

A. Multidisciplinary Minor in “Artificial Intelligence & Data Science”

Semester	Course Code	Course Title
III	CSEMMDM-01A	Programming basics using Python
IV	CSEMMDM-02A	Data Pre-processing& Visualization
V	CSEMMDM-03A	Machine Learning
VI	CSEMMDM-04A	Predictive Analytics
VII	CSEMMDM-05A	Artificial Intelligence



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Second Year B.Tech (Computer Science and Engineering)

Semester – III

CSEMMDM-01A - Programming Basics Using Python

Teaching Scheme

Lectures : - 2 Hrs/Week, 2 credits

Practical : - 2 Hrs/Week, 1 credit

Examination Scheme

ESE: 70 Marks

ISE : 30 Marks

ICA :25 Marks

Introduction: Python is a popular, general-purpose, multi-paradigm, open-source, scripting language. It is designed to emphasize code readability – has a clean syntax with high level data types. It is suited for interactive work and quick prototyping, while being powerful enough to write large applications. This course introduces the python language which has simple syntax, powerful set of libraries and robust debugger and profiler.

Course Prerequisite:

Students should have knowledge of basic programming.

Course Objectives:

1. To introduce the core components of the Python programming language.
2. To study library packages to write applications using python
3. To study GUI, exception handling and debugging python programs.

Course Outcomes :

At the end of this course, students will be able to

1. Write Python scripts using procedure oriented approach of writing a computer program.
2. Write Python scripts using Object oriented approach of writing a computer program
3. Exhibit ability to use Python's standard library packages to provide solutions to a given problem.

SECTION – I

Unit 1 - Introduction to Python (02)

Introducing the Python Interpreter, Program Execution, Execution Model Variations.

Unit 2 - Introduction to Python Programming Constructs (06)

Data types and variables, Control structures, loops and functions, Exception Handling, String handling, Scope of variables..

Unit 3 - Object Oriented Programming in Python (05)

Classes, Instance Objects, Method Objects, Class and Instance Variables, Attributes and methods, Inheritance and polymorphism

SECTION II

Unit 4 - Python Standard Library Modules and Packages (07)

Basic date and time types, General calendar-related functions, NumPy, Shallow and deep copy operations, Mathematical functions, Generate pseudo-random numbers,

Unit 5 – Introduction to GUI programming and CSV Files (07)

Data Persistence: CSV File Reading and Writing, Logging facility for Python. Introduction to GUI programming .

Unit 6 – Testing and Debugging (03)

Unit tests in Python, Debugging programs, Measure execution time of small code snippets.

ISE Evaluation for the course will consist of three programming (hands on) tests.

Internal Continuous Assessment (ICA):

Minimum 12 assignments based on above topics.

- The assignments should test and develop student's practical proficiency and ability to use Python standard library modules and packages efficiently in writing effective code for varied applications scenarios & requirements, use cases.
- Use of IDEs like PyCharm, Eclipse with PyDev, Jupyter Notebook for Interactive development and debugging of Python applications is highly recommended to enhance hands on skills in Python Programming of Students.

Text Book:

Programming in Python 3, Mark Summerfield, Second Edition

Reference Books:

1. Python Cookbook, David Beazley and Brian K. Jones, Third Edition, Shroff Publishers & Distributors Pvt. Ltd., ISBN :978-93-5110-140-6
2. Learning Python, MarkLutz, 5th edition
3. Programming Python (English), MarkLutz, 4th Edition
4. Testing Python, David Sale, Wiley India (P) Ltd., ISBN :978-81-265-5277-1

e-resources :

1. Python 3.7.3 documentation - <https://docs.python.org/3/>



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Second Year B.Tech (Computer Science and Engineering)

Semester – IV

CSEMDM-02A Data Pre-processing & Visualization

Teaching Scheme

Lectures : - 2 Hrs/Week, 2 credits

Practical : - 2 Hrs/Week, 1 credit

Examination Scheme

ESE - 70 Marks

ISE - 30 Marks

ICA - 25 Marks

Introduction:

Data science is a field of study and application that has been growing rapidly for the past several decades. As a growing field, it is gaining a lot of attention in both the media as well as in the job market. This course will introduce students to data pre-processing and visualization techniques and tools.

Prerequisite:

Fundamentals of Python Programming

COURSE OUTCOMES:

At the end of this course, the student will be able to -

1. Identify the different types of data
2. Transform raw data into understandable format
3. Use python libraries for data pre processing and visualization
4. Represent the data in various graphical forms.

SECTION - I

Unit 1 - Introduction and Describing Data

(5)

Overview, Sources of Data ,Process for Making Sense of Data, Observations and Variable , Types of Variables, Central Tendency, Distribution of the Data, Confidence Intervals, Hypothesis Tests

Unit 2 - Preparing Data Tables

(6)

Overview, Cleaning the Data, Removing Observations and Variables, Generating Consistent Scales Across Variables, New Frequency Distribution, Converting Text to Numbers, Converting Continuous Data to Categories, Combining Variables, Generating Groups.

