

B.Sc., Data Science

LOCF SYLLABUS–2025-2026

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College have has moved to CBCS and implemented the grading system.

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses with in a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs):Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs):PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC) A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of other disciplines. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Ability Enhancement Compulsory Courses (AECC)

“AECC” are the courses based upon the content that leads to Knowledge enhancement especially in Communicative English and other soft skills.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses maybe chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Field Study/ Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc

Undergraduate Programme:

Programme Pattern : The Under Graduate degree programme consists of **FIVE** vital components.

They are as follows:

Part-I: Languages (Tamil/Hindi/French/Sanskrit)

Part- II : General English

Part-III: Core Course(Theory,Practical's,GenericElectivecourses,DisciplineSpecificElectivecourses, Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Ability Enhancement Compulsory Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part-V: Extension Activity, Gender Studies

EXAMINATION

Continuous Internal Assessment (CIA):

UG-Distribution of CIA Marks Passing Minimum: 40%

Assignments-3=30%

Tests- 2=50%

Seminar=10% Attendance=10%

Question Paper Pattern Part A:

Part A1 (10X1=10 marks)

One word question/Fill in/True or False/Multiple Choice Questions Two Questions from Each unit

Part A2 (5X2=10 marks)

Match the following/Short Answers One question from Each unit

TotalMarks-20

Part B: (5X5=25marks) Paragraph Answers

Either/or type, One Questions from each unit

Part C: (10X3=30)

Essay Type Answers

Answer 3out of5 Questions One Question from each unit

Part A: K1 Level

Part B: K2, K3 and K4 Level

Part C: K5and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S.No.	Level	Parameter	Description
1	K1	Knowledge/ Remembering	It is the ability to remember the previously Learned
2	K2	Comprehension/ Understanding	The learner explain side as or concepts
3	K3	Application/ Applying	The learner uses information in a new way
4	K4	Analysis/ Analyzing	The learner distinguishes among different parts
5	K5	Evaluation/ Evaluating	The learner justifies a stand or decision
6	K6	Synthesis/ Creating	The learner creates a new product or point of view

WEIGHTAGE of K-LEVELS IN QUESTION PAPER

(Cognitive Level) K-LEVELS	Lower Order Thinking		Higher Order Thinking		Lower Order Thinking
	K1	K2	K1	K2	
END SEMESTER EXAMINATIONS(E SE)	20	25			25
Continuous Internal Assessment (CIA)	20	25			25

**QUESTION PATTERN FOR SEMESTER EXAMINATION/
Continuous Internal Assessment**

PART	MAR KS
PART–AI. (No choice , One Mark) TWO questions from each unit 10x1=10)	20
II. (No choice, Two Mark) ONE question from each unit (5x2=10)	
PART–B (Either/or type,5-Marks) ONE questions from each unit (5x5 =25)	25
PART–C (3 out of 5)(10 Marks) ONE question from each unit (3x10=30)	30
Total	75

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION
DURATION:3.00Hours.MaxMark:100

K-LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
PART							
PART–A (One Mark, No choice)(10x1=10)	10						10
(2-Marks,Nochoice) (10x2=20)	10						10
PART–B (5-Marks)(Either/or type)(5x5=25)		5	10	10			25
PART -C (10 Marks)(3 out of 5)(3x10=30) Courses having only K5,K6 levels, K5 level- 3 Questions, K6 level- 2 Questions (One K6 level question is compulsory)					20	10	30
Total	20	05	10	10	20	10	75

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$\text{GPA} = \frac{\sum_{i=1}^N C_i G_i}{\sum_{i=1}^N C_i}$	$\text{WAM(Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course I and N is the number of Courses Passed in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester on the current semester.

CLASSIFICATION OF FINAL RESULTS:

- For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
- Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses-UG

Marks Range	Grade Point	Corresponding Grade
90andabove	10	O
80andaboveandbelow 90	9	A+
70andaboveandbelow 80	8	A
60andaboveandbelow 70	7	B+
50andaboveandbelow 60	6	B
40andaboveandbelow 50	5	C
Below40	0	RA

Table-2: Grading of the Courses-PG

Marks Range	Grade Point	Corresponding Grade
90andabove	10	O
80andaboveandbelow 90	9	A+
70andaboveandbelow 80	8	A
60andaboveandbelow 70	7	B+
50andaboveandbelow 60	6	B
Below50	0	RA

Table-3: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00andabove	O	Outstanding
8.00to8.99	A+	Excellent
7.00to7.99	A	Very Good
6.00to6.99	B+	Good
5.00to5.99	B	Above Average
4.00to4.99	C	Average
Below4.00	RA	Re-appearance

Vision

To Empower the women students by providing excellent software engineering skills to meet the global needs of IT industry

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Mission

- Providing quality education in computer science and its applications by updated knowledge through technology transfer
- Enhancing professional skills to satisfy the needs of the Software industries and Technical skills of the individual towards competitive world.

B.Sc., Data Science

SYLLABUS

PROGRAMME CODE: 3UGDAS



2025-2026

SENGAMALATHAYAARE EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC) (An ISO 9001:2015 Certified Institution)

**Sundarakkottai, Mannargudi-614016,
Thiruvarur (Dt.), Tamil Nadu, India.**

Programme Objectives:

- Graduates will have the analytical abilities necessary to apply the fundamental concepts they have learned in real-world scenarios.
- Graduates with improved knowledge and skills will be able to find employment, start their own businesses, or pursue further education.
- Graduates who have studied contemporary software technologies will be well- suited to contribute as data scientists.
- Graduates who read Allied articles will be able to understand the principles linked to data science.
- Graduates will be instilled with ethical principles and social concerns, to promote a peaceful society

Programme Outcomes:

PO No.	Program Outcomes (Upon completion of the B.Sc., Data Science Degree Program, the Undergraduate will be able to)
PO-1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of a range of computer applications, computer organization, techniques of Computer Networking, Software Engineering, Web development, Database management and Advance Java that form a part of an undergraduate programme of study.
PO-2	Critical thinking and Problem Solving: Think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations.
PO-3	Scientific reasoning: Analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO-4	Digital literacy and Effective Communication: Use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology.
PO-5	Individual and Team Work: Effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO-6	Multicultural Competence, Social Interaction and Effective Citizenship: Understand the Values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediated in agreements and help reach conclusions in group settings, and demonstrate empathetic social concern and equity centered national development.
PO-7	Moral and Ethical Awareness: Embrace moral/ethical values in conducting one's life, Formulate a position / argument about an ethical issue from multiple perspectives, and use ethical practices in all work.
PO-8	Environment and Sustainability: Understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-9	Human values and Gender Issues: Understand major ideas, values, beliefs, the nature of the individual and the relationship between self and the community and aware of the various issues concerning women and society.
PO-10	Self-directed and Life long learning: Acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes.

