TITLE: Advanced Database Concepts
CODE: CIF302
CREDITS: 20
LEVEL: 3
SCHOOL: Computing and Technology
MODULE BOARD: IFS
PRE-REQUISITES: CIF202
CO-REQUISITES: None
LEARNING HOURS: 200, the nature of which is specified in the module guide

LEARNING OUTCOMES
Upon successful completion of this module, students will have demonstrated:
1. Critical analysis of current and new data models and database systems
2. Assessment of current and emerging trends in database developments

and the ability to:
3. Compare and contrast the features of different database development technologies
4. Critically evaluate the major developments and issues within the database arena

CONTENT SYNOPSIS
The content will be updated each year in order to reflect current trends in database development. Topics may include:-
Enhanced data models for advanced applications, e. g. Active Database Concepts, Temporal DB concepts. Object Relational databases, Very Large Databases along with attendant performance issues, e.g. optimisation. Advanced Database applications, e.g. supporting Call Centres, Multimedia databases. Data warehousing. Data mining and commercial data mining tools. Data Management Issues. Database Architectural issues. Distributed databases, including e.g. GRID, Databases on the World Wide Web, Mobile Databases.

TEACHING AND LEARNING METHODS:
The module will be delivered through a number of sessions including lectures, seminars and tutorials which, where possible, will be delivered by guest speakers. Tutorials and seminars will be student led via short group presentations and group work on a chosen theme. Students will be encouraged to form an evaluative approach, and further encouraged to take critical account of issues raised in discussion in their research based papers.

Learning Strategy:

Sessions (lectures/tutorials):	45 hours
Self-study:	155 hours

ASSESSMENT METHODS
Assessment will be by an individualised portfolio which will include at least one research paper, at least one practical exercise and at least one presentation, with a critique demonstrating how the portfolio relates to the module learning outcomes. There will also be a 2 hour exam at the end of the module
(a) Portfolio: 50%
(b) Exam: 50%

INDICATIVE READING LIST
Connolly, T and Begg C: Database Systems, 4th edition – A Practical Approach to Design, Implementation, and Management. Addison Wesley, 2005.

PROGRAMMES USING THIS MODULE AS CORE/OPTION:
(a) BA Business Computing (option)
(b) BSc Computing (option)

Franchised:

MODULE AUTHOR David Nelson

October 2004

Supplementary Information

Module: Advanced Database Concepts

AMPLIFIED CONTENT

This module will expand on content covered in CIF102 and CIF202, taking a more in depth look at a number of current areas in the database arena. Students will begin by gaining in depth understanding of the relational data model and associated features, including an understanding of the relational algebra operators and their similarity to SQL. Students will also examine advanced relational database design, looking at concepts such as functional dependency, correctly identifying and specifying keys, and normalisation past third normal form. The module will then move on to look at other newer generation data models, so that students have an appreciation of the suitability of various data models for different types of applications, including call centres, multimedia databases, distributed database applications, e.g. Grid, and web and e-commerce database applications. Specifically, at least relational, object-oriented and object-relational data models will be compared and contrasted, and students will have knowledge of the use of these models, query languages in each model and the problems and difficulties with each model.

The module will then look at advanced database design aspects such as the use of UML techniques for design of object database systems, and why for example traditional design techniques such as E-R modelling are not appropriate. It will then look at other aspects such as benchmarking, prototyping and optimisation, again considering various data models and also ensuring that students have an understanding of why these areas are important, especially for example for very large databases. Students will realise the importance of consistent and valid database design ensuring integrity and correctness of data, with performance characteristics in mind.

The module will then look at other aspects such as Internet and distributed databases, covering various issues. Also, security will play an important role throughout the module as protecting data within databases and during transmission is becoming an important research area.

Other database applications will then be considered, for example, temporal databases, very large databases, data warehousing, data mining, web warehousing and interoperable systems. XML will play an important role as one of the current trends in database integration.

A number of learning techniques will be used during the module, where lecture sessions, discussion sessions, research-based student and guest presentations, seminars, tutorials and group work will all be used during the module, and will feed directly in to their assessment portfolio.

Students will produce an individualised portfolio as the coursework for the module, where at an early stage in the module they will produce a learning contract which will state the portfolio items they will produce and how this meets the learning outcomes. Peer review will play a role in this portfolio to further enhance their critical skills during the module, and students will also have to demonstrate management and control of their portfolio to show that they can critically assess their own knowledge gained during the module.

Students will also be assessed by use of an exam which again will test their critical understanding of the learning outcomes for the module.

READING LIST

1. Elmasri, R and Navathe, S B: Fundamentals of Database Systems (3rd edition), Addison Wesley 2000.
2. Date, CJ: An Introduction to Database Systems, 8th edition, Addison Wesley, 2004.

Students will also be expected to read and evaluate a number of research papers on topical database areas from conference proceedings and journals, e.g. BNCOD, VLDB, ACM TODS, ACM SIGMOD.

SPECIALISED RESOURCE REQUIREMENTS

Standard CAT computing facilities with unix/linux support.