TAC 216: Applied Python

Units: 2

Link to this document

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Office: Posted on the LMS (See Course Notes)
Office Hours / Open Lab Hours: Posted on the LMS
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Course Overview

This course focuses on development of practical Python programming skills through project-based application. It is split into two parts: part one focuses on powerful features of the Python programming language itself ("Pythonic" programming), which allow students to quickly and easily manipulate data in ways not found in other languages. Part two focuses on application of modules to solve domain-specific challenges, such as in scientific computation and data visualization, system manipulation and automation, web development, and machine learning.

Learning Objectives

This course seeks to:

- provide students a deeper understanding - conceptually and contextually - of both the modern Python landscape and the engineering problem solving process as a whole.
- prepare students for real-world application of skills related to Python, including classes, scientific computation, data visualization, data wrangling, and machine learning.

Measurable Outcomes

After completing this course, students will be able to:

- Understand "Pythonic" programming techniques
- Create a computational-thinking-based plan for solving a programming challenge
- Implement a solution to a programming challenge
- Evaluate the effectiveness of a program
- Generate, organize, analyze, and interpret data in a variety of domain-specific settings

Prerequisite(s)

TAC 115, TAC 116, or equivalent

Course Notes

This course will make use of several tools for delivery of content and assignments, and for general communication. While Brightspace will be used for posting of grades, **the Learning Management System (LMS) used in this course is edstem (https://estem.org)**. It will serve as the entry-point for everything related to this course. Lecture slides and any supplemental course content will be posted to the LMS for use by all students. All assignments will be posted to the LMS and will be submitted through the LMS. General assignment help and communication will be done through the LMS.

You will receive an invite email to the LMS course at the beginning of the semester. Please familiarize yourself with the LMS before the course begins.

Attendance and Etiquette

Attendance is not part of the grading breakdown, although attending scheduled meetings will help you learn the material and succeed in this course. **Attendance is highly correlated with grade.** The instructor expects you to pay attention during scheduled meetings and be an active learner. Chatting while the instructor is talking, texting on your mobile device, and participating on social media sites during class is disrespectful to the instructor and your classmates. If you are not able to attend lectures, then you should watch the recorded lectures and complete the in-class labs.

Adding the course after the first week

Per university policy, students are allowed to add the course until the end of week three. Any students wishing to add the course should plan on attending the course from the beginning of the semester. If the student needs to add the course after week one, they will need to apply for D-Clearance. Upon getting D Clearance, students will need to reach out to advising to add the course, and should email the instructor immediately to make sure there is a plan for completion of work and learning missed materials. Any missed work is required to be completed and submitted according to the schedule provided by the instructor.

Technological Proficiency and Hardware/Software Required

Students will need a computer (laptop or desktop) and access to the internet. If you do not have access to a computer, please contact your instructor.

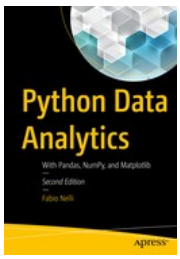
Students should have basic technical knowledge of their computer, including the ability to install software, download course material, and properly submit their assignments online. All software needed for the course is available for free.

Required Readings and Supplementary Materials

Required materials: None

Supplementary Materials:

Automate the Boring Stuff with Python 2e
https://learning.oreilly.com/library/view/automate-the-boring/9781098122584/



Python Data Analytics: With Pandas, NumPy, and Matplotlib
https://learning.oreilly.com/library/view/python-data-analytics/9781484239131/

Think Python 2e
https://learning.oreilly.com/library/view/think-python-2nd/9781491939406/

Head-First Python
https://learning.oreilly.com/library/view/head-first-python/9781491919521/

Additional reference material will be provided as needed.

Coursework

General information

1. **Unless otherwise noted, students must complete all coursework individually**.
2. Extensions will gladly be given for circumstances out of the student's control, e.g. sickness.
3. Extensions will **not** be given for anything under the student's control, e.g. extracurricular events overlapping with due dates.

Assignments

There are two types of assignments in this course:

- **Homework**: week-long assignments which pertain to the material from the current week as well as to previous weeks. Typically, these are due one week after being assigned.
- **Lab**: short, direct application of the week's topics for reinforcement. Typically, these are due one day after being assigned.

Generally, each week there will be one Homework assigned; they will relate to the topic covered that particular week. Each assignment will include instructions, a due date, and a link for electronic submission. Assignments must be submitted using this link; they will not be accepted through any other method.

Assignment Submission Policy

All assignments must be submitted through the LMS. They will not be accepted through any other method.

Late Assignment Policy

It is the student's responsibility to submit assignments on or before the due date. Assignments may be submitted within two days with a late penalty. Assignments turned in up to one day (24 hours) late will have 25% of the total points deducted from the graded score. Assignments turned in over one day and up to two days (>24 hours and <= 48 hours) late will have 50% of the total points deducted from the graded score. After two days, submissions will not be accepted, and the score for the assignment will be a 0.

