COMP3311 Database Systems - 2023

Course Code: COMP3311
Year: 2023
Term: Term 3
Teaching Period: T3
Delivery Mode: multimodal
Delivery Format: Standard
Delivery Location: Kensington

General Course Information

Course Code: COMP3311
Year: 2023
Term: Term 3
Teaching Period: T3
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

<table>
<thead>
<tr>
<th>Course Learning Outcomes</th>
<th>Assessment Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLO1: develop accurate, non-redundant data models</td>
<td>• Quizzes - All topics</td>
</tr>
<tr>
<td></td>
<td>• Final Exam - All topics</td>
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<tr>
<td>CLO2: realise data models as relational database schemas</td>
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<tr>
<td>CLO3: Formulate queries via the full range of SQL constructs</td>
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<tr>
<td>CLO4: Write stored procedures and triggers to extend DBMS capabilities</td>
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<tr>
<td>CLO5: Write applications in Python that interact effectively with databases</td>
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<tr>
<td>CLO6: Analyse performance issues in relational database applications</td>
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<tr>
<td>CLO7: Understand the overall architecture of relational DBMSs</td>
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<tr>
<td>CLO8: Understand the concepts behind transactions and concurrency control;</td>
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</tbody>
</table>
Learning and Teaching Technologies
Webcms3 | Echo 360

Additional Course Information

The official pre-requisite for this course is that students have taken either COMP2521 or COMP1927.

Whatever the formal pre-reqs, we assume primarily that students have some experience with procedural programming and some knowledge of data structures. Additionally, knowing a little Python and knowing regular expressions would help.

A perpetual problem for COMP3311 is that around half of the class has already covered basic data modelling techniques (specifically ER diagrams) and/or basic SQL in courses such as INF51603 Introduction to Business Databases or COMP1531 Software Engineering Fundamentals. On the other hand, half of the class hasn't seen this material before, so we need to cover it. Those who have seen it before should treat this as revision. Don't make the mistake of thinking "I know all this stuff"; we will definitely cover these areas in more depth than you have seen them previously.
Assessments

Assessment Structure

<table>
<thead>
<tr>
<th>Assessment Item</th>
<th>Weight</th>
<th>Relevant Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1 - SQL/PLpgSQL Assessment FormatIndividual</td>
<td>12%</td>
<td>Start Date-Due Date Week 5</td>
</tr>
<tr>
<td>Assignment 2 - Python/SQL Assessment FormatIndividual</td>
<td>16%</td>
<td>Due Date Week 9</td>
</tr>
<tr>
<td>Quizzes - All topics</td>
<td>12%</td>
<td>Start Date Weekly Due Date Weekly</td>
</tr>
<tr>
<td>Final Exam - All topics</td>
<td>60%</td>
<td>Start Date TBA during Exam Week Due Date Not Applicable</td>
</tr>
</tbody>
</table>

Assessment Details

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.

Detailed Assessment Description

Details are on the course website.

Submission notes

give cs3311 ass1 ass1.sql

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.
Detailed Assessment Description
Details are on the course website.

Submission notes
give cs3311 ass2 *.py *.sql

Assignment submission Turnitin type
This is not a Turnitin assignment

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.

Detailed Assessment Description
Details are on the course website.

Submission notes
Quizzes are on Webcms3

Assignment submission Turnitin type
This is not a Turnitin assignment

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.

Submission notes
Submit via Give

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
quizzes = mark for on-line quizzes (out of 12)
ass1 = mark for assignment 1 (out of 12)
ass2 = mark for assignment 2 (out of 16)
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

Attendance Requirements

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

General Schedule Information

1. **Lecture**: Course intro, Data Modelling, ER diagrams
   **Tutorial**: none
   **Prac Work**: Set up PostgreSQL server, SQLite
2. **Lecture**: Relational Model, SQL DDL, Mapping ER to SQL
   **Tutorial**: Data modelling, ER
   **Prac Work**: Defining a database
   **Quiz #1**
3. **Lecture**: SQL queries
   **Tutorial**: ER -> SQL
   **Prac Work**: SQL queries
   **Assignments**: Ass1 released
   **Quiz #2**
4. **Lecture**: PLpgSQL
   **Tutorial**: SQL
   **Prac Work**: Stored functions
   **Quiz #3**
5. **Lecture**: Triggers, Aggregates
   **Tutorial**: Stored functions
   **Prac Work**: Aggregates
   **Assignments**: Ass1 due (fri)
6. **Flexibility Week... no lectures, no tutorials**
7. **Lecture**: DB/PL interaction, Python, Psycopg2
   **Tutorial**: Triggers
   **Prac Work**: Python meets SQL
   **Assignments**: Ass2 released
   **Quiz #4**
8. **Lecture**: Functional dependencies, normalization
   **Tutorial**: Psycopg2
   **Quiz #5**
9. **Lecture**: Relational Algebra, Query Execution
   **Tutorial**: Normalization
   **Assignments**: Ass2 due (fri)
10. **Transactions**, Concurrency, Database Futures, Course Review
Course Resources

Recommended Resources


Course Evaluation and Development

Feedback on the course as a whole will be acquired via the end-of-term MyExperience instrument.

Feel free to email me about any issues during the term that you think require fixing.

When I last took the course (23T1) students said that

- *the second assignment was too complex*; it will be more straightforward this time
- *the course needs labs*; we'll get the tutors to focus more on practical aspects, and continue to provide prac exercises, which are effectively lab exercises

Staff Details

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Email</th>
<th>Location</th>
<th>Phone</th>
<th>Availability</th>
<th>Equitable Learning Services Contact</th>
<th>Primary Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenor</td>
<td>John Shepherd</td>
<td><a href="mailto:jas@cse.unsw.edu.au">jas@cse.unsw.edu.au</a></td>
<td>K17-410</td>
<td>mail</td>
<td>Yes</td>
<td>cs3311@cse</td>
<td>No</td>
</tr>
<tr>
<td>Administrator</td>
<td>Dylan Brotherston</td>
<td><a href="mailto:d.brotherston@unsw.edu.au">d.brotherston@unsw.edu.au</a></td>
<td></td>
<td>mail</td>
<td>No</td>
<td>cs3311@cse</td>
<td>No</td>
</tr>
<tr>
<td>COMP3311 Class</td>
<td></td>
<td><a href="mailto:cs1521@cse.unsw.edu.au">cs1521@cse.unsw.edu.au</a></td>
<td></td>
<td>email</td>
<td>No</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

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 / Submit rule, which means that if you sit an exam or
submit a piece of assessment, 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.

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 Plagiarism

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:


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 courses 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)

You should never contact any of the following people directly:

- Vice Chancellor

- Pro-vice Chancellor Education (PVCE)

- Head of School

- CSE administrative staff

- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.