Western Engineering

Western University
Faculty of Engineering
Artificial Intelligence Systems Engineering Program

AISE 3309 – Database Management Systems

Course Outline Fall 2025

COURSE 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: AISE 3309A
https://www.westerncalendar.uwo.ca/Courses.cfm?CourseAcadCalendarID=MAIN_030973_1&SelectedCalendar=Live&ArchiveID=

The focus is to teach database fundamentals required in the development and evolution of most software applications by providing a basic introduction to 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.

PRE OR COREQUISITES: AISE 2205A/B (or Software Engineering 2205A/B if taken prior to 2024-25), AISE 2251A/B (or the former Software Engineering 2251A/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.

ANTIREQUISITES: Computer Science 3319A/B, Computer Science 3120A/B, Software Engineering 3309A/B.

CEAB ACADEMIC UNITS: Engineering Science 70%, Engineering Design 30%

CONTACT HOURS:

Lectures occur weekly. Laboratory sessions occur weekly.

LECTURE:	• 3 hours per week
LAB:	2 hours per week

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

RECOMMENDED SOFTWARE: MYSQL

GENERAL LEARNING OBJECTIVES (CEAB GRADUATE ATTRIBUTES)

Knowledge Base		**Engineering Tools**	D	**Impact on Society**	
Problem Analysis	D	**Individual & Team Work**		**Ethics and Equity**	
Investigation		**Communication**		**Economics and Project Management**	
Design	D	**Professionalism**		**Life-Long Learning**	

Notation: x represents the content level code as defined by the CEAB. blank = not applicable; I = introduced (introductory); D = developed (intermediate) and A = applied (advanced).

Rating: 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 MATERIALS: Weekly content and guides for the laboratories will be available on the course OWL site. The material for this course will be taught in both lectures and labs; therefore, it is imperative that you attend each lecture and lab.

COURSE TOPICS AND SPECIFIC LEARNING OUTCOMES:

The following table summarizes the course learning outcomes along with CEAB GAIs where the GAIs in bold indicate ones to be measured and reported annually.

Course Topics and Specific Learning Outcomes	CEAB GA Indicators
1. Introduction to Database Systems At the end of this section, students will be able to:	
1.1. 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
1.2. 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:**	
2.1. Use the Entity-Relationship (ER) modeling in the conceptual database design;	D1
2.2. 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:	
3.1. Derive a set of relations from a conceptual model.	D4
4. Normalization At the end of this section, students will be able to:	

4.1. Describe the purpose of normalization and undertake the process of normalization;	D2, D3
4.2. 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:	
5.1. 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:	
6.1. Define integrity constraints using SQL.	D1
7. SQL Statements: Query, Insert, Update, and Delete At the end of this section, students will be able to:	
7.1. Retrieve data from the database, create Indexes, and create Views using SQL	ET1, ET2, PA3
7.2. 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:	
8.1. Differentiate between traditional relational databases and NoSQL databases in terms of data models, scalability, and typical use-cases;	PA3
8.2. Understand and identify the primary types of NoSQL databases: Document, Key-Value, Column-family, and Graph;	ET1
8.3. 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:	
9.1. Describe how ISO Transaction model works,	PA2
9.2. Create and use Triggers.	PA2

EVALUATION:

Name	% Worth	CEAB GAs ASSESSED
Assignments	35%	PA1, PA2, PA3, D1, D2, D3, D4, ET1, ET2, ET3
In-class Participation	5%	-
Midterm Exam	20%	PA1, PA2, PA3, D1, D2, D3, D4,
Final Exam	40%	PA1, PA2, PA3, D1, D2, D3, D4,

will be assigned on the basis of method of analysis and presentation, correctness of solution, clarity and neatness.

For this course, the following assessment has been designated as requiring supporting documentation:

- Midterm Exam, due after the reading week
- Final Exam, due during the final examination period

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%

COURSE POLICIES:

Late Submission Policy:
Please note that the assignment submission deadline includes flexibility in the form of a 48-hour submission window (grace period). As a result, the instructor reserves the right to deny any requests for academic consideration for assignments submitted after this grace period.
If students submit their assignments beyond the 48-hour grace period, a penalty of 10% per day will be applied for late submissions, up to a maximum of 3 days. After three days, late submissions will no longer be accepted. Please note that all due dates submitted on OWL includes the 48-hours grace period.

Self-Reported Absence:
No weight-shifting is allowed for self-reported absence; missed work will be due after a covered period.

Laboratory:
Throughout the semester, we will conduct a series of tutorials and support sessions designed to reinforce key concepts and assist with project assignments. These sessions are integral to the course, providing hands-on experience with essential project management tools, particularly MS Project. Early in the semester, we will hold two tutorials focused on introducing MS Project. These sessions will cover the basics of project scheduling, resource management, and task tracking, ensuring you are well-prepared for the assignments ahead.
Before each major assignment, a dedicated tutorial session will be held to explain the assignment requirements, demonstrate relevant tools and techniques, and offer guidance on how to approach the tasks. These sessions are crucial for helping you apply course concepts directly to your project work.
Attendance at the tutorials is highly recommended, as they are critical to your success in the course. While attendance at these sessions is optional, they are extremely valuable for ensuring you stay on track with your assignments. If you miss a tutorial, it is your responsibility to catch up on the material, as tutorials will not be repeated.

Midterm Exam:
There will be one two-hour, closed-book midterm exam; no calculators or reference materials are permitted. As this is a designated exam, any absence requires an official Academic Consideration Request. While no make-up exams will be scheduled, students with an approved request will have the midterm's weight transferred to their final exam, making the final exam worth 60% of the total grade. Failure to obtain an approved request for an absence will result in a mark of zero for the midterm.

Final Examination:
Please note that the final exam is central to the learning objectives for this course. Accordingly, students seeking academic consideration for this assessment must provide formal supporting documentation.

Students who are granted academic consideration for this assessment will be provided with the following opportunity to make up this work: The final examination will take place during the regular examination period. It will be three hours long, closed book, and only simple calculators are allowed.

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 and In-Class Participation:
Your active presence in this course is highly valued, as collaboration and discussion are key to mastering the material. To recognize your commitment, you can earn up to 5% of your final grade through in-class participation. For each of the approximately 24 lectures this semester, you will have the opportunity to earn 0.25 points using tools like iClicker or OWL quizzes. The full 5% is awarded for accumulating 5 points, which is equivalent to participating in 20 lectures. This system is designed with built-in flexibility, allowing you to miss up to four classes for any reason, such as a minor illness or appointment, without impacting your grade. While this flexibility covers short-term absences, we understand that more serious issues can arise. If you face a significant, prolonged issue that requires you to miss more than a few classes, please follow the university's formal Academic Consideration process, and we will work with you to ensure you are not disadvantaged.

FACULTY OF ENGINEERING POLICIES:

Students must familiarize themselves with the policies of the Faculty of Engineering
https://www.eng.uwo.ca/electrical//pdf/2025-UG-Policy-and-Procedures.pdf