



## DSCI 510: Principles of Programming for Data Science (4 units) Spring 2024

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Course Producers/Grader: TBA

When emailing *please* use "DSCI510" to start your subject line for faster processing

### Lecture:

Day: Monday  
Time: 12:00pm-1:50pm  
Room: [VPD 116](#)

### Lab:

Day: Wednesday  
Time: 12:00pm-1:50pm  
Room: [VPD 116](#)

### Course Materials:

- **Textbook** (available on the web for free): [Python for Everybody: Exploring Data in Python 3](#), by Charles R. Severance
- **Other materials:** There are a number of other materials that may be useful:
  - [Think Python \(2nd edition\)](#), by Allen B. Downey
  - Fluent Python, 2nd Edition (available via [USC Libraries](#). Go to Find -> Databases -> S -> Safari Books and sign in using your USC credentials. From there, search for Fluent Python and you should be able to see it at the very top as the first result (look for a lizard on the cover of the book)
  - ...other materials and tutorials linked throughout the semester

### Course Communication and Web Resources:

- **Course Website:** <https://blackboard.usc.edu> (used for announcements, Zoom links if applicable, lecture and lab material, submissions, etc.)
- **Course Message board:** <https://piazza.com/usc/spring2024/dsci51032429d> (used for technical questions and answers)

### Office Hours:

- **Instructor** (Virtual, recommended): Email to set up a time at any point in the week
- **Instructor** (Physical): TBA
- **Teaching Assistant:** TBA

### Catalogue Description:

Introductory programming course for non-Computer Science majors. Programming in Python for retrieving, searching, and analyzing data from the Web. Learning to manipulate large data sets.

**Prerequisite(s):** None

**Recommended Preparation:** Familiarity with some computing, programming and/or statistical concepts

### **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 the program in Communication 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 tools to manipulate large data sets.

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 amount 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 including data visualization, web scraping, database access, and more.

The course will combine lectures, labs, in-class discussion, and problem solving, readings, written homework assignments, a mid-term exam, and a final project.

### **Course Objectives:**

The objectives of this course are to teach students how to write computer code capable of searching and retrieving data, working with (large) data sets, analyzing data and visualizing the results. Specifically, students that successfully complete this course will achieve the following main objectives:

1. Acquire basic concepts in data science and Python programming
2. Develop sufficient proficiency in Python programming language to write applications capable of searching, retrieving, manipulating, analyzing, and visualizing data
3. Be able to package, deliver and present a complete Python project using the latest technologies in the data science community

### **Methods of Teaching:**

The primary teaching methods will be group discussions, case study reviews, and lectures. Students are expected to perform self-directed learning outside of class. This will encompass a considerable amount of time practicing computer programming in Python.

There will be weekly lectures and lab meetings, a midterm exam, lab/homework assignments (from the labs) and a final project.

Students are expected to have access to a computer (preferably a laptop) that can run the Python programming language and a recently updated web browser, and to bring it to class. Beyond that, no special computing facility, hardware or software will be necessary for this course.

### **Class Structure:**

The class is broken down into two phases, separated by the midterm exam. Phase 1 deals primarily with becoming familiar with computer programming and learning basic programming constructs in Python. The midterm is there to test your knowledge of the programming language and various constructs learned in the process.

Phase 2 begins after the midterm and goes further in-depth on data structures, how to gather data from the Web, how to clean, format and analyze the data, as well as visualizing data for the final project.

In short, students will learn how computer programming works as well as how to write their own programs in python. Students can then take their new skills and apply them on (large) data sets.

The course culminates in the final project, where all aspects of the course come together: from data gathering to analysis and visualization. As such, we don't have a final exam, instead you will be graded on the quality of the final project and its components.

### Class Schedule:

Throughout the course we will roughly adhere to the schedule as shown below. Please note that this may change slightly as we progress through the semester.

Attendance in class is not [strictly] mandatory, although many hints, potential midterm solutions and general good advice may be divulged in lecture.

