

Western University
Faculty of Engineering
Department of Electrical and Computer Engineering

SE 3309A: Database Management Systems

Course Outline 2023-24

Description: The focus of this course is to teach database fundamentals required in the development and evolution of most software applications. The course introduces the principles of relational database management systems. In particular, the Entity-Relationship approach to data modeling, the relational model of database management systems (DBMS) and the use of structured query languages (SQL) will be covered. The course also covers relational algebra and the use of SQL in a programming environment, and a touch upon security and authorization. Students will learn the practical benefits that stem from using a DBMS to develop software applications. Hands on experience will make use of a state-of-the-art DBMS. Students will develop a small project following software engineering principles with emphasis on designing a schema, loading data and implementing queries for an application.

Academic Calendar Copy:

The focus is to teach database fundamentals required in the development and evolution of most software applications by introducing the principles of relational database management systems such as Entity-Relationship approach to data modeling, relational model of database management systems and the use of query languages.

Contact Hours: 3-lecture hours/week, 2-laboratory hours/week, 0.5 course.

Antirequisite: Computer Science 3319A/B, Computer Science 3320A/B

Prerequisites: SE2203A/B, SE2205A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will 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.

CEAB Academic Units: Engineering Science 70%, Engineering Design 30%.

Required Textbook: T. Connolly & C. Begg, Database Systems: A Practical Approach to Design, Implementation, and Management, Sixth Edition, 2015, Addison Wesley.

General Learning Objectives (CEAB Graduate Attributes)

Knowledge Base (KB)		Use of Engineering Tools (ET)	D	Impact on Society and the Environment (IESE)	
Problem Analysis (PA)	D	Individual and Team Work (ITW)		Ethics and Equity (EE)	
Investigation (IN)		Communication Skills (CS)		Economics and Project Management (EPM)	
Design (DE)	D	Professionalism (PR)		Life-Long Learning (LL)	

Notation: *I: Introductory, D: Developed, A: Applied, or blank.* I – The instructor will introduce the topic at the level required. It is not necessary for the student to have seen the material before. D – There may be a reminder or review, but the student is expected to have seen and been tested on the material before taking the course. A – It is expected that the student can apply the knowledge without prompting (e.g. no review).

Course Objectives and Specific Learning Outcomes		CEAB Graduate Attributes Indicators	Tentative Timeline	Course Requirements
1. Introduction to Database Systems At the end of this section, students will be able to:			Week 1	<ul style="list-style-type: none"> • Group Members and Project Setup • Assignment 1 Start (Requirements Specifications)
a. Identify the importance of databases, the typical functions of Database Management Systems (DBMS), the components of DBMS environments, and the advantages and disadvantages of DBMSs;	PA1			
b. Describe the origins of the relational model and its terminology.	PA1			
2. Conceptual Database Design At the end of this section, students will be able to:			Week 2-3	<ul style="list-style-type: none"> • Assignment 1 Due • Assignment 2 Start
a. Use the Entity-Relationship (ER) modeling in the conceptual database design;	D1			
b. Identify additional data modeling concepts of the Enhanced Entity-Relationship (EER) model for conceptual database design.	D1			
3. Logical Database Design At the end of this section, students will be able to:			Week 4	
a. Derive a set of relations from a conceptual model.	D4			

Course Objectives and Specific Learning Outcomes	CEAB Graduate Attributes Indicators	Tentative Timeline	Course Requirements
4. Normalization At the end of this section, students will be able to:		Week 5-6	
a. Describe the purpose of normalization and undertake the process of normalization;	D2, D3		
b. Validate the set of relations using the technique of normalization.	D2		
5. Relational Algebra At the end of this section, students will be able to:		Week 6-7	Assignment 2 Due
a. Form queries in the relational algebra.	PA2		
6. SQL Data Definition, Constraints, Indexes, and Views At the end of this section, students will be able to:		Week 8	<ul style="list-style-type: none"> • Midterm • Assignment 3 Start
a. Define integrity constraints using SQL.	D1		
Reading Week			
7. SQL Statements: Query, Insert, Update, and Delete At the end of this section, students will be able to:		Week 10-11	Assignment 4 Start
a. Retrieve data from the database, create Indexes, and create Views using SQL;	ET1, ET2, PA3		
b. Perform databases insert, update, and delete using SQL commands.	ET2, ET3		
8. Introduction to NoSQL Databases At the end of this section, students will be able to:		Week 12	Assignment 3 Due
a. Differentiate between traditional relational databases and NoSQL databases in terms of data models, scalability, and typical use-cases;	PA3		
b. Understand and identify the primary types of NoSQL databases: Document, Key-Value, Column-family, and Graph;	ET1		
c. Create basic data models for specific NoSQL databases.	ET2, D3		
9. Transactions and Triggers At the end of this section, students will be able to:		Week 13	

Course Objectives and Specific Learning Outcomes	CEAB Graduate Attributes Indicators	Tentative Timeline	Course Requirements
a. Describe how ISO Transaction model works,	PA2		Assignment 4 Due (Project Demos)
b. Create and use Triggers.	PA2		

Evaluation

Course Component	Weight
Homework/Laboratory Assignments	35%
In class participation	5%
Midterm Test	15%
Final Examination	45%

To obtain a passing grade in the course, a mark of 50% or more must be achieved on the final examination as well as on the assignments. A final examination or assignment mark < 50% will result in a final course grade of 48% or less.

