

Planning and Quality Assurance Affairs

Form (A)

Course Specifications

General Information

Course name	Database Systems
Course number	ITCS3402
Faculty	
Department	
Course type	Major Needs
Course level	3
Credit hours (theoretical)	4
Credit hours (practical)	0
Course Prerequisites	

Course Objectives

- 1 - Describe the components of a database system and give examples of their use
- 2 - Identify major DBMS functions and describe their role in a database system
- 3 - Explain the concept of data independence and its importance in a database system
- 4 - Use a query language to elicit information from a database
- 5 - Categorize data models based on the types of concepts that they provide to describe the database structure—that is, conceptual data model, physical data model, and representational data model
- 6 - Describe the modeling concepts and notation of the entity-relationship model including its use in data modeling
- 7 - Define the fundamental terminology and principles of relational data model
- 8 - Illustrate the modeling concepts and notation of the relational data model
- 9 - Prepare a relational schema from a conceptual model developed using ER model
- 10 - Explain and demonstrate the concepts of entity integrity constraint and referential integrity constraint
- 11 - Demonstrate use of the relational algebra operations from mathematical set theory (union, intersection, difference, and cartesian product) and the relational algebra operations developed specifically for relational databases (select, product, join, and division).
- 12 - Demonstrate queries in the relational algebra and tuple relational calculus
- 13 - Create a relational database schema in SQL that incorporates key, entity integrity, and referential integrity constraints
- 14 - Determine the functional dependency between two or more attributes that are a subset of a relation
- 15 - Describe what is meant by 1NF, 2NF, 3NF, and BCNF, uses and impacts
- 16 - Demonstrate database security processes in SQL security commands
- 17 - Query Processing and Transaction management

Intended Learning Outcomes

Knowledge and Understanding	<ul style="list-style-type: none">* a1 Demonstrate knowledge of relational database schema design by employing the concepts of normal forms and entity-relationship diagrams* a2 Demonstrate knowledge of querying relational databases by using SQL* a3 Demonstrate knowledge of query evaluation by describing and implementing database algorithms* a4 Demonstrate knowledge of recent advances in database systems by identifying the connection between traditional relational databases and other data models and/or query languages* a5 Demonstrate knowledge of concurrency control by describing transactional semantics
Intellectual Skills	<ul style="list-style-type: none">* b1 Analyze requirements and plan for a solution to the given problem* b2 Evaluate the alternatives design techniques of a project and selection of the best solutions* b3 Develop ability to analyze a database request (query) and write an algebraic expression to implement it* b4 Analyze data requirements of an application and design a data model using entity relationship diagrams* b5 Analyze the status of a relation and be able to normalize it in order to avoided anomalies* b6 Analyze a relation's functional dependencies and derive a key
Professional Skills	<ul style="list-style-type: none">* c1 Practice in the lab on how using a toll SQL-PLUS to implements the SQL commands* c2 Understand SQL commands pertaining to database security
General Skill	<ul style="list-style-type: none">* d1 Gain experience to perform well in both individual and teamwork assignments* d2 Demonstrate responsibility and professionalism by delivering on-time to meet course deadlines* d3 Use of creativity and innovation in problem solving* d4 Develop communication skills and logical reasoning abilities

Course Contents

1 - Database and Database Users
2 - Database System Concepts and Architecture
3 - Data Modeling using the ER and EER model
4 - The Relational Data Model and Relational Constraints
5 - ER-to-Relational Mapping
6 - The Relational Algebra and SQL language
7 - Functional Dependencies and Normalization
8 - Transaction management and Database Security

Teaching and Learning Methods

1 - Lectures
2 - Tutorial Exercises
3 - Project and/or Assignments

Students Assessment

<u>Assessment Method</u>	<u>TIME</u>	<u>MARKS</u>
Mid-Term Exam I	6th week	20
Lab	During 16 weeks	20
Class Work	During the 16 weeks	10
Final Exam	16th week	50

Books and References

Essential books	Database Systems. A Practical Approach to Design, Implementation and Management (4nd Edition) , Thomas Connolly and Carolyn Brgg ; Addison Wesley, 2005
Recommended books	Fundamentals of Database Systems (5th edition). Elmasri and Navathe; Addison-Wesley, 2007.

Knowledge and Skills Matrix

Main Course Contents	Study Week	Knowledge and Understanding	Intellectual Skills	Professional Skills	General Skill
Database and Database Users	1	a1-a2			
Database System Concepts and Architecture	2	a1			
Data Modeling using the ER model and EER model	3-4	a1	b1		d1-d4
The Relational Data Model and Relational Constraints	5-6	a1-a2			d1-d4
ER-to-Relational Mapping	7	a1	b6		d1-d4
The Relational Algebra and SQL Language	8-10	a1-a4	b1-b4		d1-d4
Functional Dependencies and Normalization	11-13	a1-a5	b2-b6	c1-c2	d1-d4
Transaction management and Database Security	14-15	a1-a3	b2-b6	c1-c2	d1-d4