Python for Informatics Syllabus

Course Number: CSE-41225
Section ID: 112475
Course Start Date: 01/11/2016
Course End Date: 03/13/2016

Instructor Information

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Communication Policy:

It is preferred that communication is performed through the Blackboard "Discussion Board" facility, as discussions within the public venue will benefit all students.

For correspondence that is of a personal nature, you may contact me either by phone (858-717-1127) or by email.

IMPORTANT: I will try to answer your postings and emails within 48 hours of receiving them.

Welcome!

The instructor presents the fundamental elements and syntax of the Python language, and demonstrates the use of libraries that provide access to a variety of informatics related data sources and visualizations. This informatics approach serves to focus on using Python to solve data analysis problems common to the expanding world of *Informatics*. The instructor believes that the best way of learning is by doing, and that doing should be fun!

Course Purpose and Prerequisites

Informatics is the study of structure, algorithms, behavior, and interactions of information systems. Its applications are powerful and broad, and include such fields as Life Sciences, Data Mining, Business Analytics, and Social Computing. This hands-on course introduces the Python programming language, and is targeted toward students without prior programming experience who are interested in how informatics can be employed to provide solutions to complex, data intensive problems in a variety and scientific and business domains. After learning the core syntax and elements of the Python language, students will gain experience in the fundamentals of network programming, web services, databases and Structured Query Language (SQL), and data visualization.

Course Goal and Objectives

1. Describe the role of computers, software, and Python and the *new literacy*.
2. Install and operate a Python development environment.
3. Employ variables, expressions, and statements.

4. Specify Boolean expressions and conditional flow.
5. Formulate functions to support abstraction, modularization, and reuse.
6. Develop generic solutions through parametization.
7. Demonstrate the power of iteration.
8. Compose, process, and parse strings.
9. Write and read data to and from files.
10. Utilize lists to aggregate data.
11. Map key/value pairs with dictionaries.
12. Explain how tuples differ from lists.
13. Deduce the best sequence for a given context.
14. Model sequences of sequences.
15. Employ development, testing, and debugging strategies.
16. Experiment with regular expressions.
17. Utilize sockets for network communication.
18. Make use of a web service as a data source.
19. Model and employ a simple relational database.
20. Experiment with visualization techniques.

Learning Objectives

By the end of this course, the student will be able to:

- Write programs using the core Python language elements.
- Create IPython Notebooks to document coding sessions.
- Use Python to explore network programming, web services, databases and Structured Query Language (SQL), and data visualization.

Course Materials/Textbooks

Python for Informatics: Exploring Information by Dr. Charles R Severance, CreateSpace Independent Publishing Platform; 1st edition (September 2, 2013)

ISBN-10: 1492339245

ISBN-13: 978-1492339243

This textbook is freely available on the web at:
http://www.pythonlearn.com/book.php
The sample code and data files for the textbook can be found here:
http://www.py4inf.com/code/
Students may prefer to purchase a physical softbound edition of the textbook, as it is both convenient and affordable:
http://smile.amazon.com/Python-Informatics-Dr-Charles-Severance/

Course Overview

This course has 9 lessons. The topics are as follows:

Lesson1: Introduction, variables, expressions, and statements.

Lesson 2: Conditional execution and functions.

Lesson 3: Iteration and strings.
Lesson 4: Files and lists.
Lesson 5: Dictionaries and tuples.
Lesson 6: Regular expressions and network programming.
Lesson 7: Web services, database connectivity, and Structured Query Language (SQL).
Lesson 8: Data Visualization.
Lesson 9: Automation through scripting.

Online Course Structure

The course is organized using the course menu (left side of your screen):

Announcements	This is the first page you see upon entering your course. Your instructor will post weekly announcements and reminders here.
Introduction	Contains an introduction to the course and instructor biography.
Syllabus	Contains the course outline, learning objectives, weekly assignments and course details.
Lessons	If it's a fully online course, this section will have the instructor's weekly audio/image lectures. The lectures are self-paced and can be replayed like a video movie (start, pause, rewind, etc.).
Discussion Board	Questions pertaining to each lesson are posted weekly for you and your classmates to discuss and answer.
Assignments	Assignments, quizzes, Course Evaluation, and the Final Exam are available here.
Resources	Additional readings and handouts, web site links, and PowerPoint presentations are here.
Contacts	Instructor, student services and online learning support contact information is listed here.
Tools	Check your grades (My Grades), add a Homepage (Homepage), or access the Blackboard User Manual (User Manual) here.

Course Schedule

Week	Topic	Reading	Assignments
1	• Computers, Software, and Python and the *New Literacy*. o Computer Hardware Architecture o Computer Languages from Assembly to Python o Compilers vs.	Chapters 1 & 2	Assignment 1 Assigned: 01/11/16 **Quiz 1 & Assignment 1 Due: 01/17/16**

	Interpreters o A Program as Instruction Sequences • The Python Development Environment • The Fundamental Elements of Code o Variables o Expressions o Statements.		
2	• Boolean Expressions and Conditional Process Flow. • Functions o Abstraction o Modularization o Reuse o Parameters	Chapters 3 & 4	Assignment 2 Assigned: 01/18/16 **Quiz 2 & Assignment 2 Due: 01/24/16**
3	• Loops o The Power of Iteration o Infinite Loops o The *while* Loop o The *for* Loop • Strings o Understanding Strings o Composing Strings o Processing Strings o Parsing Strings	Chapters 5 & 6	Assignment 3 Assigned: 01/25/16 **Quiz 3 & Assignment 3 Due: 01/31/16**
4	• File Input/Output o Opening Files o Reading Files o Searching Through Files o Selecting Files o The *try/except* Structure o Writing Files o Closing Files • Lists o Understanding Lists o Traversing Lists o List Operators o List Methods	Chapters 6 & 7	Assignment 4 Assigned: 02/01/16 **Quiz 4 & Assignment 4 Due: 02/07/16**

