

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited with 'B' Grade by NAAC
Pollachi-642001



SYLLABUS

B.Sc. COMPUTER SCIENCE WITH DATA ANALYTICS
BATCH 2022-2025

NGM COLLEGE

Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Vision

To prepare the next generation of practitioners and researchers for a data centric world and to achieve the academic excellence and research in the field of Data Science at the national and global levels.

Mission

- To develop professionals who are skilled in the area of Data science and analytics
- To impart quality and value-based education and contribute towards the innovation of Computing expert systems.
- To apply new advancements in high performance computing hardware and software

Program Educational Objectives (PEOs)	
The B.Sc. Computer Science with Data Analytics program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics
PEO2	Apply principles of Data Science to the analysis of business problem
PEO3	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
PEO4	To enhance communicative skill and inculcate the spirit through professional activities and to solve the complex problems in data analysis
PEO5	To embed human values and professional ethics in the young minds and contribute towards nation building

Programme Outcomes (POs)	
On successful completion of the B.Sc. Computer Science with Data Analytics	
PO1	Disciplinary knowledge: Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer-based systems of varying complexity.
PO2	Scientific reasoning/ Problem analysis: Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science with Data Analytics
PO3	Problem solving: Able to provide software solutions for complex Data Analysis problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations
PO4	Environment and sustainability: Understand the impact of software solutions in environmental and societal context and strive for sustainable development
PO5	Modern tool usage: Use contemporary techniques, skills and tools necessary for integrated solutions
PO6	Ethics: Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude.
PO7	Cooperation / Team Work: Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.
PO8	Communication Skills: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	Self-directed and Life-long Learning: Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology
PO10	Research: Enhance the research culture and uphold the scientific integrity and objectivity.

Program Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Computer Science with Data Analytics program, the students are expected to	
PSO1	Impart education with domain knowledge and key technologies in data science and business analytics like data mining, machine learning, No SQL, visualization techniques, predictive modeling, and statistics effectively and efficiently in par with the expected quality standards for Data analyst professional.
PSO2	Ability to apply the mathematical, technical and critical thinking skills in the discipline of Data analytics to find solutions for complex problems.

PEOs POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	H	H	L	L
PO2	H	H	H	L	L
PO3	H	H	H	H	L
PO4	L	M	M	M	L
PO5	M	M	M	H	M
PO6	L	L	M	H	L
PO7	M	M	M	H	M
PO8	L	L	L	H	M
PO9	M	M	M	H	L
PO10	M	M	M	M	L
PSO1	H	H	H	M	L
PSO2	H	H	H	H	M

III SEMESTER									
Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX. MARKS			Credits
			T	P			CIA	ESE	
I	22UTL303/ 22UHN303 22UFR303	Tamil Paper-II/ Hindi Paper-II/ French Paper-II	3		3	50	50	100	3
II	22UEN303	English Paper – II	3		3	50	50	100	3
III	22UDA308	Core V: Problem Solving using Python	5		3	50	50	100	4
	22UDA309	Core VI: Relational Database Management System	5		3	50	50	100	4
	22UDA3A1/ 22UDA3A2	Allied III: Introduction to Linear Algebra/ Applied Statistics	4		3	50	50	100	4
	22UDA310	Core Lab III: Programming Lab in Python		4	3	25	25	50	2
	22UDA311	Core Lab IV: RDBMS Lab		4	3	25	25	50	2
IV	22HEC303	Human Excellence: Professional Values& SKY Yoga Practice-3	1		2	25	25	50	1
	22UDA3N1/ 22UDA3N2	NME I: Web Designing using HTML and CSS/ Adobe Photoshop		1	2	-	50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
EC	22CMM302	Manaiyiyal Mahathuvam - II	15 Hrs Certificate course						
	22CUB302	Uzhavu Bharatham - II	15 Hrs Certificate course						
Total								700	25

IV SEMESTER									
Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX. MARKS			Credits
			T	P			CIA	ESE	
I	22UTL404/ 22UHN404 22UFR404	Tamil Paper-II/ Hindi Paper-II/ French Paper-II	3		3	50	50	100	3
II	22UEN404	English Paper – II	3		3	50	50	100	3
III	22UDA412	Core VII: R Programming in Data Science	4		3	50	50	100	4
	22UDA413	Core VIII: Data Mining	4		3	50	50	100	4
	22UDA4A1/ 22UDA4A2	Allied IV: Fundamentals of Cloud Computing/ Internet of Things	4		3	50	50	100	4
	22UDA414	Core Lab V Programming Lab in R		4	3	25	25	50	2
	22UDA415	Core Lab VI Data Mining Lab		4	3	25	25	50	2
	22UDA4S1/ 22UDA4S2	SEC I : Naan Mudhalvan Data Science Foundation/ Microsoft Office Fundamentals		2	2	-	50	50	2
IV	22HEC404	Human Excellence: Social Values& SKY Yoga Practice-4		1	2	25	25	50	1
	22UDA4N1/ 22UDA4N2	NME II: Data Analysis using Excel/ Office Automation Tools		1	2	-	50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)	50						1
EC		Online Course (MOOC - NPTEL/SWAYAM/Spoken Tutorial)							
	22CMM403	Manaiyiyal Mahathuvam – III	15 Hrs		Certificate course				
	22CUB403	Uzhavu Bharatham - III	15 Hrs		Certificate course				
	22UDA4VA	Value-Added Course II	30 Hrs						
Total								800	28

Question Paper Pattern (Based on Bloom's Taxonomy)

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory Examinations: 50 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define/Short Answer)	10 x 1 = 10	MCQ/Define	50
K3 (Q 11-15)	B (Either or pattern)	5 x 3 = 15	Short Answers	
K4 & K5 (Q 16 – 20)	C (Either or pattern)	5 x 5 = 25	Descriptive/ Detailed	

2. Theory Examinations: 50 Marks (Part IV : NME)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define/Short Answer)	10 x 1 = 10	MCQ Define	50
K3, K4 & K5 (Q 11-15)	B (Either or pattern)	5 x 8 = 40	Short Answers	

99999

3. Practical Examinations: 100/50 Marks

Knowledge Level	Criterion	External/Internal Marks	Total
K3	Record work & Practical	50/50	100
K4			
K5		25/25	50

Components of Continuous Assessment**THEORY****Maximum Marks: 100; CIA Mark: 50**

