DEPARTMENT OF COMPUTER SCIENCE

COURSE STRUCTURE & SYLLABI
(For the students admitted from year 2025-2026 onwards)

Programme: B.Sc. Data Science

Eligibility: A Pass in Higher Secondary Examination with Mathematics as one of the subjects conducted by the Government of Tamilnadu or any other examination accepted as equivalent thereto by the Syndicate

Since 1951

JAMAL MOHAMED COLLEGE (AUTONOMOUS)
Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0
(Affiliated to Bharathidasan University)
TIRUCHIRAPPALLI – 620 020

B.Sc. DATA SCIENCE

Sem	Course Code	Part	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	23U1LT1/LA1LF1 /LH1/LU1	I	Language - I		6	3	25	75	100
	23UCN1LE1	II	English - I	English for Communication - I	6	3	25	75	100
	25UDS1CC1	III	Core - I	Programming in C and Data Structures	5	5	25	75	100
	25UDS1CC2P		Core - II	Programming in C Lab - Practical	3	3	20	80	100
	25UMA1AC1		Allied - I	Linear Algebra	4	3	25	75	100
	25UMA1AC2		Allied - II	Mathematical Statistics	4	3	25	75	100
	23UCN1AE1	IV	AECC - I	Value Education	2	2	-	100	100
				Total	**30**	**22**			**700**
II	23U2LT2/LA2/LF2 /LH2/LU2	I	Language - II		6	3	25	75	100
	23UCN2LE2	II	English - II	English for Communication - II	6	3	25	75	100
	25UDS2CC3	III	Core - III	Python Programing	5	5	25	75	100
	25UDS2CC4P		Core - IV	Python Programming Lab - Practical	4	3	20	80	100
	25UMA2AC3		Allied - III	Mathematics for Data Science	4	4	25	75	100
	25UMA2AC4P		Allied - IV	Mathematical Statistics Lab - Practical	3	3	20	80	100
	23UCN2SS	IV	Soft Skills Development	Soft Skills Development	2	2	-	100	100
	23UCN2CO	V	Community Outreach	JAMCROP	-	@	-	-	@
	23U2BT1 / 23U2AT1		Basic Tamil - I / Advanced Tamil - I	எழுத்தும் இலக்கியமும் அறிமுகம் - I தமிழ் இலக்கியமும் வரலாறும் - I	-	-	-	100 #	-
	@Only grades will be given			**Total**	**30**	**23**			**700**
III	23U3LT3/LA3/LF3 /LH3/LU3	I	Language - III		6	3	25	75	100
	23UCN3LE3	II	English - III	English for Communication - III	6	3	25	75	100
	25UDS3CC5	III	Core - V	Database Systems	4	4	25	75	100
	25UDS3CC6P		Core - VI	Database Systems Lab - Practical	3	3	20	80	100
	25UPH3AC5		Allied - V	Allied - Physics I	4	4	25	75	100
	25UPH3AC6P		Allied - VI	Allied - Physics I - Practical	3	2	20	80	100
	25UDS3GE1	IV	Generic Elective - I		2	2	-	100	100
	23UCN3AE2		AECC - II	Environmental Studies	2	2	-	100	100
				Total	**30**	**23**			**800**
IV	23U4LT4/LA4/LF4 /LH4/LU4	I	Language - IV		6	3	25	75	100
	23UCN4LE4	II	English - IV	English for Communication - IV	6	3	25	75	100
	25UDS4CC7	III	Core - VII	Big Data Analytics with NoSQL Database	5	5	25	75	100
	25UDS4CC8P		Core - VIII	Big Data Analytics Lab - Practical	3	3	20	80	100
	25UPH4AC7		Allied - VII	Allied - Physics II	5	4	25	75	100
	25UPH4AC8P		Allied - VIII	Allied - Physics II - Practical	3	2	20	80	100
	25UDS4GE2	IV	Generic Elective - II		2	2	-	100	100
	25UCN4EL		Experiential Learning	Internship	-	2	-	100	100
	25UCN4EA	V	Extension Activities	NCC, NSS, etc.	-	1	-	-	-
	23U4BT2 / 23U4AT2		Basic Tamil - II / Advanced Tamil - II	எழுத்தும் இலக்கியமும் அறிமுகம் - II தமிழ் இலக்கியமும் வரலாறும் - II	-	-	-	100 #	-
				Total	**30**	**25**			**800**
V	25UDS5CC9	III	Core - IX	Data Mining, Data Warehousing and Data Visualization	5	5	25	75	100
	25UDS5CC10		Core - X	Network Security	5	5	25	75	100
	25UDS5CC11		Core - XI	Cloud Computing	5	5	25	75	100
	25UDS5CC12P		Core - XII	Data Mining and Data Visualization Lab - Practical	4	4	20	80	100
	25UDS5DE1A/B		Discipline Specific Elective - I		5	4	25	75	100
	25UDS5SE1	IV	Skill Enhancement Course - I	Shell Programming	4	3	-	100	100
	25UDS5SE2P		Skill Enhancement Course - II	Shell Programming Lab - Practical	2	1	-	100	100
	25UDS5EC1		Extra Credit Course - I*	Online Course	-	*	-	-	-
				Total	**30**	**27**			**700**
VI	25UDS6CC13	III	Core - XIII	R Programming	6	5	25	75	100
	25UDS6CC14		Core - XIV	Machine Learning	6	5	25	75	100
	25UDS6CC15P		Core - XV	Machine Learning Lab - Practical	4	4	20	80	100
	25UDS6PW		Project Work	Project Work	5	5	-	100	100
	25UDS6DE2A/B		Discipline Specific Elective - II		4	4	25	75	100
	25UDS6DE3A/B		Discipline Specific Elective - III		4	4	25	75	100
	25UCN6AE3	IV	AECC - III	Gender Studies	1	1	-	100	100
	25UDS6EC2		Extra Credit Course - II*	Online Course	-	*	-	-	-
	25UDSECA		Extra Credit Course for all**	Online Course	-	**	-	-	-
	25UCN6ECA1		Extra Credit Course for all+	Entrepreneurship Development	-	+	-	-	-
	*** Programme Specific Online Course for Advanced Learners** **** Any Online Course for Enhancing Additional Skills** **+ Course for Enhancing Entrepreneurial Skills**			**Total**	**30**	**28**			**700**
				Grand Total		**148**			**4400**

