6.00.1x Syllabus

Welcome to 6.00.1x! In this course you'll be learning the basics of computer programming in Python and the fundamentals of computation, as well as getting the opportunity to implement your own Python functions.

This course is offered online and we understand that there are many opportunities available to cheat. We caution you to not do so. You will learn less and only harm yourself by cheating. We ask that you review our collaboration and forum guidelines, available on the course handouts page, to understand how we expect our students to conduct themselves in this course. Additionally all students are expected to follow the edX Honor Code, available at https://www.edx.org/honor

Grading Policy

In this course there will be many types of assignments. Your final grade will be a weighted average of the following:

- Finger exercises (available within each lecture video sequence) – 10%
- Problem sets – 40%
- Quiz – 25%
- Final exam – 25%

In order to earn a certificate for 6.00.1x, students must pass the course with a grade of C or better. The following grading breakdown will apply:

- >= 80%: A
- >= 65%: B
- >= 55%: C

Exercises and Exams

All course material will be released at 14:00 UTC. Finger exercises have no due date, but we encourage students to complete them as they view the lectures. See the Calendar tab for Problem Set due dates. **Regrettably, extensions are unavailable for any assignment.**

All problem sets will be due at **23:30** or **11:30 pm UTC**. This is the Coordinated Universal Time, also known as the Greenwich Mean Time. Convert to your local time zone using an online converter such as this one:
http://www.timeanddate.com/worldclock/converter.html

Exams are scheduled in advance. The **Quiz** will take place from February 6 (14:00 UTC) – February 9 (23:30 UTC). The **Final Exam** will take place from March 6 (11:00 UTC) – March 10 (23:30 UTC). The exams will take place online, on the course website.

During the exam period, the forums will be shut down. You will still be able to read posts but you will not be able to post any questions. The honor code prohibits students from communicating with one another during the exam period in any way whatsoever – so please don't discuss the exam on any other forum, website or in person with anyone else.

List of Lecture Topics

Lecture 1 – **Introduction**:

- What a computer does
- Computational thinking
- Aspects of programming languages
- Basic machine architecture

Lecture 2 – **Core elements of programs**:

- Kinds of languages
- Objects, expressions, operators
- Abstraction by naming
- Strings
- Scripts
- Straightline programs
- Branching programs

Lecture 3 – **Simple algorithms**:

- Simple programs
- Iteration
- Input
- Exhaustive enumeration
- Guess and check
- For and while loops
- Approximate solutions
- Bisection search
- Newton-Raphson

Lecture 4 – **Functions**:

- Function syntax
- Abstraction by specification
- Functions and scoping
- Floating point numbers
- Specifications
- Modules

Lecture 5 – **Recursion**:

- Recursion
- Inductive reasoning
- Divide and conquer

Lecture 6 – **Objects**:

- Structured types and mutability
- Tuples
- Lists and mutability
- Functions as objects
- Dictionaries

Lecture 7 – **Debugging**:

- Testing and debugging
- Black box testing
- Glass box testing
- Integration testing and unit testing
- Debugging with binary search

Lecture 8 – **Assertions and Exceptions**

- Assertions
- Exceptions

Lecture 9 – **Efficiency and orders of growth**:

- Complexity
- How to measure complexity
- Asymptotic notation

Lecture 10 – **Memory and search**:

- Memory storage
- Indirection
- Searching and sorting methods
- Hashing

Lecture 11 – **Classes**:

- Definition of classes
- Classes versus instances
- Methods
- Bindings of values
- Exceptions

Lecture 12 – **Object Oriented Programming and Inheritance**:

- Inheritance
- Object oriented programming

Lecture 13 – **Trees**:

- Decision trees
- Depth-first search
- Breadth-first search

Lecture 14 – **Summary**

Lecture 15 – **Research videos**