Components		Calculation	CIA Total
Test 1	$(50 / 3.33) = 15$	15+15+10+05+05	50
Test 2 / Model	$(50 / 3.33) = 15$		
Assignment / Digital Assignment	10		
Seminar / Socratic Seminar	05		
Group Task : GD, Role Play, APS	05		

Maximum Marks: 50; CIA Mark: 25

Components		Calculation	CIA Total
Test / Model	10	10+5+5+5	25
Assignment / Digital Assignment	5		
Seminar / Socratic Seminar	5		
Group Task : GD, Role Play, APS	5		

PRACTICAL**Maximum Marks: 50; CIA Mark: 25**

Components		Calculation	CIA Total
Test / Model	15	15+5+5	25
Observation Note	5		
Record	5		

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Test / Model	30	30+5+15	50
Observation Note	5		
Record	15		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Test / Model	60	60+10+30	100
Observation Note	10		
Record	30		

PROJECT

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Review I	10	10+10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Review I	20	20+20+20+40	100
Review II	20		
Review III	20		
Report Submission	40		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
5	4	2 - 3	0 - 1

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as interesting story in logical, easy to follow sequence	Information presented in logical sequence; easy to follow	Most of information presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of subject & References	Demonstrated full knowledge; answered all questions with elaboration & Material sufficient for clear understanding AND exceptionally presented	At ease; answered all questions but failed to elaborate & Material sufficient for clear understanding AND effectively presented	At ease with information; answered most questions & Material sufficient for clear understanding but not clearly presented	Does not have grasp of information; answered only rudimentary Questions & Material not clearly related to topic OR background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with audience	Refers to slides to make points; eye contact majority of time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms. Voice is clear and steady; audience can hear well at all times	Incorrectly pronounces few terms. Voice is clear with few fluctuations; audience can hear well most of the time	Incorrectly pronounces some terms. Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms. Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC**Grading Scale:**

A	B	C	D	F
09 - 10	07- 08	05 - 06	03 - 04	01 - 02

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and writing is interesting	Hits in basic content and writing is understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	<ul style="list-style-type: none"> * Word choice is rich and varies * Writing style is consistently strong * Students own formal language 	<ul style="list-style-type: none"> * Word choice is clear and reasonably precise * Writing language is appropriate to topic * Words convey intended message 	<ul style="list-style-type: none"> * Word choice is basic * Most writing language is appropriate to topic * Informal language 	<ul style="list-style-type: none"> * Word choice is vague * Writing language is not appropriate to topic * Message is unclear 	* Not adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timelines	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

Continuous Internal Assessment for Project / Internship

For Commerce, Management & Social Work Programme

The Final year Commerce, Management & Social Work students should undergo a project work during (V/VI) semester

- ❖ The period of study is for 4 weeks.
- ❖ Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- ❖ Students are divided into groups and each group is guided by a Mentor.
- ❖ The group should not exceed four students, also interested student can undergo individually.
- ❖ A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- ❖ Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- ❖ Project work constitutes 100 marks, out of which 50 is Internal and 50 is External Marks.

Mark Split UP

Internal	External	Total
50	50	100

S. No	Internal Components	Marks
1	Review - I	10
2	Review - II	10
3	Review - III	10
4	Rough Draft Submission	20
Total		50

S. No	External Components	Marks
1	Originality of Idea	05
2	Relevance to Current Trend	05
3	Candidate Involvement	05
4	Thesis Style / Language	05
5	Presentation of Report	10
6	Viva-Voce	20
Total		50

Continuous Internal Assessment for Project**For Computer Science Cluster****Maximum Marks: 50 Marks**

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	10	50
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	10	
III	Coding, Input forms, Output format, Testing OR Development, Testing	20	
IV	Preparation of Report & Submission	10	

External Assessment: 50 Marks

Mode of Evaluation	Marks	Total	Grand Total
Project Report			50
Title Relevance of the Industry/Institute	05	30	
Technology	05		
Design and development Publishing	10		
Testing, Report	10		
Viva Voce			
Project Presentation	10	20	
Q&A Performance	10		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents

The sequence in which the project report material should be arranged and bound as follows:

- Cover Page & Title Page
- Bonafide Certificates
- Declaration
- Acknowledgement
- Synopsis
- Table of Contents
- Chapters
- Appendix
- References

Format of Table of Contents

TABLE OF CONTENTS

Chapter No.	Title	Page No.
i	Certificates	
ii	Declaration	
iii	Acknowledgement	
iv	Synopsis	
1.	Introduction	
	1.1 Introduction	
	1.2 Objective of the Project	
	1.3 Company Profile	
	1.4 System Specification	
	1.4.1 Hardware Specification	
	1.4.2 Software Specification	
2.	System Study	
	2.1 Existing System	
	2.1.2 Drawbacks	
	2.2 Proposed System	
	2.3 Planning and Scheduling	
3	System Design	
	3.1 Overview of the Project	
	3.2 Modules of the Project	
	3.3 Input Design Format	
	3.4 Output Design	
	3.5 Table Design	
	3.6 Supporting Diagrams (ER/DFD/Use Case)	
4	Implementation and Testing	
	4.1 Coding Methods	
	4.2 Testing Approach	
	4.3 Implementation and Maintenance	
5	Project Evaluation	
	5.1 Project Outcome	
	5.2 Limitation of the Project	
	5.3 Further Scope of the Project	
6	Conclusion	
7	Appendix	
	7.1 Source Code	
	7.2 Screenshots and Reports	
8	References	

Size of the Project

The Project Report contents should be maximum of not exceeding 70 pages.

