



# ISYS224

## Database Systems

S2 Day 2016

*Dept of Computing*

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## General Information

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Credit points

3

Prerequisites

ISYS114

Corequisites

Co-badged status

### Unit description

This unit provides an in-depth study of modern database technology and its dominant role in developing and maintaining enterprise information systems. The aim is to teach students how to program database applications. The emphasis is placed on business applications, using Structured Query Language (SQL) as an interactive and a programmatic language, on principles of the relational-database model, and on fundamental components of a client-server database-management system. Practical work involves the use of a commercial database-management system together with programming tools.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

Demonstrate understanding of the basic concepts that underlie modern database management systems

Design and develop small, functional database applications using modern database design methods

Use industrial-strength database tools and interactive development environments

Practice database programming using SQL

Develop an appreciation of the challenges in data storage and management

## General Assessment Information

### LATE SUBMISSION OF ASSESSMENT TASKS

No extensions will be granted. Students who have not submitted an assessment task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for Disruption to Studies for that task is made and approved.

### STANDARDS

Four standards, namely Developing, Functional, Proficient, and Advanced, summarize as many different levels of achievement. Each standard is defined to help students know what kind of performance is expected to deserve a certain mark. The standards corresponding to the learning outcomes of this unit are given below:

Criteria	Standards
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<b>LO#1</b>	Represents a student who has demonstrated inaccurate knowledge of database concepts	Represents a student who has demonstrated broad knowledge of database concepts but with limited understanding	Represents a student who has demonstrated critical analysis skills in fundamental database concepts	Represents a student who has demonstrated critical analysis skills in fundamental database concepts who also has exceptional analytical and critical thinking capability
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<b>LO#2</b>	Represents a student who has limited database design and development skills.	Represents a student who has capability to design and develop functional database with documentation.	Represents a student who has capability to design and develop functional and highly maintainable database, with documentation.	Represents a student who has capability to design and develop functional and highly maintainable database, with documentation and familiarity with tools and interactive development environments, and has exceptional ability to solve challenging database problems
<b>LO#3</b>	Represents a student with very limited ability to use database tools and interactive development environments	Represents a student who has familiarity with tools and interactive development environments	Represents a student very familiar with tools and interactive development environments with good ability to solve database problems.	Represents a student very familiar with tools and interactive development environments, and has exceptional ability to solve challenging database problems.
<b>LO#4</b>	Represents a student with very limited database programming skills.	Represents a student who is comfortable with database programming.	Represents a student very familiar with database programming and quite able to implement solutions to database problems.	Represents a student with exceptional database programming skills and able to implement maintainable solutions to challenging database problems.
<b>LO#5</b>	Represents a student with limited appreciation of the data storage and management concepts.	Represents a student with a good understanding of the challenges that data storage and management involve.	Represents a student with a good understanding of the challenges data storage and management involve, and some the means to resolve them.	Represents a student with an exceptional understanding of the challenges data storage and management involve, and ability to provide creative solutions to such challenges.

## GRADING

At the end of the semester, you will receive a grade that reflects your achievement in the unit

- **Fail (F):** does not provide evidence of attainment of all learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; and incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.
- **Pass (P):** provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of

study; and communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.

- **Credit (Cr)**: provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; plus communication of ideas fluently and clearly in terms of the conventions of the discipline.
- **Distinction (D)**: provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
- **High Distinction (HD)**: provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application.

The final mark for the unit will be calculated by combining the marks for all assessment tasks according to the percentage weightings shown in the assessment summary. However, note that *the final examination in this unit is a hurdle requirement. You must get a mark of at least 40% in the examination to pass the unit. If you get a mark of at least 30% in your first attempt at the final examination you will be given a second and final attempt.* Concretely, you will pass the unit if you

- obtain a total mark of 50% or higher and a mark of 40% or higher in the final examination;
- demonstrate that you can perform at a Functional level or higher for each criterion assessed in the three assignments;
- reach a Functional level or higher for each criterion assessed in the final examination.

In order to obtain a higher grade than a Pass, you have to fulfil additional conditions. Namely, you must demonstrate and apply your knowledge of fundamental database concepts consistently

- at an Advanced level and have a total mark of 85% or higher to obtain **High Distinction**;
- at least at a Proficient level and have a total mark of 75% or higher to obtain **Distinction**;
- at least at a Proficient level and have a total mark of 65% or higher to obtain **Credit**.

## Assessment Tasks

Name	Weighting	Due
<a href="#">Diagnostic Test</a>	10%	Week 3
<a href="#">Assignment 1</a>	20%	Week 7
<a href="#">Assignment 2</a>	20%	Week 12
<a href="#">Final Examination</a>	50%	TBA

### Diagnostic Test

Due: **Week 3**

Weighting: **10%**

The focus of the diagnostic test will be on conceptual modeling of databases.

