UNSW Course Outline

COMP3311 Database Systems - 2024

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General Course Information

Course Code : COMP3311
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Computer Science and Engineering
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

This course aims to explore in depth the practice of developing database applications and the theory behind relational database systems. It will also give a very brief overview of the technologies used in implementing database management systems and the past, present and

future of database systems.

Large data resources are critical to the functioning of just about every significant modern computer application. Hence, knowledge of how to manage them is clearly important to the IT industry. In the context of further study, COMP3311 also provides a foundation for further study in advanced database topics, such as COMP9312 Graph Data Analytics, and COMP9315 Database Systems Implementation. Database concepts are also relevant in courses such as COMP9319 Web Data Compression and Search and COMP6714 Information Retrieval and Web Search.

By the end of this course, we want you to be capable of building high-quality (correct and efficient) applications based on relational databases, to have a sound understanding of issues in managing relational database management systems, and an overview of how they work internally.

Course Aims

This course aims to explore in depth the practice of developing database applications and the theory behind relational database management systems (RDBMSs). It will also give an overview of the technologies used in implementing database management systems and the past, present and future of database systems and database research.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : develop accurate, non-redundant data models
CLO2 : realise data models as relational database schemas
CLO3 : Formulate queries via the full range of SQL constructs
CLO4 : Write stored procedures and triggers to extend DBMS capabilities
CLO5 : Write applications in Python that interact effectively with databases
CLO6 : Analyse performance issues in relational database applications

Course Learning Outcomes	Assessment Item
CLO1 : develop accurate, non-redundant data models	• Quizzes - All topics • Final Exam - All topics
CLO2 : realise data models as relational database schemas	• Quizzes - All topics • Final Exam - All topics
CLO3 : Formulate queries via the full range of SQL constructs	• Assignment 1 - SQL/PLpgSQL • Quizzes - All topics • Final Exam - All topics
CLO4 : Write stored procedures and triggers to extend DBMS capabilities	• Assignment 1 - SQL/PLpgSQL • Quizzes - All topics • Final Exam - All topics
CLO5 : Write applications in Python that interact effectively with databases	• Assignment 2 - Python/SQL • Quizzes - All topics • Final Exam - All topics
CLO6 : Analyse performance issues in relational database applications	• Quizzes - All topics • Final Exam - All topics

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quizzes - All topics Assessment Format: Individual	12%	Due Date: Week 2, 3, 4, 7, 8, 10
Assignment 1 - SQL/PLpgSQL Assessment Format: Individual	13%	Due Date: Week 5
Assignment 2 - Python/SQL Assessment Format: Individual	15%	Due Date: Week 9
Final Exam - All topics Assessment Format: Individual	60%	Start Date: Not Applicable Due Date: Exam Period

Assessment Details

Quizzes - All topics

Assessment Overview

Starting in Week 2, there will be online quizzes on topics from previous weeks. This gives you a chance to review what you've learned on those topics. Quizzes are released on Monday mornings and are due before midnight on the following Friday (i.e. 5 days later). Each quiz will have 4 questions. Quizzes are automatically marked.

Course Learning Outcomes

- CLO1 : develop accurate, non-redundant data models
- CLO2 : realise data models as relational database schemas
- CLO3 : Formulate queries via the full range of SQL constructs
- CLO4 : Write stored procedures and triggers to extend DBMS capabilities
- CLO5 : Write applications in Python that interact effectively with databases
- CLO6 : Analyse performance issues in relational database applications

Assignment 1 - SQL/PLpgSQL

Assessment Overview

Students must solve problems by developing queries and functions on a supplied schema and database.

Assignments are auto-marked for correctness and tested for efficiency.

We provide testing harnesses for the assignments so that you can determine whether your code is producing the correct output. The supplied tests will use one instance of the database; the

auto-marking will use these same tests, but will also run tests using one or more different database instances.

Course Learning Outcomes

- CLO3 : Formulate queries via the full range of SQL constructs
- CLO4 : Write stored procedures and triggers to extend DBMS capabilities

Assignment 2 - Python/SQL

Assessment Overview

Devise small application programs in Python that interact with a supplied database.

Assignments are auto-marked for correctness and tested for efficiency.