GENERIC ELECTIVE COURSES

Semester	Course Code	Course Title
III	25UDS3GE1	Business Process Outsourcing
IV	25UDS4GE2	Web Design

 # Self-Study Course – Basic and Advanced Tamil
(Applicable to the candidates admitted from the academic year 2023 -2024 onwards)

Semester	Course Code	Course Title
II	25U2BT1	Basic Tamil - I (எழுத்தும் இலக்கியமும் அறிமுகம் - I)
	25U2AT1	Advanced Tamil - I (தமிழ் இலக்கியமும் வரலாறும் -I)
IV	25U4BT2	Basic Tamil - II (எழுத்தும் இலக்கியமும் அறிமுகம் -II)
	25U4AT2	Advanced Tamil - II (தமிழ் இலக்கியமும் வரலாறும் -II)

Mandatory

Basic Tamil Course - I and II are offered for the students who have not studied Tamil Language in their schools and college.

Advanced Tamil Course - I and II are offered for those who have studied Tamil Language in their schools but have opted for other languages under Part - I.

DISCIPLINE SPECIFIC ELECTIVES

Semester	Course Code	Course Title
V	25UDS5DE1A	Internet of Things
	25UDS5DE1B	Block Chain Technology
VI	25UDS6DE2A	Computing Technologies for Data Science
	25UDS6DE2B	Augmented Reality and Virtual Reality
	25UDS6DE3A	Web Technology
	25UDS6DE3B	Artificial Intelligence

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25UDS1CC1	Core – I	5	5	25	75	100

Course Title	Programming in C and Data Structures

SYLLABUS		
Unit	**Contents**	**Hours**
I	Basic of C: History of C and its importance – Structure of a C program – Data Types – Constants and Variables – Operators and Expressions – Order of Precedence, Evaluating of Arithmetic Expressions – *Type Conversion*- Decision Statements: if, if-else, and nested if statements.	15
II	Loops Structures: For Loop, While, Do-while loop – Arrays: - One Dimensional Array, Two-dimensional Arrays, Character Arrays and Strings – Functions: Function with arrays- Function with decision and looping statements - *Recursion*.	15
III	Pointers: Introduction – Pointer Expressions – Chain of Pointers – Pointers and Arrays – Array of Pointers – Pointers as function arguments – Functions returning Pointers – Pointers to Functions – Function pointer – Structures - declaration, initialization, Array of Structures – Pointer to structures, Structures and functions – *Types of Enumerated data types*, Unions.	15
IV	Strings Processing, Standard string library functions – Files: introduction and files functions – Writing and reading in Text mode – Simple application: Display the contents of a file. Write data to a file. Append data to an existing file – File IO – *Reading and writing structures*.	15
V	Stack: LIFO concept, Stack operations, Array implementation of stack – Queue: FIFO concept, Queue operations, Array implementation of queue – Singly Linked List: concepts, operations – Doubly Linked List: concepts, operations – Trees: General trees, *Binary trees*.	15
VI	**Current Trends (For CIA only):**	