Unit 3 - Introduction to NumPy

(6)

Understanding Data Types in Python, The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything in Between, Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic.

SECTION-II

Unit 4 - Data Manipulation with Pandas

(5)

Installing and Using Pandas, Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping,

UNIT 5 Data Visualization

(6)

Overview, Visualization Design Principles, Tables, Univariate Data Visualization, Multivariate Data Visualization, Visualizing Groups, Dynamic Techniques

Unit6-Visualization with Matplotlib and Seaborn

(6)

General Matplotlib Tips, Two Interfaces for the Price of One, Simple Line Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colorbars, Multiple Subplots, Text and Annotation.

Internal Continuous Assessment (ICA):

ICA should consist of Solving 8- 10 practical assignments on above units.

Text Book:

1. Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2014. (Unit- I and II)
2. Glenn J. Myatt, Making sense of Data: A practical Guide to Data Visualization, Advanced Data Mining Methods and Applications, John Wiley Publishers, 2009.(Unit-V)
3. Python Data Science Handbook – Essential Tools for working with Data : Jake VanderPlas, O’rielly (Unit III, IV, VI)

B. Multidisciplinary Minor in “Software Engineering”

Semester	Course Code	Course Title
III	CSEMDM-01B	Software Engineering
IV	CSEMDM-02B	Software Testing and Quality Assurance
V	CSEMDM-03B	Object Oriented Modelling and Design
VI	CSEMDM-04B	Management Information System
VII	CSEMDM-05B	Information Retrieval



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Second Year B.Tech (Computer Science and Engineering)

Semester – III
CSEMDM-01B Software Engineering

Teaching Scheme

Lectures : - 2 Hrs/Week, 2 credits

Practical : - 2 Hrs/Week, 1 credit

Examination Scheme

ESE : 70 Marks

ISE : 30 Marks

ICA: 25 Marks

Introduction : Current Software engineering methods and techniques have made us much better at building large and complex systems than we were. However, there are still too many projects that are late, over budget, and do not deliver the software that meets customer's needs. The main aim of introducing this course is to understand the methods, processes, techniques, and approaches which are required to develop high-quality software products within schedule and budget. On top of that this course ensures understanding of the complete Software Development Life Cycle (SDLC) for the development of software products as per the customer's needs. Further, it ensures the knowledge of various quality standards used in the software system and the Agile Project Management Process.

Course Prerequisite:

An understanding of Programming skills.

Course Outcomes:

At the end of the course Student will be able to

1. Apply the appropriate lifecycle model for software development.
2. Prepare SRS and SDS accordingly for a given problem.
3. Apply appropriate software testing method.
4. Ensure the quality of a product by applying the quality management process.

SECTION-I

Unit 1 - Introduction to Software Engineering (5)

Introduction, The Problem Domain, Software Engineering Challenges and Approach, Software Process, Characteristics of Software Process, Software Development Process Models: Waterfall model, Prototype model, Agile process model.

Unit 2 - Software Requirement Analysis & Specification (5)

Need of SRS, Characteristics of Good SRS, Requirement Process, Requirements specification,

Functional Specification with Use Cases, Other Approaches for Analysis: Data Flow Diagram, Entity Relationship Diagram,

Unit 3 - Software Architecture and Design (6)

Introduction to Software Design, Software Architecture: Role of Software Architecture, Architecture Views, Component & Connector View, Architecture Style for Component & Connector view, Documenting Architecture Design, Function- Oriented Design, Object Oriented Design, High Level Design, Detailed Design, Verification, Metrics.

SECTION-II

Unit 4 - Testing (04)

Testing Fundamentals, Testing Process, Black-Box Testing, White-Box Testing, Object-Oriented Software testing methods, Functional testing, Unit testing, System testing, User satisfaction testing.

Unit 5 - Project Planning and Management (6)

Project management process, The Inspection and Audit Process, Software Configuration Management process, Effort estimation, Project Schedule and Staffing, Quality planning: Quality Concepts, Qualitative quality management planning. CMM project management process, Risk Management Planning, Project Monitoring Plan, Detailed Scheduling.

Unit 6 - Agile Project Management (5)

Introduction to APM, Implementation, Iterative Project Management Life Cycle, Adaptive Project Management Life Cycle, Adaptive & Integrating the APM toolkit, The Science of Scrum, New Management Responsibilities.

Text Books:

- 1.An Integrated Approach to Software Engineering, Pankaj Jalote, 3rd Edition (Narosa Publishers)
- 2.Effective Project Management Traditional, Agile, Extreme, Robert K. Wysocki, 6th Edition,WILEY INDIA
- 3.Software project management in practice, Pankaj Jalote Pearson India Ltd.

