UNIVERSITY OF PETROLEUM & ENERGY STUDIES

	Python Programming	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	--				
Co-requisites	--				

Course Objectives

1. To learn the basics of python programming.
2. To develop programming skills in python.
3. To understand the intermediate knowledge about various data structures in python language.

Course Outcomes
On completion of this course, the students will be able to

CO1. Know the basic python programming concepts, data structures & regular expressions.
CO2. Discuss file handling operations and understand OOPS concepts using python.
CO3. Develop modules and implement web development framework.
CO4. Discuss the role of python in advance technology.

Catalog Description
Python is a programming language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data understanding and exploration. It covers data types, control flow, object-oriented programming, and graphical user interface-driven applications. It also discusses text processing, simple graphics creation and image manipulation, HTML and web programming, and genomics. It enables various web applications concepts.

Course Content
Unit 1.
a) An Introduction to Python
Introduction, A Brief History of Python, Python Versions, Installing Python, Environment Variables, Executing Python from the Command Line, IDLE, Editing Python Files, Python Documentation, Getting Help, Dynamic Types, Python Reserved Words, Naming Conventions
b) Basic Python Syntax
Basic Syntax, Comments, String Values, String Methods, The format Method, String Operators, Numeric Data Types, Conversion Functions, Simple Output, Simple Input, The % Method, The print Function
c) Language Components
Indenting Requirements, the if Statement, Relational and Logical Operators, Bit Wise Operators, the while Loop, break and continue, the for Loop.

Unit 2.
a)   Collections
Introduction, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, Summary
b)   Functions
Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function, map, filter, Mapping Functions in a Dictionary, Lambda, Inner Functions, Closures
c)   Modules
Modules, Standard Modules – sys, math, time, The dir Function

Unit 3.
a) Exceptions
Errors, Runtime Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, raise, assert.
b) Input and Output
Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods, Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, The pickle Module

Unit 4.
a) Classes in Python
Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes
b) Regular Expressions
Introduction, Simple Character Matches, Special Characters, Character Classes, Quantifiers, The Dot Character, Greedy Matches, Grouping, Matching at Beginning or End, Match Objects, Substituting, splitting a String, Compiling Regular Expressions, Flags.

Unit 5.
a) Data Structures
List Comprehensions, Nested List Comprehensions, Dictionary Comprehensions, Dictionaries with Compound Values, Processing Lists in Parallel, Specialized Sorts, Time Functionality, Generators.
b) Writing GUIs in Python
Introduction, Components and Events, An Example GUI, The Tk Widget, Button Widgets, Entry Widgets, Text Widgets, Checkbutton Widgets, Radiobutton Widgets, Listbox Widgets, Frame Widgets, Menu Widgets, Toplevel Widgets, Dialogs.

Unit 6.
a) The OS Module
The Environment, creating a Process, Listing Files, Other Process Methods, File Information (Metadata), Working with Directories.
b) Numerical Analysis & Plotting
Numpy – Overview, Setup, Datatypes, Basic Operators, Indexing, Broadcasting, Matrix Operators.
Matplotlib-Overview, Setup, Basic plots, Customizing plots, Subplots, 3D plots.
c) Data Processing with Pandas
Pandas – Overview, Setup, Data Structures, Indexing & Selecting Data, groupby Operations, Reshaping data.

Text Book
 Programming with Python (IBM ICE Publications 2018 Edition).

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	MSE	Quiz/Assignment/ etc.	ESE
Weightage (%)	20%	30%	50%

Relationship between the Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Course Outcomes	PO1	PO2	PO3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO 10	PSO 1	PSO2
CO1												
CO2												
CO3												
CO4												
Average												

1=Weak   2=Moderate   3=Strong