On successful completion you will be able to:

- Demonstrate understanding of the basic concepts that underlie modern database management systems

### Assignment 1

Due: **Week 7**

Weighting: **20%**

Assignment 1 will focus on logical design and implementation of databases

On successful completion you will be able to:

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Use industrial-strength database tools and interactive development environments
- Practice database programming using SQL

### Assignment 2

Due: **Week 12**

Weighting: **20%**

Assignment 2 will assess certain fundamental aspects of database systems including database programming..

On successful completion you will be able to:

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Use industrial-strength database tools and interactive development environments
- Practice database programming using SQL
- Develop an appreciation of the challenges in data storage and management

## Final Examination

Due: **TBA**

Weighting: **50%**

The final examination will assess students' understanding of the fundamental concepts behind database management systems, and their skills in database programming and development.

On successful completion you will be able to:

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Practice database programming using SQL
- Develop an appreciation of the challenges in data storage and management

## Delivery and Resources

### CLASSES

Each week you should attend three hours of lectures, a tutorial and a practical session. For details of days, times and rooms consult the [timetables webpage](#).

**Note that Tutorials and Practicals commence in week 2.** You should have selected a practical session during enrolment. **You should attend the practical session you are enrolled in.**

If you do not have a class, or if you wish to change one, you should see the enrolment operators in the E7B courtyard during the first two weeks of the semester. Thereafter you should go to the Student Centre.

Please note that you are **required** to hand in all the assessed work in this unit. Failure to do so

may result in you failing the unit or being excluded from the exam.

## REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

### Textbook

The textbooks listed below cover much of the required material that will be used in preparation of lectures and/or assignments and/or practicals.

- Thomas Connolly and Carolyn Begg. *Database Systems. A Practical Approach to Design, Implementation, and Management*, Sixth Edition, Pearson, 2015, ISBN-13: 978-1-292-06118-4
- Niles Shah. *Database Systems Using Oracle: A Simplified Guide to SQL and PL/SQL*, Second Edition, Pearson, 2004, ISBN-10: 0131018574

For some parts of learning, other necessary material will be made available on the ISYS224 iLearn site.

## UNIT WEBPAGE AND TECHNOLOGY USED AND REQUIRED

Digital recordings of lectures are available from **echo360** at iLearn. Read these [instructions](#) for details.

### Websites

The web page for this unit can be found at <http://ilearn.mq.edu.au>

### Technology

In this unit you will be exposed to the following technology and tools

- Oracle - Database Management System
- Powerdesigner - Data Modeling Software Tool

### Discussion Boards

The unit will make use of discussion boards hosted within iLearn. Please post questions there, they will be monitored by the staff on the unit regularly.

## Unit Schedule

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1	Introduction to Databases: Relational model	Connolly & Begg, Chapters 1,2,4
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2	Database modeling (ER modeling, EER modeling)	Connolly & Begg, Chapters 12-13
3	Conceptual & Logical Database design	Connolly & Begg, Chapters 16-17
4-6	Data Manipulation and Database Normalisation	Connolly & Begg, Chapters 6, 14-15 Shah, Chapters 4-8
7	Relational Algebra	Connolly & Begg, Chapter 5
Recess		
8-9	Advanced SQL (PL/SQL)	Connolly & Begg, Chapter 8 Shah, Chapters 10-14
10	Transaction management	Connolly & Begg, Chapter 22
11	Concurrency control, Recovery	Connolly & Begg, Chapter 22 (and Lecturer provided)
12	Data Storage and Management	(Lecturer Provided)
13	Revision	Lecturer Provided

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public <http://www.mq.edu.au>

[u/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcome

- Develop an appreciation of the challenges in data storage and management

#### Assessment tasks

- Assignment 2
- Final Examination

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcomes

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Use industrial-strength database tools and interactive development environments
- Develop an appreciation of the challenges in data storage and management

#### Assessment tasks

- Assignment 1
- Assignment 2
- Final Examination

### Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships

with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

## **Learning outcome**

- Develop an appreciation of the challenges in data storage and management

## **Assessment tasks**

- Assignment 2
- Final Examination

## **Discipline Specific Knowledge and Skills**

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## **Learning outcomes**

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Use industrial-strength database tools and interactive development environments
- Practice database programming using SQL
- Develop an appreciation of the challenges in data storage and management

## **Assessment tasks**

- Diagnostic Test
- Assignment 1
- Assignment 2
- Final Examination

## **Critical, Analytical and Integrative Thinking**

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and

systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## **Learning outcomes**

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Develop an appreciation of the challenges in data storage and management

## **Assessment tasks**

- Diagnostic Test
- Assignment 1
- Assignment 2
- Final Examination

## **Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## **Learning outcomes**

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Develop an appreciation of the challenges in data storage and management

## **Assessment tasks**

- Assignment 1
- Assignment 2
- Final Examination

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms

effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

- Demonstrate understanding of the basic concepts that underlie modern database management systems
- Design and develop small, functional database applications using modern database design methods
- Develop an appreciation of the challenges in data storage and management

## **Assessment tasks**

- Diagnostic Test
- Assignment 1
- Assignment 2
- Final Examination