SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

**SECTION I**

SUBJECT AREA AND COURSE NUMBER

COMP 661

COURSE TITLE

PROGRAMMING WITH PYTHON II

TYPE COURSE

NON-FEE VOCATIONAL

CATALOG COURSE DESCRIPTION

This course introduces more advanced Python concepts to the learner. Topics covered include data structuring techniques using tuples, lists, and dictionaries, object-oriented programming concepts, and exception handling. Examples and labs used in this course will continue to draw from diverse areas such as financial data processing, gaming applications, and more. Students will be able to use this knowledge to land entry-level positions in such fields as data science, embedded programming, game development, software development, automation, cyber security penetration development, and more. (FT)

LECTURE/LABORATORY HOURS

126

ADVISORIES

COMP 660 PROGRAMMING WITH PYTHON I

RECOMMENDED SKILL LEVEL

- Possess a $12^{th}$ grade reading level
- Ability to communicate effectively in the English language
- Knowledge of math concepts at the $8^{th}$ grade level and computer literacy

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility
   SDCE students demonstrate interpersonal skills by leaning and working cooperatively in a diverse environment.
2. Effective Communication
   SDCE students demonstrate effective communication skills.

INSTITUTIONAL STUDENT LEARNING OUTCOMES (CONTINUED)

3. Critical Thinking
   SDCE students critically process information, make decisions, and solve problems independently or cooperatively.
4. Personal and Professional Development
   SDCE students pursue short term and life-long learning goals, mastering necessary skills and using resource management and self-advocacy skills to cope with changing situations in their lives.

COURSE GOALS

1. Gain intermediate skills for working with Python.
2. Learn how to utilize data structures including lists, tuples, and dictionaries.
3. Use Python to work with files, folders, and the operating system.
4. Learn how to handle exceptions.
5. Work with Python in an object-oriented way.

COURSE OBJECTIVES

Upon successful completion of the course, the student will be able to:

1. Demonstrate an intermediate understanding of Python.
2. Work with data structures, including lists, tuples, and dictionaries.
3. Create, update, and delete files and folders on a computer.
4. Handle errors and exceptions that may occur.
5. Build objects and custom modules using object-oriented concepts.

**SECTION II**

COURSE CONTENT AND SCOPE

1. Lists and Tuples
   - 1.1. Lists
     - 1.1.1. Adding and removing items
     - 1.1.2. Processing items
     - 1.1.3. Passing into functions
     - 1.1.4. Nesting
     - 1.1.5. Counting, reversing, and sorting
     - 1.1.6. Copying, slicing, and concatenating
     - 1.1.7. Built-in functions
   - 1.2. Tuples
2. Dictionaries
   - 2.1. Usage
   - 2.2. Getting, setting, and adding items
   - 2.3. Deleting items
   - 2.4. Looping through keys and values
   - 2.5. Converting between dictionaries and lists
   - 2.6. Working with complex objects as values

COURSE CONTENT AND SCOPE (CONTINUED)

3. File I/O (Input/Output) and File OS (Operating System)
    - 3.1. Introduction to file I/O
        - 3.1.1. Opening and closing files
        - 3.1.2. Writing to text files
        - 3.1.3. Reading from text files
        - 3.1.4. Lists in text files
        - 3.1.5. Writing to CSV (Comma Separated Value) files
        - 3.1.6. Reading from CSV files
        - 3.1.7. Binary files
    - 3.2. Introduction to file OS
4. Exception Handling
    - 4.1. Common errors
    - 4.2. Exceptions
    - 4.3. Try statements
    - 4.4. Multiple exceptions handling
    - 4.5. Getting error information from exception objects
    - 4.6. Finally clauses
    - 4.7. Raising an exception
5. Object-Oriented Programming
    - 5.1. Defining a class
        - 5.1.1. Constructor and attributes coding
        - 5.1.2. Coding methods
    - 5.2. Object composition
    - 5.3. Encapsulation
        - 5.3.1. How it works
        - 5.3.2. Hide attributes
        - 5.3.3. Use methods to access hidden attributes
        - 5.3.4. Use properties to access hidden attributes
    - 5.4. Inheritance
        - 5.4.1. How inheritance works
        - 5.4.2. Subclasses
        - 5.4.3. Polymorphism
        - 5.4.4. Check an object's type
    - 5.5. Override object methods
        - 5.5.1. Define a string representation for an object
        - 5.5.2. Define an iterator for an object
    - 5.6. Custom exceptions
    - 5.7. Inheritance usage

APPROPRIATE READINGS

Reading assignments may include, but are not limited to, assigned readings from textbooks, supplemental reading assignments, industry-related periodicals or magazines, manuals, online help pages, articles posted on the Internet, and information from Web sites, online libraries and databases. Topics should be related to Python programming and include techniques for working with Python concepts such as tuples, lists, dictionaries, File I/O, objected-oriented programming, debugging, and exception handling.

## WRITING ASSIGNMENTS

Writing assignments may include, but are not limited to, completing assigned reports, providing written answers to assigned questions, performing internet research and reporting on that research. An example would include a case study that compares a financial application written in Python using object-oriented techniques to one that does not.

## OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to, appropriate internet research, reading from assigned textbooks and completing the assignments at the end of each chapter, and studying as needed to perform successfully in class. An appropriate assignment would include the creation of an application that computes the future value of a user's investment over time, using data structures such as lists, tuples, or dictionaries, and object-oriented programming techniques to accomplish the task.

## APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Assignments which demonstrate critical thinking may include but are not limited to, designing and building an object-oriented Python-based application or game. Students will be expected to participate in online class discussion posts, in-class discussions and project reviews related, but not limited to, intermediate level Python topics.

## EVALUATION

Students must meet course competencies, which include multiple measures of performance related to the course objectives. Evaluation methods may include, but are not limited to, performance in a variety of activities and assignments, such as completing a research project individually or in a group, hands-on projects, quizzes, class participation, written and practical tests, attendance and punctuality.

Upon successful completion of the course, a Certificate of Course Completion will be issued. Upon successful completion of all courses in the program, a Certificate of Program Completion will be issued.

## METHOD OF INSTRUCTION

Methods of instruction, may include, but are not limited to lecture, hands-on demonstrations, online and in-class discussions, computer-assisted instruction, field trips, and laboratory assignments.

This course, or sections of this course, may be offered through distance education.

TEXTS AND SUPPLIES

*Think Python: How to Think Like a Computer Scientist*, Allen Downey, Green Tea Press, current edition
*Exploring Data Using Python 3,* Charles Severance, independent, current edition

Web Resources:
Udemy: Programming with Python, https://www.udemy.com/programming-with-python/learn/v4/overview
Python Org, https://www.python.org/
Wikibooks: Python Programming, https://en.wikibooks.org/wiki/Python_Programming

Supplies: Journal (composition book), USB Drive or other storage media

PREPARED BY Zak Ruvalcaba DATE June 5, 2019

DATA REVISED BY _____ DATE _____

Instructors must meet all requirements stated in Policy 3100 (Student Rights, Responsibilities and Administrative Due Process), and the Attendance Policy set forth in the Continuing Education Catalog.

REFERENCES:

San Diego Community College District Policy 3100
California Community Colleges, Title 5, Section 55002
Continuing Education Catalog