

<b>Unit Title: Relational Database Applications in Business</b>	<b>Unit Code: RDAB</b>
<b>Level: 6</b>	<b>Learning Hours: 210</b>
<b>Learning Outcomes and Indicative Content:</b>	
Candidates will be able to:	
<ol style="list-style-type: none"> <li><b>1. Critically evaluate database systems in comparison with other kinds of information systems.</b> <ol style="list-style-type: none"> <li>1.1 Identify the limitations of a flat-file system.</li> <li>1.2 Describe the ANSI-SPARC three-schema architecture for database applications.</li> <li>1.3 Explain the terms, logical and physical data independence.</li> <li>1.4 Identify the functionality provided by a typical RDBMS.</li> </ol> </li> <li><b>2. Demonstrate an understanding of the foundations of the relational model.</b> <ol style="list-style-type: none"> <li>2.1 Define the constituents of the relational model.</li> <li>2.2 Explain the concept of data integrity.</li> <li>2.3 Discuss the connection between the relational model and the theory of relations.</li> <li>2.4 Formulate simple queries in the relational algebra.</li> </ol> </li> <li><b>3. Analyse a set of requirements to produce a conceptual model for a business application.</b> <ol style="list-style-type: none"> <li>3.1 Produce an Enhanced Entity-Relationship model from a description of a business process and document it using UML.</li> <li>3.2 Produce a set of relational schema definitions from an EER model.</li> <li>3.3 Evaluate a relational design.</li> </ol> </li> <li><b>4. Normalise a relational database schema.</b> <ol style="list-style-type: none"> <li>4.1 Produce a set of functional dependencies from a description of a business process.</li> <li>4.2 Document a set of functional dependencies using dependency diagrams.</li> <li>4.3 Use a set of functional dependencies to put a set of relations into 3rd normal form.</li> <li>4.4 Selectively denormalise a set of relations.</li> </ol> </li> <li><b>5. Use SQL to query an existing database.</b> <ol style="list-style-type: none"> <li>5.1 Use SELECT to query a database.</li> <li>5.2 Join tables.</li> <li>5.3 Use aggregate functions.</li> <li>5.4 Use complex WHERE clauses.</li> </ol> </li> </ol>	

**6. Establish and modify a new database.**

- 6.1 Implement a logical model using SQL commands to define database tables.
- 6.2 Define integrity constraints.
- 6.3 Insert, update and delete data in a database.
- 6.4 Define views.

**7. Advise on techniques for database performance tuning.**

- 7.1 Explain the factors that influence database performance.
- 7.2 Identify different types of file organisation.
- 7.3 Describe the main types of index and discuss their relative merits.
- 7.4 Select indexes for relations based on a workload description.

**8. Advise on the issues involved in concurrent access to a database.**

- 8.1 Discuss the use of transactions in database systems.
- 8.2 Discuss the problems caused by uncontrolled concurrent access to shared data.
- 8.3 Define the ACID properties of transactions.
- 8.4 Explain the concept of serialisability.
- 8.5 Describe the use of concurrency control techniques.

**9. Ensure the correct application of techniques for database recovery.**

- 9.1 Discuss the need for effective recovery techniques.
- 9.2 Explain how the DBMS uses buffers to cache disk blocks.
- 9.3 Explain how the recovery manager prevents loss of data after a crash.
- 9.4 Explain how checkpoints are used to limit the extent of recovery operations.
- 9.5 Describe recovery techniques based on deferred and immediate update.

**10. Advise on the issues involved in database security.**

- 10.1 Discuss the need for database security.
- 10.2 Explain how user accounts and privileges can be used to control access to data.
- 10.3 Explain how views can be used to control access to data.
- 10.4 Describe SQL support for access control.
- 10.5 Describe security measures for highly sensitive data.

**11. Advise on the application of data warehousing.**

- 11.1 Explain the difference between OLTP and OLAP.
- 11.2 Critically evaluate the data warehouse approach to data management.
- 11.3 Describe the architecture and information flow of a data warehouse.
- 11.4 Describe data warehouse design techniques.

**12. Advise on current trends in databases.**

- 12.1 Distributed databases.
- 12.2 Object-oriented databases.
- 12.3 Databases and XML.

**Assessment Criteria:**

- Assessment method: written examination
- Length of examination: three hours
- Candidates should answer four questions from a choice of eight, each question carrying equal marks.

**Recommended Reading**

Connolly T, Begg E, *Database Systems: A Practical Approach to Design, Implementation and Management* (2004), Addison Wesley  
ISBN: 0321210255

Elmasri R, Navathe S, *Fundamentals of Database Systems* (2006), Addison Wesley  
ISBN: 032141506X

Ramakrishnan R, Gehrke J, *Database Management Systems* (2002), McGraw Hill  
ISBN: 0071230572