

# Databases II (Advanced Databases)

## COMPSCI 4411/9538

### Course Outline

## 1. Course Information

### Course Information

- Course name: Database II (Advanced Databases)
- Course number: COMPSCI 4411/9538 A
- Academic term: Fall 2024
- [REDACTED]
- Time: Tuesdays 12:30-2:30 pm and Thursdays 12:30-1:30 pm

### List of Prerequisites

- COMPSCI 3319A/B or COMPSCI 3120A/B

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

## 2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Mostafa Milani (Course Coordinator)	mostafa.milani@uwo.ca	[REDACTED]		Thursdays 4:00-5:00 pm
Amirhossein Alizad				TBD

Students must use their Western (@uwo.ca) email addresses when contacting their instructors. Please use [cs4411@uwo.ca](mailto:cs4411@uwo.ca) for any course related questions and include the exact text "[CS 4411]" at the beginning of your email title; otherwise your email will not be answered.

Office hours are online (in Zoom) and require completing a sign-up sheet as outlined in OWL.

TA's office hours TBD.

## 3. Course Syllabus, Schedule, Delivery Mode

Databases II (Advanced Databases) is an advanced course in database systems with topics such as data storage, indexing, query execution, query optimization, advanced concurrency control, recovery concepts, and parallel and distributed databases.

**Course-level learning outcomes:**

- Explain how a database management system stores data and allows for quick access.
- Explain the purpose of indexes and database catalogs and how a database management system creates and manages them.
- Explain how a database answers queries and how to choose and execute an optimal plan to run a query evaluation.
- Explain how a database evaluates multiple queries concurrently and optimizes the query evaluation process.
- Determine when to use multiple databases across devices for various applications.
- Improve the performance of databases using tuning techniques.

The course will be delivered in person during the lecture hours. Lecture notes will be posted online in OWL.

#### **Table of contents (tentative):**

- Introduction (Week 1, Sep 5)
- Data Storage (Week 2, Sep 10 and 12)
- Indexing and File Organizations (Weeks 3 and 4, Sep 17, 19, 24 and 26)
- Query Evaluation (Weeks 5 and 6, Oct 1, 3, 8 and 10)
- **Midterm Exam (Week 7, Oct 22, during the lecture time, in class)**
- Query Optimization (Week 7 and 8, Oct 24, 29, and 31)
- Transaction Management and Concurrent Evaluation (Week 9, Nov 5 and 7)
- Transaction Management and Crash Recovery (Week 10, Nov 12 and 14)
- Parallel and Distributed Databases (Week 11, Nov 19 and 21)
- Database Tuning (Week 12 and 13, Nov 26 and 28)
- NoSQL Databases and Course Review (Week 13, Dec 3 and 5)

#### **Key Sessional Dates:**

Classes begin: September 5, 2024

Fall Reading Week: October 12 – 20

Classes end: December 6, 2024

Exam period: December 9 – 22, 2024

## **4. Course Materials**

The lectures are from the following textbook, which is available online:

- [Database Management Systems, 3rd Edition](#), by Gehrke and Ramakrishnan

Supplementary textbooks, also available online:

- [Database Systems Concepts](#), 7th Edition, by Silberschatz, Korth and Sudarshan
- [Database Systems: The Complete Book](#), 2nd Edition, by Garcia-Molina, Ullman, and Widom
- Online material

All course material will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

## 5. Methods of Evaluation

### Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

- Assignments 15% (three assignments, 5% each)
- Midterm exam 20%
- Final exam 30%
- Project 35%

### Tentative list of subjects and dates:

- Assignment 1: Data storage and indexing (available: Sep 12, deadline: Sep 26)
- Assignment 2: Query answering and optimization (available: Oct 31, deadline: Nov 14)
- Assignment 3: Transaction management and crash recovery (available: Nov 14, deadline: Nov 28)
- Midterm exam: Weeks 1-6 (date and time: Oct 22, 12:30-2:30 pm, in class)
- Project (deadline: Dec 6, 11:55 pm)
- Final exam: Weeks 1-13 (date and time: TBD)

### General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration\\_Sep24.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf)

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

[https://registrar.uwo.ca/academics/academic\\_considerations/](https://registrar.uwo.ca/academics/academic_considerations/)

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Practical laboratory and performance tests (Defined by policy)
- Midterm (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration)

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

### Evaluation Scheme for Missed Assessments

All missed assessments require Academic Consideration; otherwise, the student will receive a zero for the assessment. If a student misses the midterm exam, their final exam will be reweighted to include the midterm's portion of the grade. Students who miss the final exam will be required to write a makeup exam. For missed projects or assignments, students will be granted an extension to submit their work.

The last submission date for assignments is one week after the original deadline, as this is when the solutions will be posted. Similarly, the cut-off date for project submissions is one week after the project deadline. If a student fails to meet these cut-off dates, their final exam will be reweighted to account for the missed assignment or project.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

### **Coursework with Assessment Flexibility**

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

**Assignments.** Students are expected to submit each of the three assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 20% per day will be applied. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours).

## **6. Additional Statements**

### **Religious Accommodation**

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>.

### **Accommodation Policies**

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

### **Academic Policies**

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf)

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices are allowed during the examination.

**Scholastic offences** are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>

### Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

[https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html)

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time

management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.