Regrade requests

Sometimes, an error in grading may occur. Students have one week to contest a grade once it has been posted. After this one week, the grade will not be changed. To contest a grade, create a private post on the LMS and select the grades folder. In the post, include your name, the assignment name, and your reasons. Tag your instructor and your grader. This will allow the grader and instructor to view your submission and make a decision. (Note: this is not for *resubmissions*, just *regrades*, i.e. when an error in grading may have occurred.)

Exams

No make-up exams (except for documented medical or family emergencies) will be offered. If you will not be able to attend an exam due to an athletic game or other valid reason, then you must coordinate with the instructor before the exam is given. You may arrange to take the exam before you leave with an approved university personnel during the time you are gone, or within the week the exam is given. If you do not take an exam, then you will receive a 0 for the exam. If you need accommodations authorized by the Office of Student Accessibility (OSAS), notify the instructor at least two weeks before the exam. This will allow time for arrangements to be made.

Final Project

Description

There will be a final project in this course which aims to solve a real-world problem by applying Pythonic techniques. Each student will conceive of, design, build, test, and verify a solution for the given problem.

The implementation of the final project itself will be a web app which incorporates two or more of the various computational domains covered during the semester. The concept of the app is up to the student; the project proposal must be approved by the instructor. The proposal should include a generalized description of the solution app, the target audience, and a description of which computational domains it will incorporate.

The final project will be graded on how it fulfills the requirements and the quality and completion of the app. **The Final Project must represent the student's sole effort.**

Schedule

Week (Fall/Spring)	Week (Summer 6)	Week (Summer 8)	Event
11	5	6	Project assigned

12	5	6	Project proposal and approval
13 through 16	5 through 6	6 through 8	Work on Final Projects
16 (Final exam time)	6 (Final exam time)	8 (Final exam time)	Due: Final Project

Final Grade breakdown

The coursework is comprised of a mixture of Homeworks, Exams, and the Final Project, with the following grade breakdown:

Item	% of grade
Homeworks	50
Labs	10
Test (one)	10
Final Project	30
TOTAL	100

Course Schedule: Topic Breakdown

During Fall and Spring, Topics correspond to Week numbers. During Summer, each Week covers two (2) to three (3) Topics.

Topic	Topics	Supplementary Reading	Assigned work	Due
1	Introduction: problem-solving, Python IO and tools	Automate Ch 1, 2	-	-
2	Python Core: sequence, selection, iterate, and data types	Think Python Ch 13	L02, H02	L02
3	Python Core: functions	Automate Ch 3	L03, H03	L03, H02
4	Objects and Classes: the basics	Think Python Ch 17, 18	L04, H04	L04, H03
5	*Pythonic*: iterators, comprehensions, and generators	Think Python Ch 19	L05, H05	L05, H04
6	*Pythonic*: first-class objects, functional programming	Head First Ch 10	L06, H06	L06, H05
7	Test 01; Debugging	-	L07	L07, H06
8	Scientific Computation part 1	Python Data Analytics Ch 3	L08, H08	L08
9	Scientific Computation part 2	Python Data Analytics Ch 4	L09, H09	L09, H08
10	Data Visualization part 1	Python Data Analytics Ch 6	L10, H10	L10, H09
11	Data Visualization part 2		L11, FINAL PROJECT	L11, H10
12	Data Wrangling		L12, H12	L12, FP PROPOSAL
13	Machine Learning part 1	Python Data Analytics Ch 8, 9	L13	L13

14	Web Part 1: Databases, backend	Automate Ch 16	L14	L14
15	Web Part 2: APIs, frontend	Head First Ch 5	-	-
FINALS	FINAL PROJECT DUE	**Date**: See the LMS		

Academic Integrity

Assignments in computer programming courses are different from those in some other types of courses. Students may NOT collaborate, work together, share code, or in any way exchange solutions for assignments. Assignments may be analyzed by software that looks for similarity. Any sharing of ideas or code will be considered a violation of academic integrity (cheating); an OAI report will be filed with the recommended penalty of an F in the course. Do not share your code with anyone else in this or a future section of the course, as allowing someone else to copy your code carries the same penalty as copying the code yourself.

If the instructor, a grader, or a teaching assistant suspects you of academic dishonesty, it has to be reported to OAI. Do not share assignments with another person. Do not submit another person's work as your own. Do not look at other students' papers during exams. Do not leave the room during an exam without permission. Do not cheat! As Trojans, we are faithful, scholarly, skillful, courageous, and ambitious.

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Sharing of course materials outside of the learning environment

As per SCampus Section 11.12(B):

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy.)

Support Systems

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services - (213) 740-0776
https://osas.usc.edu/
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710
campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
ombuds.usc.edu
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.