SEMESTER III

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA308			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	5	Core V: Problem Solving using Python	Semester:	III
					Credits: 4	4

Course Objective

- To know and understand the basics of Python programming.
- To able to understand the concepts of decision and control statements.
- To learn the concepts of functions and strings.
- To use Python data structures – lists, tuples and dictionaries.
- To learn the concept of object-oriented programming in Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Develop solutions to simple computational problems.	K1
CO2	Decompose a Python program into functions.	K2
CO3	Represent compound data using Python lists and tuples	K3
CO4	Representation of data using tuples, set and dictionaries	K4
CO5	Apply OOPs concepts in real-time Python applications.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	m	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	m	H	H
CO4	M	H	M	H	M	m	H	L	M	L	H	H
CO5	H	M	H	H	m	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction: History of Python – Executing Python Programs – Commenting in Python – Internal Working of Python - Python Character Set – Token – Python Core Data Type – print() Function – Assigning Values to Variables – Multiple Assignments – input() Function – eval() Function – Formatting Numbers and Strings – Python Inbuilt Functions - Decision and Loop Control Statements	14
Unit II	Functions: Introduction – Syntax and Basics of Function – Use of a Function – Parameters and Arguments in a Function – Local and Global Scope of a variable – return Statement – Recursive Functions – Lambda function. Strings: Introduction – str class – Basic Inbuilt Python Functions for String – Traversing String with for and while Loop – Immutable Strings – Various String Operations.	14
Unit III	Lists: Introduction – Creating Lists – Accessing the Elements of a List – Negative List Indices – List Slicing - List Slicing with Step Size – Python Inbuilt Functions for Lists – List Operator – List Comprehensions – List methods – List and Strings – Splitting a String in List – Passing and Returning List from a Function. Tuples : Creating Tuples - tuple() Function - Inbuilt Functions for Tuples - Indexing and Slicing - Operations on Tuples - Passing Variable Length Arguments to Tuples - Lists and Tuples - Sort Tuples - Traverse Tuples from a List - zip() Function - Inverse zip(*) Function	15
Unit IV	Sets: Creating Sets - Set in and not in Operator - Python Set Class - Set Operations. Dictionaries: Need of Dictionaries - Basics of Dictionaries - Creating a Dictionary - Adding and Replacing Values - Retrieving Values - Formatting Dictionaries - Deleting Items - Comparing Two Dictionaries - Methods of Dictionary Class - Traversing Dictionaries - Nested Dictionaries - Traversing Nested Dictionaries. File Handling: Introduction – Need of File Handling – Text Input and Output – seek() Function – Binary Files.	16
Unit V	Object-Oriented Programming: Class, Objects and Inheritance: Defining Classes – Self-parameter and Adding Methods to a Class – Display Class Attributes and Methods – Special Class Attributes – Accessibility – Constructor and Destructor Methods – Passing an Object as Parameter to a Method – Method Overloading – Operator Overloading – Inheritance – Types of Inheritance – Using super() – Method Overriding.	16
	Total Contact Hrs	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok Namdev Kamthane, Amit Ashok Kamthane,	Programming and Problem Solving with PYTHON	McGraw Hill Education (India) Private Limited,	First Edition, 2018.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Allen Downey, Jeffrey Elkner, Chris Meyers	How to Think like a Computer Scientist- Learning with Python	Dreamtech Press	Reprint Edition 2016.
2	Timothy A, Budd	Exploring Python	McGraw Hill Education India Private Limited	Tenth Reprint, 2017
3	Peter Norton et al.,	Beginning Python	Wiley & Dreamtech Press	2006
4	Al Sweigart,	Automate the Boring Stuff with Python: Practical Programming for Total Beginners	No Starch Press,	2nd Edition, 2019
5	Liang Y. Daniel	Introduction to Programming Using Python	Pearson Education	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics		
Course Code:	22UDA309			Title	Batch:	2022 – 2025	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	5	Core VI: Relational Data Base Management System	Semester:	III	
					Credits: 4	4	

Course Objective

- Gain a good understanding of the architecture and functioning of Database Management Systems
- Understand the use of Structured Query Language (SQL) and its syntax.
- Apply Normalization techniques to normalize a database.
- Understand the need of transaction processing and learn techniques for controlling the consequences of concurrent data access.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe basic concepts of database system	K1
CO2	Design a Data model and Schemas in RDBMS	K2
CO3	Competent in use of SQL	K3
CO4	Analyze functional dependencies for designing robust Database	K4
CO5	Applications using PL/SQL	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction to DBMS– Data and Information - Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages	14
Unit II	Relational Model: CODD’s Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.	14
Unit III	Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security	15
Unit IV	SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery	16
Unit V	PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.	16
	Total Contact Hrs	75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Sumathi, S. Esakkirajan,	Fundamentals of Relational Database Management System	Springer International Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abraham Silberchatz, Henry F. Korth, S. Sudarshan,	Database System Concepts	McGrawHill 7th Edition	2019
2	Alexis Leon & Mathews Leon	Fundamentals of DBMS	Vijay Nicole Publications 2nd Edition	2014
3	Ramez Elmasri and Shamkant B. Navathe,	Fundamentals of Database Systems	Pearson Education, Fifth Edition,	2008.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B. Sc Computer Science with Data Analytics	
Course Code:	22UDA3A1			Title	Batch:	2022 – 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Generic Elective Allied III: Introduction to Linear Algebra	Semester:	III
					Credits: 4	4

Course Objective

To introduce the computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, and vector spaces

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the concept/theory in linear algebra, to develop dynamic and graphical views to the related issues of the chosen topics as outlined in “course content,” and to formally prove theorems	K1
CO2	Recognize the basic applications of the chosen topics and their importance in the modern science	K2
CO3	Develop simple mathematical models, and apply basic linear algebra techniques learned from the chosen topics to solve simple problems	K3
CO4	Report and communicate effectively with others and present mathematical results in a logical and coherent fashion	K4
CO5	Appraise the power and beauty of mathematics, and solve problems independently and collaboratively as part of a team	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Elimination = Factorization: $A = LU$ – Transposes and Permutations	12
Unit II	Vector Spaces and Subspaces – Spaces of Vectors – The Null space of A : Solving $Ax = 0$ – The Rank and the Row Reduced Form – The complete solution to $Ax=b$ – Independence, Basis, and Dimensions – Dimensions of the four Subspaces – Orthogonality – Orthogonality of the Four Subspaces – Projections – Least Squares Approximations – Orthogonal Bases and Gram – Schmidt.	11
Unit III	Determinants – The Properties of Determinants – Permutations and Cofactors – Cramer's Rule, Inverse, and Volumes – Eigen values and Eigenvectors – Introduction to Eigen values – Diagonalizing a Matrix – Applications to Differential Equations – Symmetric Matrices – Positive Definite Matrices – Similar Matrices – The Singular Value Decomposition	13
Unit IV	Singular value Decomposition – Linear Transformations – The Idea of a Linear Transformation – The Matrix of a Linear Transformation – Change of Basis – Diagonalization and the Pseudo inverse.	11
Unit V	Complex Vectors and Complex Matrices – Complex Numbers – Hermitian and Unitary Matrices - The Fast Fourier Transform – Applications – Numerical Linear Algebra.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gilbert Strang	Introduction to Linear Algebra,	Wellesley – Cambridge Press, 5th Edition.	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.Lang	Introduction to Linear Algebra.	Springer.- Second Edition.	1997
2	Gilbert Strang	Linear Algebra and Its Applications.	Cengage Learning Fourth Edition.	2006
3	David C. Lay, Steven R. Lay, and Judi J. McDonald	Linear Algebra and Its Applications.	Pearson – 5th Edition.	2014

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Mr. Earnest Rajadurai	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc,			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	23UDA3A2			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	5	Generic Elective Allied III: Applied Statistics	Semester:	III
					Credits:	4

Course Objective

The course aims to

- Solve the past data related to a variable and to fit a suitable model.
- Highlight the important logic and methodology for calculation of various index numbers.
- Develop an understanding of Statistical Quality Control.
- Learn the various methods of sampling techniques.
- Develop the basic statistics using excel functions and data analysis tools.

