PCAR 2001 PYTHON PROGRAMMING (3-0-0)

OVERALL COURSE OBJECTIVES: The objective of this course is to provide learners with a comprehensive understanding of Python, from basic programming to handling complex data structures and accessing web data. By the end, learners should be proficient in Python and be able to use their skills to extract, parse, and analyze data. Moreover, they should be equipped to take on further advanced programming courses.

Module 1: Programming for Everybody (Getting Started with Python) [19 Hours]

This course aims to teach everyone the basics of programming computers using Python. We cover the basics of how one constructs a program from a series of simple instructions in Python. The course has no prerequisites and avoids all but the simplest mathematics. Anyone with moderate computer experience should be able to master the materials in this course. This course will cover Chapters 1-5 of the textbook "Python for Everybody". Once a student completes this course, they will be ready to take more advanced programming courses. This course covers Python 3.

Sub-Topics
Installing Python
Python as a Language
Eben Upton and the RaspBerry Pi
Variables and Expressions
Conditional Code
Conditional Statements
Loops and Iteration

Formative Assessments:
5 quizzes, 1 peer-review assignment, and 7 coding/lab assignments.

Module 2: Python Data Structures [19 Hours]

This course will introduce the core data structures of the Python programming language. We will move past the basics of procedural programming and explore how we can use the Python built-in data structures such as lists, dictionaries, and tuples to perform increasingly complex data analysis. This course will cover Chapters 6-10 of the textbook "Python for Everybody". This course covers Python 3.

Sub-Topics
Strings
Files
Lists
Dictionaries
Tuples

Formative Assessments:
5 quizzes, 1 peer-review assignment, and 7 coding/lab assignments.

Module 3: Using Python to Access Web Data [19 Hours]

This course will show how one can treat the Internet as a source of data. We will scrape, parse, and read web data as well as access data using web APIs. We will work with HTML, XML, and JSON data formats in Python. This course will cover Chapters 11-13 of the textbook "Python for Everybody". To succeed in this course, you should be familiar with the material covered in Chapters 1-10 of the textbook and the first two courses in this specialization. These topics include variables and expressions, conditional execution (loops, branching, and try/except), functions, Python data structures (strings, lists, dictionaries, and tuples), and manipulating files. This course covers Python 3.

Sub-Topics
Regular Expressions
Networks and Sockets
Programs that Surf the Web
Web Services and XML
JSON and the REST Architecture

Formative Assessments:
5 quizzes and 8 coding/lab assignments

LEARNING OUTCOMES: On successful completion of the course the students shall be able to:

1. Demonstrate understanding of basic programming concepts in Python, including constructing simple programs.
2. Apply gained Python proficiency to pursue more advanced programming courses.
3. Evaluate and use Python's core data structures such as lists, dictionaries, and tuples for sophisticated data analysis.
4. Extract and interpret data from the internet using Python's web scraping tools and APIs.
5. Interpret and manipulate web data, specifically HTML, XML, and JSON, using Python.
6. Synthesize various Python concepts, such as handling different data structures and manipulation of web data, to solve complex problems.