

CDSA 102 Programming for Data Science

BLOCK- 01

Unit 1

Understanding Programming- I [What is Programming? Basic Programming Concepts, why should you learn Computer Programming? Essentials of a Programming Language.]

Unit 2

Understanding Programming- II [Types of Computer Programming Languages, Various programming approaches, Skills Required for Programming, How to Start Programming? Career options for Programmers.]

Unit 3

Basics of Python- I [Why should you learn to write programs? Computer hardware architecture, understanding programming, Conversing with Python, Terminology: Interpreter and compiler, what is a program? writing a program, The building blocks of programs]

Unit 4

Basics of Python- II [Why you should learn Python? Salient features of Python, Areas where Python is in use, How to download and install Python?, basic syntax, etc]

BLOCK- 02

Unit 5

Programming with Python (Variables, expressions, and statements)- [Values and types, Variables, Variable names and keywords, Statements, Operators and operands, Expressions, Order of operations, Modulus operator, String operations, Asking the user for input, Comments, Choosing mnemonic variable names]

Unit 6

Conditional execution in Python [Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, catching exceptions using try and except, Short-circuit evaluation of logical expressions]

Unit 7

Iteration in Python [Updating variables, the while statement, Infinite loops, finishing iterations with continue, Definite loops using for, Loop patterns, Counting and summing loops, Maximum and minimum loops]

Unit 8

Functions in Python [Function calls, Built-in functions, Type conversion functions, Math functions, Random numbers, adding new functions, Definitions and uses, Flow of execution, Parameters and arguments, Fruitful functions and void functions, why functions?]

BLOCK- 03

Unit 9

Strings in Python [Getting started with string, Traversal through a string with a loop, Looping and counting, The in operator, String comparison, String methods, Parsing strings, Format operator]

Unit 10

Lists in Python [Getting started with List, List operations, List methods, deleting elements, Lists and functions, Lists and strings]

Unit 11

Dictionaries in Python [Getting started with Dictionaries, Dictionaries and files, Looping and dictionaries]

Unit 12

Tuples in Python [Comparing tuples, Tuple assignment, Dictionaries and tuples, Multiple assignment with dictionaries, Using tuples as keys in dictionaries]

BLOCK- 04

Unit 13

Basics of R programming- I [Features of R, why use R? Applications of R Programming, Alternatives to R programming, Downloading and Installing R, Run R Programming on Your Computer, R's Help System, Understanding Errors.]

Unit 14

Basics of R programming- II [The Terminal, Working with Vectors, Sub-setting Vectors - the magic "[]", Other Useful Functions, R Syntax, Loops in R]

Unit 15

Qualitative Variables (Creating and using categorical variables in R) [The Function factor(), Visualizing Qualitative Variables, How Factors are Stored in R, Changing Factor Levels, Hypothesis Testing for Factors]

Unit 16

Quantitative Variables (Creating and using continuous variables in R) [Working with Numeric Data, Hypothesis Testing, Resistant measures of center and spread, Visualizing Quantitative Data, Converting Quantitative Data to Qualitative, Fitting and Modeling Distributions]

BLOCK- 05

Unit 17

Bivariate Data in R [Basic approaches to dealing with two variables, Two Qualitative Variables, Two Quantitative Variables, Qualitative and Quantitative Variables]

Unit 18

The Data Frame in R [The R equivalent of the spreadsheet, Data Frames, attaching data, Changing Data Frames]

Unit 19

Importing and Exporting Data in R [Getting your data into R, Importing Data, Exporting Data, Importing Other Data Types, Some Typical Problems]

Unit 20

Manipulating Data in R [An introduction to data wrangling, Summarizing Data, Reformatting Data, Reshape, Merging Data Sets, more about Loops]

BLOCK- 06

Unit 21

Working with multiple variables in R [Some basic tools for multivariate data, Working with Multivariate Data, PCA, Clustering]

Linear Models in R [Linear regression, Violation of Assumptions and Transformation of Data, Hypothesis Testing, Predictions and Confidence Intervals from Regression Models]

Unit 22

Visualizing Data in R [Enhancing scatter plots, Basic Scatter Plots, Multi-Panel Plots I: Layout, Adding a Secondary y-axis, Summary]