	Topics/Daily Activities	Book Chapters (TP = Think Python, P4E = Python For Everyone)
<b>Week 1</b>	Introduction, programming practices, functions	TP 1-3,
<b>Week 2</b>	Python syntax: variable types, conditionals, iteration	TP 1-3, 5, 7, P4E 1-3
<b>Week 3</b>	Python syntax II: functions revisited, exception handling, putting it all together	TP 4, 6, P4E 4
<b>Week 4</b>	Python syntax III: Data structures. Lists, dicts, tuples, sets	TP 10-12, P4E 8-10
<b>Week 5</b>	Strings and dates, file and CSV processing	TP 8, 13-14
<b>Week 6</b>	Object oriented programming	TP 15-18, P4E 14
<b>Week 7</b>	Advanced Python syntax (lambda functions, iterators, comprehensions), midterm review	TP 19
<b>Week 8</b>	Midterm	
<b>Week 9</b>	Network access, APIs/JSON, web scraping	P4E 13,
<b>Week 10</b>	Databases and SQLI	P4E 15
<b>Week 11</b>	SQL II and Pandas I	P4E 15
<b>Week 12</b>	Pandas II	TBA
<b>Week 13</b>	Data visualization and user interfaces I	P4E 16
<b>Week 14</b>	Data visualization and user interfaces I	TBA
<b>Week 15</b>	Work on Final Projects, course wrap up	

<b>FINALS Week</b>	<b>Final project Due</b>	
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### Grading:

We will be using the following grading scheme for the course:

Lab Assignments: 30%  
 Midterm Exam: 30%  
 Final Project: 40%  
**Total: 100%**

Grades will range from A through F.

The following is a rough breakdown for grading:

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

*Grading for the course will be based on the following components:*

#### Lab Assignments

Following each lecture, there will be weekly laboratory assignments. These assignments are designed to reinforce the content discussed in lectures. Lab assignments are comprised of various coding tasks that students are expected to submit online (the exact methods are to be announced in the first lecture). Assignments are to be completed individually, during the lab session or taken to-go as homework. Unless explicitly stated otherwise, late submissions are not permitted. There are no lab assignments in the week of the midterm exam or the last week of class. There may be a “makeup” lab offered during the semester in case one is missed.

#### Midterm Exam

Halfway through the course there will be a midterm exam to test students understanding of the general computer programming concepts as well as the Python programming language. The midterm exam will be held in person for the on-campus students. For off-campus students the midterm exam will be in-person too, with a proctor approved by the DEN@Viterbi team. For more DEN@Viterbi proctor-related information, please visit: <https://viterbigrad.usc.edu/technical-support/homework-exams/>

For off-campus students who work or reside in Los Angeles, Orange and Ventura counties, examinations will be taken at USC’s main campus on the date and time stated on the course syllabus.

#### Final Project

The final project is a culmination of the skills acquired in class and applied to a domain of your interest. This is particularly useful for students from disciplines other than computer science.

For example, if you are interested in housing prices you can search for data pertaining to locations and average prices of homes in an area and compare those prices to crime rates as published by the police or sheriff departments. To get to a visualization of the results you will need to write a script that can gather data, parse, and clean the data before analyzing it, and ultimately design a visualization of the results in a way that makes sense and yields new insights. Lab assignments in the second half of the class will be geared towards the final project and you may re-use your code in your final project - therefore it would behoove you to start thinking of a subject for your final project as early as possible.

## Academic Integrity

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://policy.usc.edu/wp-content/uploads/2021/04/SCampus-Part-B.pdf>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct: <https://policy.usc.edu/research-and-scholarship-misconduct/>.

Use of AI and specifically Large Language Models (LLMs) *is allowed*. However, it is only allowed as a tool to assist in learning. That is to say, that you may use AI models such as **ChatGPT** or **Claude 2** to help understand the assignments, to ask generic questions about programming in Python and help you by generating code samples that could be of use to explain how certain programming constructs work. Submitting assignments completely generated by AI **is strictly prohibited** and when discovered will be awarded 0 points for the assignment. We will be utilizing additional software to check for code generated by an AI.

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university’s mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or “recycle” work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity’s website](#), and university policies on [Research and Scholarship Misconduct](#).

## **Course Content Distribution and Synchronous Session Recordings Policies**

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. 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. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

## **Statement on Academic Conduct and Support Systems**

### **Academic Integrity:**

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

### **Students and Disability Accommodations:**

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to

be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at [osas.usc.edu](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

### **Support Systems:**

#### [Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

#### [988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

#### [Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

#### [Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

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

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

#### [The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

#### [USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

#### [Diversity, Equity and Inclusion](#) - (213) 740-2101

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

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) 442-1200 – 24/7 on call

Non-emergency assistance or information.

#### [Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

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.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.