PSO. No.	PROGRAMME SPECIFIC OUTCOME Students will be able to
PSO1	Apply the concepts and practical knowledge in analysis, design and development of computing systems and applications to multi-disciplinary problems.
PSO2	To provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Data science with ethical values
PSO3	Develop Data Science professional to manage various IT controls in business organizations.
PSO4	Explore technical comprehension in varied areas of Data Science and experience a conducive environment in cultivating skills for thriving career and higher studies.
PSO5	Familiarity and practical competence with a broad range of programming language and open- source platforms



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(Affiliated to Bharathidasan University)

(Accredited by NAAC)

**SUNDARAKKOTTAI, MANNARGUDI-614016,
TAMILNADU, INDIA.**

Department of Computer Applications

B.Sc., Data Science

Course Structure under CBCS

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(For the candidates admitted in the academic year 2025-2026)

ELIGIBILITY: A passing 12th standard with Computer Science or Mathematics

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Ins. Hr/ Week	L	T	P	O	Credit	Exam Hours	Marks		Total
												Int.	Ext.	
I	I	Language Course-I	U25LC101	Podhu Tamil-I Tamil Elakkiya Varalaru-I	6	5	1	-	-	3	3	25	75	100
	II	English Course-I	U25ELC101	General English-I	6	5	1	-	-	3	3	25	75	100
	III	Core Course-I(CC)	U25DS101	Programming in C and Data Structures	5	4	1	-	-	5	3	25	75	100
		Core Practical-I(CP)	U25DS102P	Programming in C Lab	4	-	1	3	-	4	3	25	75	100
		Allied Course-I(AC)	U25AMT101	Optimization Techniques	3	3	-	-	-	2	3	25	75	100
		Allied Practical-I(AP)	U25AMT102P	Data Analytics Using Spread Sheets	2	-	-	2	-	-	-	-	-	-
	IV	Non Major Elective-I @ Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil languages was not studied in school Level (or) b) Special Tamil if Tamil language was studied upto 10th & 12 th std Those who choose NCC in Part V must choose NCC course as Non-Major Elective			2	2	-	-		2	3	25	75	100

		Foundation Course-FC	U25FCDS11	Fundamentals of Information Technology and Data Science	2	2	-	-	-	2	3	25	75	100
					30	21	4	5	-	21	-	-	-	700
II	I	Language Course-II	U25LC202	Podhu Tamil-II Tamil Elakkiya Varalaru – II	6	5	1	-	-	3	3	25	75	100
	II	English Course-II	U25ELC202	General English-II	6	5	1	-	-	3	3	25	75	100
	III	Core Course–II(CC)	U25DS203	Python Programming	5	4	1	-	-	5	3	25	75	100
		Core Practical–II(CP)	U25DS204P	Python Programming Lab	4	-	1	3	-	4	3	25	75	100
		Allied Course–II(AC)	U25AMT203	Algebra and Calculus	3	3	-	-	-	2	3	25	75	100
		Allied Practical-I(AP)	U25AMT102P	Data Analytics Using Spread Sheets	2	-	-	2	-	2	3	25	75	100
	IV	Non Major Elective-II @ Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil languages was not studied in school Level (or) b) Special Tamil if Tamil language was studied upto 10 th & 12 th std			2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course(SEC)- I	U25SEDS21	Office Automation	2	2	-	-	-	2	3	25	75	100
		TOTAL			30	21	4	5	-	23	-	-	-	800
III	I	Language Course–III	U25LC303	Podhu Tamil- III Tamizhaga Varalarum Panpadum	6	5	1	-	-	3	3	25	75	100
	II	English Course-III	U25ELC303	General English-III	6	5	1	-	-	3	3	25	75	100
	III	Core Course–III(CC)	U25DS305	Database Systems	4	3	1	-	-	4	3	25	75	100
		Core Practical- III (CP)	U25DS306P	Database Systems Lab	4	-	1	3	-	4	3	25	75	100
		Allied Course–III (AC)	U25AMT304	Statistics I	2	2	-	-	-	2	3	25	75	100

		Allied Practical(AP)- II	U25AMT305P	Statistics for Data Science Lab	2	-	-	2	-	-	-	-	-	-
	IV	Skill Enhancement Course(SEC)-II	U25SEDS32	Digital Principle and Computer Organizations	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course (SEC)-III	U25SEDS33	Data and Information Security	2	2	-	-	-	2	3	25	75	100
	V	Special Course	25UGSC	Health &Wellness	2	-	-	2	-	1	1	-	-	-
				TOTAL	30	19	4	7	-	21	-	-	-	700
IV	I	Language Course-IV	U25LC404	Podhu Tamil IV Tamizhum Ariviyalum	6	5	1	-	-	3	3	25	75	100
	II	English Course–IV	U25ELC404	General English IV	6	5	1	-	-	3	3	25	75	100
	III	Core Course-IV(CC)	U25DS407	Big Data Analytics with NoSQL Database	5	4	1	-	-	5	3	25	75	100
		Core Practical-IV (CP)	U25DS408P	Big Data Analytics Lab	4	-	1	3	-	4	3	25	75	100
		Allied Course–IV (AC)	U25AMT406	Statistics II	3	3	-	-	-	2	3	25	75	100
		Allied Practical-II (AP)	U25AMT305P	Statistics for Data Science Lab	2	-	-	2	-	2	3	25	75	100
	IV	Skill Enhancement Course(SEC)-IV	U25SEDS44	Computing Technologies for Data Science	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course (SEC)- V	U25SEDS45	Mobile Application Development	2	2	-	-	-	2	3	25	75	100
		TOTAL			30	21	4	5	-	23	-	-	-	800
V	III	Core Course-V(CC)		Data Mining and Data Warehousing	5	4	1	-	-	5	3	25	75	100
		Core Course–VI(CC)		Cyber Security	5	4	1	-	-	4	3	25	75	100
		Core Course–VII(CC)		Operating Systems	6	5	1	-	-	6	3	25	75	100
		Core Practical-V(CP)		Data Mining Lab	4	-	1	3	-	4	3	25	75	100