…… Self Study

Text Book(s):

1. E. Balagurusamy, “Programming in ANSI C”, Tata McGraw Hill, New Delhi, Seventh Edition, 2016.
2. E. Horowitz, S. Sahni and Susan Anderson Freed, “Fundamental Data Structures in C”, 2ed, Orient Black Swan Publisher, 2009.

Reference Book(s):

1. E. Karthikeyan, “A Textbook on C Fundamentals, Data Structures and Problem Solving”, Prentice-Hall of India Private Limited, New Delhi, 2008.
2. Yashavant Kanetkar, “Let us C”, BPB Publications, Tenth Edition, New Delhi, 2010.

Web Resource(s):

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.w3schools.in/data-structures/intro

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Summarize the basic knowledge to develop C programs	K1
CO2	Manipulate Looping, arrays and functions	K2
CO3	Apply and write programs for solving real world problems	K3
CO4	Create open, read, manipulate, write and close files.	K4
CO5	Understand the basic concepts in data structures.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	3	3	2	2	2	3	2.5
CO2	3	3	2	3	2	3	2	3	2	2	2.5
CO3	3	2	3	3	3	2	3	2	3	2	2.6
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	3	2	3	2	2	3	3	2.5
									Mean Overall Score		**2.54**
									Correlation		**High**

Mean Overall Score = Sum of Mean Score of COs / Total Number of COs

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. S. Benazir Butto

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25UDS1CC2P	CORE – II	3	3	20	80	100
Course Title	Programming in C Lab – Practical						

1. Write a C program
    a. To convert temperature from degree Centigrade to Fahrenheit.
    b. To find whether the given number is Even or Odd.
    c. To find the greatest of three numbers.
2. Write a C program to use the switch statement to display Monday to Sunday.
3. Write a C program to display first Ten Natural Numbers and their sum.
4. Write a C program to find Multiplication of Two Matrices.
5. Write a C program
    a. To find the maximum number in Array using pointer.
    b. To reverse a number using pointer.
    c. To add two numbers using pointer.
6. Write a C program to solve Quadratic Equation using functions.
7. Write a C program to find factorial of a number using Recursion.
8. Write a C program to show Call by Value and Call by Reference.
9. Write a C program to create a file containing Student Details.
10. Write a C program to implement a stack using singly linked list, Implement Queue using Linked List.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	To relate the ways to solve simple programs	K2
CO2	To understand and trace the execution of programs using arrays	K3
CO3	To develop programs with functions and pointers	K4
CO4	To solve data handling problems using files	K4
CO5	To implement stack and queue operations.	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	2	3	2	2	2	2	2.4
CO2	3	3	3	2	2	3	3	3	2	2	2.6
CO3	3	2	3	2	3	2	3	3	3	0	2.4
CO4	2	3	2	2	3	3	3	2	2	2	2.4
CO5	3	3	3	3	3	3	2	3	3	3	2.9
										Mean Overall Score	**2.54**
										Correlation	**High**

Mean Overall Score = Sum of Mean Score of COs / Total Number of COs

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. J. Sahitha Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25UMA1AC1	Allied - I	4	3	25	75	100

Course Title	Linear Algebra

SYLLABUS

Unit	Contents	Hours
I	Systems of Linear Equations - Row Reduction and Echelon Forms - *Solution Sets of Linear Systems* - Applications of Linear Systems - Introduction to Linear Transformations- Matrix Operations	**12**
II	The Inverse of a Matrix - Partitioned Matrices - Matrix Factorizations - Applications to Computer Graphics - Cramer's Rule - *Linear Transformations*	**12**
III	Vector Spaces and Subspaces - Null Spaces, Column Spaces, and Linear Transformations - Linearly Independent Sets - Bases - *Coordinate Systems* - The Dimension of a Vector Space - Rank	**12**
IV	Eigenvectors and Eigenvalues - The Characteristic Equation - Diagonalization	**12**
V	Inner Product, Length, and Orthogonality - Orthogonal Sets - Orthogonal Projections-The Gram–Schmidt Process - Inner Product Spaces - Applications of Inner Product Spaces	**12**

