

SECTION I

Trimester	I	Class	1MCA
Course Code	MCA135	Course title	Advance Database Technologies
Hours	45	Hours per week	4
Faculty name	Dr D. Peter Augustine	Contact details	E-Mail: peter.augustine@christuniversity.in
Class policies and guidelines	<ul style="list-style-type: none"> • Strictly adhere to the class policies of the University and Computer Science Department. • Active and voluntary participation is expected during teachings and discussions • Unbiased peer support is encouraged • As per the timeslot mentioned in the timetable students are expected to be inside the classroom on time. 		
Course Description / Objective	To provide a strong foundation for database application design and development by introducing the fundamentals of database technology.		
Program Outcomes	<p>PO1: Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.</p> <p>PO2: Problem Analysis: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.</p> <p>PO3: Design/Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.</p> <p>PO4: Conduct Investigations of complex computing problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.</p> <p>PO5: Modern Tool usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.</p> <p>PO6: Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.</p> <p>PO7: Life-long learning: Recognize the need, and have the ability, to engage</p>		

Course Outcomes	<p>in independent learning for continual development as a computing professional.</p> <p>PO8: Project management and finance: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.</p> <p>PO9: Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.</p> <p>PO10: Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.</p> <p>PO11: Individual and Team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.</p> <p>PO12: Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.</p> <p>CO1: Understand the basic concepts of database systems, transactions, and related database facilities like concurrency control, data object locking and protocols.</p> <p>CO2: Analyze the database requirements and develop logical design of the database.</p> <p>CO3: Develop NoSQL database applications using storing, accessing, and querying.</p>
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CO-PO MAPPING

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
CO-PO mapping	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	2	-	2	2	-	2	2	-	2
CO2	2	-	3	-	3	-	2	2	2	-	2	-
CO3	3	-	3	3	-	1	3	3	1	1	-	3

SECTION II

Unit number and title	Unit details	Week (Starting and end dates)	Hours per Week	Pedagogy (teaching learning methods used)/ activities and or class trips/ dates for assessment	Resource/ Reference details
Unit I CONCEPTUAL MODELLING AND DATABASE DESIGN	Using High-Level Conceptual Data Models for Database Design, Entity Types and Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types - ER Diagrams,	Week 1	4(hrs)	PPT	Korth F. Henry and Silberschatz Abraham, Database System Concepts, McGraw Hill, 6th Edition, 2010.
	Naming Conventions and Design Issues, Relationship Types of Degree Higher than Two – Enhanced entity relationship model – relational database design by ER- and EER-to-relational mapping.	Week 2	4 hrs	Critical Analysis + Case Study	

Unit II NORMALIZATION, FILE ORGANIZATION , AND INDEXING	Design Guidelines for Relation Schemas-Functional Dependencies-Normal Forms Based on Primary Keys-Second and Third Normal Forms- Boyce-Codd Normal Form- Multivalued Dependency and Fourth Normal Form-Join Dependencies and Fifth Normal Form	Week 3 & 4	6 hrs	Lecture + Case Study	Korth F. Henry and Silberschatz Abraham, Database System Concepts, McGraw Hill, 6th Edition, 2010.
	File Organization - Organization of Records in Files - Ordered Indices - B+ Tree Index Files - Static Hashing - Bitmap Indices	Week 4 & 5	3 hrs	PPT	
Unit III TRANSACTION PROCESSING AND DISTRIBUTED DATABASES	Transaction - Introduction to transaction processing-transaction and system concept- Desirable properties of transaction- Transaction support in SQL- concurrency control techniques – Two phase Locking techniques for concurrency	Week 5 & 6	5 hrs	Lecture	O'neil Patric, O'neil Elizabeth, Database Principles, Programming and Performance, Argon Kaufmann Publishers, 2nd Edition, 2002.
	Concurrency Control Based on Timestamp Ordering. Recovery Concepts. Distributed databases: Distributed Database concepts-Types- Data Fragmentation-Replication- Allocation Techniques. Overview of Transaction Management- Overview of Concurrency Control and Recovery.	Week 7	4 hrs	PPT	
Unit IV INTRODUCTION TO NoSQL	Definition and Introduction-Sorted Ordered Column-Oriented Stores- Key/Value Stores. Interacting with NoSQL, NoSQL Storage Architecture:	Week 8	4 hrs	Lecture + Problem Solving	Reference from google
	Working with Column-Oriented Databases-HBase Distributed Storage Architecture, NoSQL Stores: Accessing Data from Column-Oriented Databases Like HBase- Querying Redis Data Stores- Querying in Neo4J	Week8 & 9	5 hrs	Lecture + Demonstration	