COURSE OUTCOME

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of time series data and methods used to forecast the future.	K1
CO2	Understand the various statistical functions used to identify the processing product with in the control or not.	K2
CO3	Know the examined lots of products are free of defectives.	K3
CO4	Apply various sampling techniques in real life business problems.	K4
CO5	Execute the statistical functions and data analysis tools in excel.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	M	H	H	H	M	L	M	L	M	M	H	H
CO2	H	M	M	H	H	L	M	L	M	L	H	H
CO3	M	H	M	H	M	M	H	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	L	H	M
CO5	H	M	H	H	L	L	M	L	M	H	H	H

SYLLABUS

UNIT	CONTENT	No. of Hours
I	Sampling Techniques: Definition – Methods of sampling – Probability sampling: Simple random sampling (SRS) with and without replacement – Selection of SRS using lottery method and random number table method – Stratified random sampling – Systematic sampling and Clustering sampling. Non-probability sampling: Convenience sampling, Judgment sampling and Quota sampling – Sampling errors (Concepts only).	12
II	Time series - meaning uses and its components –Trend: Estimation of Trend – Moving average method and method of least square – Simple problems - Seasonal variations: Measuring seasonal variations - Simple average method only.	12
III	Index Numbers - Definition – Uses – Construction of Unweighted and weighted Index – Laspeyre's, Paasche's, Fisher's index numbers – Time reversal and factor reversal tests - Cost of living Index number - Simple problems.	10
IV	Theory of Statistical Quality Control (SQC) - Concept, uses, construction and interpretation of Mean, Range, p, np and C charts- Simple problems.	13
V	Statistics using Excel: Statistical functions – Measure of Central tendency: AVERAGE, AVERAGEA, MEDIAN, MODE. Measure of Dispersion: MIN, MAX, QUARTILE, VAR, VARP, STDEV, STDEVP, SKEW, Distributions: BINOMDIST, POISSON.DIST, NORMDIST, NORMINV. Time series: FORECAST TREND, SLOPE and INTERCEPT. Data Analysis using Excel: Descriptive Statistics – t-Test: Two-sample (equal and unequal variance) for mean, Paired two samples for mean, Z-test: Two-sample for means – ANOVA – Correlation – Regression – Moving average.	13

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.C. Gupta and V. K. Kapoor	Fundamental of Applied Statistics	Sultan Chand & Sons Publishers, New Delhi	2012
2	S.P. Gupta and M.P. Gupta	Business Statistics	Sultan Chand & Sons Publishers, New Delhi	2015
3	R.S.N. Pillai and Bhagavathi	Statistics Theory and Practice	Sultan Chand & Sons Publishers, New Delhi, 7 th Edition	2008
4	S.P. Gupta	Statistical Methods	Sultan Chand & Sons Publishers, New Delhi, 28 th Edition	2017
5	Ananthi Sheshasayee and Sheshayee	Computer Applications in Business and Management	Margam Publication	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Prem . S. Mann	Introductory Statistics	John Wiley & Sons	2007
2	Allan Bluman	Introductory Statistics. A step by step approach	McGraw-Hill Publication	2009

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
S. Earnest Rajadurai	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA310			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab III Programming Lab in Python	Semester:	III
					Credits:	2

Course Objective

- To know and understand the basics of Python programming.
- To able to understand the concepts of decision and control statements.
- To learn the concepts of functions and strings..
- To use Python data structures – lists, tuples and dictionaries.
- To learn the concept of object oriented programming in Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Knowledge of various python tools and python program execution	K3
CO2	Solve Problems using control structures, functions, list, tuples, dictionaries and file handling	K4
CO3	Solve problems using OOPs concept	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	m	H	L	M	H	H	L	H	H
CO3	M	M	M	H	M	H	M	M	M	m	H	H

Content	
<ol style="list-style-type: none"> 1. Write a Python program that displays the following information: Name, Address, Mobile number, College Name and Course 2. Write a Python program to find the largest of three numbers using if else and conditional operator 3. Develop a Python program to print the Employee pay slip using eval() function. 4. Write a Python program to find the difference between the ASCII code of the any lower case letter and its corresponding uppercase letter. 5. Write a Python program to demonstrate the uses of various python built-in functions. 6. Write a Python program to print the number of days in a month. 7. Read a distance in meter and a time in seconds through keyboard. Write a Python program to calculate the speed of a car in meter/second. 8. Implement the string operations using string slicing functions. 9. Write a Python program to strip unwanted character from a string. 10. Write a python program to find the product of two matrices 11. Write recursive functions for the factorial of positive integer 12. Write recursive functions to display prime number from 2 to n 13. Write a python program that writes a series of random numbers to a file from 1 to n and display 14. Consider the list with mixed type of elements, such as L1=[1,"x",4,6,90, "apple", „a", o,4]. Create another list using comprehension which consists of only the integer element present within the list L1. 15. Write a function reverse(Lst) to reverse the elements of a list. 16. Write a program to assign grades to students and display all the grades using keys() and get() method of a dictionary. 17. Write a python program to demonstrate the use of super(). Write a Python program to perform arithmetic operations on complex numbers using method overloading. 18. Write a program to add the content of a file numbers.txt and display the sum of all numbers present in a file. 19. Write a python program to make a simple calculator 20. Write a python program for Linear Search and Binary Search. 	
Total Hours 60	

