

COMP3350: Advanced Database

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	This course provides students with theoretical knowledge and practical skills in advanced topics in database systems, big data and modern data-intensive systems. Specific topics include indexing methods, query processing and optimisation strategies for relational database systems, Object Relational Mapping and Object Database design, distributed database systems, and data mining on large databases.
Academic Progress Requirements	Nil
Requisites	You cannot enrol in this course if you have successfully completed INFT3007.
Assumed Knowledge	COMP1140 Database & Information Management and either INFT1004 Introduction to Programming or SENG1110 Object Oriented Programming
Contact Hours	Callaghan Lecture Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1 Workshop Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1
Unit Weighting Workload	10 Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
A/Pr Suhuai Luo
Suhuai.Luo@newcastle.edu.au
(02) 4985 4508
Consultation: Thu 11am - 12pm. Email for appointment.

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Information and Physical Sciences**
SR233, Social Sciences Building
Callaghan
CESE-SIPS-Admin@newcastle.edu.au
+61 2 4921 5513
9am-5pm (Mon-Fri)

SYLLABUS

Course Content 1. DBMS Internals

- Storage and Indexing
- Query Processing and Optimization
- Concurrency Control
- Crash Recovery

2. Physical Database Design and implementation issues3. Object Relational Mapping (ORM)4. Big Data and Parallel and Distributed databases (topics such as role of NoSQL, Map-reduce, Hadoop platform etc.) 5. Contemporary issues and emerging technologies such as On-Line Analytical Processing (OLAP), Data Warehouses, database-as-a-service (DB clouds)

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Design, develop and implement a mid-scale relational database for an application domain using a commercial-grade RDBMS
2. Identify and resolve physical database design and implementation issues
3. Use the persistence framework of chosen language to perform Object Relational Mapping
4. Research, analyse and use emerging technologies such as Big Data, NoSQL, On-Line Analytical Processing (OLAP) and Data Warehouses
5. Have hands-on experience with a number of contemporary information management systems

Course Materials

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

-

Course Assessment Requirements:

- Assessment 4 - Final exam: Pass requirement 40% - Must obtain 40% in this assessment item to pass the course.

Compulsory Placement and WHS Requirements:

-

SCHEDULE

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Written Assignment 1	April 3, 5pm	Group	25%	1, 2, 3, 5
2	Written Assignment 2	May 1, 5pm	Group	20%	4, 5
3	Written Assignment 3	May 29, 5pm	Individual	20%	4, 5
4	Final exam*	Formal examination period	Individual	35%	1, 2, 3, 4, 5

* This assessment has a compulsory requirement.

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Written Assignment 1

Assessment Type

Written Assignment

Purpose

Students will demonstrate their skills in conceptual modelling, mapping EER-Relational, Normalisation, and Advanced SQL.

Description

In the assignment, student groups will develop, implement and present a RDBMS solution for a given problem domain. Students will demonstrate their skills in conceptual modelling, mapping EER-Relational, Normalisation, and Advanced SQL. In addition to the online submission of all code and related documentation, students will demonstrate their assessment to the tutor in a lab class.

Weighting

25%

Due Date

April 3, 5pm

Submission Method

In Class
Online

Assessment Criteria

See assignment specifications

Return Method

In Class

Feedback Provided

In Class - .

Opportunity to

Students WILL NOT be given the opportunity to reattempt this assessment.

Reattempt

Assessment 2 - Written Assignment 2

Assessment Type

Written Assignment

Purpose

Students will develop, implement and present a Business Intelligence (BI) report.

Description

In this assignment, student groups will develop, implement and present a Business Intelligence (BI) report for a given context. In addition to the online submission, students will present their assessment to the class.

Weighting

20%

Due Date

May 1, 5pm

Submission Method

In Class
Online

Assessment Criteria

See assignment specifications

Return Method

Not Returned

Feedback Provided

In Class - .

Opportunity to

Students WILL NOT be given the opportunity to reattempt this assessment.