Unit V INTRODUCTION TO NoSQL	Implement the following based on a domain; DDL commands, DML commands, TCL commands, NoSQL CRUD operations, NoSQL aggregate function, Data manipulation using CASSANDRA.	Week 10 & 11	9 hrs	Demonstration	Reference from google
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SECTION III

This course will follow the assessment outline given below:

CIA I (a)	CIA I (b)	CIA II	CIA III	Attendance	ESE
10	10	50	20	10	100

Mapping: A template to map the Learning Outcomes of the course against the components of assessment is given below

Course Outcomes	CIA I (a)	CIA I (b)	CIA II	CIA III
CO1:	6	5	20	5
CO2:	4	5	20	5
CO3:			10	10

SECTION IV

Assignment description:

ASSESSMENT: CIA 1 (a)

Topic:	ER-Diagram
Description:	All students should upload the ER diagram as per the module and domain identified.

	Upload the ER diagram as a doc/pdf containing
Max. Team size:	Individual Submission
Technology Tool to be used	Software development Tools (ERDPlus, Draw.io)
Submission format:	Google Classroom
Deadline for submission of the assignment:	5.8.2023
Maximum marks:	10
General Instructions	<ul style="list-style-type: none">• Late submissions will not be entertained.• Figures and Tables must be cited

Technology / Tools Used

Google Classroom - Student can post their ER-Diagram using Google Classroom within the specified due date.

Evaluation Rubrics:

Rubric	Criteria [Marks]			
Depth in the study [5]	In-depth knowledge on the topic and on the related concepts [5]	Sufficient understanding on the given subject [3]	Created the Model but not its relevance [2]	No clarity on the work and not attempted with references [0]
Content & Creativity [3]	Divided the task perfectly and contributed evenly [3]	Divided the task perfectly and individual contribution is uneven [2]	Divided the task but no coordination [1]	No proper segregation of task and lack of coordination [0]
Structure & Organization of Design [2]	Detailed, well-structured and professionally formatted [2]	Precise and enough coverage on the Domain and properly formatted [1]		No structure found in the flow of topics and clumsy format [0]

Mapping the Learning Outcomes with components of the evaluation rubrics

Learning Outcomes of the assignment	Method of assessment	Evaluation Rubrics
LO1: Students can able to construct the ER-Diagrams	✓ Creation of ER Diagrams for the given scenario	✓ Impression
LO2: Analyzing and using the Software Development Tools		

Assignment description:

ASSESSMENT: CIA 1 (b)

Description	: Class Test (MCQ)
Grade	: 10 Marks
Type	: Online/ Offline (MCQ Test)
Topic Covered	: UNIT – I, II and III

Learning outcomes:

LO1: Acquire in depth knowledge of Advance database technology.

LO2: Demonstrate a critical understanding of tools with related noSQL, services and applications

Evaluation Rubrics [R1]:

Mapping the Learning Outcomes of the assignment with components of the evaluation rubrics:

Learning Outcomes of the assignment	Method of assessment
LO1: Acquire in depth knowledge of Advance database technology.	Completion of the course
LO2: Demonstrate a critical understanding of tools with related noSQL, services and applications	

Assessment: CIA 2 (Mid-Sem Exam for 50 marks)

Team size	Individual
Submission format:	Handwritten
Deadline for submission:	6.9.2023
Mode	Descriptive Test (Unit 1,2,3 and 4) both theory and program-based questions
Maximum marks:	50 Marks

LO1: Understanding of Basics of DBMS and RDBMS

LO2: Features of RDBMS

LO3: Design and develop real-world applications using RDBMS Application software

ASSESSMENT: CIA-3

Assessment Description:

Topic:	The video should discuss very crisp installation and uniqueness of the flavor of the NoSQL, followed by demonstration of basic usage of the DB with help of examples. students are requested to do the connectivity of Data Base with the front end.
Description:	Each group should identify a flavor of NoSQL and prepare a video on it
Max. Team size:	This is a group assignment with max group size being 4 and minimum 3.
Submission format:	Video form
Deadline for submission of the assignment:	15.9.2023
Time limit:	Minimum Duration of the video is 8 minutes and maximum are 10 minutes
Maximum marks:	20
General Instructions	Late submission will not be entertained.

Learning Outcomes

LO1: Understand the basic concepts of database and the installation Procedure

LO2: Demonstrate importing/exporting data

Evaluation rubrics

Score	Impression
05	Creativity
10	Relevance of Content
03	Team Work
02	Timely Submission

Mapping the Learning Outcomes with components of the evaluation rubrics

Learning Outcomes of the assignment	Method of assessment	Evaluation Rubrics
LO1: Students are asked to investigate about Schemeless Databases	✓ Creation of Databases and store the values	<input type="checkbox"/> Impression
LO2: Can able to install on their own and work with it.		