	○ Deleting List Elements ○ List Functions ○ Using Lists • Parsing • Aliasing • Lists as Arguments		
5	• Dictionaries ○ Maps and Key/Value Pairs ○ Dictionaries for Counting ○ Dictionaries for Parsing • Tuples ○ Comparing and Assigning ○ Tuples from Dictionaries ○ Using Dictionaries to Sort Tuples ○ Using Tuples as Dictionary Keys • Sequences of Sequences	Chapters 8 & 9	Assignment 5 Assigned: 02/28/16 **Quiz 5 & Assignment 5 Due: 02/14/16**
6	• Regular Expressions a. Extracting b. Combining and Searching c. Escaped Characters • Simple Network Programming with Socket Communication	Chapters 10 & 11	Assignment 6 Assigned: 02/15/16 **Quiz 6 & Assignment 6 Due: 02/21/16**
7	• Web Services as Data Sources a. Parsing XML Trees b. JavaScript Object Notation (JSON) c. Parsing JSON d. Application Programming Interfaces (APIs) e. Security Conventions in API Usage • Using Relational Databases a. What is a Database? b. Schema c. Logical, Primary, and Foreign Keys	Chapters 12 & 13	Assignment 7 Assigned: 02/22/16 **Quiz 7 & Assignment 7 Due: 02/28/16**

	d. Structured Query Language (SQL) e. Retrieving and Inserting Records • The JOIN Operation		
8	• Experimenting with visualization techniques.	Chapters 14 & 15	Assignment 8 Assigned: 02/29/16 **Quiz 8 & Assignment 8 Due: 03/13/16**
9	• Review	N/A	
	ASSIGNMENT POINTS		
	PEERWISE POINTS		
	QUIZ POINTS		
	TOTAL COURSE POINTS		

Assignment Requirements

IMPORTANT! Late assignments (anything posted or sent after the due date) will be graded -1 point for each day late unless due to a verifiable medical or family emergency. Assignments sent with the wrong naming convention or in the wrong format will be considered late until they are sent correctly. Late assignments will be accepted at the discretion of the instructor and cannot be accepted more than 1 week late.

Peerwise Participation

PeerWise is a learning and assessment resource that requires students to create, verify, and refine their understanding of course related topics. Students are required to create 32 PeerWise multiple choice questions (an average of 4 per week) that pertain to our course material. The questions can be distributed across the course topics as the student chooses. All questions must be submitted by the end of the course. The sooner they are submitted, the more benefit they will provide to both the student and the class. Students must register into the PeerWise website here:
https://peerwise.cs.auckland.ac.nz/

Peerwise Course ID

When registering for PeerWise, a course ID is required. The course ID for this section is:

12523

When registering for PeerWise, a student ID is required. Your PeerWise student ID will be your UCSD Student ID (for example, U09999999).

Grades

No late assignments are accepted.

Grades are based on points and the letter grades are given as follows:

A+	99-100
A	92-98
A-	90-91
B+	88-89
B	82-87
B-	80-81
C+	78-79
C	72-77
C-	70-71
D+	68-69
D	60-67
F	0-59

You may check your grade anytime by clicking **Course Tools** and then **My Grades**. This will show you the points you have earned so far in this course.

Weighted Grades	
Assignments	60% (7.5% per assignment)
Quizzes	30%
Peerwise Participation	10%
TOTAL	100%

About Assignments

Assignments are to be saved as IPython Notebook or as Python .py files. Please include your last name within the name of the file (e.g., average_doe.ipynb, or assign2_doe.py). When you click on the assignment name in the Assignments area, you will see the assignment directions. Under that is a link to complete the assignment. Click this and then you'll see a Browse button, click this, and locate your assignment (the Word document) on your computer and Open it. This will upload your assignment. Click Submit when you are done uploading it. You may only upload the assignment one time so be sure you have completed it and that you select the correct file. Assignments are 60% of your grade.

Student Resources

On any Blackboard screen, there are tabs across the top and one is called the Student Tab. There is information on how to get started as a student and who to contact if you encounter any problems. There are also videos and written instructions on how to do some of the most common things in Blackboard.

Another one of these tabs is called FAQ (Frequently Asked Questions). If you click on the Students Category (on the left), you can find step-by-step directions for everything from sending email to uploading your assignments to posting a reply on the discussion board.

Code of Conduct

All participants in a course at UC San Diego Extension are bound by the University of California Code of Conduct, found at http://www.ucop.edu/ucophome/coordrev/ucpolicies/aos/uc100.html.

Academic Honesty Policy

The University is an institution of learning, research, and scholarship predicated on the existence of an environment of honesty and integrity. As members of the academic community, faculty, students, and administrative officials share responsibility for maintaining this environment. It is essential that all members of the academic community subscribe to the ideal of academic honesty and integrity and accept individual responsibility for their work. Academic dishonesty is unacceptable and will not be tolerated at the University of California. Cheating, forgery, dishonest conduct, plagiarism, and collusion in dishonest activities erode the University's educational, research, and social roles.
If students who knowingly or intentionally conduct or help another student perform dishonest conduct, acts of cheating, or plagiarism will be subject to disciplinary action at the discretion of UC San Diego Extension.