



School of Computer Science and Information Systems

44-560 Advanced Topics in Database Systems

(3 hours)

Spring 2026

Instructor: Dr. Zhengrui (Jerry) Qin

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Office Hour:

MWF: 9:25-9:55am, 10:55-11:55am, 1:55-2:45pm, or
by appointments.

Prerequisites: 44460 Database Systems with a grade of C or better (B or better for graduate students), or graduate standing with prior database experience and experience in Java programming.

Textbook and supplementary materials:

Title: Database Systems: Design, Implementation, and Management

Edition: 12e

Authors: Carlos Coronel and Steven Morris

Software: Students must have frequent access to

Microsoft Office, including Word and PowerPoint

ERD Plus, LucidChart, Microsoft Visio or other ER diagramming tool

Java JDK 8, or later (free download)

NetBeans 8.2 or later (free download)

Oracle 12c and Oracle SQL Developer (free download)

A tool that will compress and decompress .zip files.

<https://nwmissouri.instructure.com>

Students using an Apple Mac computer will need to download VirtualBox and install Windows 10 in order to install Oracle.

Course description: Advanced topics in database systems, including database administration, distributed databases, and data warehousing. Hands-on experience using a Database Management System in a client/server environment. (3 credit hours)

Student learning outcomes:

- identify the basic concepts of data warehousing, including the architectures used and the characteristics of data warehouse data
- design both operational databases and data warehouses, including dimensional modeling and transformation of operational data into data suitable for storing in a data warehouse
- utilize client-side activities in a DBMS, including creating and modifying database objects; adding, deleting and modifying data; querying data; creating triggers and stored procedures; embedding SQL statements in a programming language; accessing and modifying data in a database programmatically
- identify the basic concepts of transaction management, including concurrency controls, locks, transaction

- logs, and recovery
 - analyze access plans through the use of the basic concepts of query optimization
 - describe the basic concepts of distributed databases, including the various options for distributing a database, the functions of a distributed DBMS, transparency requirements, and partitioning schemes
- Student learning outcomes assessment methods:** Assignments, quizzes, exams.

Instructional methods: Students should expect the following instructional methods; lectures, class discussions, small group work, individual and group work, learner presentations, and guest speakers.

Graded course requirements: (Points are estimates and may vary slightly)

Components	Points
Exam 1	100
Exam 2	100
Exam 3	100
Final Exam	150
Assignments	150
Quizzes	30
Participation	30
Total Points	660
Miscellaneous	20-30 (bonus)

Note: Out of the 20 available bonus points, 10 points are awarded for completing installations, and an additional 10 points are given for obtaining an SQL certification on any platform and sharing the certification on LinkedIn. Additional bonus points may also be earned through in-class activities.

Grading scale:

Grading Scale – Undergraduates		Grading Scale – Graduates	
Percent Range	Grade	Percent Range	Grade
88-100%	A	90-100%	A
>= 78% and < 88%	B	>= 80% and < 90%	B
>= 68% and < 78%	C	>= 70% and < 80%	C
>= 58% and < 68%	D	>= 60% and < 70%	D
below 58%	F	below 60%	F

Grading Policy: Grades are posted in the online gradebook. You are responsible for checking the gradebook at least once a week to ensure that your grades are properly posted. If there is an error in grading, you must bring that to the attention of the class assistant or instructor *within two weeks of the time the grade is posted*.

To satisfy the university policy that graduate students in 500-level courses must have requirements beyond those of the undergraduate students, a different grading scale is used for undergraduate and graduate students.

Course Outline/Major Topics Studied:

Week #	Lectures	Notes
Week 1	Review of ER Modeling	Student Agreement Quiz
Week 2	Review of ER Modeling	(Sep 1 Labor Day — no classes) Assignment 1: ER Review
Week 3	Normal Forms	Quiz: ER & Normal Forms Assignment 2: Normalization
Week 4	Join and GroupBy SQL Review	Assignment 3: SQL Review
Week 5	Transaction Management	Quiz: SQL Assignment 4: Transactions
Week 6	Query Optimization	Exam 1: M1 & M2 Assignment 5: Query Optimization
Week 7	Distributed Database	Assignment 6: Distributed DB
Week 8	Spring break	No classes
Week 9	Transaction & Distributed Database	Quiz: Transactions & Distributed DB
Week 10	Advanced SQL	Assignment 7: Joins, Sequences & Subqueries
Week 11	PL/SQL	Quiz: Adv SQL, PL/SQL
Week 12	Data Warehouse	Assignment 8: PL/SQL Exam 2: M3, M4, M5
Week 13	NoSQL, MongoDB	Assignment 9: Data warehouses
Week 14	JDBC	Quiz Assignment 10: MongoDB
Week 15	SQL Injection Final Exam Review	Exam 3: M6 & M7
Week 16	Final Exam	April 29, 12:20-2:20pm

Attendance: Attendance in this course is mandatory. Some in-class exercises may have points associated with them and may not be announced in advance. A student who misses such an exercise due to an unexcused absence will not be allowed to make it up and will receive a zero. Excused absences include attendance at a university sponsored event (documented with an excuse signed by the university sponsor prior to the event) or by circumstances considered adequately extenuating by the course instructor. It is the responsibility of the student to promptly notify his or her instructor when unable to attend class. Please refer to the university policy on attendance at <https://www.nwmissouri.edu/policies/academics/Attendance.pdf>

Participation: To earn participation points, students must demonstrate appropriate behavior in class, actively work on in-class exercises, and submit the completed exercises by the deadline. Failure to meet any of these requirements will result in the loss of participation points for that day. Each student is allowed to miss in-class exercises worth up to 3 points without providing an excuse.

Exams and Quizzes: Exams and quizzes must be taken at the scheduled time, as outlined on the course website. The tentative weeks for exams are listed in the course schedule, with exact dates and additional details provided online. All exams are closed book and closed notes unless explicitly stated otherwise by the instructor. Exams and quizzes will be conducted using LockDown Browser. The use of any electronic devices other than your laptop is strictly prohibited.

If you must miss an exam or quiz, it is your responsibility to notify the instructor in advance and provide written documentation of a valid and verifiable reason (such as illness, family emergencies, or university-sponsored events). Failure to do so may result in point deductions or a grade of zero. Make-up exams will only be granted with appropriate verification and prior approval.

Assignments: Assignments are individual projects. They must be submitted in the appropriate drop box by the due date. Submitting incorrect file results in getting a 0 for that assignment. You may talk freely with your classmates, instructor, and class/lab assistants regarding the assignments, but any help received must be fully credited. Failure to credit a source constitutes plagiarism and is subject to the university rules regarding cheating. It is never permissible to copy another person's work. Read the section in this syllabus on academic honesty for details.

Late Submission Policy: Assignments submitted after the due date will incur a 20% deduction for each 24-hour period. If any issue, such as a technical problem or health concern, prevents you from submitting the assignment on time, you must notify the instructor BEFORE the due date.

Professionalism: Students are expected to behave in a professional manner in their dealings with each other, the class assistant, and the instructor. E-mails and other electronic communications should be politely written, use proper grammar, and follow the rules of capitalization. **Emails must include the course number (44-560)**. For security reasons, I never open emails that do not include an appropriate entry for the subject.

Disclaimer: Course schedule is subject to change and you will be responsible for abiding by any such changes. Your instructor will notify you of any changes.