		Elective Course– I(Anyone)		Computer Networks /Data Exploration and Visualization/ Text and Speech Analysis	4	4	-	-	-	3	3	25	75	100
		Elective Course – II(Ar		Internet of Things/ Blockchain Technology/ Augmented Reality and Virtual Reality	4	4	-	-	-	3	3	25	75	100
	IV	Environmental Studies		Environmental Studies	2	2	-	-	-	2	3	25	75	100
		Internship/Industrial Visit/Field Visit			-	-	-	-	-	2	-	-	-	-
				TOTAL	30	23	4	3	-	28	-	-	-	700
VI	III	Core Course VIII(CC)		Machine Learning	6	5	1	-	-	4	3	25	75	100
		Core Practical-VI(CP)		Machine Learning Lab	6	1	-	-	-	4	3	25	75	100
		Core Project		Project with Viva-Voce/Group Project	5	-	5	-	-	5	3	25	75	100
		Elective Course-III(Anyone)		Distributed Computing/Cloud Computing/Grid Computing	4	3	1	-	-	3	3	25	75	100
		Elective Course– IV(Anyone)		Deep Learning/ Artificial Intelligence/ Computer Vision	4	3	1	-	-	3	3	25	75	100
	IV	Value Education		Value Education	2	2	-	-	-	2	3	25	75	100
		Professional Competency Course		E-Commerce	2	2	-	-	-	2	3	25	75	100
	V	Gender Studies		Gender Studies	1	1	-	-	-	1	3	25	75	100
		Extension Activities**			-	-	-	-	-	1	-	-	-	-
		TOTAL			30	17	8	-	-	25	-	-	-	800
				Value Added Course (Atleast one per year)	-	-	-	-	-	3*2	-	-	-	-
					180	-	-	-	-	141	-	-	-	4500

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	No. of Credits
1.	I	Language Courses	4	12
2.	II	English Courses	4	12
3.	III	Core Courses	8	37
4.		Core Practical	6	24
5.		Allied Courses I & II	4	8
6.		Allied Practical	2	4
7.		Elective Courses	4	12
8.		Project	1	5
9.	IV	Foundation Course	1	2
10.		Non-Major Elective Courses	2	4
11.		Skill Enhancement Courses	5	10
12.		Environmental Studies	1	2
13.		Value Education	1	2
14.		Internship/Industrial Visit/Field Visit	1	2
15.		Professional Competency Skill	1	2
16.	V	Gender Studies	1	1
17.		Extension Activities	1	1
18.		Special Course	1	1
	Total		48	141

NOTE:

S.NO.	PARTICULARS	CIA	ESE
1.	THEORY	25	75
2.	PRACTICAL	25	75
3. Separate passing minimum is prescribed for Internal and External marks			

NON-MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course Code	Course	Course Title
I	IV	U25NMEDS11	NME-I	Introduction to Operating Systems
II		U25NMEDS22	NME-II	Working Principles of Internet



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI-614016.

(For the Candidates admitted in the academic year 2025-2026)

DEPARTMENT OF COMPUTER APPLICATIONS

B.Sc., DATA SCIENCE

Semester: III-CC-III: Database Systems

Ins. Hrs./Week:4

Course Credit:4

Course Code:U25DS305

UNIT-I: Introduction

(12 Hours)

Databases and Database Users: Introduction - characteristics of data base approach – intended uses of a DBMS- advantages and implication of database approach. Database Systems Concepts and Architecture: Data models- schemas and instances- DBMS architecture and data independence- database languages and interfaces- database system environment- classification of database management systems.

UNIT-II: Data Modeling

(12 Hours)

Data Modeling :High level conceptual data models for database design- Entity types- entity sets- attributes and keys- Relationships- relationship types- roles and structural constraints - Weak entity types- ER diagrams and design issues.

UNIT-III: Relational Data Model

(12 Hours)

Relational Data Model and Relational Algebra: Brief discussion on CODD rules relational model concepts- constraints and schemas- Update operation on relations- basic and additional relational algebra operations- queries in relational algebra,

UNIT-IV: Structured Query Language

(12 Hours)

Structured Query Language (SQL): Data definition in SQL- Basic and complex queries- SQL Insert-delete- update statements and views in SQL- embedded SQL. Database Design: Design guidelines for relational schemas- functional Dependencies - normalization -1st, 2nd, 3rd, 4th and 5th normal forms Database design process- factors influencing physical database design guidelines and guidelines for relational systems.

UNIT-V: File Organization

(12 Hours)

Record Storage and Primary File Organizations: Secondary storage devices buffering of blocks- placing file records on disk- operations on files- heap files and sorted files – hashing techniques. Index Structure of Files: Single – level and multilevel ordered indexes- dynamic multi-level indexes using B-trees and B+ trees.

Total Lecture Hours-60

COURSE OUTCOMES

Upon successful completion of this course the students would be able to:

1. To understand the basic concepts of database systems
2. To understand the relational data model
3. To apply the concepts of database design
4. To design and create database with normalization
5. To analyze the storage and file organization concepts

TEXT BOOK(S):

1. Abraham Silberschatz, Hendry F. Korth, S Sudharshan,” Database System Concepts”, 6th Edition, McGraw Hill International, 2019.
2. Fundamentals of Database Systems Ramez Elmasri and Shamkant B. Navathe, 7th Edition (or latest available) Pearson Education.

REFERENCES BOOK(S)

1. Ramez Elmasri and ShamkanthB. Navathe, “Fundamentals of Database Systems”, Pearson Education, 5th Edition, 2008, ISBN: 978– 81– 317 – 1625-0.
2. Raghu Ramakrishnan, “Database Management System”, McGrawHill, Third Edition, 1997 ISBN:0071230572.
3. GaryW.Hansenand JamesV.Hansen, “DatabaseManagementandDesign”PHIPvt.Ltd.,2nd Edition, 1995N: 81-203-1465-4.
4. DateCJ,Kanna A, “Database Systems”, PearsonEducation, 8thEdition, 2006,ISBN: 978-81-775-8556-8.
5. Abraham Silberschatz, Hendry F. Korth, S Sudharshan,” Database System Concepts”, 6thEdition, McGraw Hill International, 2019..

