

COURSE BRIEF

COURSE TITLE	Computational Thinking and Programming	PRE-REQUISITES	NA
COURSE CODE	ECSE105L	TOTAL CREDITS	5
COURSE TYPE	Foundation	L-T-P FORMAT	2-1-4

COURSE SUMMARY

This course offers student to understand the core knowledge of Python language, how to use it in scientific and real-world scenario. Course start with introduction to computer, Programming Basic, Hardware Basics, and Programming Languages. Further, Python Control Structures, Decisions, Loops, Defining Functions and Boolean Operators are covered in depth. Top-Down Design, Bottom-Up Implementation, Sequences, Strings, Regular expressions, Files, object-oriented concepts and at the end of this course student will be able to build an application on their own.

COURSE-SPECIFIC LEARNING OUTCOMES (CO)

By the end of this program, students should have the following knowledge, skills and values:

CO1: Implement a given algorithm in Python by using standard programming constructs such as, repetitions, functions, modules, aggregated data (arrays, lists, etc.), etc.

CO2: Explain the output of a given Python program and debug errors in a given Python program.

CO3: Write simple programs using the features of object-oriented programming language such as, encapsulation, polymorphism, inheritance, etc.

How are the above COs aligned with the Program-Specific Objectives (POs) of the degree?

Detailed Syllabus

Module 1 (Contact hours: 11)

Overview of course, Introduction: Introduction to Computer Science; Computer Algorithms; Computer Hardware; Computer Software; The process of Computational Problem Solving; Introduction to Python programming language Data and Expressions: Literals; Variables and Identifiers; Operators; Expressions and Data Types, Logical operator; Boolean operator;

Boolean Expressions; Control Structures; Selection Control, Iterative Control Lists: List Structures; Lists in Python, Iterating Over Lists in Python;

Module 2 (Contact hours: 11)

Functions: Program routes; Calling Value Returning Functions; Calling Non- value Returning Functions Parameter Passing; Keyword and Default Arguments in Python; Variable Scope; Modular design Modules; Top-Down Design, Python Modules; File Handling Operation in file, Reading and Writing Text Files, Sequences, Strings.

Module 3 (Contact hours: 10)

Files. Exceptions Data Collections Applying Lists, List Operations, Dictionary Type in Python Set Data Type in Python; Non-Sequential Collections, Dictionary Operations Introduction to Object Oriented Programming, Class, Object.

Module 4 (Contact hours: 10)

Encapsulation, Data abstraction, Inheritance, Polymorphism, Graphics Programming: Graphics Programming, Using Graphical Objects, Interactive Graphics, Displaying Images, Generating Colors, Graphics Objects, Entry Objects, Test Case: Numpy, scipy; Test Case: panda, Matplotlib.

TEXTBOOKS/LEARNING RESOURCES:

- a) *Dierbach, "Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus", Wiley, 2015 edition, 2015, ISBN- 978-81-265-5601-4.*
- b) *Allen B. Downey, O'Reilly, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, 2015, ISBN-978-1-491-93936-9.*

REFERENCE BOOKS/LEARNING RESOURCES:

- a) *Martin C. Brown, "Python: The Complete Reference", McGraw-Hill, ISBN- 9780072127188.*
- b) *edX: Computing in Python I: Fundamentals and Procedural Programming (Georgia Tech.).*

EVALUATION POLICY

Components of Course Evaluation	Percentage
Mid Term Examination	15
End Term Examination	25
Continuous Lab Evaluation	20
Quiz	10
Assignment	10
Project	20