Reattempt

Assessment 3 - Written Assignment 3

Assessment Type	Written Assignment
Purpose	Study NoSQL data store and product.
Description	Students will select one NoSQL data store (Key-Value, Graph Databases, Column-based, Document Store, etc.) and a product that implements the selected technology, and write a research report on the NoSQL data store and product.
Weighting	20%
Due Date	May 29, 5pm
Submission Method	In Class Online
Assessment Criteria	See assignment specifications.
Return Method	Not Returned
Feedback Provided	In Class - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Final exam

Assessment Type	Formal Examination
Purpose	To provide students the opportunity to demonstrate their learning in the course in an exam setting.
Description	This is a formal examination providing students the opportunity to demonstrate their learning in the course in an exam setting.
Weighting	35%
Compulsory Requirements	Pass requirement 40% - Must obtain 40% in this assessment item to pass the course..
Due Date	Formal examination period
Submission Method	Online
Assessment Criteria	Marks specified for each question
Return Method	Not Returned
Feedback Provided	No Feedback - .
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods	Communication methods used in this course include: Communication methods used in this course include: - Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site. - Email: Students will receive communications via their student email account. - Face to Face: Communication will be provided via face to face meetings or supervision.
Course Evaluation	Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.
Oral Interviews (Vivas)	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure . In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule .
Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35 .
Adverse Circumstances	The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where: <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;3. you are requesting a change of placement; or4. the course has a compulsory attendance requirement. Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.
Other Information	GRADUATE PROFILE STATEMENTS The following table illustrates how this course contributes towards building the skills students will need to work in their profession. Level of capability <ul style="list-style-type: none">• Level 1 indicates an introduction to a topic at a university level• Levels 2 and 3 indicate progressive reinforcement of that topic• Level 4 indicates skills commensurate with a graduate – entry to professional practice• Level 5 indicates highly specialist or professional ability Bachelor of Computer Science

GRADUATE PROFILE STATEMENTS

The following table illustrates how this course contributes towards building the skills students will need to work in their profession.

Page 5 of 7

COMP3350: Advanced Database
Callaghan and Ourimbah Semester 1 - 2023



Level of capability

- Level 1 indicates an introduction to a topic at a university level
- Levels 2 and 3 indicate progressive reinforcement of that topic
- Level 4 indicates skills commensurate with a graduate – entry to professional practice
- Level 5 indicates highly specialist or professional ability

Bachelor of Computer Science

	University of Newcastle Bachelor of Computer Science Graduate Profile Statement	Taught	Practised	Assessed	Level of capability
1	Knowledge of basic science and computer science fundamentals	X	X	X	3
2	In depth technical competence in the discipline of computer science	X	X	X	4
3	An ability to carry out problem analysis, requirements capture, problem formulation and integrated software development for the solution of a problem	X	X	X	4
4	Capacity to continue developing relevant knowledge, skills and expertise in computer science throughout their careers	X	X	X	3
5	An ability to communicate effectively with other Computer Scientists, Software Engineers, other professional disciplines, managers and the community generally	X	X	X	3
6	Ability to undertake and co-ordinate large computer science projects and to identify problems, their formulation and solution				
7	Ability to function effectively as an individual, a team member in multidisciplinary and multicultural teams and as leader/manager with capacity to assist and encourage those under their direction				
8	Understanding of social, cultural, global and business opportunities of the professional computer scientist; understanding the need for and principles of sustainability and adaptability				
9	Understanding of professional and ethical responsibilities and a commitment to them				
10	Understanding of entrepreneurship, need of and process of innovation, as well as the need of and capacity for lifelong learning				

Bachelor of Information Technology

	University of Newcastle Bachelor of Information Technology Graduate Profile Statement	Taught	Practised	Assessed	Level of capability
1	Demonstrate a comprehensive understanding of the discipline of information technologies with an emphasis on net-centric applications, information management, and user requirements for ethical professional practice	X	X	X	3
2	Apply critical reasoning and systems thinking to understand and support the operation and	X	X	X	3

Page 6 of 7

COMP3350: Advanced Database
Callaghan and Ourimbah Semester 1 - 2023



3	constraints of contemporary enterprises and their dynamic environment.				
	Work independently and collaboratively to locate, manage and organise information and resources and apply evidence-based methodologies to create, modify and maintain designs and design solutions.	X	X	X	4
4	Use creativity, problem solving skills, project management skills and technical expertise to analyse, interpret, evaluate and generate solutions to complex technical and organisational problems.	X	X	X	4
5	Demonstrate professional judgement and responsibility by communicating information technology principles, practices, standards to specialist and non-specialist audience clearly and persuasively.	X	X	X	3

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

© 2024 The University of Newcastle, Australia