DATA 5405 Python Fundamentals

Shanghai Edition

Course Description

This course is an introduction to Python, with an emphasis on general programming concepts (structure, logic, data, etc.) that apply to just about any general purpose programming language. Starting with a review of fundamental programming concepts, the course uses short lessons, quizzes, and coding challenges to cover the basics of how Python is used in a professional Business Analytics setting. The course concludes with a final project designed to demonstrate proficiency. Prerequisites: graduate standing or permission of the instructor.

Desiderata

Course Goals / Theory

- To introduce fundamentals of logical reasoning as used in contemporary programming languages
- To survey essential data structures needed to organize, store, and integrate data
- To master syntax, control structures, data types, etc. in the Python programming language

Learning Objectives / Practice

- To write Python scripts of moderate length and complexity
- To develop proficiency with professional-level data science tools

Instructor

Christopher L. Huntley
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Christopher L. Huntley is a Business Analytics professor at the Charles F. Dolan School of Business at Fairfield University, where he has served in various capacities, ranging from department chair to NCAA representative. He is currently director of Fairfield

StartUp, a talent incubator that connects student entrepreneurs with potential advisors, mentors, customers, and private investors. StartUp's annual Showcase event, where students pitch their ideas in front of a live audience, attracts ~2500 viewers each year. Dr. Huntley earned a Ph.D. in Systems Engineering from the University of Virginia. Prior to completing his doctoral studies he worked as a consulting data analyst in the transportation and defense industries. A particular highlight was a project for 'Carvin' Marvin Runyon to reorganize / re-turf the US Postal Service in 1992; the resulting zip code maps are still in use today. He also played a key role in the Conrail / CSX Transportation merger in 1996.

He has been programming in Python since the 1990s, teaching his first Python Fundamentals class in 2002. He has also mastered (?) a variety of other languages over the years, including BASIC, Pascal, Fortran77, Modula-2, 8088 Assembly, C, C++, SQL, BASH, Common LISP, Scheme, Visual Basic, AWK, Java, Javascript, C#, HTML/CSS, and a few others that are not used much anymore. He might someday choose to learn R, but currently does not see the use.

Office Hours

Office hours are every Saturday at 7pm CST (7am EST) except as directed

Resources

- **Supplement:** Python for Everybody: Exploring Data in Python 3, by Charles R. Severance, available here. The PDF, HTML, and Kindle versions are free. This book is optional, for those who would like additional background. Each of the first 10 chapters corresponds to a Lesson on the syllabus.
- **Software:** JupyterLab (programming environment)
- **Hardware:** Each student will need a laptop or desktop computer
- **Websites:** The official Python 3 Documentation covers the Python language and all built-in libraries. When in doubt, read the documentation.

Student Expectations

This is a graduate class intended for aspiring *professionals*:

- **Set aside at least 10 hours per week for completing your assignments.** Consider yourself fortunate if you can complete it faster than that, but also make sure that you are not missing something important. Then use the remaining time to study on your own.

- **Do your own work.** There is no professional benefit to pretending that somebody else's work is your own. We will follow Fairfield University's academic honesty policy

to the letter.

> It is expected that all work done for this class will be in strict compliance with the principles of academic honesty and integrity, as outlined in the Student Catalog. Cheating, plagiarism, copying, or dishonesty of any kind is not acceptable and will result in a zero for the exam or assignment and possible a failing grade for the class, and/or expulsion from the program.

In addition you will have to swear to the following pledge on any graded work:

> On my honor as a Fairfield University student, I have neither given nor received any unauthorized aid on this assignment.

The pledge is a contract. Failure to comply will result in an F for the *course*. So, try to avoid even the appearance of misconduct.

- **Be a good teammate and class citizen.** Free-riding and other unprofessional behavior will result in immediate consequences, which may include failing the course.

If you cannot abide by these policies then please take another course.

Assignments and Course Grade

Homework Assignments (ungraded)

There will be weekly homework assignments that involve writing moderately complex code. The work is ungraded. Instead use it to assess for yourswelf whether you are making progress in the course. If you are having trouble completing the homework then ask for help in office hours, where we can review the code line by line if needed.

Quizzes (75% of Course Grade)

Quizzes will be given on the days shown in the attached schedule of classes. They are **closed book / notes** and designed to last about 25 minutes, though you may take longer if needed.

Project (25% of Course Grade)

There is a group coding project at the end of the course to ...

- assess whether you can craft programming logic and implement in Python
- learn to work effectively in teams

You may use generative AI (e.g., ChatGPT) for the project but have to be able to **explain each line of code**.

Grading Scale

All assignment grades are entered into the gradebook on a GPA scale, where A is 3.67+, A- is 3.34-3.66, etc. The overall course grade is then the weighted average of the grades.

Any assignment that is not scored on a GPA scale will be normalized as follows:

```
Grade Points = 3.5 + ½(x−µ)/σ,
```

where

- x is the student's raw score for the assignment
- µ and σ are the class average and standard deviation for the assignment
- Note that the average score is always 3.5, which is an A-.

After scaling, letter grades are assigned as follows:

- A: GP score above 3.66
- A-: GP score in [3.34, 3.66)
- B+: GP score in [3.0 3.34)
- B: GP score below 3

Dates and Deliverables

- WEEK 0
  - Lesson 0: Getting Started
- WEEK 1
  - Lesson 1: Python Preliminaries
  - Lesson 2: Basic Computation
  - Lesson 3: Conditional Execution
  - **Quiz 1**
- WEEK 2
  - Lesson 4: Functions
  - Lesson 5: Iteration
  - Lesson 6: Strings
  - **Quiz 2**
- WEEK 3
  - Lesson 7: Files
  - Lesson 8: Lists
  - Lesson 9: Dicts
  - **Quiz 3**
- WEEK 4
  - Lesson 10: Tuples

- **Final Project (Challenge Problems)**

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