| Name of Faculty | : | Faculty of Engineering & Technology |
|---|---|---|
| Name of Program | : | Master of Technology (M.Tech.) – Artificial Intelligence and Data Science |
| Course Code | : | 1MAI05 |
| Course Title | : | Advanced Python Programming |
| Type of Course | : | Professional Core |
| Year of Introduction | : | 2023-24 |

| Prerequisite | : | Proficiency in Python programming fundamentals |
|---|---|---|
| Course Objective | : | Master Python data structures, modular programming, error handling, file I/O, and turtle graphics for comprehensive Python programming skills. |
| Course Outcomes | : | At the end of this course, students will be able to: |
| | CO1 | Develop python programs by applying data structures - dictionary, tuple, and set concepts. |
| | CO2 | Develop modules and packages in python programs for modular programming approach. |
| | CO3 | Implement error handling techniques using exception handling |
| | CO4 | Develop python programs using file input/output operations. |
| | CO5 | Draw graphics using the turtle module |

**Teaching and Examination Scheme**

| Teaching Scheme (Contact Hours) | | | Credits | Examination Marks | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical Marks | | Total Marks |
| L | T | P | C | SEE | CIA | SEE | CIA | |
| 3 | 0 | 2 | 4 | 70 | 30 | 30 | 20 | 150 |

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P** – Practical, **C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists ofAssignments/Seminars/Presentations/MCQ Tests, etc.))*

**Course Content**

| Unit No. | Topics | Teaching Hours | Weightage | Mapping with CO |
|---|---|---|---|---|
| 1 | **Basic of python data structure**: Dictionary, Tuple and Set: Introduction to Strings, Lists, Set - Sets in Python , Create a Set, Accessing Python Sets, Delete from sets, Update sets, Python Set Operations, Tuple -Tuples in Python, Creating Tuples, Accessing Tuple ○ Iterate over tuples, Slicing tuples, Tuples are Immutable, Python Tuple | 08 | 15% | CO1 |

| | | | | |
|---|---|---|---|---|
| | Operations, Built-In Tuple Functions and methods, Dictionary -Dictionaries in Python, Creating Dictionaries, Accessing Items in Python Dictionaries, Add, Update, Remove in Dictionaries, Properties of Dictionary Keys, Built-In Dictionary Methods and functions | | | |
| 2 | **Modules and Packages:** Introduction to module, Creating user defined module, Importing a module in python, Normal import, From import, From import with *, Module search path, Introduction to Packages, Creating user defined package, Importing a package in python, Normal import, From import, From import with * ,Intra-package References, Installing PIP, Installing/uninstalling python packages | 12 | 25% | CO2 |
| 3 | **Exception handling:** Introduction to Exception, Types of Exceptions - Built-in Exceptions, User defined Exceptions , Raising Exceptions, Handling Exceptions, Try clause, Except clause, Finally clause | 08 | 15% | CO3 |
| 4 | **Files Handling:** Introduction to files and its types, Binary files, Text files, Opening and Closing Text File, Reading and Writing Files, Setting Offsets in File, Object Serialization - Pickle Module | 09 | 22% | CO4 |
| 5 | **Graphics with Turtle:** Introduction to turtle graphics, Turtle methods, Turtle Screen Methods, Turtle programming - loopsand conditional statements. | 08 | 23% | CO5 |

| **Suggested Distribution of Theory Marks Using Bloom's Taxonomy** | | | | | | |
|---|---|---|---|---|---|---|
| **Level** | Remembrance | Understanding | Application | Analyse | Evaluate | Create |
| **Weightage** | **20** | **30** | **30** | **20** | **0** | **0** |

*NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.*

**Suggested List of Experiments/Tutorials**

| Sr. No. | Name of Experiment/Tutorial | Teaching Hours |
|---|---|---|
| 1 | Write a program to demonstrate the set functions and operations | 02 |
| 2 | Write a program to input n numbers from the user and store these numbers in a tuple. Print the maximum and minimum number fromthis tuple. | 02 |
| 3 | Create a user-defined function that prints a tuple whose values are the cube of a number between 1 and n (both included), Where n is an integer number and passed as an argument. | 02 |
| 4 | Write a program to demonstrate tuples functions and operations | 02 |

| | | |
|---|---|---|
| 5 | Write a program to count the number of times a character appears in a given string using a dictionary | 02 |
| 6 | Write a program to concatenate the following dictionaries to create anew one.<br>Sample Dictionary:<br>dic1={1:10, 2:20}<br> dic2={3:30, 4:40}<br> dic3={5:50,6:60}<br>Expected Result: {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60} | 02 |
| 7 | Write a program to define a module to find the area andcircumference of a circle.<br>a) import the module to another program.<br>b) import a specific function from a module to another program. | 02 |
| 8 | Install urllib3 package using PIP. Send HTTP requests to any URL and print status for the same. | 02 |
| 9 | Write a user-defined exception that could be raised when the text entered by a user consists of less than 10 characters | 02 |
| 10 | Write a python program to demonstrate exception handling. | 02 |
| 11 | Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order. | 02 |
| 12 | Draw color-filled shapes (square, rectangle, and circle) using Turtle. | 04 |
| 13 | Draw a smiling face emoji and rainbow using Turtle | 04 |

**Major Equipment/ Instruments and Software Required**

| Sr. No. | Name of Major Equipment/ Instruments and Software |
|---|---|
| 1 | Python IDEs and Code Editors<br>Open Source : IDLE, Jupyter |

**Suggested Learning Websites**

| Sr. No. | Name of Website |
|---|---|
| 1 | www.python.org |
| 2 | www.learnpython.org |
| 3 | www.hack.io/tutorials/learn-python |
| 4 | www.nptel.iitm.ac.in |

**Reference Books**

| Sr. No. | Name of Reference Books |
|---|---|
| 1 | Learn Programming in Python with Cody Jackson by Cody Jackson – Packt Publishing, 2018 |
| 2 | Python Basics: A Practical Introduction to Python 3 by David Amos, Dan Bader et. Al - Real Python, 2021 |