WEB RESOURCES

- 1.<https://www.tutorialspoint.com/dbms/index.htm>
- 2.<https://www.w3schools.in/dbms/intro>
- 3.<https://www.w3schools.com/sql/>
- 4.<https://www.javatpoint.com/dbms-tutorial>
- 5.<https://www.geeksforgeeks.org/dbms/>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3									3	3	3		2
CO2		3	3								3	3	3		2
CO3		3				2		2			3	3			2
CO4		3						3						3	2
CO5	3														3

Strong-3 Medium-2 Low-1

**SENGAMALATHAYA A EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SUNDARAKKOTTAI, MANNARGUDI-614016.
(For the Candidates admitted in the academic year 2025-2026)
DEPARTMENT OF COMPUTER APPLICATIONS
B.Sc., DATA SCIENCE

Ins. Hrs./Week:4

Semester: III-CP-III: Database Systems Lab

Course Credit:4

Course Code: U25DS306P

List of Experiments

1. Write a query for basic concepts and the applications of database systems using MYSQL.
2. Write a query to perform basic operation with MYSQL.
3. Write a query for nested queries, set of aggregate operations and views.
4. Perform the following using SQL:
 - a. Viewing all databases,
 - b. Creating a Database,
 - c. Viewing all Tables in a Database.
5. Write a query for DDL statements: Creating Tables (With and Without Constraints)
 - a. Primary Key, Foreign Key,
 - b. Unique, Default
 - c. Null, Not null
 - d. Enable Constraints, Disable Constraints, Drop Constraints
6. Write a query for DML statements: Inserting/Updating/ Deleting Records in a Table.
7. TCL: Saving (Commit) and Undoing (rollback)
8. Perform the following:
 - a. Altering a Table,
 - b. Dropping a Table
 - c. Truncating a Table
 - d. Renaming a Table
 - e. Backing up/ Restoring a Database.
9. For a given set of relation schemes, create tables and perform the following
 - a. Simple Queries,
 - b. Simple Queries with Aggregate functions,
 - c. Queries with Aggregate functions (group by and having clause),
10. For a given set of relation schemes, create tables and perform the following
 - a. Queries involving – Date Functions
 - b. Queries involving – String Functions
 - c. Queries involving - Math Functions
11. Perform the following with creating necessary tables.
 - a. Join Queries-Inner Join
 - b. Outer Join
 - c. Sub queries
12. Perform the following with creating necessary tables
 - a. With IN clause
 - b. With EXISTS clause
13. For a given set of relation tables perform the following
 - a. Creating Views (with and without check option),
 - b. Dropping views,
 - c. Selecting from a view

Total Lab Hours: 60

COURSE OUTCOMES

Upon successful completion of this course the students would be able to:

1. To understand the basic concepts of database systems
2. To understand the relational data model.
3. To apply the concepts of database design.
4. To design and created at a base with normalization.
5. To analyze the storage and file organization concepts.

TEXT BOOK(S):

1. Abraham Silberschatz, Hendry F. Korth, S Sudharshan,” Database System Concepts”, 6th Edition, McGraw Hill International, 2019.
2. Fundamentals of Database Systems Ramez Elmasri and Shamkant B. Navathe, 7th Edition (or latest available) Pearson Education.

REFERENCES BOOK(S)

1. Ramez Elmasri and Shamkanth B.Navathe, “Fundamentals of Database Systems”,Pearson Education, Fifth Edition, 2008, ISBN: 978– 81– 317 – 1625-0.
2. Raghu Ramakrishnan, “Database Management System”,McGraw Hill, 3rd Edition,1997,ISBN: 0071230572.
3. Gary W.Hansenand JamesV. Hansen,“Database Management and Design” PHI Pvt.Ltd., Second Edition, 1995N: 81-203-1465-4.
4. Date CJ, Kanna A, “Database Systems”, Pearson Education, 8th Edition, 2006, ISBN: 978-81-775-8556-8.
5. Abraham Silberschatz, Hendry F. Korth, S Sudharshan,” Database System Concepts”, Sixth Edition, McGraw Hill International, 2019..

WEB RESOURCES

- 1.<https://www.tutorialspoint.com/dbms/index.htm>
- 2.<https://www.w3schools.in/dbms/intro>
- 3.<https://www.w3schools.com/sql/>
- 4.<https://www.javatpoint.com/dbms-tutorial>
- 5.<https://www.geeksforgeeks.org/dbms/>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3									3	3	3		2
CO2		3	3								3	3	3		2
CO3		3				2		2			3	3			2
CO4		3						3						3	2
CO5	3														3

Strong-3 Medium-2 Low-1



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI-614016.

(For the Candidates admitted in the academic year 2025-2026)

DEPARTMENT OF COMPUTER APPLICATIONS

B.Sc., DATA SCIENCE

Semester: III-SEC-II: Digital Principle and Computer Organizations

Ins. Hrs./Week:2

Course Credit:2

Course Code:U25SEDS32

UNIT-I: Combinational Logic

(6 Hours)

Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers – Demultiplexers.

UNIT-II: Synchronous Sequential Logic

(6 Hours)

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.

UNIT-III: Computer Fundamentals

(6 Hours)

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

UNIT-IV: Processor

(6 Hours)

Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Micro programmed Control – Pipelining – Data Hazard – Control Hazards

UNIT-V: Memory and I/O

(6 Hours)

Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA

Total Lecture Hours: 30

COURSE OUTCOMES

Upon completion of the course the students would be able to

1. To design various combinational digital circuits using logic gates.
2. To design sequential circuits and analyze the design procedures.
3. To state the fundamentals of computer systems and analyze the execution of an instruction.
4. To analyze different types of control design and identify hazards.
5. To identify the characteristics of various memory systems and I/O communication

TEXTBOOK(S)

1. M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.
2. David A .Patterson, JohnL. Hennessy, "Computer Organization and Design, The Hardware Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2021.

REFERENCE BOOK(S)

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.
2. William Stallings, "Computer Organization and Architecture—Designing for Performance", Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.
4. Digital Principles And Computer Organization by Dr. K. Muralibabu, Dr. L. Agilandeeshwari from Suchitra Publications.
5. "Computer Organization and Design, The Hardware/ Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

WEBRESOURCES

1. <https://alison.com/course/introduction-to-c-plus-plus-programming>
2. <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>
3. https://www.w3schools.com/cpp/cpp_oop.asp
4. https://www.w3schools.com/cpp/cpp_intro.asp
5. https://www.w3schools.com/cpp/cpp_oop.asp

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
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CO2		3	3					3		3	3	3	3		
CO3		2	3			2		3		3	3	3			
CO4		2	3					3		3				3	
CO5			3					3		3					3

Strong-3 Medium-2 Low-1



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI 614016.

