Introduction to Programming with Python

Lyon College, Summer term I 2023, CSC 109 Derby Science Center
Room 209, Mon-Fri 1pm-3pm

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General information

This four-week course is designed to provide students with a comprehensive
introduction to programming in Python, covering fundamental concepts and
practical applications of the language.

- Meeting Times: Monday through Friday, 13:00-15:00

- Home work: Monday through Friday, ca. 3 hrs

- Meeting place: Derby Science Building Computer Lab 209

- Professor: Marcus Birkenkrahe

- Office: Derby Science Building room 210

- Phone: (870) 307-7254 (office) / (501) 422-4725 (private)

- Office hours: Monday through Friday, 15-15:30

- Textbook: Sweigart, Al (2020), Automate the Boring Stuff with Python
  (2e), NoStarch Press. Online: automatetheboringstuff.com/2e/

Objectives

Students will learn how to install Python and an IDE, and get started with
basic data types, control flow statements, functions, files, and exceptions.
They will also gain hands-on experience with more advanced topics such as

object-oriented programming, modules and packages, testing and debugging, and data analysis and visualization.

Throughout the course, students will have ample opportunity to practice their programming skills with a variety of exercises and projects using the Google Colaboratory and DataCamp platforms. They will also receive guidance and feedback from the instructor on their progress and final projects.

By the end of the course, students should have a solid foundation in Python programming and be able to apply their skills to a wide range of projects, from game development to process automation, data analysis and visualization. This course is ideal for anyone with little or no programming experience who wants to learn Python or for those who have some experience in programming and want to learn more advanced concepts and practical applications.

Course requirements

- Formal prerequisite MTH 101 (College Algebra)

- No prior knowledge required

- Curiosity is essential

- Experience with computers is useful but not critical

Grading system

You should be able to see your current grade at any time using the Canvas gradebook for the course.

REQUIREMENT	UNITS	PPU	TOTAL	% of TOTAL
Home assignments	20	5	100	25.
Class participation	20	5	100	25.
Multiple-choice tests	4	25	100	25.
Capstone project	1	100	100	25.
TOTAL			400	100.

Home assignments include:

- 15 DataCamp lessons over 3 courses (Intro to Python, Intermediate Python, and Intro to downloading data with Python)

- 5 weekly programming assignments

Class participation includes:

- Active participation

- Completing practice exercises in class

- Uploading practice files or links

Capstone project includes:

- Project proposal (mid-course)

- Project presentation (last week)

- Submission of project materials (by June 23rd)

Grading table

This table is used to convert completion rates into letter grades.

%	Letter Grade
100-98	
97-96	A (passed - very good)
95-90	
89-86	
85-80	B (passed - good)
79-76	
75-70	
69-66	C (passed - satisfactory)
65-60	
59-56	
55-50	D (passed)
49-0	F (failed)

Schedule and session content

For **important dates**, see the 2022-2023 Academic Calendar at: catalog.lyon.edu/202223-academic-calendar

Python basics - language and infrastructure

- What programming is good for

- Downloading, installing and running Python

- Interactive notebooks

First program - input and output

- Printing stuff

- Getting input

- Built-in string functions

Flow control - if, else, and elif statements

- Flow charts and flow control concepts

- If, Else, and Elif statements

- BPMN

Flow control - while and for loops

- While loops

- For loops

Functions

- Built-in functions

- Writing your own functions

- Global and local scope

Handling errors

- try and except statement

- exceptions

Lists

- List data type

- For loops with lists, multiple assignment and augmented operators

- List methods

- Similarities between lists and strings

Dictionaries

- Dictionary data type

- Data structures

Manipulating strings

- Advanced string syntax

- String methods

- String formatting

Regular expressions

- Regex groups and the pipe character

- Character classes and methods

- Regex example program: phone and email scraper

Files and file management

- Filenames and absolute/relative paths

- Reading and writing plaintext files

- Copying and moving files and folders

- Deleting files

- Walking a directory tree

Debugging and error messages

- Raise and assert statements

- Logging data

- Using the debugger

Web scraping

- The webbrowser module

- Downloading with Requests

- Parsing HTML with Beautiful Soup

- Controlling the browser with Selenium

Excel, Word, and PDF documents

- Reading Excel spreadsheets

- Editing Excel spreadsheets

- Reading and editing PDFs

- Reading and editing Word documents

Working with tabular data and pandas

- Loading, inspecting data frames

- Selecting columns and rows

- Logical testing

GUI Automation: image recognition

- Controlling the mouse from Python

- Controlling the keyboard from Python

- Screenshots and image recognition

Data visualization with Python

- Creating line plots and adding text

- Scatter plots and bar charts

- Histograms

Machine learning: building a spam filter

- Supervised learning with Naive Bayes

- Data cleaning and bag-of-words text mining

- Training, testing and improving a spamfilter

Project presentations

- Individual project presentations

- Interactive practice with participants

- In-class discussions and reflection

Learning management system

- We use Lyon's Canvas installation for this course.

- The course home page is at lyon.instructure.com/courses/1700

- The home page contains: assignments, grades, pages, people, syllabus, quizzes, Google Drive, Course evaluation and Zoom.

- The Zoom page includes cloud recordings of all past sessions.

- Recorded sessions will be deleted after the last class.

DataCamp

The course includes a free subscription to the DataCamp classroom at data-camp.com for further study, and for the opportunity to earn a certificate for the course `Introduction to Data Science in Python`.

Google Colaboratory

Google Colab (colab.research.google.com/) is a (free) online platform to create, edit and run interactive notebooks in R or Python. This enables students to learn literate programming techniques. All code-along and practice exercises for this class will be on Google Colab.

GitHub

All course materials are available as `ipynb`, `org` and `pdf` files in a GitHub repository (github.com/birkenkrahe/py). GitHub is the worldwide largest online platform for software development.

Textbooks

This is a selection of text books and mixed media sources used to prepare this course, which was first offered in summer 2023. Planned to be offered again: fall 2023/2024 (Batesville High School), summer 2024/2025.

- Automate the Boring Stuff with Python (3e) by A Sweigart (NoStarch, 2023). URL

- Introduction to Programming in Python by D Malan (freeCodeCamp, 2023). URL

- Introduction to Data Science with Python by H Green-Lerman (DataCamp, 2022)

- Invent Your Own Computer Games With Python (4e) by A Sweigart (NoStarch, 2023). URL

- Learn to Code by Solving Prolbems by D Zingaro (NoStarch, 2021).

- Python Crash Course (3e) by E Matthes (NoStarch, 2023).

- Python Workout by R Lerner (Manning, 2020).

- Whirlwind Tour of Python by J VanderPlas (O'Reilly, 2016). URL

Standard and course policies

- **Standard Lyon College Policies** are incorporated into this syllabus and can be found at: lyon.edu/standard-course-policies.

- The **Assignments and Honor Code** and the **Attendance Policy** are incorporated into this syllabus also and can be found at: tinyurl.com/LyonPolicy.