…… Self Study

Text Book:

David C. Lay, Steven R. Lay, Judi J. McDonald, Linear Algebra and its Applications, Fifth Edition, Pearson Education, U.S.A, 2016. ‘

UNIT I Chapter 1: Sections 1.1, 1.2, 1.5, 1.6, 1.8. Chapter 2: Sections 2.1.
UNIT II Chapter 2: Sections 2.2, 2.4, 2.5,2.7. Chapter 3: Section 3.3.
UNIT III Chapter 4: Sections4.1, 4.2, 4.3-4.6.
UNIT IV Chapter 5: Sections 5.1, 5.2, 5.3. Chapter 6: Sections 6.1-6.4.
UNIT V Chapter 6: Sections 6.1-6.4, 6.7, 6.8.

Reference Books:

1. T.K. Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy, Algebra Volume-II, Ananda Book Depot, Chennai (2019).
2. David C. Lay, Steven R. Lay, Judi J. McDonald, Linear Algebra and its Applications, Fifth Edition, Pearson Education, U.S.A, 2016.
3. Charu C. Aggarwal, Linear Algebra and Optimization for Machine Learning, Springer Nature Switzerland, 2020.

Web Resources:

1. https://youtu.be/nG_zOJCvmzw?si=v_Li8DLmovXzEF13
2. https://youtu.be/kZwSqZuBMGg?si=lhe9ZYhy6_06_x0z
3. https://youtu.be/JO9jNe6BemE?si=3ZhcSZcnhStmsqtK

Course Outcomes		
Upon successful completion of this course, the student will be able to		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	solve systems of linear equations using row reduction, echelon forms, and matrix operations.	**K1**
CO2	apply matrix factorization, inverse of matrices, partitioned matrices, and Cramer's rule to solve problems, including applications in computer graphics.	**K2**
CO3	demonstrate an understanding of vector spaces, subspaces, bases, coordinate systems, and rank.	**K3**
CO4	analyze eigenvalues, eigenvectors, diagonalization, and their role in linear transformations.	**K4**
CO5	apply concepts of inner product spaces, orthogonality, Gram-Schmidt process, and projections in real-world applications.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**2.7**
CO2	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2.7**
CO3	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**2.6**
CO4	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2.5**
CO5	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2.6**
Mean Overall Score											**2.62**
Correlation											**High**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. C. Gurubaran & Mr. A. Ahamed Ashick Ali

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25UMA1AC2	Allied - II	4	3	25	75	100

Course Title	Mathematical Statistics

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Design of Sample Survey** – The principal steps in sample survey- Principles of sample survey - Sampling and non-sampling errors – Advantages of sampling over complete census – Limitation of sampling – Types of sampling – Simple random sampling.	**12**
II	**Exact Sampling Distribution (Chi-Square Distribution)** – Chi-square variate – Derivation of chi- square distribution – M.G.F of χ^2 distribution – cumulant generating function of χ^2 distribution – Mode and Skewness of χ^2 distribution – Additive property of chi-square variate – chi-square test as a test for population variance - chi-square test of goodness of fit – Independence of attributes.	**12**
III	**Testing of Hypothesis: Basic Definitions – Test of Hypothesis (Large Sample Tests)** – Test of significance of single mean - Test of significance of difference of two means – Test of significance of single proportion.	**12**
IV	**Test of Hypothesis (Small Sample Tests)** – Test of significance of single mean - Test of significance of difference of two means – Paired t – test – Variance ratio test –F test.	**12**
V	**Design of Experiments**: one way and two way classification – completely Randomized Design (CRD) – Randomized Block Design (RBD).	**12**

Text Book:

1. S.C. Gupta & V.K. Kapoor – Elements of Mathematical Statitics, Third edition, Sultan Chand & Sons educational publisher, New Delhi – 2022
   - Unit – I Chapter 19: Section 19.1 – 19.7
   - Unit – II Chapter 13: Section 13.1 – 13.5
2. N. Subramaniam, Probability and Statistics, first edition, SCM Publisher, Erode (2005)
   - Unit – III Chapter 4: Section 4.1 – 4.2 (Page No.: 291 – 324).
   - Unit – IV Chapter 4: Section 4.3 (Page No.: 344 – 382)
   - Unit – V Chapter 5: Section 5.1 – 5.2 (Page No.: 408 – 444)

Reference Books:

1. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sulthan Chand & Sons, Eleventh Edition,2002
2. Goon A M, Gupta M K, Das Gupta B, Fundamentals of Statistics, (Vol-I) -, The World Press (Pvt) Ltd., Kolkata.

