

Module Code	Pre-requisite Module codes	Co-Requisite Modules code(s)	ISCED Code	Subject Code	ECTS Credits	NFQ Level (CPD)#
CMPU3002	CMPU2006				10	7
Module Title	Advanced Database Systems					

Advanced Database Systems

School Responsible:	School of Computing
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Module Overview:

This module builds on the introduction to database concepts and technologies provided in Database Systems by presenting advanced implementation aspects of the relational database model, It also presents the concept of dimensional models from a technical perspective and introduces emerging database models such as NOSQL systems and emerging technologies such as data mining.

Learning Outcomes (LO): (to be numbered)

For a 5ECTS module a range of 4-10 LOs is recommended

On Completion of this module, the learner will be able to

1	demonstrate an understanding of advanced implementation concepts for the relational database model and analyse the implications of those concepts
2	discuss the limitations of the relational database model
3	compare the various architectures for distributed databases and analyse the issues involved in distributed database design
4	compare, contrast and analyse the various emerging technologies for database systems
5	analyse strengths and weaknesses of the applications of database technologies to various subject areas
6	Implement and design dimensional models for data intensive applications
7	implement a NOSQL database systems using appropriate tools and techniques
8	Demonstrate an understanding of the basic concepts of data mining and knowledge discovery from data.

Indicative Syllabus:

- Advanced Database Normalization
- Query Processing, Optimization, and Database Tuning

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<ul style="list-style-type: none"> • Physical Database Design and Tuning • Transaction Processing, Concurrency Control, and Recovery • Dimensional modeling: star schema, snowflake schema • The ETL process overview • Data Mining, Data Warehousing and OLAP • Distributed Databases and the CAP theorem • Introduction to NOSQL database systems • NOSQL document-based databases • Graph-based databases

Learning and Teaching Methods:	
The course delivery involves a combination of lectures and labs which may incorporate the use of blended learning techniques as appropriate throughout the delivery.	
Total Teaching Contact Hours	39
Total Self-Directed Learning Hours	148

Module Delivery Duration:
This module is delivered over one semester

Assessment		
The methods of assessment to be used to measure the learning objectives stated above are written examination and continuous assessment including one or more of assignment, essay, problem-solving exercise, oral presentation, and class or lab tests.		
Assessment Type	Weighting (%)	LO Assessment (No.)
Final Exam	70%	1,2,3,4,5,6,7,8
Continuous Assessment	30%	1,2,6,7,8
Module Specific Assessment Arrangements (if applicable)		
(a) Derogations from General Assessment Regulations		

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(b) Module Assessment Thresholds	
(c) Special Repeat Assessment Arrangements	

Essential Reading: (author, date, title, publisher)

Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, 6th ed.; Addison-Wesley, 2011; ISBN: 9780132144988

Banker, Kyle. MongoDB in action. Manning Publications Co., 2011.

C. Adamson. Star Schema: the complete reference. McGraw-Hill 2011, ISBN-13: 978-0071744324

Kimball, Ralph, and Margy Ross. The data warehouse toolkit: the complete guide to dimensional modeling. John Wiley & Sons, 2011.

Kristina Chodorow. MongoDB, the Definitive Guide. O'Reilly Publishing, 2014

Membrey, Peter, Eelco Plugge, and DUPTim Hawkins. The definitive guide to MongoDB: the noSQL database for cloud and desktop computing. Apress, 2011.

Rik Van Bruggen, Learning Neo4j, Packt Publishing, 2015

Supplemental Reading

P. Tan, M. Steinbach, V. Kumar. *Introduction to Data Mining*. Pearson New International Edition, 2016

C. Adamson. Star Schema: the complete reference. McGraw-Hill 2011, ISBN-13: 978-0071744324
7.

Web references, journals and other

Technologies:

MongoDB Documentation:

Neo4j Documentation:

Weka documentation:

Version No:		Amended By	
Commencement Date		Associated Programme Codes	

Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned

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*Details of the assessment schedule should be contained in the student handbook for the programme stage.

Date of Academic Council approval

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