

Pre-Requisite Modules code(s)	Co-Requisite Modules code(s)	ECTS credits	Module Code	Module Title
CMPU2007, CMPU3010		5	CMPU4002	Advanced Data Management

8.7.1. Advanced Data Management

Module author: Patricia O'Byrne and Databases Group

Module Description:

This module develops the student's ability to manipulate stored data and reformat data for storage or transport. The student learns to optimise queries in a relational database, use middleware to attach between client and server, implementing constraints and propagating errors where appropriate. The student learns to evaluate the correct storage and transport format for data, looking at a range of techniques such as relational data, object-oriented data and XML.

Module aim

The aim of this module is to...

- Convert data from one model paradigm to another.
- Store, manipulate and retrieve data from objects and XML in a relational database.
- Optimise the storage, retrieval and transport of data.

Learning Outcomes:

On completion of this module, the learner will be able to.....

- Demonstrate an understanding of Relational Algebra and calculus, applying them to complex queries to solve and optimise them.
- Evaluate and discriminate between the methods of constraint implementation and checking.
- Store and manipulate objects in an object relational database.
- Convert object models to relational models.
- Evaluate the appropriateness of storage structures to different application areas.
- Discuss and implement storage structures and models in XML, and how to query them using XPATH.
- Evaluate the application of SQL/XML and XQuery in converting data between relational and XML structures.

Learning and Teaching Methods:

This module will be delivered over four hours per week for one Semester. This will consist of one hour lecture, one hour tutorial and one two-hour laboratory session. During the lecture, new material will be disseminated. Techniques will be applied in the practical laboratory sessions. Where appropriate, students will work in teams. The tutorials will review theory and practice, to prepare them for practical and examination work, in accordance with the requirements of the students. A virtual learning environment and a central database may be used for this module.

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Module content:

Expressing queries in relational algebra and relational calculus. Using DeMorgan's theorem to rephrase queries. Advanced queries and optimising them. Verification and validation using client-side processing, triggers and table constraints. Types and Object representation in a large-scale hybrid relational database. Conversion of data models from object to relational and from relational to object and associated issues. XML, SQL/XML, XQuery, XPath. Criteria for choosing storage and transport mechanisms for data.

Module Assessment

Module will be assessed by both non-exam and examination assessment. Students must pass the entire module.

Essential Reading:

Elmasri & Navathe, 2007, 'Fundamentals of Database Systems' 5th Ed., Addison Wesley.

Depending on database being used:

- Sunderraman, R., 2007, 'Oracle 10g Programming: A Primer, Addison Wesley
- Sack, J., 2008, SQL Server 2008 Transact-SQL Recipes: A Problem-Solution Approach, APress
- Geschwinde, E., 2001, PostgreSQL Developer's Handbook, 2nd Ed., Sams

Supplemental Reading:

Connolly & Begg, 2009, 'A practical approach to design, implementation and management' 5th ed. Addison Wesley

Web references, journals and other:

www.oracle.com

www.postgresql.org

[http://msdn.microsoft.com/en-us/library/bb510741\(SQL.100\).aspx](http://msdn.microsoft.com/en-us/library/bb510741(SQL.100).aspx)

webcourses.dit.ie

Further Details:

e.g. laboratory sessions limited to 20 – 25 by lab size. 4 contact hours per week. To be delivered in one semester.

Date of Academic Council approval