Web Resources:

1.https://www.youtube.com/watch?v=FSVUDMmEb1M&list=PLLyj1Zd4UWrOk5wIki_oOxHJnNj0_437&index=3
2.https://www.youtube.com/watch?v=XV5eijyoFPc&list=PLLyj1Zd4UWrOk5wIki_oOxHJnNj0_437&index=9
3. https://www.youtube.com/watch?v=qNGDD_Rh8ps&list=PLU6SqdYcYsfJPF-4HphQQ8OceDtqhlSW8

Course Outcomes		
Upon successful completion of this course, the student will be able to		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	understand the concept of sampling and sampling distribution.	**K1**
CO2	prepare the principal steps in sample survey	**K2**
CO3	demonstrate an understanding the small and large sample problems during the preparation of table values.	**K3**
CO4	acquire conceptual knowledge and skill of exact sampling distribution and preparation of chi-square test as a test for population variance.	**K4**
CO5	acquire the design of experiments knowledge in one way and two way classifications.	**K5**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	3	3	1	1	1	1	2.0
CO2	3	3	2	3	2	3	2	3	2	2	2.5
CO3	3	2	3	2	2	2	1	1	3	1	2.0
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	1	2	3	1	2	2	2	2.0
									Mean Overall Score		**2.22**
									Correlation		**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. SHIEK PAREETH

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25UDS2CC3	Core – III	5	5	25	75	100

Course Title	Python Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Object Oriented Programming: Procedural and Object-Oriented Programming – Classes – Working with instances – techniques for designing classes. – Inheritance: introduction to inheritance – Polymorphism	15
II	Python: Installing python- The python Interpreter – Interactive mode – Writing and running programs in script mode- IDLE programming environment – Input, processing and output – Displaying output with print function –Strings and String literals- Comments – variables – Reading input from the Keyboard - Operators- more about output – Decision structures and Boolean logic – Repetition Structures	15
III	Lists, Tuples, Strings, Dictionaries and Set: Sequences – Introduction to Lists – List slicing – 'in' operator – list methods and built-in-functions – copying lists – processing lists – Two Dimensional Lists – Tuples. Strings: Basic String Operations – String Slicing Testing, Searching and manipulating strings – *Dictionaries and Set: Dictionaries – Set – Serializing Objects*.	15
IV	Functions, Modules and File Handling: Functions: introduction to functions – Defining and calling functions – designing a program to use functions – Local variables – passing arguments to functions – Global variable and Global Constants- –Value returning functions: generation – user defined value returning functions – Modules: math module- Storing functions in modules - Files: Introduction to File Input and Output – Using Loops to process files – processing records - Exceptions – *Python Standard Library - Regular Expression*.	15
V	Data Analysis using Python: Load data into a Data Frame - Fundamentals of Data Manipulation with Python.	15
VI	**Current Trends (For CIA only):**	

…… Self Study

Text Book(s):

Allen B. Downey, "Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016

Reference Book(s):

1. Satyanarayana, Radhika Mani, Jagadesh, "Python Programming", Universities Press (India) Pvt. Ltd 2018.
2. Wesley Chun "Core python Programming" Pearson Education, 2006.