(For the Candidates admitted in the academic year 2025-2026)

DEPARTMENT OF COMPUTER APPLICATIONS

B.Sc., DATA SCIENCE

Semester: III-SEC-III: Data and Information Security

Ins. Hrs./Week:2

Course Credit:2

Course Code:U25SEDS33

UNIT-I: Introduction

(6 Hours)

History - Information Security, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT-II: Security Investigation

(6 Hours)

Need for Security, Business Needs for security, Threats, Attacks, Legal, Ethical and Professional Issues- An Overview of Computer Security- Access Control Matrix, Policy- Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT- III: Digital Signature and Authentication

(6 Hours)

Digital Signature and Authentication Schemes: Digital signature – Digital Signature Schemes and their Variants-Digital Signature Standards-Authentication: Overview-Requirements Protocols Applications – Kerberos – X.509 Directory Services.

UNIT-IV: E-Mail and IP Security

(6 Hours)

E-mail and IP Security: Electronic mail security: Email Architecture – PGP – Operational Descriptions – Key management –Trust Model– S/MIME.IP Security: Overview – Architecture – ESP, AH Protocols IPSec Modes – Security association – Key management.

UNIT-V: Web Security

(6 Hours)

Web Security: Requirements- Secure Sockets Layer – Objectives – Layers – SSL secure communication – Protocols – Transport Level Security. Secure Electronic Transaction- Entities DS Verification-SET processing.

Total Lecture Hours: 30

COURSE OUTCOMES

Upon completion of the course the students would be able to

1. To explain the fundamentals of Information Security, security models, information system components,
2. To analyze security threats, attacks, vulnerabilities, and apply security policies.
3. To demonstrate the concepts of digital signatures and authentication mechanisms.
4. To apply email and IP security techniques, including PGP, S/MIME and IPSec architecture.
5. To evaluate web security requirements and implement secure communication protocols.

TEXT BOOK(S)

1. MichaelE Whitman and Herbert J Mattord, “Principles of Information Security, Course Technology, Sixth Edition, 2017.
2. Stallings William, “Cryptography and Network Security: Principles and Practice, Seventh Edition, Pearson Education, 2017.

REFERENCE BOOK(S)

1. Harold F. Tipton, Micki Krause Nozaki, “Information Security Management Handbook, Volume 6, Sixth Edition, 2016.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, “Hacking Exposed”, Mc Graw-Hill, Seventh Edition, 2012.
3. Matt Bishop, “Computer Security Art and Science, Addison Wesley Reprint Edition, 2015.
4. Michael E. Whitman & Herbert J. Mattord – Principles of Information Security, Ninth Edition., Cengage, 2024.
5. William Stallings, “Cryptography and Network Security: Principles and Practice”, Ninth Global Edition, Pearson, 2024

WEB RESOURCES

1. <https://www.geeksforgeeks.org/what-is-information-security/>
2. <https://www.fortinet.com/resources/cyberglossary/data-security>
3. <https://www.exabeam.com/explainers/information-security/information-security>
4. <https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-12r1.pdf>
5. https://www.vssut.ac.in/lecture_notes/lecture1423183198.pdf

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3						3		3	3	3	3		
CO2		3	3					3		3	3	3	3		
CO3		2	3			2		3		3	3	3			
CO4		2	3					3		3				3	
CO5			3					3		3					3

Strong-3 Medium-2 Low-1

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SUNDARAKKOTTAI, MANNARGUDI- 614016.
(For the Candidates admitted in the academic year 2025– 2026)
DEPARTMENT OF COMPUTER APPLICATIONS
BACHELOR OF COMPUTER APPLICATIONS (BCA)

Semester: III-Special Course - Health & Wellness

Ins. Hrs./Week: 2

Course Credit: 1

Course Code: 25UGSC

UNIT I: Introduction to Holistic Well-being

Introduce the core components of Health & Well-being namely Physical, mental And emotional well-being. Provide worksheets on all the four components individually and explain the inter Connectedness to give an overall understanding.

UNIT II: Wellness Wheel Exercise (Overall Analysis)

Guide students to assess their well-being in various life dimensions through exercises on various aspects of wellbeing, and explain the benefits of applying wellness wheel.

Introduce Tech Tools:

Explore the use of technology to support well-being.

Introduce students to apps for meditation, sleep tracking, or healthy recipe inspiration.

UNIT III: Breaking Bad Habits (Overall Analysis)

Open a discussion on bad habits and their harmful effects.

Provide a worksheet to the students to identify their personal bad habits.

Discuss the trigger, cause, consequence and solution with examples.

Guide them to replace the bad habits with good ones through worksheets.

UNIT IV: Physical Well-being

1. Fitness

Introduce the different types of fitness activities such as basic exercises, cardiovascular exercises, strength training exercises, flexibility exercises, so on and so forth. (Include theoretical explanations and outdoor activity).

2. Nutrition

Facilitate students to reflect on their eating habits, their body type, and to test their knowledge on nutrition, its sources and the benefits.

3. Yoga & Meditation

Discuss the benefits of Yoga and Meditation for one's overall health.

Demonstrate different yoga postures and their benefits on the body through visuals (pictures or videos)

4. Brain Health

Discuss the importance of brain health for daily life.

Habits that affect brain health (irregular sleep, eating, screen time).

Habits that help for healthy brains (reading, proper sleep, exercises).

Benefits of breathing exercises and meditation for healthy lungs.

5. Healthy Lungs

Discuss the importance of lung health for daily life.

Habits that affect lung health (smoking, lack of exercises).

Benefits of breathing exercises for healthy lungs.

6. Hygiene and Grooming

Discuss the importance of hygienic habits for good oral, vision, hearing and skin health.

Discuss the positive effects of grooming on one's confidence level and professional growth.

Suggested Activities (sample): Nutrition:

Invite a nutritionist to talk among the students on the importance of nutrition to the body or show similar videos shared by experts on social media. Organize a 'Stove less/fireless cooking competition' for students where they are expected to prepare a nutritious dish and explain the nutritive values in parallel.

