IS271: Intro to Computer Systems & Programming
Fall 2019

Syllabus

Overview

Description

This course introduces students to computer programming (using Python) and gives them a survey of foundational computer science topics, including boolean logic, computer architecture, operating systems, algorithms, networks, and databases. The course focuses on practical skills for manipulating library and archive metadata, such as searching and sorting data, parsing text with regular expressions, writing database queries, fetching data from online APIs, and handling multiple serialization formats (XML, JSON, CSV, Excel). Emphasis is placed on working with standard metadata encodings, such as MARC and EAD.

Time & Place

Mondays, 9am - 12:30pm
September 30, 2019 - December 9, 2019
GSEIS Room 111

Prerequisites

None

Instructor

Joshua Gomez
Lecturer | Department of Information Studies
Head of Software Development & Library Systems | Library
UCLA
joshuagomez@library.ucla.edu
(310) 794-9797

Office hours: Fridays at 11am in Powell Library Room 390 (Use elevator in east wing entrance)
Goals

Upon completion of this course students should be able to:

➔ Explain the basics of operating systems, networks, databases, and algorithms
➔ Explain the differences between procedural and object-oriented programming
➔ Transform metadata in multiple formats by writing programs in Python
➔ Write database queries using SQL
➔ Create simple web pages with HTML and CSS
➔ Perform basic operations using the command line interface

For students wishing to pursue a career in information technology, this course serves as a foundation for more advanced topics in databases and software development.

For students pursuing a more traditional path in librarianship, the knowledge gained in this course will help them manipulate metadata and become better collaborators or managers of technology projects.

Materials

Computer

All students will need a laptop computer during class with the following tools installed:

➔ Python 3 (I recommend following the Hitchhiker's Guide to Python)
➔ Git (Github has a simple set up guide)

Texts

Required:

  ◆ You may use the newer 13th edition if you want, but I will be working from the 12th edition, which you can buy used at a much cheaper price. You may also use the older 11th edition.

Supplemental:

➔ Lubanovic, Bill, Introducing Python, O'Reilly Media, 2014
Policies

Attendance
Attendance is not recorded, but it is extremely important. Each topic builds upon the previous material, similar to a math course. Missing a class will make it difficult to keep up.

Quizzes
A quiz is given every week. **No makeups are allowed for the quizzes** (though an early one can be arranged for an anticipated absence). The questions will focus on the previous week’s lecture topic with some questions about Python programming as well.

Homework
A programming assignment will be given each week as homework. It will be due the following week. Students will complete these individually.

Exam
The final exam will be cumulative. It will focus heavily on the theoretical topics, but will also include some questions about the practical skills taught throughout the course.

Grading

- 60% Homework (9 total. The earlier assignments are simpler and carry less weight)
- 30% Final Exam
- 10% Quizzes (8 total)

Communication & Readings
General announcements will be sent to students’ email via CCLE.

Course readings are referenced in the Schedule section of this syllabus. If you are using a different edition of the textbook, be aware that chapter numbers change between editions. Be sure you are reading the chapter about the topic for the week. Any supplemental readings will be posted on CCLE.

The instructor will purchase lunch or dinner for the first student who sends an email to him referring to this line of the syllabus.
Schedule

Week 1 - September 30, 2019

Lecture - Binary Data & Boolean Logic
Instruction - Variables, Data Types & Collections
Readings - Brookshear, Chapter 1.1-1.2, 1.5-1.6 (20 pgs)
- Optional: Brookshear, Chapter 0, 1.3-1.4
- Supplemental: Lubanovic, Chapters 1-3

Homework 1 - Perform some basic tasks of storing, combining, and retrieving values in variables, lists, and dictionaries.

Week 2 - October 7, 2019

Quiz 1

Lecture - Computer Architecture
Instruction - Control Structures, Part 1 (Conditions & Loops)
Readings - Brookshear, Chapter 2.1-2.3 (16 pgs)
- Optional: Brookshear, Chapter 2.4-2.7
- Supplemental: Lubanovic, Chapter 4 (if-else; while loops; for loops)

Homework 2 - Write a simple program that uses condition statements and loops

Week 3 - October 14, 2019

Quiz 2

Lecture - Operating Systems
Instruction - Control Structures, Part 2 (Functions)
- Unix commands
Readings - Brookshear, Chapter 3 (23 pgs)
- Hansen: Understanding the Python Traceback
- Supplemental: Lubanovic, Chapter 4 (comprehensions, functions), Chapter 8 (File I/O)

**Homework 3**  - Write functions that process data and store data in files

---

**Week 4 - October 21, 2019**

**Quiz 3**

**Lecture**  - Programming Languages & Paradigms

**Instruction**  - Object-Oriented Programming

**Readings**  - Read: Brookshear, Chapter 6.1, 6.5 (16 pgs)
  - Optional: Brookshear, Chapter 6.2-6.4
  - Supplemental: Lubanovic, Chapter 6

**Homework 4**  - Write a program using classes, objects, attributes, and methods

---

**Week 5 - October 28, 2019**

**Quiz 4**

**Lecture**  - Character Encoding (ASCII vs. Unicode)
  - Metadata Encoding (MARC, EAD)
  - Metadata Serialization (XML, JSON, CSV, Excel)

**Instruction**  - XPath
  - RegEx
  - Dealing with Dates and Times

**Readings**  - Supplemental: Lubanovic, Chapter 7 (Text Strings), Chapter 8 (Structured Text Files), Chapter 10 (calendars & clocks)

**Homework 5**  - Write programs that convert one data format to another
  - Write functions that use regular expressions to parse textual data
Week 6 - November 4, 2019

Quiz 5
Lecture - Data Structures
Instruction - Followup on serialization
Readings - Chapter 8.1-8.2 (6 pgs)
Homework 6 - Implement a Linked List, a Stack, and a Queue using OOP

Week 7 - November 11, 2019

No class: Veteran’s Day Holiday

Week 8 - November 18, 2019

Quiz 6
Lecture - Relational Databases
Instruction - SQL
Readings - Brookshear, Chapter 9.1-9.2 (16 pgs)
- Wikipedia, ACID
- Supplemental: Lubanovic, Chapter 8 (SQL, SQLite)
Homework 7 - Use SQL to create, populate, and query a database

Week 9 - November 25, 2019

Quiz 7
Lecture - Networks
**Instruction**  - HTML  
- HTTP Requests  
- Web scraping  

**Readings**  - Brookshear, Chapter 4.1-4.4 (31 pgs)  
- Supplemental: Lubanovic, Chapter 9 (Web Clients)  

**Homework 8**  - Write programs that pull data from public APIs and web pages  

---  

**Week 10 - December 2, 2019**  

**Quiz 8**  

**Lecture**  - Algorithms  
- Software Engineering  

**Instruction**  - Git & Github  
- Virtual Environments  

**Readings**  - Brookshear, Chapter 5.1, 5.3-5.5 (28 pgs)  

**Homework 9**  - Write a search algorithm, submit a pull request to a Github repo  

---  

**Week 11 - December 9, 2019**  

**Final Exam**