MODULE **DESCRIPTOR**

MODULE TITLE	ENTERPRISE DATA MANAGEMENT		
MODULE CODE	CO4759 (L7)	**CREDIT VALUE**	20 UK CREDITS / 10 ECTS
SCHOOL	SCHOOL OF SCIENCES		

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**

Indicative syllabus 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

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

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.

Distance learning

The module tutor will deliver live online lectures through MS Teams. During the live lectures the participating students will have the opportunity to engage in discussions, present their views and ask questions. The lecture sessions will be recorded and made available to the students through Blackboard. Students who cannot participate in a live lecture will have the opportunity to answer and reflect on guided questions in the subsequent live lectures or participate asynchronously on discussion boards. The module tutor will provide appropriate feedback to students' comments, as a result of the discussions. Tutor feedback will primarily be provided in an asynchronous manner through Blackboard and emails, but when the need arises, the module tutor will schedule live sessions to provide further feedback. Where appropriate, students will be also provided with relevant further reading, web links and resources for independent study. Speakers from leading organizations will be invited, where possible, to deliver invited talks and enhance the students' experience.

Students will also be provided with bi-weekly self-assessment quizzes, so that they can reflect on their progress.

Students will be provided with access to specialised software/datasets/scripts/programs, through which they will be able to complete the practical components of the module. The students will obtain the practical sheets from Blackboard and they are expected to follow the instructions included in the practical sheets to complete the lab work. If students have difficulties with a particular exercise, they are expected to contact the module tutor or post a question on the discussion forum, where the module tutor and/or their peers can provide feedback. Different means of communication will be utilized by the tutor to offer support to the students based on the reported issue, i.e. email, Skype, MS Teams, etc.

ASSESSMENT METHODS

This module is assessed through one Portfolio of coursework and one Exam.