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok Namdev Kamthane, Amit Ashok Kamthane,	Programming and Problem Solving with PYTHON	McGraw Hill Education (India) Private Limited,	First Edition, 2018.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Allen Downey, Jeffrey Elkner, Chrish Meyers	How to Think like a Computer Scientist- Learning with Python	Dreamtech Press	Reprint Edition 2016.
2	Timothy A, Budd	Exploring Python	McGraw Hill Education India Private Limited	Tenth Reprint, 2017
3	Peter Norton et al.,	Beginning Python	Wiley & Dreamtech Press	2006
4	Al Sweigart,	Automate the Boring Stuff with Python: Practical Programming for Total Beginners	, No Starch Press,	2nd Edition, 2019
5	Liang Y. Daniel	Introduction to Programming Using Python	Pearson Education	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA311			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core lab IV: RDBMS Lab	Semester:	III
					Credits: 4	4

Course Objective

- To understand the fundamentals of relational and object-oriented database systems
- To understand the techniques in developing databases for real time applications.
- To be familiar with PL/SQL commands.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Implement programs using object oriented database systems.	K3
CO2	Construct programs in PL/SQL with real time applications.	K4
CO3	Gain knowledge about PL/SQL commands.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
<ol style="list-style-type: none"> 1. Create a database and perform DDL commands create, alter, drop, rename and truncate. 2. Create a database. Write a query to create primary constraints with column level with naming convention. 3. Create a database. Write a query to create default and check constraints.

4. Use SQL commands to implement the concept of built in functions 5. Execute the date and string functions in SQL. 6. Create two tables named sales and orders. Combine the records in two tables using joins. 7. Write a query to update multiple records from students' table. 8. Implement PL/SQL program for EB calculation. 9. Implement the concept of recursive function 10. Use SQL Queries to manage views, Sequence and Synonyms 11. Implement the concept of packages using procedure and function 12. Design a PL/SQL to handle User Defined Exception 13. Create a cursor to select the five highest paid employees from the employee table. 14. Prepare an employee payroll of a company using Stored Functions. 15. Implement Trigger for student data.
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Sumathi, S. Esakkirajan,	Fundamentals of Relational Database Management System	Springer International Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Abraham Silberchatz, Henry F. Korth, S. Sudarshan,	Database System Concepts	McGrawHill 7th Edition	2019
2	Alexis Leon & Mathews Leon	Fundamentals of DBMS	Vijay Nicole Publications 2nd Edition	2014
3	Ramez Elmasri and Shamkant B. Navathe,	Fundamentals of Database Systems	Pearson Education, Fifth Edition,	2008.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA3N1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.	15	NME I: Web Designing using HTML and CSS	Semester:	III
					Credits: 4	2

Course Objective

The objective of this course is to make the students to gain the practical knowledge of HTML and CSS. This will help the students to develop effective Web pages of their own.

COURSE OUTCOME

On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the heading levels, ordered and unordered levels within a web page	K1
CO2	Understand the concept of inserting a graphics and creation of link in a web page	K2
CO3	Creating a table in a web page	K3
CO4	Understanding the concept of Frames and Forms	K4
CO5	Creation of a web page using Cascading Style Sheet	K5

Content
<ol style="list-style-type: none"> 1. Program to describe various text formatting commands. 2. Program to create an Unordered list. 3. Program to create an Ordered list. 4. Program to create a Table. 5. Program to create a Hyper link. 6. Program to insert an image to Web page and to implement Marquee tag. 7. Program to implement Audio and Video Element.

8. Program to divide a web page into Frames.
9. Program to create a form in HTML
10. Program to create a form in HTML and display the data in the same window
11. Program to implement External Style Sheet
12. Program to implement Internal Style Sheet
13. Program to implement Inline Style Sheet
Total Hours 15 Hrs

References

1. <https://www.w3schools.com/html/>
2. <https://www.programiz.com/html/form>
3. <https://www.geeksforgeeks.org/>
4. <https://www.javatpoint.com/html-form>
5. <https://www.tutorialspoint.com/html/>
6. <https://www.makeitsimple.co.in/>

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA3N2			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.	15	NME I: Adobe Photoshop	Semester:	III
					Credits: 4	2

COURSE OBJECTIVE

The objective of this course is to make the students to gain a working knowledge of Photoshop and develop their skills in editing and altering photographs for through a basic understanding of the tool bar, layers, and the adjustments panel.

COURSE OUTCOME

On completion of the course, students should be able to

Course Outcomes (CO)

CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO3	To access the new tools for designing multi-layered applications.	K1
CO4	To Create simple shapes by applying shape tweens and motion tweens.	K2
CO5	To Identify the basic tools and components of multimedia components.	K5

Content
<ol style="list-style-type: none"> 1. Understanding of Image Menu using Photoshop 2. Reduce Picture Size and Replace color using Photoshop 3. Make a simple book cover by using basic functionalities using Photoshop 4. Transfer an object from one image to another and erase background using Photoshop 5. Add a pattern as background using Photoshop 6. Create India Map using Photoshop

7. Retouching photos using Photoshop 8. Take a logo and modify it using Photoshop 9. Alter an image using filters using Photoshop 10. Special Effects-Color in black and white image using Photoshop 11. Special Effects-Feathered Portraits (Soft fade) using Photoshop 12. Poster Designing for an event
Total Hours 15 Hrs

References

1. <https://www.w3schools.com/html/>
2. <https://www.programiz.com/html/form>
3. <https://www.geeksforgeeks.org/>
4. <https://www.javatpoint.com/html-form>
5. <https://www.tutorialspoint.com/html/>
6. <https://www.makeitsimple.co.in/>

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Ms. Sivakamisundareswari	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

SEMESTER IV

Programme Code:	B.Sc			Programme Title:	B. Sc Computer Science with Data Analytics	
Course Code:	22UDA412			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	5	Core VII: R Programming for Data Science	Semester:	IV
					Credits: 4	3

Course Objective

To enable the students to gain basic knowledge about R.

