

## MODULE DESCRIPTOR

<b>MODULE TITLE</b>	Enterprise Data Management		
<b>MODULE CODE</b>	CO4759 (L7)	<b>CREDIT VALUE</b>	20 Credits (10 ECTS)
<b>SCHOOL</b>	SCHOOL OF SCIENCE		

### MODULE AIMS

This module addresses the needs of a business for a well-designed information system. The module studies the design processes in forming both logical and physical database models, leading to the development of a fully functional database system.

The main objectives of the module are to:

- Apply design techniques to construct an information model.
- Study a relational database management system.
- Study and use the Structured Query Language (SQL)
- Design and develop a relational database according to the requirements of an organisation

### MODULE CONTENT

**Databases:** introduction, actors, DBMS, Data Models, Schemas, Instances, Three-schema Architecture and Data Independence, Database System Environment, Centralized and Client/Server Architectures, Classification of DBMSs

**Models:** Conceptual Models, Logical Models, Physical Models, Relational Model, Constraints

**Conceptual Data Modelling:** Entities, Keys, Relationship Types, Relationship Sets, Roles, Structural Constraints, Weak Entities, ER Diagrams, Design Issues, Subclasses, Superclasses and Inheritance, Specialization and Generalization, Extended ER, UNION, ERD to Relational Model.

**Structured Query Language (SQL) and Database Programming:** DML, DDL, DCL, Triggers and Views, Procedures, Functions, Advanced Database Programming

**Normalization:** Anomalies, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF

**DB Programming:** Interaction with DBMS with Java and .NET, Semi Structured Data and XML

**Big Data:** Introduction and Overview, Intro to Web2.0, REST Principles, Replication, Scalability and Security Issues

**Document-oriented NoSQL databases:** NoSQL, JSON, Key-Value data model, CouchDB, MongoDB, CouchDB Queries: Managing DBs, Managing Documents, Querying Data (e.g., with (Materialized) Views (Map-Reduce style in Javascript))

**Column Stores and NewSQL:** BigTable (Examples, How-big are Big-tables, Conceptual vs. Physical View), Apache HBase (Architecture, Features), NewSQL

**Introduction to "Big-Data" Analytics:** Example Scenarios and Architectures, Map-Reduce/Dryad programming models, Map- Architecture, In-Memory Shuffling, Speculative Execution

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## INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:

1. Evaluate the advantages and disadvantages of a database management systems and their role in an organisation
2. Design conceptual data models and construct appropriate physical structures
3. Develop a relational database using a modern DBMS
4. Apply appropriate retrieval techniques to retrieve data from a relational database

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## TEACHING METHODS

Lectures deliver factual material, introduce key concepts, direct reading and relate academic aspects to practical considerations.

Tutorial sessions allow students to apply the techniques and reinforce the material delivered in the lecture.

Practical sessions enable students to discuss material and complete online or paper-based exercises.

The module will be assessed by one assignment. The assignment requires the student to design the conceptual model of a database, realize the database in a DBMS and query the data using SQL.

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## ASSESSMENT METHODS

This module is assessed through a Case study portfolio of practical work (100%).