

# 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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## Overview

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.

## 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
Programming assignments	4	25	100	25.
Class participation	20	5	100	25.
Multiple-choice tests	4	25	100	25.
Capstone project	1	100	100	25.
TOTAL			400	100.

## 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)

## **Tentative schedule and session content**

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

## **DataCamp**

The course includes a free subscription to the DataCamp classroom at [datacamp.com](https://datacamp.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/](https://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](https://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 Problems 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](https://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](https://tinyurl.com/LyonPolicy).