(Annexure H-8)

SYLLABUS

For

MASTER OF SCIENCE (MATHEMATICS) – FYIP
Semester–III, IV

(Under Continuous Evaluation System)

Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF FIVE YEARS INTEGRATED PROGRAMME

MASTER OF SCIENCE (MATHEMATICS) – FYIP

(Session 2024-25)

Credit Based Continuous Evaluation Grading System (CBCEGS)

MASTER OF SCIENCE (MATHEMATICS) – FYIP SEMESTER III

Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
FMAM-3135	Python Programming	C	3-0-2	3-0-1	4	100	50	30	20	3+3

MASTER OF SCIENCE (MATHEMATICS) – FYIP SEMESTER IV

Course Code	Course Title	Course Type	Hours per week	Credit		Marks				Examination Time (in Hours)
			L-T-P	L-T-P	Total	Total	Ext.		CA	
							L	P		
FMAM-4135	Foundation of Statistical Computing	C	3-0-2	3-0-1	4	100	50	30	20	3+3

MASTER OF SCIENCE (MATHEMATICS) – FYIP
SEMESTER III
Session 2024-25
PYTHON PROGRAMMING
Course Code: FMAM- 3135

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend basics of Python programming like operators, data types, I/O, etc.
CO2: Apply various control statements of Python Programming Language for designing solutions to different real world problems.
CO3: Implement various built-in and user defined function, packages and modules to solve mathematical problems.
CO4: Apply different matrix operations using NumPy and perform file manipulations.

MASTER OF SCIENCE (MATHEMATICS) – FYIP
SEMESTER III
Session 2024-25
PYTHON PROGRAMMING
Course Code: FMAM- 3135

Examination Time: (3+3) Hours

L	T	P
3	0	1

Max. Marks: 100
Theory: 50
Practical: 30
CA: 20

Instructions for the Paper Setters:

Eight questions of equal marks (10 marks each), (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

UNIT I

Introduction to python and Setting up the Python development Environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Declaring and using Numeric data types: int, float, complex Lists and Tuples and their basic operations, Python console Input / Output. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators.

UNIT II

Calculation of area, surface area and volume of geometrical objects. String Handling, Unicode strings, Strings Manipulation: - compare strings, concatenation of strings, slicing strings in python, converting strings to numbers and vice versa. Dictionaries Control statements: if-else, Nested If-Else, Loops (for, while) Loop manipulation using pass, continue, breakand else.

UNIT III

Built in function and modules in python, user defined functions, passing parameters, arguments and return values; formal vs actual arguments, Lamda function in python, Recursion, organizing python codes using functions, modules and external packages.

Math Module: Constants, Arithmetic functions, Power functions, Logarithmic functions, Trigonometric and Angular functions.

UNIT IV

Matrix operations using NumPy array (Multiplication. Addition, matrix multiplication, inverse, determinant, adjoint, Eigenvalues, etc).
Files: manipulating files and directories, OS and Sys modules; creating and reading a geometric file (csv or tab separated) understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek. Introduction to graphic. **Plotting graphs and objects.**

References / Textbooks:

1. Mark Lutz, Learning Python, O'Reilly Media, 2013.
2. David Beazley, Python cookbook, O'Reilly Media, 2013.
3. David Beazley, Python Essential Reference, Addison-Wesley Professional, 2009.
4. John Zelle, Python programming: An Introduction to Computer Science, Franklin, Beedle & Associates Inc, 2004.
5. Alex Mortelli, Python in a Nutshell, O'Reilly Media, 2006.

Note: The latest editions of the books should be followed.

MASTER OF SCIENCE (MATHEMATICS) – FYIP
SEMESTER IV
Session 2024-25
COURSE CODE: FMAM-4135
FOUNDATION OF STATISTICAL COMPUTING

Course Outcomes:

After passing this course the student will be able to:
CO1: Comprehend basics of Statistical Computing and managing data structures like vector, matrix, etc.
CO2: Create, operate and manage lists and data frames.
CO3: Apply control and I/O statements for generating outputs.
CO4: Simulate various descriptive and analytical algorithms using R language along with their visualization.

MASTER OF SCIENCE (MATHEMATICS) – FYIP
SEMESTER IV
Session 2024-25
COURSE CODE: FMAM-4135
FOUNDATION OF STATISTICAL COMPUTING

Examination Time: (3+3) Hrs.	**L**	**T**	**P**	**Max. Marks: 100**
				Theory: 50
	3	**0**	**1**	**Practical: 30**
				CA: 20

Instructions for Paper Setter -
Eight questions of equal marks (10 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT - I

Data Statistics: Sampling, Cumulative statistics, Statistics for Data frames, matrix objects and lists. Introduction to R, Help functions in R, Vectors, Common Vector Operations, Using all and any function, subletting of vector. Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns, lists, Creating lists, general list operations, Accessing list components and values, applying functions to lists, recursive lists

UNIT - II

Creating Data Frames – Matrix-like operations in frames , Merging Data Frames, Applying functions to Data frames, Factors and Tables , factors and levels , Common functions used with factors , string operations

UNIT - III

Input/ Ouput: scan() , readline() Function, Printing to the Screen Reading and writing CSV and text file. Control statements: Loops, Looping Over Nonvector, Sets, if-else , writing user defined function, scope of the variable, R script file

UNIT - IV

Graphics in R: Graph Syntax ((title, xlabel, ylabel, pch, lty, col.), Simple graphics (Bar, Multiple Bar, Histogram, Pie, Box-Plot, Scatter plot, qqplot), Low-level and High-Level plot functions, par() command to generate multiple plots.

Note:
Practical: Based on simple mathematical problems and based on syllabus of Statistical Methods for descriptive Statistics.

References / Textbooks:

1. Andrie de Vries and Joris Meys, R Programming for Dummies, Wiley (2016), 2nd Edition.
2. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (2017), 1st Edition.
3. Sandip Rakhsit, Statistics with R Programming, McGraw Hill Education (2018), 1st Edition.
4. Garrett Grolemund, Hands on Programming with R, O'Reilly (2014), 1st Edition
5. Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013)
6. Tilman M. Davies, The Book of R: A first Course in Programming and Statistics, No Strach Press (2016), 1st Edition