Homework/Laboratory Assignments: There will be 4 assignments in this course as listed in the table below. Students will work in groups, will choose a project topic and work on these 4 assignments based on the chosen and approved topic. By the end of the 4th assignment students will have developed a database application.

Assignment	Description	Weight
1	Requirement specification	5%
2	Relational Model/Normalization	10%
3	Creating the database system in a DBMS	10%
4	Web Interface for the database application	10%

Late Submission Policy: There will be strict deadlines for the assignments. Marks will be deducted for late assignment. 10% per day will be subtracted for late assignment, to a maximum of 3 days late.

Class Participation: Students are expected to attend class and participate to its interactive components. Marks will be assigned for in class participation using methods such as: iClicker, quizziz or Kahoots, at the instructor's discretion.

Laboratory: Students will work on these assignments as a part of the lab sessions and as well as a part of their homework. In the online lab sessions, the TAs will provide clarifications, will answer questions, and provide tutorials to enable the completion of the above assignments.

Midterm Test: There will be one midterm test. The test will be closed book (no books, notes and calculators will be allowed), with a duration of two hours.

Final Examination: The final examination will take place during the regular examination period.

Assignment Submissions are online on the OWL website.

Use of English: In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Attendance: Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the department, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Absence Due to Illness or Other Circumstances: Students should immediately consult with the instructor or department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see the attached “Instructions for Students Unable to Write Tests or Examinations or Submit Assignments as Scheduled”). The student should seek advice from the instructor or department Chair regarding how best to deal with the problem. Failure to notify the instructor or department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

For more information concerning accommodations for religious holidays, see the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Missed Midterm Examinations: If a student misses a midterm examination, the exam will not be rescheduled. The student must follow the Instructions for Students Unable to Write Tests and provide documentation to their department within 24 hours of the missed test. The department will decide whether to allow the reweighting of the test, where reweighting means the marks normally allotted for the midterm will be added to the final exam. If no reasonable justification for missing the test can be found, then the student will receive a mark of zero for the test.

If a student is going to miss the midterm examination for religious reasons, they must inform the instructor in writing within 48 hours of the announcement of the exam date or they will be required to write the exam.

Cheating and Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes

or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on 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>).

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

Policy on Repeating All Components of a Course: Students who are required to repeat an Engineering course must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted by the student for grading in subsequent years.

Internet and Electronic Mail: Students are responsible for regularly checking their Western e-mail and the course web site (<https://owl.uwo.ca/portal/>) and making themselves aware of any information that is posted about the course.

Accessibility: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 ext. 82147 for any specific question regarding an accommodation.

Support Services: Office of the Registrar, <http://www.registrar.uwo.ca/>
Student Development Centre, <http://www.sdc.uwo.ca/>
Engineering Undergraduate Services, <http://www.eng.uwo.ca/undergraduate/>
USC Student Support Services, <http://westernusc.ca/services/>

Students who are in emotional/mental distress should refer to Mental Health@Western, http://www.health.uwo.ca/mental_health/, for a complete list of options about how to obtain help.

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

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 gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, [here](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

A. GENERAL REGULATIONS & PROCEDURES

1. All first-year students will report to the Undergraduate Services Office by submitting the [Academic Consideration Request Form](#), for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting [Academic Consideration Request Form](#). Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the [Academic Consideration Request Form](#). If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.
3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to report your absence using the [Academic Consideration Request Form](#) and request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must submit an "[Application for a Special Exam](#)" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to submit the [Academic Consideration Request Form](#) and provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, you must provide the doctor with a **Student Medical Certificate** to

complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

Calendar References: Check these regulations in your 2023 Western Academic Calendar available at: www.westerncalendar.uwo.ca.

Absences Due to Illness:

https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_135

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

<http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=>

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live&ArchiveID=#Page_86

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Add Deadlines: First term half course (i.e. “A” or “F”)	September 15, 2023
Full courses and full-year half course (i.e. “E”, “Y” or no suffix)	September 15, 2023
Second term half course (i.e. “B” or “G”)	January 16, 2024

Drop Deadlines: First term half course without penalty (i.e. “A” or “F”)	November 13, 2023
Full courses and full-year half courses without penalty (i.e. “E”, “Y” or no suffix)	November 30, 2023
Second term half or second term full course without penalty (i.e. “B” or “G”)	March 7, 2024

Contact Information:

Undergraduate Services Office:	SEB 2097	Phone: 519-661-2130 E-mail: engugrad@uwo.ca
Chemical & Green Process Engineering:	TEB 477	Phone: 519-661-2131 E-mail: cbeugrad@uwo.ca
Civil Engineering:	SEB 3005	Phone: 519-661-2139 E-mail: civil@uwo.ca
Computer, Electrical, Mechatronic Systems & Software	TEB 279	Phone: 519-661-3758 E-mail: eceugrad@uwo.ca
Integrated Engineering	ACEB 2410	Phone: 519-661-6725 E-mail: engceli@uwo.ca
Mechanical Engineering:	SEB 3002	Phone: 519-661-4122 E-mail:

mmeundergraduate@uwo.ca