USC VITERBI SCHOOL OF ENGINEERING INFORMATICS PROGRAM

INF 510: Principles of Programming for Informatics (4 units)

Dr. Yigal Arens
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Time: 4:00pm–7:20pm
Day: Tuesday
Room: KAP 144

Instructor's office hours: TBD, Probably just before class

Students are advised to make appointments with the professor ahead of time in any event and be specific with the subject matter to be discussed. Students should also be prepared for their appointment by bringing all applicable materials and information.

Teaching Assistant: TBD

IT Support: TBD

Catalogue Description:
Graduate-level programming course for non Computer Science majors. Programming in Python for informatics applications, which includes retrieving, searching, analyzing, and manipulating large data sets. (Note: The USC Catalogue description contains an error – Java will **not** be taught or used in this course.)

Expanded Course Description:
This course is designed to serve as an introduction to computer science concepts and basic programming skills that are specifically geared toward Informatics, and forms a part of the introductory coursework for advanced degrees in informatics.. The main objective of this course is to introduce the fundamental concepts behind general computer science and programming, and to give students practical hands-on experience reading and writing computer programs, in order to give them the skills required to build informatics applications.

The course is designed to be accessible to non-Computer Science major students with little or no programming experience, and emphasizes writing programs that are capable of retrieving and manipulating large amounts of data. The first half of the course focuses on Python as a first programming language, while the second half of the course covers selected advanced topics such as data visualization, web scraping, database access and others.

The course will be a combination of lecture, in-class discussion, readings, written homework assignments, a mid-term exam, a final project, and a final exam.

Course Objectives:
The objective of this course is to train students to be able to read and write computer code capable of manipulating large data sets. Specifically, students successfully completing this course will achieve three main objectives:

1. Develop sufficient proficiency in Python to write application capable of retrieving, searching, manipulating, and analyzing data
2. Develop sufficient proficiency in Java to write and execute basic programs, as preparation for further coursework in computer programming.
3. Acquire basic concepts in computer science and programming.

Methods of Teaching:
The primary teaching methods will be discussion, case studies, and lectures. Students are expected to perform directed self-learning outside of class which encompasses, among other things, a considerable amount of programming practice.

There will a midterm exam and comprehensive final exam. There are also 6 homework assignments and one final project. There will be no laboratory assignments, and no special computing facility, hardware or software will be necessary for this course.

Grading Schema:
Final: 25%
Mid-Term: 20%
Homework Assignments: 30%
Final Project 25%
Total 100%

Grades will range from A through F. The following is the breakdown for grading:

94 - 100 = A   74 - 76 = C
90 - 93 = A - 70 - 73 = C-
87 - 89 = B+   67 - 69 = D+
84 - 86 = B   64 - 66 = D
80 - 83 = B-   60 - 63 = D-
77 - 79 = C+   Below 60 is an F

The graded coursework will consist of four major components:

1. BI-WEEKLY HOMEWORK – Six programming assignments, each requiring 10-15 hours to complete. Programming assignments may also include a set of exercises from the textbook and may include additional questions from outside sources. Each student is expected to submit the completed assignment each week. All six homework assignments are to be submitted individually and students will receive individual scores. However students may work in groups to complete the tasks. Guidelines and additional information will be developed to provide a common vernacular for the assignments. It is crucial that students turn in whatever they have completed on the due date. NO assignment will be accepted late. An incomplete grade will be granted only under the conditions called out in the student handbook, *SCAMPUS*, which is available online, http://scampus.usc.edu.

2. FINAL PROJECT – A final project that builds on the techniques taught in class. The final project will be a programming assignment that addresses a data informatics task. The project will be assigned by week 11, so that students will have about 4 weeks to complete the project. The project will require 40-60 hours to complete.

3. MID-TERM EXAM - A written exam, halfway through the term

4. FINAL EXAM - A culminating exam, covering all of the material from the course, will be held during the exam period at the end of the semester (date will be posted in the online Schedule of Classes).

Class Communication:
Blackboard at USC will be used for class communication.

Books and Readings:
All books, papers or reports will be available to students in one of three ways: 1) in the USC bookstore; 2) via a CD that the instructor will provide at the beginning of class; and/or 3) via the web.

Required Reading:
Python for Informatics: Exploring Information. Charles Severance. An open textbook, available online. (PI)

Class Structure & Schedule:
Class sequence, dates, topics and guest speakers are subject to change as the semester proceeds. Any revisions will be noted and announced in class in advance.

	Topics/Activities	Readings & Homework	Deliverables
Wk1	Intro to Programs, Variables, Expressions, Operators.	PI Ch. 1 & 2, pg. 1-32.	
Wk2	Conditional Execution, Functions.	PI Ch. 3 & 4, pg. 33-58	HW 1
Wk3	Iteration. Loops, including "for" and "while." Strings. String Operations.	PI Ch. 5 & 6, pg. 59-80.	
Wk4	Reading and Writing Files. Lists and Their Operations.	PI Ch. 7 & 8, pg. 81-110.	HW 2
Wk5	Dictionaries. Text Handling. Tuples. Tuples as dictionary keys.	PI Ch. 9 & 10, pg. 111-132.	
Wk6	Regular expressions, Searching, extracting data. Networked Programs. Parsing HTML.	PI Ch. 11 &12, pg. 133-154.	HW 3
Wk7	Webscraping. XML. APIs. Databases. SQL. Spidering.	PI Ch. 13 & 14, pg. 155-192.	
Wk8	Review.		Mid-Term Exam
Wk9	Visualization. Automation. Pipes.	PI Ch. 15 & 16, pg. 193-214.	HW 4
Wk10	Object oriented programming in Python (classes, objects, etc.)		
Wk11	More OOP (Inheritance, composition, builders)		HW 5
Wk12	Large programs: Modules, packages		
Wk13	Introduction to Pandas & SQL		HW 6
Wk14	More Pandas (Dataframe slicing, input/output, matplotlib/Seaborn)		
Wk15	Advanced data structures/ Summary and Review		Final Project
			Final Exam

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information http://emergency.usc.edu* will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.