UNIT V: Emotional Well-being

1. Stress Management

Trigger a conversation or provide self-reflective worksheets to identify the stress factors in daily life and their impact on students' performance. Introduce different relaxation techniques like deep breathing, progressive muscle relaxation, or guided imagery.

(use audio recordings or visuals to guide them through these techniques).

After practicing the techniques, have them reflect on how these methods can help manage stress in daily life.

2. Importance of saying 'NO'

Explain the students that saying 'NO' is important for their Physical

Explain the students that saying 'NO' is important for their Physical and mental well-being, Academic Performance, Growth and Future, Confidence, Self-respect, Strong and Healthy Relationships, building reputation for self and their family (avoid earning a bad name).

Factors that prevent them from saying 'NO'.

How to practice saying 'NO'.

3. Body Positivity and self-acceptance

Discuss the following with the students.

What is body positivity and self-acceptance?

Why is it important?

Be kind to yourself.

Understand that everyone's unique.

Suggested Activities (Sample):

(Importance of saying 'NO')

Provide worksheets to self-reflect on...

how they feel when others say 'no' to them

the situations where they should say 'no'

Challenge students to write a song or rap about the importance of saying no and how to do it effectively.

Students can perform their creations for the class.

UNIT VI: Social Well-Being

1. Practicing Gratitude

Discuss the importance of practicing gratitude for building relationships with family, friends, Relatives, mentors and colleagues.

Discuss how one can show gratitude through words and deeds.

Explain how practicing gratitude can create 'ripple effect'

2. Cultivating Kindness and Compassion

Define and differentiate between kindness and compassion.

Explore practices that cultivate these positive emotions

Self-Compassion as the Foundation.

The power of small gestures.

Understanding another's perspective.

The fruits of compassion.

3. Practising Forgiveness

Discuss the concept of forgiveness and its benefits.

Forgiveness: What is it? and What it isn't?

Benefits of forgiveness.

Finding forgiveness practices.

4. Celebrating Differences

Appreciate the value of individual differences and foster inclusivity.

The World: A Tapestry of Differences (cultures, backgrounds, beliefs, abilities, and appearances).

Finding strength in differences (diverse perspectives and experiences lead to better problem-solving and innovation).

Celebrating differences, not ignoring them (respecting and appreciating the unique qualities).

Activities for celebrating differences (share culture, learn about others, embrace new experiences)

5. Digital Detox

Introduce the students to:

The concept of a digital detox and its benefits for social well-being How to disconnect from devices more often to strengthen real-world connections

UNIT VII: Intellectual Well-being

1. Being a lifelong Learner

Give students an understanding on:

The relevance of intellectual well-being in this 21st century to meet the expectations in personal and professional well-being

The Importance of enhancing problem-solving skills Cultivating habits to enhance the intellectual well-being (using the library extensively, participating in Extra-curricular activities, reading newspaper etc.)

2. Digital Literacy

Discuss:

The key aspects of digital literacy and its importance in today's world.

It is more than just liking and sharing on social media.

The four major components of digital literacy (critical thinking, communication, Problem-solving, digital citizenship).

Why is digital literacy important?

Boosting one's digital skills.

3. Transfer of Learning

Connections between different subjects How knowledge gained in one area can be applied to others.

Suggested Activities (sample): Intellectual Well-being.

Provide worksheets to students for teaching them how to boost intellectual well-being.

Ask the students to identify a long-standing problem in their locality and come up with a solution and present it in the classroom. Also organize an event like 'Idea Expo' to display the designs, ideas, and suggestions, to motivate the students to improve their intellectual well-being.

UNIT VIII: Environmental Well-being

The Importance of initiating a change in the environment.

The session could be around:

Defining Environmental well-being (physical, chemical, biological, social, and psychosocial factors)

People's behaviour, crime, pollution, political activities, infra-structure, family situation etc.

Suggesting different ways of initiating changes in the environment (taking responsibility, creating Awareness, volunteering, approaching administration).

Suggested Activities (sample).

Providing worksheets to self-reflect on how the environment affects their life, and the ways to initiate a change

Dedicate a bulletin board or wall space (or chart work) in the classroom for students to share their ideas for improving. Environmental well-being.

Creating a volunteers' club in the college and carrying out monthly activities like campus cleaning, awareness campaigns against noise pollution, (loud speakers in

Public places), addressing anti-social behavior on the campus or in their locality.

UNIT IX :Mental Well-being

1. Importance of self-reflection

Discuss:

Steps involved in achieving mental well-being (self-reflection, self-awareness, applying Actions, achieving mental well-being).

Different ways to achieve mental well-being (finding purpose, coping with stress, moral Compass, connecting for a common cause).

The role of journaling in mental well-being

2. Mindfulness and Meditation Practices.

Benefits of practicing mindful habits and meditation for overall well-being.

1. Connecting with nature

Practising to be in the present moment Nature walk, feeling the sun, listening to the natural

sounds

Exploring with intention Hiking, gardening to observe the nature

Reflecting on the emotions, and feeling kindled by nature.

2. Serving people

Identifying the needs of others

Helping others.

Volunteering your time, skills and listening ear.

Finding joy in giving.

3. Creative Expressions Indulging in writing poems, stories, music

Making/listening, creating visual arts to connect with inner selves.

Suggested Activities (Sample):

(Mindfulness and Meditation) Conducting guided meditation every day for 10

Minutes and directing the students to record the changes they observe.

UNIT X: Situational Awareness (Developing Life skills)

1. Being Street smart

Discuss:

Who are street smart?

Why is it important to be street smart?

Characteristics of a street smart person: Importance of acquiring life skills to become street smart

(General First-aid procedure, CPR Procedure, Handling

Emergency situations like fire, flood etc).

2. Digital Awareness

Discuss:

Cyber Security

Information Literacy.

Digital Privacy

Fraud Detection

Suggested Activities (sample):

(Street Smart) Inviting professionals to demonstrate the CPR

Procedure

Conducting a quiz on Emergency Numbers

UNIT XI: Understanding Addiction

Plan this session around:

Identifying the environmental cues, triggers that lead to picking up this habit

Knowing the impact of substance abuse Adverse health conditions, social isolation, ruined future, hidden financial loss and damaging the family reputation. Seeking help to get out of this addiction.

Suggested Activities Provide Worksheets to check the students' level of understanding about substance addiction and their impacts.

Share case studies with students from real-life.

Play/share awareness videos on addiction/de-addiction, experts talk.

*Conduct awareness programmes on Drugs and its ill effects.