- To understand getting data in R.
- To enable the students to understand about objects and date and time functions.
- To facilitate the students to have knowledge on control structures and functions.
- To smooth the progress of learning debugging and simulation.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the knowledge of R concepts.	K1
CO2	To understand how to read the larger datasets in R.	K2
CO3	To get knowledge on managing data frames.	K3
CO4	Analyze and understand the control structures and functions.	K4
CO5	Investigate debugging and loop functions in R.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	<p>Overview of R: R Introduction - S Introduction – S Philosophy – Back to R - Basic Features of R – Free software - Design of the R system - Limitations of R - R Resources.</p> <p>R Nuts and Bolts: Entering Input-Evaluation - R Objects – Numbers – Attributes - Creating vectors – Lists - Mixing objects - Explicit coercion - Matrices - Lists - Factors - Missing Values - Data frames - Names.</p>	12
Unit II	<p>Getting Data in and out of R: Reading and Writing Data – Reading Data Files with read.table() - Reading in Larger Datasets with read.table - Calculating Memory Requirements for R Objects - Using the readr package.</p> <p>Using Textual and Binary Formats for Storing Data: Using dput() and dump() - Binary Formats.</p> <p>Interfaces to the Outside World: File Connections - Reading Lines of a Text File - Reading From a URL Connection.</p>	11
Unit III	<p>Subsetting R Objects: Subsetting a Vector - Subsetting a Matrix - Subsetting Lists - Subsetting Nested Elements of a List – Extracting Multiple Elements of a List - Partial Matching - Removing NA Values.</p> <p>Vectorized Operations: Vectorized Matrix Operations.</p> <p>Dates and Times : Dates in R - Times in R - Operations on Dates and Times.</p> <p>Managing Data Frames with the dplyr package: Data Frames – The dplyr Package - dplyr Grammar - Installing the dplyr package -select, filter(), arrange(), rename(), mutate() – CONTENTS - group_by() ,%>% .</p>	13
Unit IV	<p>Control Structures: if-else - for Loops - Nested for loops – while Loops - Repeat Loops - next, break.</p> <p>Functions: Functions in R - Your First Function - Argument Matching - Lazy Evaluation - The ... Argument - Arguments Coming After the Argument.</p> <p>Scoping Rules of R: A Diversion on Binding Values to Symbol - Scoping Rules - Lexical Scoping: Why Does It Matter? - Lexical vs. Dynamic Scoping - Application: Optimization - Plotting the Likelihood.</p>	11
Unit V	<p>Loop Functions: Looping on the Command Line - lapply() - sapply() - split() - Splitting a Data Frame - tapply - apply() - Col/Row Sums and Means - Other Ways to Apply - mapply() – CONTENTS – Vectorizing a Function.</p> <p>Debugging: Something's Wrong! - Figuring Out What's Wrong - Debugging Tools in R - Using traceback() - Using debug() – Using recover().</p> <p>Profiling R Code: Using system.time() - Timing Longer Expressions - The R Profiler - Using summaryRprof().</p> <p>Simulation-Generating Random Numbers - Setting the random number seed - Simulating a Linear Model -Random Sampling.</p>	13
	Total Contact 60 Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger D. Peng	R Programming for Data Science	Lean pub publishers	2015.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jared P.Lander ,	R for Everyone – Advanced Analytics and Graphics	Addison Wesley Data & Analytics Series	Reprint 2016.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA413			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Core VIII: Data Mining	Semester:	IV
					Credits:	3

Course Objective

To enable the students to gain the knowledge about Data Mining

- To understand the Basics of Data mining.
- To learn how to use association rule in data mining.
- To learn efficient clustering techniques.
- To understand the concepts of decision trees.
- To know the scope of temporal and spatial data mining..

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Apply the knowledge data mining to mine the data.	K1
CO2	Analyze the complexity and correctness of the association rule.	K2
CO3	Choose the appropriate clustering algorithm for a specified application.	K3
CO4	Apply and implement decision tree design techniques.	K4
CO5	Apply temporal and spatial data mining.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	DATA MINING: Introduction- Data mining - Data mining definitions-KDD Vs Data mining-DBMS Vs Data mining-Other related areas-DM Techniques-Other mining problems-Issues and challenges in DM-DM Application areas.	12
Unit II	ASSOCIATION RULE: Introduction - Methods to discover Association rules- APriori Algorithm-Partition Algorithm-Pincer- Search Algorithm - Dynamic Item set Counting Algorithm-FP tree Growth algorithm - Eclat and dEclat-Rapid association rule mining-Incremental algorithm-Border algorithm-Generalized Association Rule.	11
Unit III	CLUSTERING: Introduction-Clustering paradigms-Partitioning Algorithms-A-Medoid Algorithms - CLARA – CLARANS – Hierarchical clustering – DBSAN – BIRCH – CURE - Categorical clustering Algorithms – STIRR – ROCK - CACTUS.	13
Unit IV	DECISION TREES: Decision tree – introduction -Tree construction principle-Best split-Splitting Indices-Splitting criteria-Decision tree constructing algorithms-CART-ID3-C4.5- CHAID.	11
Unit V	TEMPORAL AND SPATIAL DATA MINING: Introduction of temporal data mining – temporal association rules – sequence mining. Spatial Mining: Spatial Mining tasks – Spatial Clustering – Spatial Trends.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arun K. Pujari	Data mining Techniques	Universities Press, Second Edition,	2010.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J. Han, M. Kamber	Data Mining: Concepts and Techniques	Harcourt India / Morgan Kauffman	2011

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA4A1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	.	Allied IV: Fundamentals of Cloud Computing	Semester:	IV
					Credits: 4	4

Course Objective

To enable the students to gain the knowledge about Internet of Things

- Understand the cloud computing architectures, applications and challenges.
- Know how the data is stored in the cloud and the various services offered by the cloud.
- Develop the skills in Web Application Development using cloud technologies

