

COMP-4006 Course Syllabus

1 Course Information

Course Name	COMP-4006: Python Programming II (Python Software Development)
Prerequisites	COMP-4005, COMP-4003
Required Textbook	No textbook required

2 Course Description

This accelerated course covers advanced Python programming for data scientists and cybersecurity professionals. Students are assumed to have an introductory level Python programming course prior to this, covering basics (writing/executing programs, conditionals, loops, functions, and classes).

This course focuses on giving students the ability to create and utilize modules (including the Python standard library) for advanced programming tasks. Projects are used to give practice taking a high-level problem statement and developing a solution. Understanding advanced data types (classes) as well as common source code management are covered. Object oriented and functional programming are introduced as common techniques used to organize and implement solutions to problems. Usage of python to manipulate and present data is also covered, so that students can begin to understand how to analyze information and discern meaningful observations based on that information.

Topic list (approximately week by week for ten-week quarter):

- Python Review and Git
- Command Line Basics and Anaconda environments
- Importing and Testing Code
- Python Memory Model / References / Aliasing
- Collections module
- Functional vs Object-Oriented Programming
- Object-oriented programming
- Python Standard Library
- Scientific Python Ecosystem

3 Textbook and Materials

There is no required textbook for participation in this class. All materials will be available for students enrolled in the course at <https://canvas.du.edu> and online at various internal and external web sites. You will need a good internet connection and a laptop that meets DU specifications. (See <https://www.du.edu/it/support/how-to/students/laptops>). For technical support in using Canvas, please go to <http://otl.du.edu/knowledgebase/canvas>

3.1 Optional Reading Material

- Python for Data Analysis by Wes McKinney
- Introducing Python, 2nd edition by Bill Lubanovic
- Learning Python, 5th Edition

4 Course Learning Objectives

After this course, students can:

1. Use classes as more complex data structures than lists/maps/tuples
2. Understand implementation concerns and performance of common data structures (e.g., dictionaries, linked-lists, etc.)
3. Use Python library modules for extended structures (e.g., collections, dataframes, etc.)
4. Understand how to create and utilize modules for larger projects
5. Be able to use git for source code management
6. Have the confidence to ingest data, do basic manipulation (such as descriptive statistics) and present the data in common formats
7. Use python unit testing libraries to write tests for their code
8. Create and understand object oriented code structures
9. Understand basic functional programming concepts

5 Course Outcomes

The high level outcomes from this course are as follows:

1. Given a medium sized project description, break it down into manageable sized pieces of code

2. Identify data structures that will help solve problems that arise in implementing a solution to the given project
3. Build a solution to a given problem, using proper code organization and testing
4. Analyze basic data using Python and be able to visualize important features of the data

6 Program Level Goals

Courses in the cyber security MS program, including this one, should contribute to overall program level outcomes for students. This course contributes to the following program level goals:

1. Apply programming and core CS topics; including network programming, algorithms and data structures, and computer organization.
2. Utilize and comprehend at least one compiled programming language (C/C++) and two or more interpreted/scripting languages (Bash, Python).

7 Knowledge Units

This course covers the following NSA cybersecurity Knowledge Units:

1. Basic Scripting and Programming (BSP, Core Technical KU)
2. Systems Programming (SPG, Optional KU)

8 Attendance Policy

Regular attendance is expected. Students are responsible for all material covered in class, including announcements and handouts.

9 Academic Integrity

All work submitted for this course must be the student's own original work. Any instance of plagiarism or cheating will be dealt with according to the university's academic integrity policy. Refer to the Student Rights and Responsibilities, as well as the University of Denver Student Honor code, here: <https://studentaffairs.du.edu/student-rights-responsibilities>

10 Disability Services

If you have a disability that may affect your ability to complete the work for this course, please contact the Disability Services office at: <https://studentaffairs.du.edu/disability-services-progr>