(Arrange Experts from the concerned government departments and NGOs working in drug addiction issues) and maintain the documents of the program

Total Lecture Hours : 30

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SUNDARAKKOTTAI, MANNARGUDI-614016.

For the Candidates admitted in the academic year 2025–2026)

**DEPARTMENT OF COMPUTER APPLICATIONS
B.Sc., DATA SCIENCE**

Semester: IV-CC-IV: Big Data Analytics with NoSQL Database

Ins. Hrs./Week:5

Course Credit:5

Course Code:U25DS407

UNIT-I: Introduction

(15 Hours)

Introduction: Introduction to big data– sources of big data – real time application of big data – challenges in collecting and validating big data.

UNIT-II: Hadoop

(15 Hours)

Hadoop: Hadoop – Hadoop ecosystem for processing big data –Hadoop cluster Hadoop distributed file system– working with files in HDFS – map reduce technique for big processing – Joining data from different sources using map reduce.

UNIT-III: Hive and Pig

(15 Hours)

Hive and Pig: Hive and pig – need for high-level tools in big data processing – unstructured and structured data – Not Only SQL (NOSQL) commands – use of Hive as an interface to Hadoop –Use of pig as a programming Tool for big data processing.

UNIT-IV: Introduction to NoSQL

(15 Hours)

Introduction to NoSQL: An Overview of NoSQL - Defining NoSQL - What NoSQL is and what it is not - List of NoSQL Databases - Characteristics of NoSQL -RDBMS approach – Challenges

UNIT-V: NoSQL Storage Types

(15 Hours)

NoSQL Storage Types: NoSQL Storage Types - Column-oriented databases Document store –Key value store -Multi-storage type databases - Advantages and Drawbacks – Transactional application - Computational application - Web-scale application

Total Lecture Hours: 75

COURSE OUTCOMES:

Upon successful completion of this course the students would be able to:

1. To apply big data concepts in various domains
2. To understand hadoop ecosystems
3. To apply the concepts of pig and hive
4. To implement NoSQL Databases
5. To explain various NoSQL storage type

TEXT BOOK(S)

1. Allen B.Downey, “Think Python: How to Think Like a Computer Scientist“, Second Edition, Updated for Python3,Shroff/O'Reilly Publishers, 2016.
2. Satyanarayana, Radhika Mani,Jagadesh, ”Python Programming”, Universities Press (India) Pvt. Ltd 2018.

REFERENCE BOOK(S)

1. Gaurav Vaish,“Getting Started with NoSQL”, Published by Packt Publishing Ltd.,2013,ISBN978-1-84969-4-988 17
2. “Big data analysis for Dummies”, Dummies press, 2011.
3. Hadoop Fundamentals, packet Publications, 2012.

4. Bart Baesens, Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Wiley, 2014
5. Soumendra Mohanty, Madhu Jagadeesh, and Harsha Srivatsa, "Big data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", Published by Apress Media, 2013.

WEB RESOURCES

1. <https://www.w3schools.com/BigdataAnalytics/>
2. https://en.wikipedia.org/wiki/Big_data
3. <https://www.scylladb.com/learn/nosql/nosql-database-resources/>
4. https://www.w3schools.com/big_dataintroduction
5. <https://www.geeksforgeeks.org/introduction-to-nosql/>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
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CO2	3	3	3					2		3	3	3	3		3
CO3	3	3				2		2		3	3	3			3
CO4	3	3						3		3				3	3
CO5	3	3						3		3					3

Strong-3 Medium-2 Low-1

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SUNDARAKKOTTAI, MANNARGUDI- 614016.
(For the Candidates admitted in the academic year 2025-2026)
DEPARTMENT OF COMPUTER APPLICATIONS
B.Sc., DATA SCIENCE

Semester: IV-CP-IV: Big Data Analytics Lab

Ins. Hrs./Week:4

Course Credit:4

Course Code:U25DS408P

List of Experiments :

1. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System.
2. Installation of Hadoop Ecosystem-Pig
3. Installation of Hadoop Ecosystem-Hive
4. Write a hive query to load the data into table from any local file on the system.
5. Write a hive query, which returns the contents of the whole table.
6. Demonstrate the usage of Hive functions.
7. Write a hive query to load the data in to table from any local file on the system.
8. Write a hive query, which returns the contents of the whole table.
9. Demonstrate the usage of Hive functions.
10. Reading MongoDB and writing into MySQL

Total Lab Hours: 60

COURSE OUTCOMES:

Upon successful completion of this course the students would be able to:

1. To install Hadoop distributed file system
2. To install Hadoop ecosystems
3. To write hive queries to load and returns the contents
4. To implement MongoDB for unstructured data
5. To use read and write various files in MongoDB

TEXT BOOK(S)

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Satyanarayana, Radhika Mani, Jagadeesh, "Python Programming", Universities Press (India) Pvt. Ltd 2018.

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1. Gaurav Vaish, "Getting Started with NoSQL", Published by Packt Publishing Ltd., 2013, ISBN 978-1-84969-4-988 17
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WEB RESOURCES

- 1.<https://www.w3schools.com/BigdataAnalytics/>
- 2.https://en.wikipedia.org/wiki/Big_data
- 3.<https://www.scylladb.com/learn/nosql/nosql-database-resources/>
- 4.https://www.w3schools.com/big_dataintroduction
- 5.<https://www.geeksforgeeks.org/introduction-to-nosql/>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3						2		3	3	3	3		3
CO2	3	3	3					2		3	3	3	3		3
CO3	3	3				2		2		3	3	3			3
CO4	3	3						3		3				3	3
CO5	3	3						3		3					3

Strong-3 Medium-2 Low-1



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI 614016.
(For the Candidates admitted in the academic year 2025-2026)
DEPARTMENT OF COMPUTER APPLICATIONS
B.Sc., DATA SCIENCE

Semester: IV-SEC-IV: Computing Technologies for Data Science

Ins. Hrs./Week:2

Course Credit:2

Course Code:U25SEDS44

UNIT-I: Mobile Computing

(6 Hours)

Introduction to Mobile Computing - Applications of Mobile Computing- Spread spectrum -MAC Protocols - SDMA- TDMA- FDMA- CDMA - GSM - Services & Architecture - Protocols - Connection Establishment - Frequency Allocation - Routing - GPRS.