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic knowledge on virtualization	K1
CO2	Understand the concept of cloud computing services and its business value	K2
CO3	Analyze various web based applications for collaborating everyone in cloud computing	K3
CO4	Assess various industrial platforms for the developments	K4
CO5	Analyze on cloud mobility and governance.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Introduction – Essentials – Benefits – Why cloud – Business and IT perspective – cloud and virtualization – cloud service requirements – dynamic cloud infrastructure – cloud computing characteristics – cloud adoption – cloud rudiments. Cloud deployment models: introduction – cloud characteristics – measured service accounting – cloud deployment models – security in a public cloud – public versus private clouds – cloud infrastructure self-service	12
Unit II	Cloud as a service: introduction – gamut of cloud solutions – principal technologies- cloud strategy – cloud design and implementation using SOA – conceptual cloud model – cloud service defined. Cloud solutions: introduction – cloud ecosystem – cloud business process management – cloud service management – on premise cloud orchestration and provisioning engine – computing on demand.	11
Unit III	Cloud offerings: Introduction – introduction storage, retrieval archive and protection-cloud analytics – testing under cloud – information security – virtual desktop infrastructure-storage cloud. Cloud Management: Introduction – resiliency – provisioning – asset management-cloud governance – high availability and disaster recovery – charging models – usage reporting, and metering. Cloud Virtualization Technology: Introduction – virtualization demand – virtualization benefits – server virtualization – virtualization for x86 architecture – hypervisor management software – virtual infrastructure requirements.	13
Unit IV	Cloud Infrastructure: Introduction – storage virtualization – storage area networks-network attached storage – cloud server virtualization – networking essential to the cloud. Cloud and SOA: Introduction – SOA Journey to Infrastructure – SOA and the cloud – SOA Defined – SOA and infrastructure as a service – SOA based cloud infrastructure steps – SOA Business and IT services	11
Unit V	Cloud Mobility: Introduction – the business problem – mobile enterprise application platforms – mobile application architecture overview. Cloud Governance: Introduction – service level agreement and compliance – data privacy and protection risks – enterprise governance – risk management – third party management – information management.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr. Kumar Saurabh	Cloud Computing- Unleashing Next Gen Infrastructure to Application	Wiley India Pvt Ltd, 3rd Edition	2014
2	Rajkumar Buyya, James Broberg, Andrzej Goscinski	Cloud computing principles and paradigms	Wiley India	2014.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Michael Miller	Cloud computing web-based application that change the way you work & collaborate online	Pearson Education	2013
2	Kris Jamsa	Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business	Jones & Bartlett Publishers	2013

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. E. Rama Devi	Dr. E. Rama Devi	Mr. K. Srinivasan	Dr. R . ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA4A2			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	.	Allied IV: Internet of Things	Semester:	IV
					Credits: 4	4

Course Objective

To enable the students to gain the knowledge about Internet of Things

- To learn about various IOT-related protocols.
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT.
- To develop IoT infrastructure for popular applications.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding the concept of IoT.	K1
CO2	Analyze various protocols for IoT..	K2
CO3	Design a PoC of an IoT system using Raspberry Pi/Arduino.	K3
CO4	Apply data analytics and use cloud offerings related to IoT.	K4
CO5	Analyze applications of IoT in real time scenario.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Fundamentals of IOT: Genesis of IOT – IOT and Digitization – IOT Impact. Comparing IOT Architectures: The oneM2M IoT Standardized Architecture – The IoT World Forum (IoTWF) Standardized Architecture - A Simplified IoT Architecture - The Core IoT Functional Stack - IoT Data Management and Compute Stack - Sensors, Actuators, and Smart Objects.	12
Unit II	IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e and LORA WAN. IP as the IoT Network Layer: The Need for Optimization - Optimizing IP for IoT. Application Protocols for IoT: The Transport Layer - IoT Application Transport Methods and Protocols.	11
Unit III	Data and Analytics for IOT: An Introduction to Data Analytics for IoT - Machine Learning - Big Data Analytics Tools and Technology - Edge Streaming Analytics - Network Analytics.	13
Unit IV	Securing IoT: A Brief History of IoT Security - Common Challenges in IoT Security - IoT Security Practices and Systems - Formal Risk Analysis Structures: OCTAVE and FAIR.	11
Unit V	Case Studies/ Industrial Applications: Manufacturing: An Introduction to Connected Manufacturing - Architecture for the Connected Factory. Utilities: An Introduction to the Power Utility Industry – The GridBlocks Reference Model. Smart and Connected Cities: Smart City Use-Case Examples: Street Lighting Architecture - Smart Parking - Smart Parking Architecture - Smart Traffic Control Architecture.	13
	Total Contact Hrs	60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things	Cisco Press	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga, Vijay Madisetti	Internet of Things – A hands-on approach	Universities Press	2015
2	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things – Key applications and Protocols	Wiley Publications	2012.

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Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA414			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	60	Core Lab III Programming Lab in R	Semester:	III
		.			Credits:	2

Course Objective

- Gain knowledge in basics of R
- To understand and trace the execution in R
- Understand and customize graphs
- To make students to develop applications using R

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics in R programming in terms of constructs, control statements, string functions	K3
CO2	Implement data frames and lists.	K4
CO3	Design applications in R using File concept.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
<ol style="list-style-type: none"> 1. Implement R Expressions and Data Structures 2. Implement any 10 built in functions in R. 3. Create and manipulate vector in R 4. Create and manipulate Matrix in R.

5. Create Factors and Implement Operations on Factors. 6. Implement operations on Data Frames. 7. Implement operations on Lists. 8. Working with looping statements. 9. Implement Plot function in R to customize Graphs. 10. Implement 3D Plot in R to customize Graphs. 11. (a) Read data from a text file saved on hard disk (b) Read data from a comma separated file (c) Read data from the Excel file (d) Read data right from internet 12. Working on sample data set
Total Hours 75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Roger D. Peng	R Programming for Data Science	Lean pub publishers	2015.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jared P.Lander ,	R for Everyone – Advanced Analytics and Graphics	Addison Wesley Data & Analytics Series	Reprint 2016.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA415			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab VI Data Mining Lab	Semester:	III
					Credits:	2

Course Objective

- To learn fundamental of data mining.
- Designed to exercise the data mining techniques such as
- classification, clustering.
- Demonstrate various mining algorithms on real world data.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn to execute data mining tasks using a data mining toolkit (such as WEKA) and visualize the results.	K3
CO2	Demonstrate the working of algorithms for data mining tasks such association classification.	K4
CO3	Apply various clustering algorithms on the given data set.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content
<ol style="list-style-type: none"> 1. Demonstrate Categorical (or nominal) attributes and the real-valued attributes. 2. Create an Student Table with the help of Data Mining Tool WEKA. 3. Apply Pre-Processing techniques to the training data set of Student Table. 4. Perform the statistical analysis of data

5. Demonstration of association rule mining using APriori algorithm on supermarket data. 6. Perform the classification by decision tree induction. 7. Create a Decision Tree, train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. 8. Load the sample dataset and run the ID3 classification algorithm. 9. Perform the cluster analysis by k-means method using R. 10. Perform the hierarchical clustering using R. 11. Implement Regression Analysis using R. 12. Implement Outlier detection using R.
Total Hours 75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Arun K. Pujari	Data mining Techniques	Universities Press, Second Edition,	2010.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J. Han, M. Kamber	Data Mining: Concepts and Techniques	Harcourt India / Morgan Kauffman	2011

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA4S1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	SEC I: Data Science Foundation	Semester:	III
					Credits:	2

