

<b>DEREE COLLEGE SYLLABUS FOR:</b>							
<b>ITC 3160 FUNDAMENTALS OF RDBMS</b> (Updated Fall 2021)	<b>3/1.5/3</b> <b>UK LEVEL: 5</b> <b>UK CREDITS: 15</b>						
<b>PREREQUISITES:</b>	ITC 2088 Introduction to Programming						
<b>COREQUISITES:</b>	None.						
<b>CATALOG DESCRIPTION:</b>	Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL).						
<b>RATIONALE:</b>	Database systems are powerful, complex structures for managing data and they provide a rich environment for study. A database management system is the most important part in application development. The course focuses on the functions of an RDBMS and its role as the foundation of modern information systems by exposing students to the fundamentals of planning and collecting data, designing, implementing, maintaining and managing databases.						
<b>LEARNING OUTCOMES:</b>	As a result of taking this course, the student should be able to: <ol style="list-style-type: none"> <li>1. Demonstrate understanding of the fundamental concepts of the relational database model and utilize database management systems to organize, store and retrieve data.</li> <li>2. Use SQL (Structured Query Language) for database definition and manipulation</li> <li>3. Model business requirements using Entity-Relationship Modelling tools.</li> <li>4. Identify functional dependencies and apply normal forms to evaluate the quality of a relational database design.</li> <li>5. Use a conventional programming language to implement database connections.</li> </ol>						
<b>METHOD OF TEACHING AND LEARNING:</b>	In congruence with the teaching and learning strategy of the college, the following tools are used: <ul style="list-style-type: none"> <li>• Lectures and class discussions. Laboratory sessions involving training on database tools and practice on the design and development of databases.</li> <li>• Office hours held by the instructor to provide further assistance to students.</li> <li>• Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.</li> </ul>						
<b>ASSESSMENT:</b>	<table border="1" style="width: 100%;"> <tr> <td colspan="2">Summative:</td> </tr> <tr> <td>1<sup>st</sup> assessment: Group coursework project Database Design and SQL problems</td> <td style="text-align: center;"><b>30%</b></td> </tr> <tr> <td>2<sup>nd</sup> assessment: Portfolio of student work and oral assessment</td> <td style="text-align: center;"><b>10%</b></td> </tr> </table>	Summative:		1 <sup>st</sup> assessment: Group coursework project Database Design and SQL problems	<b>30%</b>	2 <sup>nd</sup> assessment: Portfolio of student work and oral assessment	<b>10%</b>
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<b>INDICATIVE READING:</b>	<p data-bbox="618 858 862 884"><b>REQUIRED READING:</b></p> <ol data-bbox="618 890 1455 989" style="list-style-type: none"> <li>1. Connolly, T. &amp; Begg, C. (2014). Database systems: a practical approach to design, implementation, and management. Boston: Addison-Wesley.</li> </ol> <p data-bbox="618 1031 932 1056"><b>RECOMMENDED READING:</b></p> <ol data-bbox="618 1062 1455 1283" style="list-style-type: none"> <li>1. Berners-Lee, T., Hendler, J. and Lassila, O., (2001). The Semantic Web. Scientific American, 279, 2001.</li> <li>2. Codd, E.F., Extending the database relational model to capture more meaning, ACM Transactions on Database Systems (TODS), v.4 n.4, p.397-434</li> <li>3. Elmasri, R., &amp; Navathe, S. (2007). Fundamentals of database systems. Boston: Pearson Addison Wesley.</li> </ol>						
<b>INDICATIVE MATERIAL:</b> (e.g. audiovisual, digital material, etc.)	<p data-bbox="618 1331 924 1356"><b>REQUIRED MATERIAL:</b> N/A</p> <p data-bbox="618 1398 995 1423"><b>RECOMMENDED MATERIAL:</b> N/A</p>						
<b>COMMUNICATION REQUIREMENTS:</b>	<p data-bbox="618 1461 1352 1522">Daily access to the course’s site on the College’s Blackboard CMS. Communication using proper written and oral English.</p>						
<b>SOFTWARE REQUIREMENTS:</b>	<p data-bbox="618 1560 1455 1717">A relational database management software (OracleXE or MySql) A client software to access the database (SQL Developer or MySQL Workbench), An Entity-Relationship modelling tool (Oracle's SQL Data Modeller or MySQL Workbench Visual Database Design)</p>						
<b>WWW RESOURCES:</b>	<ul data-bbox="618 1755 1442 1854" style="list-style-type: none"> <li>• Oracle SQL Language Reference:</li> <li>• <a href="https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm">https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm</a></li> <li>• MySQL Online Documentation: <a href="http://dev.mysql.com/doc/">http://dev.mysql.com/doc/</a></li> </ul>						
<b>INDICATIVE CONTENT:</b>	<ol data-bbox="618 1892 940 1917" style="list-style-type: none"> <li>1. Introduction to Databases</li> </ol>						

- 1.1. Traditional file based systems and their limitations
- 1.2. Database approach (DBMS) and its components
- 1.3. Roles in the database environment
- 1.4. Advantages and disadvantages of database systems
- 1.5. Distributed databases
2. The Relational Model
  - 2.1. Definition of relational data structures, database relations, keys
  - 2.2. Representation of relational database schemas
  - 2.3. Relational Algebra
  - 2.4. Relational integrity (entities and relationships)
  - 2.5. Views
3. Structured Query Language
  - 3.1. Introduction, objectives, terminology
  - 3.2. Data manipulation
    - 3.2.1. Querying, sorting, grouping of data
    - 3.2.2. Using logical and list operators
    - 3.2.3. Single row numeric and string functions
    - 3.2.4. Group functions
    - 3.2.5. Joins
    - 3.2.6. Sub-queries
    - 3.2.7. Inserting, deleting and updating data.
  - 3.3. Data definition
    - 3.3.1. Creating, altering and dropping database objects: tables, views, indexes, synonyms, constraints, users
  - 3.4. Creating Procedures and Functions
  - 3.5. Creating Database Triggers
4. Entity–Relationship Modelling and Logical Database Design
  - 4.1. Entity and Relationship Types
  - 4.2. Attributes (single, composite and derived)
  - 4.3. Structural Constraints (1:1, 1:\*, \*: \* relationships)
  - 4.4. Multiplicity, Cardinality and participation
5. Physical Database Design for relational databases
  - 5.1. Comparison of Logical and Physical database design
  - 5.2. The physical database design methodology
  - 5.3. Capacity Planning
6. Normalization
  - 6.1. Update anomalies
  - 6.2. Functional dependencies
  - 6.3. First, second, and third normal forms
7. Transaction Management
  - 7.1. Transaction Support
  - 7.2. Concurrency Control
    - 7.2.1. Locking methods
    - 7.2.2. Time stamping methods
8. Security
  - 8.1. Threats and countermeasures
  - 8.2. Granting and Revoking Privileges