ISYS224

Database Systems

S2 Evening 2014

Computing

Contents

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General Information

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Credit points
3

Prerequisites
ISYS114(P) or COMP114(P) or ISYS154(P) or COMP154(P)

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 database administration

Assessment Tasks

Name	Weighting	Due
Diagnostic assessment	10%	Week 3
Assignment 1	20%	Week 8
Assignment 2	20%	Week 12
Final Examination	50%	TBA

Diagnostic assessment

Due: **Week 3**
Weighting: **10%**

The focus of the first assignment 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 8**
Weighting: **20%**

The second assignment 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%**

This is a turn-it-in written assignment. An anonymised real world database application environment and it's associated challenges will be provided. Students would be required to draw upon the lessons learned in the lectures on database administration to complete the submission.

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 database administration

Final Examination

Due: **TBA**
Weighting: **50%**

For this unit, a final examination is fully appropriate to test learning outcomes #1, 2 and 4. It in particular allows to accurately assess the degree of understanding of fundamental concepts that underlie modern database management systems, database development skills (from conceptual modeling to logical design to physical design), and fundamental programming skills in SQL and PL/SQL. The final examination accounts for 50% of the final mark. The final examination will be held during the examination period right after the semester's end, and will take 3 hours to complete.

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

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 most of the required material and 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*, Fifth Edition, Addison-Wesley, 2010, ISBN-13: 978-0-321-60110-0

- Database Administration: The Complete Guide to DBA Practices and Procedures, 2/ ECraig S. Mullins. ISBN-10: 0321822943, ISBN-13: 9780321822949©2013, Addison-Wesley Professional.

For some parts of learning, the necessary reading (book chapters, codes, slides, etc.) 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

1	Introduction to Databases: Relational model	Connolly & Begg, Chapters 1-4
2	Database modeling (ER modeling, EER modeling)	Connolly & Begg, Chapters 12-13
3	Conceptual & Logical Database design	Connolly & Begg, Chapters 16-17
4	Database Normalisation	Connolly & Begg, Chapter 14-15
5	Data Manipulation, SQL	Connolly & Begg, Chapter 6; Shah, Chapters 5-8
6	Relational algebra and relational calculus	Connolly & Begg, Chapter 5
7	Database System Performance	Craig S Mullins
Recess		
8-10	Database Availability	Craig S Mullins
11	Database Transaction management	Craig S Mullins
12	Concurrency control	Connolly & Begg, Chapter 22; lecturer provided
13	Security Backup & Recovery	Craig S Mullins

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

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy 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/

Late Submission Policy: 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 special consideration for that task is made and approved.

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) 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

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

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 database administration

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 database administration

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
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Assessment tasks

- Diagnostic assessment
- 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 database administration

Assessment tasks

- Diagnostic assessment

- 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 database administration

Assessment tasks

- Assignment 1
- Assignment 2
- Final Examination

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 database administration

Assessment tasks

- 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 database administration

Assessment tasks

- Diagnostic assessment
- Assignment 1
- Assignment 2
- Final Examination

Administration Policies

ADMINISTRATION, POLICIES

Macquarie is developing a number of policies in the area of learning and teaching. Approved policies and associated guidelines can be found at Policy Central. Refer to the Science Centre regarding the implementation of these policies (e.g. precise procedures, forms, deadlines, etc).

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.

Grading

STANDARDS

Four standards, namely Developing, Functional, Proficient, and Advanced, summarize as many different levels of achievement. Each standard is precisely 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:

Knowledge development and Application of Knowledge	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

Database design, development and implementation	Represents a student who has limited database design and development skills, with some very basic demonstration of tools and interactive development environments	Represents a student who has capability to design and develop functional database with documentation and familiarity with tools and interactive development environments	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	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

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.

In this unit, your final grade depends on your performance in each part of the assessment. For each assessment task, you receive a mark that combines your standard of performance regarding each learning outcome assessed by this task. Then the different component marks are added up to determine your total mark out of 100. Your grade then depends on this total mark and your overall standards of performance.

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**.