Course Objective

To enable the students to gain the knowledge about the Data Science

- * To understand the data science fundamentals and process.
- * To learn to describe the data for the data science process.
- * To learn to describe the relationship between data.
- * To utilize the Python libraries for Data Wrangling.
- * To present and interpret data using visualization libraries in Python

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the data science process	K1
CO2	Steps of Data Science process	K2
CO3	NumPy process for numerical computation	K3
CO4	Use the Python Libraries for Data Wrangling	K4
CO5	Apply visualization Libraries in Python to interpret and explore data	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	M	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H
CO4	M	H	M	H	M	L	H	L	M	M	H	H
CO5	H	M	H	H	M	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – Retrieving data	6
Unit II	Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications	6
Unit III	Data Types in Python - Basics of Numpy arrays –Computation on NumPy arrays: Universal Functions - Aggregations –Computations on arrays – Comparisons, masks, boolean logic	6
Unit IV	Data manipulation with Pandas – Panda Objects - Data indexing and selection – operating on data – missing data	6
Unit V	Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms	6
	Total Contact Hrs	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Cielen, Arno D. B. Meysman, and Mohamed Ali	Introducing Data Science	Manning Publications	2016
2	Jake VanderPla	Python Data Science Handbook	O'Reilly,	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert S. Witte and John S. Witte	Statistics	Wiley Publications	2017
2	Allen B. Downey	Think Stats: Exploratory Data Analysis in Python	Green Tea Press	2014.

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA4S2			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	SEC I: Microsoft Office Fundamentals	Semester:	III
					Credits:	2

Course Objective

Getting an insight knowledge on Ms-word, Ms-excel, and Power point.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge of various text formats and creating customers list using mail merge for sending letters to the respondents at a time.	K3
CO2	Aware and apply various statistical tools available in Ms-excel for all applications	K4
CO3	To gain knowledge making effective presentation using power point presentation.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content	
	<ol style="list-style-type: none"> 1. Create a document and apply different formatting options 2. Design a Greeting card using Word Art for different festivals 3. Create your Bio data and use page borders and shadings 4. Create a document and insert header and footer, page title etc. 5. To create a document, set the margins, orientation, size, Column water mark, page color and page borders 6. Insert a table into the document 7. Write a program to implement mail merge 7. Prepare a mark sheet of your class subjects 8. Apply the creating, editing, saving, printing, securing & protecting operations to an excel spreadsheets 9. Prepare a bar chart and pie chart for analysis of five year results of your institute 10. Prepare an Attendance sheet of 10 students for any subjects of your Syllabus. Calculate their total attendance, total percentage of attendance of each student and average of attendance 11. Apply themes and layouts to power point slides and insert pictures, graphics, shapes and tables into presentation 12. Create a company advertisement using power point presentation
Total Hours 30 Hrs	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. S. Srivastava	MS Office	Lakshmi Publications	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dave Jaworski	Microsoft Secrets	Morgan James Publishing	2017

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc			Programme Title:	B.Sc Computer Science with Data Analytics	
Course Code:	22UDA4N1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.	15	NME II: Data Analysis using Excel	Semester:	III
					Credits: 4	2

Course Objective

This course was designed for the intermediate student who has already mastered the basic skills and wants to gain more advanced skills to put to work in a business environment or for personal use.

Course Outcomes (CO)

CO1	To apply the different type of tools available in Photoshop to create simple applications.	K3
CO2	To interpret programs using various filters in Photoshop	K4
CO3	To access the new tools for designing multi-layered applications.	K1
CO4	To Create simple shapes by applying shape tweens and motion tweens.	K2
CO5	To Identify the basic tools and components of multimedia components.	K5

Contents	Hrs
<ol style="list-style-type: none"> 1. In a new worksheet, create a table and insert information of student details. Use features of Format Menu. 2. Create employee table and calculate the salary. Use mathematical functions for the worksheet. 3. Create own templates in Excel. 4. Create and use data validation rules. 5. Create, manage, and format pivot tables and pivot charts. 6. Create a data and use sumif and countif formulas 7. Create and write complex formulas. 8. Create and use IF statements. 9. Apply custom and prebuilt conditional formatting. 10. Work with functions to manipulate strings of text and data. 11. Create charts in excel 12. Create a data and using that data perform Match and index 13. Create a data and using that data perform Vlookup concept 	15 Hrs

Reference:

<https://www.w3schools.com/EXCEL/index.php>

<https://www.tutorialspoint.com/excel/index.htm>

<https://www.geeksforgeeks.org/introduction-to-ms-excel/>

<https://www.javatpoint.com/excel-tutorial>

<https://www.simplilearn.com/learn-ms-excel-free-training-course-skillup>

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	BSc Computer Science with Data Analytics	
Course Code:	22UDA4N2			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	NME II: Office Automation Tools	Semester:	III
					Credits:	2

Course Objective

Getting an insight knowledge on Ms-word, Ms-excel, and Power point.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To gain knowledge of various text formats and creating customers list using mail merge for sending letters to the respondents at a time.	K3
CO2	Aware and apply various statistical tools available in Ms-excel for all applications	K4
CO3	To gain knowledge making effective presentation using power point presentation.	K5

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	H
CO2	H	H	H	H	H	L	M	L	H	L	H	H
CO3	M	M	M	H	M	L	M	M	M	L	H	H

Content	
	<ol style="list-style-type: none"> 1. Create a document and apply different formatting options 2. Design a Greeting card using Word Art for different festivals 3. Create your Bio data and use page borders and shadings 4. Create a document and insert header and footer, page title etc. 5. To create a document, set the margins, orientation, size, Column water mark, page color and page borders 6. Insert a table into the document 7. Write a program to implement mail merge 7. Prepare a mark sheet of your class subjects 8. Apply the creating, editing, saving, printing, securing & protecting operations to an excel spreadsheets 9. Prepare a bar chart and pie chart for analysis of five year results of your institute 10. Prepare an Attendance sheet of 10 students for any subjects of your Syllabus. Calculate their total attendance, total percentage of attendance of each student and average of attendance 11. Apply themes and layouts to power point slides and insert pictures, graphics, shapes and tables into presentation 12. Create a company advertisement using power point presentation
Total Hours 30 Hrs	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. S. Srivastava	MS Office	Lakshmi Publications	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dave Jaworski	Microsoft Secrets	Morgan James Publishing	2017

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