



Department of Computer Science

## Course Outline

### Databases II (Advanced Databases)

### COMPSCI 4411/9538

## 1. Course Information

### Course Information

- Course name: Databases II (Advanced Databases)
- Course number: COMPSCI 4411/9538 A
- Academic term: Fall 2023
- Location: NSC-7
- Time: Tuesdays 12:30-2:30 pm and Thursdays 12:30-1:30 pm
- There is no laboratory or tutorial.

### 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 Counselling) 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

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	MC384		Thursdays 4:00-5:00 pm
Vladimir Zhurov	vzhurov3@uwo.ca	Zoom		Tuesday 3:00-4:00 pm

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.

## 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 7)
- Data Storage (Week 2, Sep 12 and 14)
- Indexing and File Organizations (Weeks 3 and 4, Sep 19,21, 26 and 28)
- Query Evaluation (Weeks 5 and 6, Oct 3, 5, 10 and 12)
- **Midterm Exam (Oct 17, during the lecture time, NSC7)**
- Query Optimization (Week 7 and 8, Oct 19, 24, and 26)
- Transaction Management and Concurrent Evaluation (Week 9, Nov 7 and 9)
- Transaction Management and Crash Recovery (Week 10, Nov 14 and 1)
- Parallel and Distributed Databases (Week 11, Nov 21 and 23)
- Database Tuning (Week 12 and 13, Nov 28 and 30)
- NoSQL Databases and Course Review (Week 13, Week 14, Dec 5 and 7)

### Key Sessional Dates:

Classes begin: September 7, 2023

Fall Reading Week: October 30 – November 5, 2023

Classes end: December 8, 2023

Exam period: December 10 – 22, 2023

### Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

## 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 García-Molina, Ullman, and Widom
- Online material

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

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: <http://owl.uwo.ca>.

## 5. Methods of Evaluation

The overall course grade will be calculated as listed below:

- Assignments 15% (three assignments, 5% each)
- Midterm exam 30%
- Final exam 40%
- Project 15%

### Tentative list of subjects and dates:

- Assignment 1: Data storage and indexing (deadline: Oct 22)
- Assignment 2: Query answering and optimization (deadline: Nov 19)
- Assignment 3: Transaction management and crash recovery (deadline: Dec 3)
- Midterm exam: Weeks 1-6 (date and time: Oct 17, 12:30-2:30 pm)
- Project (deadline: Dec 8, 11:55 pm)
- Final exam: Weeks 1-13 (date and time: TBD)

To pass the course, students must obtain at least 50% of the total mark, at least 50% of the mark for the assignments and the project, and at least 50% of the mark for the midterm exam and the final exam.

## 6. Student Absences

Lecture attendance is not mandatory. If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

### Assessments worth less than 10% of the overall course grade:

The only assessment with less than 10% is one assignment. In case of missing one assignment, the final exam

will be reweighted to cover its mark, and no communication with the course instructor is needed.

### **Assessments worth 10% or more of the overall course grade:**

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

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

If a student misses the midterm, their final will be reweighted to cover for it. If a student misses the final project, or if they miss two or all assignments, their final mark will be incomplete (INC) and they will have to complete these assessments the next time the course will be offered.

### **Absences from Final Examinations**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

## **6. Accommodation and Accessibility**

### **Religious Accommodation**

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### **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).

## 7. Academic Policies

The website for Registrarial Services is <http://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 midterm and final exams. If you are caught using any electronic devices during the exams for any reasons, you will fail the course.**

**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:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://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.

## 8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling 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 the Student Development Centre (<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/>.

