



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DIP - PROGRAMMING FOR PROBLEM SOLVING								
III Semester (Lateral entry students): Common for all branches								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
ADPE02	MC	L	T	P	C	CIA	SEE	Total
		-	-	-	-	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisite: There are no prerequisites to take this course.								

I. COURSE OVERVIEW:

This course introduces students to writing computer programs. This course presents the principles of structured programming using the Python language, one of the most increasingly preferred languages for programming today. Because of its ease of use, it is ideal as a first programming language and runs on both the PC and Macintosh platforms. However, the knowledge gained in the course can be applied later to other languages such as C and Java. The course uses iPython Notebook to afford a more interactive experience. Topics include fundamentals of computer programming in Python, object-oriented programming and graphical user interfaces.

II. COURSE OBJECTIVES:

The students will try to learn:

- I Acquire programming skills in core Python.
- II Acquire Object-oriented programming skills in Python.
- III Develop the skill of designing graphical-user interfaces (GUI) in Python.
- IV Develop the ability to write database applications in Python.
- V Acquire Python programming skills to move into specific branches - Internet of Things (IoT), Data Science, Machine Learning (ML), Artificial Intelligence (AI) etc.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Apply fundamental programming concepts, including variables, data types, operators, control structures, and functions, to develop Python programs.
- CO2 Design and implement modular Python programs using functions, recursion, and built-in data structures to solve computational problems.
- CO3 Utilize Python's object-oriented programming concepts, including classes, objects, inheritance, and polymorphism, to develop reusable software solutions.
- CO4 Apply file handling, exception handling, and modules to create robust, efficient, and maintainable Python applications.
- CO5 Develop interactive applications using Python graphical user interface (GUI) components and relevant libraries.
- CO6 Analyze and solve real-world engineering and computational problems by applying Python programming techniques, object-oriented principles, and standard libraries.

IV. COURSE CONTENT:

MODULE-I: INTRODUCTION TO PYTHON (09)

Introduction to Python: Features of Python, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator

MODULE-II: DECISION CONTROL STATEMENTS (10)

The if Decision Control Flow Statement, The if...else Decision Control Flow Statement, The if...elif...else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement.

MODULE-III: CONTAINER DATA TYPES (10)

Lists: Accessing List elements, List operations, List methods, List comprehension

Tuples: Accessing Tuple elements, Tuple operations, Tuple methods, Tuple comprehension, Conversion of List comprehension to Tuple, Iterators and Iterables, zip() function.

Sets: Accessing Set elements, Set operations, Set functions, Set comprehension

Dictionaries: Accessing Dictionary elements, Dictionary operations, Dictionary Functions, Nested Dictionary, Dictionary comprehension.

MODULE-IV: STRINGS AND FUNCTIONS (10)

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Functions: Communicating with functions, Variable Scope and lifetime, return statement, Types of arguments, Lambda functions, Recursive functions.

MODULE-V: OBJECT-ORIENTED PROGRAMMING (09)

Classes and Objects – Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes. OOPs Features: Abstraction, Encapsulation, Inheritance, and Polymorphism.

TEXT BOOKS:

1. Reema Thareja, “Python Programming - Using Problem Solving Approach”, Oxford Press, 1st Edition, 2017.
2. Dusty Philips, “Python 3 Object Oriented Programming”, PACKT Publishing, 2nd Edition, 2015.

V. REFERENCE BOOKS:

1. Yashavant Kanetkar, Aditya Kanetkar, “Let Us Python”, BPB Publications, 2nd Edition, 2019.
2. Martin C. Brown, “Python: The Complete Reference”, McGraw Hill, Indian Edition, 2018.
3. Michael H. Goldwasser, David Letscher, “Object Oriented Programming in Python”, Prentice Hall, 1st Edition, 2007.
4. Taneja Sheetal, Kumar Naveen, “Python Programming – A Modular Approach”, Pearson, 1st Edition, 2017.
5. R Nageswar Rao, “Core Python Programming”, Dreamtech Press, 2018.

VI. ELECTRONIC RESOURCES:

1. <https://realPython.com/Python3-object-oriented-programming/>
2. <https://Python.swaroopch.com/oop.html>
3. https://Python-textbok.readthedocs.io/en/1.0/Object_Oriented_Programming.html
4. <https://www.programiz.com/Python-programming/>

VII. MATERIAL ONLINE:

1. Course template
2. Tech-talk topics
3. Assignments
4. Definition and terminology
5. Tutorial question bank
6. Model question paper – I
7. Model question paper – II
8. Lecture notes
9. Early lecture readiness videos (ELRV)
10. Power point presentations