Web Resource(s):

1. https://www.python.org
2. https://www.programiz.com/python-programming
3. https://www.w3schools.com/python/python_intro.asp

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Interpret and manipulate the OOPs Concepts	K1
CO2	Install python and write programs to solve simple problems	K2
CO3	Explain basic data structures in Python	K3
CO4	Store and manipulate data using file system	K4
CO5	Implement Python packages and libraries	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	3	3	1	1	1	1	2.0
CO2	3	3	2	3	2	3	2	3	2	2	2.5
CO3	3	2	3	2	2	2	1	1	3	1	2.0
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	1	2	3	1	2	2	2	2.0
										Mean Overall Score	**2.22**
										Correlation	**Medium**

Mean Overall Score = Sum of Mean Score of COs / Total Number of COs

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Vaaheetha Kfatheen

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25UDS2CC4P	CORE – IV	4	3	20	80	100

Course Title	Python Programming Lab – Practical

1. Write Python programs for the following: (using Basics of Python)
    a. Purposefully raise Indentation Error and correct it.
    b. Compute distance between two points taking input from the user (use Euclidean distance formula).
    c. To takes numbers as command line arguments and print its sum
2. Write Python programs for implementing the following: (using Control Flow)
    a. Finding the factorial of a number.
    b. Print the prime numbers below 100
3. Write Python programs for implementing the following: (using Strings)
    a. Count the numbers of characters in the string and store them in a dictionary data structure
    b. Using split and joins methods in the string and trace a birthday with a dictionary data structure.
4. Write Python programs for the following: (using List)
    a. Finding mean, median, mode for the given set of numbers in a list.
    b. Function dups to find all duplicates in the list.
5. Write Python programs to do the following (using Methods)
    a. Create a Python class named Circle constructed by a radius and two methods which will compute the area and the perimeter of a circle.
    b. Create a Python class named Rectangle constructed by a length and width and a method which will compute the area of a rectangle.
6. Write Python programs to implement
    a. Constructors to assign the PI_VALUE.
    b. Polymorphism to print area of square/rectangle depending upon the number of parameters passed.
7. Write Python programs to implement
    a. Inheritance
    b. Method overloading and overriding
8. Write a python program (using files)
    a. to open and write “Hello World” into a file.
    b. to write the content “Hi Python Programming” for the existing file.
    c. To import values from a CSV file to create Pandas Data Frame
9. Write a Python program to create an Email slicer.
10. Write a Python program to generate password.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Write simple programs using control structures, functions and strings	K2
CO2	Develop programs using tuples, lists, sets and dictionary	K3
CO3	Write simple programs using Constructors, Method overloading and inheritance	K4
CO4	Develop programs using files and regular expressions	K4
CO5	Write simple programs using packages and exception handling	K5

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	3	3	1	1	1	1	2.0
CO2	3	3	2	3	2	1	1	2	2	2	2.0
CO3	3	2	3	2	2	2	1	1	3	1	2.0
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	1	2	3	1	2	2	2	2.0
										Mean Overall Score	**2.12**
										Correlation	**Medium**

Mean Overall Score = Sum of Mean Score of COs / Total Number of COs

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. J. Fathima Fouzia

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25UMA2AC3	Allied - III	4	4	25	75	100

Course Title	Mathematics for Data Science

SYLLABUS		
Unit	**Contents**	**Hours**
I	Mathematical Logic: Statements and notation – connectives – Negation – Conjunction – Disjunction – Statement formulas and truth tables – Conditional and Biconditional – well-formed formulas - Tautologies	**12**
II	Set theory: Basic concept of set theory – Notation – Inclusion and equality of sets – the power set – Some operations on sets – Venn diagrams – Cartesian products.	**12**
III	Differential equations of the first order with higher degree – Equations solvable for p- Equations Solvable for y – *Equations Solvable for x* - Clairaut's form. (Problems only)	**12**
IV	*Linear Differential Equations with constant coefficients * - Particular integral – Special method of finding P.I. – Derivation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Different integrals of First Order P.D.E. (Problems only)	**12**
V	Standard type of first order partial differential equations I, II, III and IV (Clairaut's form) - *Lagrange's equations*. (Problems only).	**12**

…… Self Study

Text Book:

1. Tremblay J.P and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata Magraw Hill bub. Co. Ltd, 2015
2. S. Narayanan, T.K. Manicavachagom Pillay, Calculus Volume-III, S. Viswanathan Publishers Pvt. Ltd. (2012)

UNIT I	Chapter 1: Sections 1.1, 1.2.1 - 1.2.11	T.B-1
UNIT II	Chapter 2: Sections 2.1.1 – 2.1.9	T.B-1
UNIT III	Chapter 1 Sections 5.1–5.4, 6.1, 6.2	T.B-2
UNIT IV	Chapter 2 Sections 1–4	T.B-2
	Chapter 3 Sections 1–3	
UNIT V	Chapter 4 Sections 5.1-5.4, 6	T.B- 2

Reference Books:

1. Liu C.L and Mohapatra "Elements of Discrete Mathematics" Tata Magraw Hill bub. Co. Ltd, reprint 2015
2. P. Kandasamy and K. Thilagavathy, Allied Mathematics, S. Chand & Company Ltd, New Delhi (2010).
3. A. Abdul Rasheed, Allied Mathematics, Vijay Nicole Imprints private limited, Chennai (2008).
4. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma Publishing house (2002).