We provide testing harnesses for the assignments so that you can determine whether your code is producing the correct output. The supplied tests will use one instance of the database; the auto-marking will use these same tests, but will also run tests using one or more different database instances.

Course Learning Outcomes

- CLO5 : Write applications in Python that interact effectively with databases

Final Exam - All topics

Assessment Overview

Exam conducted in the CSE labs in a closed environment, covering all aspects of the course. Students will be expected to write queries on a supplied database, perform data modelling, analyse aspects of a schema/database, etc.

Course Learning Outcomes

- CLO1 : develop accurate, non-redundant data models
- CLO2 : realise data models as relational database schemas
- CLO3 : Formulate queries via the full range of SQL constructs
- CLO4 : Write stored procedures and triggers to extend DBMS capabilities
- CLO5 : Write applications in Python that interact effectively with databases
- CLO6 : Analyse performance issues in relational database applications

Detailed Assessment Description

SQL / PLpgSQL

Assessment Length

3 hours

Hurdle rules

Must score more than 40% on the Final Exam in order to pass the course.

General Assessment Information

Grading Basis

Standard

Requirements to pass course

Students need to score at least 50 out of 100 to pass. Thus, it's necessary to attend the final exam.

quizzes = mark for on-line quizzes (out of 12)

ass1 = mark for assignment 1 (out of 13)

ass2 = mark for assignment 2 (out of 15)

exam = mark for final exam (out of 60)

okExam = exam >= 24 (after scaling)

mark = ass1 + ass2 + quizzes + exam

grade = HD|DN|CR|PS if mark >= 50 && okExam

= FL if mark < 50

= UF if !okExam

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 12 February - 18 February	Lecture	Course intro, Data Modelling, ER diagrams
Week 2 : 19 February - 25 February	Lecture	Relational Model, SQL DDL, Mapping ER to SQL
Week 3 : 26 February - 3 March	Lecture	SQL queries
Week 4 : 4 March - 10 March	Lecture	PLpgSQL functions
Week 5 : 11 March - 17 March	Lecture	Triggers, Aggregates
Week 6 : 18 March - 24 March	Other	Flexibility Week - No lecture and no lab.
Week 7 : 25 March - 31 March	Lecture	DB/PL interaction, Python, Psycopg2
Week 8 : 1 April - 7 April	Lecture	Functional dependencies, Normalization
Week 9 : 8 April - 14 April	Lecture	Relational Algebra, Query execution, Tuning
Week 10 : 15 April - 21 April	Lecture	Transactions, Concurrency control, Database futures, Course review

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Any of the following books is a suitable textbook for this course:

- [Fundamentals of Database Systems](#) , Elmasri and Navathe, 7th edition, 2016, Addison-Wesley
- [Database System Concepts](#) , Silberschatz, Korth, Sudarshan, 6th edition, 2010, McGraw-Hill
- [Database Systems: The Complete Book](#) , Garcia-Molina, Ullman, Widom, 2nd edition, 2008, Prentice-Hall
- [Database Systems: An Application-Oriented Approach](#) Kifer, Berstein, Lewis, 2nd edition (Complete Version), 2006, Addison-Wesley

Choose the one that best suits your learning style and preferences. Also, if you have access to an earlier edition of any of these books (one or two editions less than the one given above), it will be fine for this course.

The textbooks give the greatest detail on the topics covered in the course, but cover many other topics. The Course Notes have less detail, but cover exactly the course syllabus. The Lecture Slides have even less detail, but include the examples discussed in lectures.

The software systems to be used in this course are PostgreSQL, SQLite, Python and psycopg2. The documentation and manuals provided with [PostgreSQL](#) and [Python](#) are actually very good, and the [SQLite](#) and [psycopg2](#) documentation is also reasonable, so you don't need to buy textbooks for these. However, if you feel more comfortable with a book, there are references to a range of books on the web sites for [PostgreSQL](#) , [SQLite](#) , and [Python](#) .

Course Evaluation and Development

This course is evaluated each session using the myExperience system.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Administrator	Dylan Brotherston					No	No
Convenor	Yuekang Li		501-G, K17 Building			No	No
	COURSE EMAIL					Yes	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/ student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/ Moodle/LMS applies.

Academic Honesty and Plagarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - https://nucleus.unsw.edu.au/en/contact-us

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the course convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)