UNIT-II: Edge Computing Definition and Use Cases

(6 Hours)

Introduction to Edge Computing Scenario's and Use cases - Edge computing purpose and definition, Edgecomputingusecases,Edgecomputinghardwarearchitectures,Edgeplatforms,EdgevsFog Computing, Communication Models - Edge, Fog and M2M.

UNIT-III: Quantum Computing

(6 Hours)

Introduction to quantum computing – quantum computing need - – Quantum Measurements Density Matrices - Positive-Operator Valued Measure - Fragility of quantum information: Decoherence - Quantum Superposition and Entanglement - Quantum Gates and Circuits - Deutsch's algorithm.

UNIT-IV: Robotic Process Automation

(6 Hours)

RPA Basics: History of Automation, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, processes Types of Bots, Workloads which can be automated – Excel Data Tables:DataTablesinRPA,ExcelandDataTablebasics,DataManipulationinexcel,EmailAutomation: Email Automation, Incoming Email automation, Sending Email automation.

UNIT-V: Distributed Ledger Technology

(6 Hours)

Introduction – distributed ledgers in a nutshell - distributed identity – decentralized network – distributed ledger – network consensus – future of DLT

Total Lecture Hours: 30

COURSE OUTCOMES

Upon successful completion of this course the students would be able to:

1. To explain the basics of mobile telecommunication systems.
2. To explore edge computing.
3. To describe quantum computing.
4. To apply automation concepts.
5. To illustrate DLT.

TEXT BOOK(S)

1. Mobile Communications, Jochen Schiller, Secondnd Edition, Pearson Education (UNIT I)
2. Edge Computing: Models, Technologies and Applications F. Bonomi, R. Milito, P. Natarajan, J. Zhu
Publisher: Springer (Part of the Internet of Things series) (UNIT II)
3. Quantum Computation and Quantum Information, Michael A. Nielsen and Isaac L. Chuang Publisher:
Cambridge University Press (UNIT III)
4. Learning Robotic Process Automation, Alok Mani Tripathi, Packt Publishing (UNIT IV)
5. Block Chain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, A press (UNIT V)

REFERENCE BOOK(S)

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd,
New Delhi – 2012.(Unit1)
2. IoT and Edge Computing for architects- Second Edition, by Perry Lea, Publisher: Packt Publishing,
2020, ISBN: 9781839214806.(Unit2)
3. M.A.Nielsen and I.L.Chuang, “Quantum computation and quantum information”, Cambridge, 2010
(Unit3))
4. Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing Release,
2018, ISBN: 9781788470940.(Unit4)
5. Alexander Lipton and Adrien Treccani, “Blockchain and Distributed Ledgers Mathematics,
Technology, and Economics, World Scientific, 2021(.Unit5)

WEB RESOURCES:

1. <https://www.guvi.in/blog/data-science-technologies/>
2. <https://www.simplilearn.com/resources-to-learn-data-science-online-article>
3. <https://medium.com/data-science-at-microsoft/data-science-learning-resources-193ccf6fafb>
4. <https://curve.mit.edu/10-resources-data-science-mit-open-learning>
5. <https://www.pragmaticinstitute.com/resources/articles/data/20-data-tools-commonly-used-by-data-practitioners/>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3						3		3	3	3	3		
CO2		3	3					3		3	3	3	3		
CO3		2	3			2		3		3	3	3			
CO4		2	3					3		3				3	
CO5			3					3		3					3

Strong-3 Medium-2 Low-1

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SUNDARAKKOTTAI, MANNARGUDI - 614016.
(For the Candidates admitted in the academic year 2025-2026)
DEPARTMENT OF COMPUTER APPLICATIONS
B.Sc., DATA SCIENCE

Semester: IV-SEC-V: Mobile Application Development

Ins. Hrs./Week:2

Course Credit:2

Course Code:U25SEDS45

UNIT-I: Android Fundamentals

(6 Hours)

Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End Key Mobile Application Services- Publishing Your Application.

UNIT-II: Understanding Activities

(6 Hours)

Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation- Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

UNIT-III: Using Basic Views

(6 Hours)

Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views Using Web View- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.

UNIT-IV: SMS Messaging

(6 Hours)

Sharing Data in Android-Creating Your Own Content Providers -Using the Content Provider SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

UNIT-V: Consuming Web Services

(6 Hours)

Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading.

Total Lecture Hours: 30

COURSE OUTCOMES:

Upon completion of the course the students would be able to

1. To explain the fundamentals of Android application development and mobile application architectures
2. To develop Android applications using Activities, Intents, Fragments and Notifications
3. To implement Android applications using various Views, Menus and Web Views
4. To develop Android applications that support SMS messaging, email services and content providers
5. To create Android applications that consume web services using HTTP and JSON

TEXTBOOK(S)

1. Jerome Di Marzio, "Beginning Android Programming with Android Studio", Fourth Edition.
2. Bill Phillips, Chris Stewart, Kristin Marsicano and Brian Gardner, Android Programming: The Big Nerd Ranch Guide, Fifth Edition, Big Nerd Ranch Guides, 2019.
3. Wei-Meng Lee, "Beginning Android Programming with Android Studio", Fifth Edition, John Wiley & Sons, 2018.
4. B.M. Harwani, "Android Programming Unleashed", First Edition, Pearson Education, 2015.

REFERENCEBOOK(S)

1. Dawn Griffiths, David Griffiths, "Head First Android Development: A Brain-Friendly Guide", 2017.
2. Neil Smyth, "Android Studio 3.0 Development Essentials: Android", 8 th Edition.
3. Pradeep Kothari, "Android Application Development (With Kitkat Support)", Black Book 2014.
4. Reto Meier and Ian Lake, "Professional Android", Fourth Edition, Wrox Press (John Wiley & Sons), 2018.
5. Jerome (J.F.) Di Marzio, "Beginning Android Programming with Android Studio", Fourth Edition, Apress, 2017.

WEB RESOURCES:

- 1.<https://developer.android.com>
- 2.<https://developer.android.com/studio>
- 3.<https://developer.android.com/courses>
- 4.<https://source.android.com>
- 5.<https://developer.android.com/training>

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1		2				1	2	2		1	1	
CO2	2	2	3		3			1	1	1	3		2	1	
CO3	2	2	3	1	3				1	1	2	3	2		
CO4	2	3	3	2	3	1	1	1	1	1	3	2	2	2	
CO5	2	3	3	2	3			1	1	2	3	2	3	3	1

Strong-3 Medium-2 Low-1