Web Resources:

1. https://nptel.ac.in/courses/111/107/111107111/
2. https://nptel.ac.in/courses/111/102/111102133/
3. https://www.youtube.com/@4GSilverAcademy
4. https://www.youtube.com/@mathematicskala
5. https://www.youtube.com/@mathematicskala

Course Outcomes		
Upon successful completion of this course, the student will be able to		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	understand the fundamental concepts of mathematical logic, including statements, connectives, truth tables, and tautologies.	**K1**
CO2	apply set theory concepts such as set operations, Venn diagrams, Cartesian products, and power sets to solve problems.	**K2**
CO3	solve first-order differential equations of higher degree, including equations solvable for p, y, and x, as well as Clairaut's form.	**K3**
CO4	analyze and solve linear differential equations with constant coefficients and partial differential equations using appropriate methods.	**K4**
CO5	evaluate and solve standard types of first-order partial differential equations, including Lagrange's equations.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	3	3	1	1	1	1	2.0
CO2	3	3	2	3	2	3	2	3	2	2	2.5
CO3	3	2	3	2	2	2	1	1	3	1	2.0
CO4	2	3	2	3	3	3	3	3	2	2	2.6
CO5	3	2	2	1	2	3	1	2	2	2	2.0
										Mean Overall Score	**2.22**
										Correlation	**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. C. Gurubaran & Mr. A. Ahamed Ashick Ali

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25UMA2AC4P	Allied - IV	3	3	25	75	100

Course Title	Mathematical Statistics Lab - Practical

Contents
1. Find Mean, Median and Mode using SPSS.
2. Calculate Standard deviation and variance using SPSS.
3. Demonstrate Bar diagram in SPSS.
4. Construct Line diagram in SPSS.
5. Demonstrate Pie chart in SPSS
6. Construct Histograms in SPSS.
7. Explore t-test for one sample problem.
8. Analyze t-test for two sample problems.
9. Demonstrate t-test for testing the significance of Correlation Coefficient in SPSS.
10. Implement the analysis of variance using SPSS.
11. Demonstrate how to handle Missing data in SPSS.
12. Show Summary Measures for Categorical Data in SPSS.
13. Construct Charts for Categorical Data in SPSS
14. Find the Co efficient of correlation using SPSS.
15. Find the Regression equation of X on Y.

Text Book(s):
1. SPSS for You - A. Rajathi & P. Chandran – MJP Publications, Chennai, 2019 2. SPSS in Simple Steps, Pandya Kiran, Bulsari Smruti, Sinha Sanjay, Dreamtech press, New Delhi, 2012
Reference Book(s):
1. Data analysis using SPSS for windows, Jeremy J. Foster, Sage publications, London, New edition. Versions 8-10, 2001 2. SPSS for windows Step by Step, George Darren and Mallery Paul, Dorling Kindersley Publishing Pvt Ltd, Noida, UP, 201
Web Resource(s):
1. https://www.youtube.com/watch?v=8PhXIZbPmVI 2. https://www.youtube.com/watch?v=LUf6Y4Wakaw

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Perform a wide range of data management tasks in SPSS application.	**K1**
CO2	Perform data checking and create simple tables and charts.	**K2**
CO3	Perform database management tasks, descriptive statistics and graphics, and basic inferential statistics for comparisons and correlations	**K3**
CO4	Understand the basic workings of SPSS, and perform basic statistical analyses.	**K4**
CO5	Perform advanced analysis in SPSS	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**3**	**3**	**2**	**1**	**3**	**3**	**3**	**2**	**3**	**2.6**
CO2	**2**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**1**	**3**	**2.5**
CO3	**3**	**1**	**3**	**3**	**1**	**3**	**1**	**3**	**3**	**3**	**2.4**
CO4	**3**	**2**	**3**	**2**	**1**	**1**	**2**	**3**	**3**	**3**	**2.3**
CO5	**2**	**3**	**1**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**2.5**
Mean Overall Score											**2.46**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. V. Krishnan