem;
- Learning a basic set of "recipes"—algorithms;
- Learning how to use simulations to shed light on problems that don't easily succumb to closed form solutions;
- Learning about how to use computational tools to help model and understand data.

Required Material

Textbook: *Introduction to Computer Science and Programming*

Author: Eric Grimson, John Guttag

Grading

- Quiz 1 20%
- Quiz 2 20%
- Midterm 20%
- Final Exam 40%

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	



Course Schedule

The course has 24 class sessions in total. All sessions are 2 hours and 15 minutes in length.

Note: the course outline and required readings are subject to change.

Class 1:

Goals of the course; what is computation; introduction to data types, operators, and variables

Class 2:

Operators and operands; statements; branching, conditionals, and iteration

Class 3:

Common code patterns: iterative programs

Class 4:

Decomposition and abstraction through functions; introduction to recursion

Class 5:

Floating point numbers, successive refinement, finding roots

Quiz 1

Class 6:

Bisection methods, Newton/Raphson, introduction to lists

Class 7:

Lists and mutability, dictionaries, pseudocode, introduction to efficiency

Class 8:

Complexity; log, linear, quadratic, exponential algorithms

Class 9:

Binary search, bubble and selection sorts

Class 10:

Divide and conquer methods, merge sort, exceptions

Class 11:

Testing and debugging

Class 12:

More about debugging, knapsack problem, introduction to dynamic programming

Quiz 2



Class 13:

Dynamic programming: overlapping subproblems, optimal substructure

Class 14:

Analysis of knapsack problem, introduction to object-oriented programming

Class 15:

Abstract data types, classes and methods

Class 16:

Encapsulation, inheritance, shadowing

Class 17:

Computational models: random walk simulation

Class 18:

Presenting simulation results, Pylab, plotting

Midterm

Class 19:

Biased random walks, distributions

Class 20:

Monte Carlo simulations, estimating

Class 21:

Validating simulation results, curve fitting, linear regression

Class 22:

Normal, uniform, and exponential distributions; misuse of statistics

Class 23:

Stock market simulation

Class 24:

Course overview; what do computer scientists do?

Final Exam

Attending Policy

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.



Policy on “Late Withdrawals”

In accordance with university policy, appeals for late withdrawal will be approved ONLY in case of medical emergency and similar crises.

Academic Honesty

Hunan University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

General Expectations:

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

Special Needs or Assistance

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.