Syllabus and Course Information

BU MET CS-521: Information Structures with Python (Spring 2020 Section A4)

Welcome to CS-521!!!

I am excited to teach this course. This course will present an effective approach to help you learn Python. With extensive use of graphical illustrations, we will build understanding of Python and its capabilities by learning through many simple examples and analogies. The class will involve active student participation, discussions, and programming exercises. This approach will help you build a strong foundation in Python that you will be able to effectively apply in real-job situations and future courses.

Instructor: Professor Eugene Pinsky

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Course Times: Wed 6:00 – 8:45 pm

Place: CAS B-20

Office Hours: Tue 3-5 or by appointment

Teaching Assistant: Aysha Kenza
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Course Materials:

(1) Required Textbook: Introduction to Programming Using Python by Y. Daniel Liang (Pearson Publishing)
(2) Course notes (from the course website) – presentation slides
(3) Python Programming Environment – we will be using Spyder IDE (Integrated Development Environment) and Anaconda Python Distribution. We have these installed in our virtual lab. MET Virtual Labs (VLAB) provide students with all required software. Most of the examples presented in class will be run in this environment. You can familiarize yourself with the virtual labs with the information from our website: http://www.bu.edu/metit/services/#vlab-target

There are many on-line resources available. This is a partial list:

1. http://www.pythontutor.com/visualize.html - this website is very useful and allows to run simple Python programs and visualize the execution. Many of the illustrations in the course notes were generated using this website.
2. https://docs.python.org/2/tutorial - an official Python tutorial
3. https://www.tutorialspoint.com/python - a detailed tutorial with many simple examples
4. https://www.learnpython.org - free, interactive tutorial
5. https://www.python.org/community/sigs/current/edu-sig/ - contains links to learning resources, including two free books

Teaching Approach and Goals

I am a strong believer in learning by using many illustrated examples. These examples will help us build the fundamental understanding of Python and how to use it to solve real problems. Many simple exercises presented in the course will help you develop skills that are needed to use Python effectively in your workplace and more advanced courses.

To accomplish this goal, course materials are divided into a set of pdf files corresponding to particular topic(s). These files will typically consist of three sections:

(1) course material with many examples
(2) interview questions – these are real examples of Python job interview questions collected from various sources in the internet.
(3) sample programming problems

please note that material in (2) and (3) is for additional practice only. The homework assignments are mostly from the textbook.

Homework, Grading and Exams:

Final	30%
Project	20%
Homework	35%
Quizzes	15%

There are six 30 minute quizzes. The final is 60 minutes. All exams are multiple choice and will be done in the blackboard.

This is a programming class and it is essential that students have practice. Most homework assignments will consist both programming problems from the textbook.

Quizzes and the final are closed book and will consist of typical Python questions that one can expect at a job interview

The project is open ended and the topics can be chosen by students. In this project, students have to illustrate the usage of different programming concepts covered in class. At the minimum, the project should use a class, a function, at least three container types (lists, strings, dictionaries, sets and/or tuples) and major control flow constructs. Students will present their projects on the last day of the course.

The goal of this is to get practice in Python programming and feel comfortable with interview type environments. We focus on presenting many illustrated simple examples to understand Python capabilities. We very strongly encourage and emphasize active student participation and discussions.

Course Outline:

The course consists of 7 modules. Each module is typically 1-2 weeks. All exercises are from the textbook. They will be posted as we progress in the course. Due dates for the homework will be indicated explicitly. No late homework will be accepted

Please check for updates and new materials as they will be added throughout the course.

Module 1

Topics: introduction to computing and problem solving, Python programming environment, Python IDEs, iPython Notebook environment, modules, input/output, running Python, core data types, simple expressions

Reading: Chapters 1, 2

Course Materials:

overview.pdf, types_and_mutability.pdf

Module 2

Topics: variables, immutability, expressions, operators and Boolean expressions, operator precedence

Reading: Chapters 2, 3

Course Materials:

types_and_variables.pdf

collections.pdf,

Module 3

Topics: mathematical functions, strings and text manipulation, selections, control flow (if, break, continue, for, while) and iterations, files and file manipulation

Reading: Chapters 4, 5, 8, 13

Course Materials:

control_flow.pdf, files.pdf, strings_indexing_and_slicing.pdf

strings_methods.pdf

Module 4

Topics: collections, set membership and comprehension, lists, tuples, sets, dictionaries, searching and sorting

Reading: Chapters 10, 11, 14

Course Materials:

dictionaries.pdf, lists_indexing_and_slicing.pdf, lists_methods.pdf

sets.pdf, tuples.pdf, sets.pdf

Module 5

Topics: advanced data structures, functions, exception handling, parameter passing, recursive functions

Reading: Chapters 6, 15

Course Materials:

exceptions.pdf, functional_programming.pdf, functions.pdf

Module 6

Topics: objects and classes, attributes, methods, data encapsulation, abstract classes, inheritance and polymorphism

Reading: Chapters 7, 12

Course Materials:

classes.pdf, inheritance_and_polymorphism.pdf

Module 7

Project presentations and review

About the Instructor:

Eugene Pinsky received his B.A. in Mathematics from Harvard University and his Ph.D. in Computer Science from Columbia University. He has taught extensively both in academia and industry. His research interests are in performance analysis and computational algorithms in data science and machine learning with emphasis on computational finance and programmatic advertising.