DEPARTMENT OF COMPUTER APPLICATIONS

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Name of the Program and Specialisation	M.C.A. – Computer Applications		
Course Title	Database Management Systems		
Course Code	CA712	No. of Credits	3
Department	Computer Applications	Faculty	Dr. S. Nickolas
Session	Jan 2023	Section	B
Pre-requisites Course Code	CA711, CA713	Course Coordinator	Dr. S.R.Balasundaram
Course Teacher E-mail	nickolas@nitt.edu	Telephone No.	0431-2503739
Course Type	Core course		

Syllabus :

Database System architecture – Data Abstraction – Data Independence – Database Languages – Data Models – Entity-Relationship model – integrity constraints -Conceptual Design with ER Model. Relational Model – Keys - Constraints – Querying – Views – Relational Query Languages : Relational Algebra – Relational Calculus – SQL. Relational Database Design – Axioms – Normal Forms - Normalization – Decomposition – Dependency preservation – Lossless Design. – Query Processing and Optimization: Evaluation of Relational Algebra expressions – Query Equivalence – Join Strategies – Query Optimization Algorithms - Storage and File Structures : Indices –- B + Trees – Hashing. Transaction processing: Serializability – Concurrency Control Mechanisms – Protocols – Recovery Systems.

COURSE OVERVIEW

The database management systems course provides a general overview of the need and purpose of database systems. It presents the entity-relationship model with its design issues and constraints and also presents the relational model covering the relational algebra, relational calculus and SQL. It focuses on the relational database design which covers the theory of functional dependencies and normalization with emphasis on the understanding of each normal form. It deals with file-system structure and mapping of relational data to a file system. It explains a variety of access techniques such as hashing and indexing. It addresses query-evaluation algorithms, and query optimization based on equivalence-preserving query transformations. The course also focuses on the database tuning, security, transaction-processing system, concurrency control, techniques for ensuring serializability and recovery.

COURSE OBJECTIVES

- To make the students to learn different database models
- To provide knowledge of design of databases
- To explain the concepts of query languages and transaction management

COURSE OUTCOMES	Aligned Programme Outcomes (PO)
1. Get practical knowledge on designing and creating relational database systems	1,2,3,5,7,8
2. Describe the nuances of Data retrieval methods	1,3,5,7
3. Apply normalization techniques in DB design	1,2,3,7
4. Perform concurrency and Transaction Management operations	2,3,7,8

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	1,2	File System versus DBMS – Advantages – Database Languages - ER-Model: Entities – Relationships	Chalk and Talk/ PPT Presentation
2	3	Additional Features of ER Model - Conceptual Design with ER Model	-do-
3	4	Relational Model – Keys - Constraints – Querying – Views	-do-
4	5	Relational Algebra – Relational Calculus – SQL – QBE	-do-
5	6	File Organization – Organization of records in files – Indexing – Ordered Indices - B + Tree Index files	-do-
6	7	Hashing – Static – Dynamic – Query Optimization – Transformation of Relational Expressions – Choice of evaluation plans	-do-
7	8	Database Design – Pitfalls in Relational Database Design – Functional Dependencies	-do-
8	9,10	Decomposition – Normalization – I to V Normal Forms	-do-
9	11	DB Tuning – Security	-do-

| 10 | 12 | Transaction Management – Transactions – Transaction state – Concurrent executions | -do- |
| 11 | 13 & 14 | Serializability – Concurrency Control – Protocols – Crash Recovery | -do- |

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	Week 4	1 Hr	20
2	Cycle Test 2	Week 8	1 Hr	20
3	Assignment / Surprise Quiz/ Seminar/	After Week 6		10
	Compensation Assessment	After Week 8	1 Hr.	20
4	End Semester	At the end of the semester	3 Hrs	50

ESSENTIAL READINGS :

1. Silberschatz, Korth and Sudarshan, "Data Base System Concepts", McGraw-Hill, 7th Edition, 2019.
2. C. J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education/Addison Wesley, 2015
4. Raghu Ramakrishnan and Johannes Gehrke, "Data Base Management Systems", 4th Edition, McGraw-Hill, 2018.

COURSE EXIT SURVEY

- The students through the class representative may give their feedback at any time to the course faculty which will be duly addressed.
- The students may also give their feedback during Class Committee meeting.
- 'Course Outcome Survey' form will be distributed on the last working day to all the students and the feedback on various rubrics will be analyzed.
- The COs will be computed after arriving at the final marks.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

- **Plagiarism**
  The students are expected to come out with their original code for problems given as assignments during the class work, and tests/examinations. If found to be copied from internet/other students, zero marks will be assigned and action will be taken.

- **Attendance**

  100% is a must. However, relaxation will be given for leave on medical emergency requirements and representing institute events. Minimum 75% is required for appearing in the final End Semester Exam.
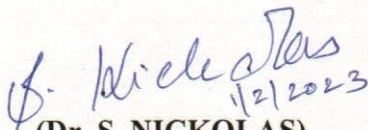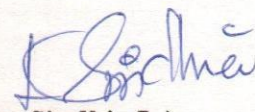
- **Academic Honesty**
    i. Possession of any electronic device, if any, found during the test or exam, the student will be debarred for 3 years from appearing for the exam and this will be printed in the Grade statement/Transcript.
    ii. Tampering of MIS records, if any, found, then the results of the student will be withheld and the student will not be allowed to appear for the Placement interviews conducted by the Office of Training & Placement, besides (i).
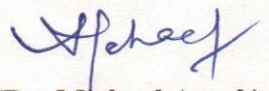
ADDITIONAL COURSE INFORMATION

The students can get their doubts clarified at any time with their faculty member with prior appointment.

FOR SENATE'S CONSIDERATION

(Dr. S. NICKOLAS) Course Faculty	**(Dr. Sindhia L.)** CC-Chairperson	**(Dr. Michael Arock)** HOD