Module Specification

Introduction to Databases

Version: 2023-24, v2.0, 19 Jul 2023

Contents

Part 1: Information

Module title: Introduction to Databases

Module code: UFCFTK-30-1

Level: Level 4

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

Field: Computer Science and Creative Technologies

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: See learning outcomes

Outline syllabus: Relational Model: terminology, keys, integrity, relational algebra.

SQL: (using a suitable dbms e.g. Mysql), table creation and maintenance, queries,

calculations and functions, groups and group functions, joining tables, subqueries, views.

Database Design Process: Database Design and Normal Forms

Data Modelling: entity-relationship model, use of ER diagrams in database design, relationships, keys. Conceptual and logical model. Use of UML notation for conceptual model. OO Modelling.

Normalisation: functional dependency, normal forms 1NF, 2NF, 3NF, data redundancy and update anomalies.

Transaction Management: Serialisability, concurrency control, locking, granularity, 2PL, deadlock, timestamping.

Query Processing and Optimisation Query and query trees, transformation to equivalent relational algebra expressions, comparison of rule based v. cost bases strategies. Physical consideration of optimisation: clustering and striping. Goals in optimization and summary of conditions.

Performance Tuning: Indexing and efficiency; B trees, B+trees. Denormalisation, disk storage, security and integrity.

Backup and recovery: problems, transaction logging, recovery techniques.

Weaknesses of relational DBMSs.

Alternatives to Relational databases Relational vs Non Relational approaches, Overview of NoSQL database categories and types.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning:

The main material in the module will be introduced in lectures. This theoretical exposure to the material will then be supplemented by practical lab sessions using a relational database, like Mysql. Also, a programming language will be introduced working with a database. The students will also get experience working with a noSQL database.

Independent learning:

In addition, students will be expected to develop independent learning approaches through directed reading, study and self-paced quizzes and exercises to reinforce, critically appraise and reflect upon concepts and techniques presented in lectures.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Understand the principles of relational databases, relational algebra and SQL rate a proficiency in writing Structured Query Language

MO2 Understand the database design steps within the systems development life cycle and be able to differentiate among conceptual, logical, and physical database design

MO3 Demonstrate knowledge of different approaches to data and object modelling by producing models for some simple problems

MO4 Acquire the necessary skills to develop an end to end application

MO5 Understand how SQL is executed internally and be able to construct query trees and understand query evaluations and optimization techniques

MO6 Have some knowledge and experience at alternative approaches to storage and also alternative approaches to relational model e.g. NoSQL databases

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufcftk-30-1.html

Part 4: Assessment

Assessment strategy: The assessment strategy will consist of two coursework tasks. Both tasks will be based on material covered in lectures and practicals, with guidance offered to the students during practicals.

At both first sit and resit, the assessment tasks are:

- Task 1 (40%): This involves assessing the different stages of a database design.

-Task 2 (60%): Students will design and implement a small end-to-end database application. A mandatory demonstration of the application will be scheduled and will be used to support the marking of this task.

Opportunities for formative feedback are built into module delivery. Guidance and feedback will be provided through self-directed learning, class activities, in-class discussions and also by giving feedback on Lab exercises.

Assessment tasks:

Written Assignment (First Sit)
Description: Database Design
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Written Assignment (First Sit)
Description: Implementation, Testing and Evaluation of Database Application (with a Demo)
Weighting: 60 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO4, MO5, MO6

Written Assignment (Resit)
Description: Database Design
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Written Assignment (Resit)
Description: Implementation, Testing and Evaluation of Database Application (with a Demo).
Weighting: 60 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Cyber Security and Digital Forensics [Frenchay] BSc (Hons) 2023-24

Cyber Security and Digital Forensics [NepalBrit] BSc (Hons) 2023-24

Cyber Security and Digital Forensics {Foundation} [Frenchay] BSc (Hons) 2022-23