Reference Books :

- 1.Software Engineering, Ian Sommerville, 6th edition, Pearson education Asia.
- 2.Software Engineering Fundamentals, Ali Behforooz and Frederick j. Hudson (Oxford UniversityPress).
- 3.Project Management with Scrum, Ken Schwaber.
- 4.Software Engineering-A precise approach, Pankaj Jalote Wiley Precise Precise Textbook.



PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Second Year B.Tech (Computer Science and Engineering)
Semester – IV

CSEMDM-02B Software Testing and Quality Assurance

Teaching Scheme

Lectures : - 2 Hrs/Week, 2 credits

Practical : - 2 Hrs/Week, 1 credit

Examination Scheme

ESE : 70 Marks

ISE : 30 Marks

ICA : 25 Marks

COURSE OUTCOMES:

At the end of this course, students will be able to

1. Compare the different software testing methods and select the suitable one for a given scenario.
2. Design test strategy & test plan for software testing.
3. Apply different approaches of management, quality assurance and standards for software engineering processes.
4. Demonstrate automated testing tools to test software.

SECTION– I

Unit 1: Fundamentals of Software Testing (06)

Introduction, Basics of Software Testing, Approaches to Testing, Testing During Development Life Cycle, Essential of Software Testing, Features of Testing, Misconceptions About Testing, Principles of Software Testing, Test Policy, Strategy, Planning, Process, Challenges in Testing, Test Team Approach, Methods.

Unit 2: Methods of Testing (06)

Software Verification and Validation, Black-Box and White-Box Testing, Static and Dynamic Testing, Black-Box Testing Techniques-Equivalence Partitioning, Data Testing, State Testing, Other Black Box Test Techniques. White-Box Testing Techniques.

Unit 3: Levels of Testing (05)

Verification and Validation Model, Levels of Testing, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, System Testing- GUI Testing, Compatibility Testing.

SECTION II

Unit 4: Test Planning & Documentation (06)

Test Planning-The goal of Test Planning, Test Planning Topics, Writing and Tracking Test Cases The Goal of Test Case Planning, Test Case Planning Overview, Test Case Organization

and Tracking, Reporting Bugs- Getting Your Bugs Fixed,

Unit 5: Quality Concepts & Software Quality Assurance (06)

Quality Concepts-What is Quality?, Software Quality, The Software Quality Dilemma, Achieving Software Quality, Software Quality Assurance-Background Issues, Elements of Software Quality Assurance.

Unit 6: Automated Testing and Testing Tools (05)

Introduction, The Benefits of Automation and Tools, Test Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation, Open-Source Testing Tools, Case Studies on Testing Tools-Selenium.

Internal Continuous Assessment (ICA):

Assignments:

- Minimum 8- 10 assignments based on each topic of above syllabus.

Two assignments on use of Selenium for software testing.

Text books:

1. Software Testing Principles, Techniques and Tools By M G Limaye, Published by Tata McGraw-Hill Education Private Limited, Published 2009, ISBN (13): 978-0-07-013990-9, ISBN (10): 0-07-013990-3 (Chapter 1 & 3)
2. Software Testing, Second Edition By: Ron Patton, Published by SAMS, ISBN-13: 978-0672327988 ISBN-10: 0672327988 (Chapter 2, 4 & 6)
3. Software Engineering: A Practitioner's Approach by Roger S Pressman, 8th Edition
4. Publisher McGraw Hill (Chapter 5)

Reference books:

1. Software Testing Principle and Practices By Ramesh Desikan, Gopaldaswamy Ramesh, Pearson Education, ISBN 978-81-7758-121-8
2. Software Testing Principles and Practices By Naresh Chauhan, Publisher OXFORD UNIVERSITY PRESS-NEW DELHI, ISBN 0-19-806184-6
3. Beautiful Testing: Leading Professionals Reveal How They Improve Software By Adam Goucher, Tim Riley, Publisher O'reilly
4. Foundations of Software Testing By Rex Black, Dorothy Graham, Erik Van Veenendaal IsabelEvans, Published by Cengage Learning India Pvt Ltd.
5. Lessons Learned in Software Testing by Cem Kaner , James Bach , Bret Pettichord, Publisher Wiley
6. Testing Computer Software Cem Kaner, Jack Falk, Hung Q. Nguyen, Publisher Wiley
7. Selenium Testing Tools Cookbook By Unmesh Gundecha Published by Packt, ISBN: 978-

1-84951-574-0

8. Dr. K.V.K.K. Prasad, “Software Testing Tools: Covering WinRunner, Silk Test, LoadRunner, JMeter and TestDirector With Case Studies”, Dreamtech Publications ISBN: 10:81-7722-532-4

Reference tutorials:

1. Spoken Tutorials on Selenium Software Testing Framework at http://spokentutorial.org/tutorialsearch/?search_foss=Selenium&search_language=English