



**NORTHWEST**  
MISSOURI STATE UNIVERSITY  
MARYVILLE | KANSAS CITY

**School of Computer Science and Information Systems**  
**44-560 Advanced Topics in Database Systems**  
**(3 hours) Spring 2025**

**Instructor:** Dr. Keli Cheng  
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**Office Hour:**  
Mon/Wed: 3:00 p.m. – 6:00 p.m.  
Friday: 3:00 p.m. – 4:00 p.m.  
Others by appointment

**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

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
<b>Total Points</b>	<b>660</b>
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
>= 70% and < 78%	C	>= 70% and < 80%	C
>= 60% and < 70%	D	>= 60% and < 70%	D
below 60%	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: January 13 - 17	Review of ER Modeling	Student Agreement Quiz
Week 2: January 20 - 24	Review of ER Modeling	No class Monday (MLK Day) <b>Assignment 1:</b> ER Review

Week 3: January 27 - 31	NormalForms	Quiz: ER & Normal Forms <b>Assignment 2:</b> Normalization
Week 4: February 3 - 7	Join and GroupBy SQL Review	<b>Assignment 3:</b> SQL Review
Week 5: February 10 - 14	Transaction Management	Quiz: SQL <b>Assignment 4:</b> Transactions
Week 6: February 17 - 21	Query Optimization	<b>Exam 1: M1 &amp; M2</b> <b>Assignment 5:</b> Query Optimization
Week 7: February 24 - 28	Distributed Database	<b>Assignment 6:</b> Distributed DB
Week 8: March 3 - 7	Transaction & Distributed Database	Quiz: Transactions & Distributed DB
Week 9: March 10 - 14	- - - Spring Break (no class) - - -	- - - Spring Break (no class) - - -
Week 10: March 17 - 21	Advanced SQL	<b>Assignment 7:</b> Joins, Sequences & Subqueries
Week 11: March 24 - 28	PL/SQL	Quiz: Adv SQL, PL/SQL
Week 12: March 31 - April 4	Data Warehouse	<b>Assignment 8:</b> PL/SQL <b>Exam 2: M3, M4, M5</b>
Week 13: April 7 - 11	NoSQL, MongoDB	<b>Assignment 9:</b> Data warehouses
Week 14: April 14 - 18	JDBC	Quiz <b>Assignment 10:</b> MongoDB
Week 15: April 21 - 25	SQL Injection Final Exam Review	<b>Exam 3: M6 &amp; M7</b>
<b>April 28, 9:40 am - 11:40 am</b>	<b>FINAL EXAM</b>	<a href="https://www.nwmissouri.edu/registrar/finals.htm">https://www.nwmissouri.edu/registrar/finals.htm</a> <b>Final Exam is cumulative</b> <b>Location will be announced on Canvas on Apr</b>
May. 5	Final Grades Due	

**Note:** Course schedule is subject to change with instructor notification and students will be responsible for abiding by these changes.

**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 25% 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.

**Final exams:** If an emergency occurs that prevents the administration of a course scheduled final examination, the final course grades will be calculated based on the work in the course completed to that point in time and the faculty member's considered judgment. Final exams will not be rescheduled, and a grade of "I" will not be given as a result of an institutional cancellation of a final examination. This final exam policy does not apply to online courses. Check final exam schedule: <https://www.nwmissouri.edu/registrar/finals.htm>

**Administrative drop:** An instructor may request the Office of the Registrar delete a student from a course roster if the student has not met the prerequisite for the course as stated in the catalog, or as a result of non-attendance in the course.

**Academic Administrative withdrawal:** When it is in the best interest of Northwest Missouri State University for a student to withdraw, a student will be given a W, put on administrative hold, and given notice that they are about to be withdrawn. This action will result in removal of all credits associated with courses that have yet to be completed in the semester in question and the student will be administratively withdrawn from the University. An Administrative Withdrawal does not affect the student's grade point average. Please refer to Northwest Missouri State University's Academic Administrative Withdrawal Policy at: <https://www.nwmissouri.edu/policies/academics/Adding-Dropping-Withdrawals.pdf>

**University communications:** Students are expected to use their Northwest student email account for any electronic correspondence within the university. Students are also strongly advised to check their email and CatPAWS accounts on a regular basis.

**Academic integrity policy:** The students, faculty, and staff at Northwest endeavor to sustain an environment that values honesty in academic work, that acknowledges the authorized aid provided by and intellectual contributions of others, and that enables equitable student evaluation. Please refer to Northwest Missouri State University's Academic Integrity Policy at <http://www.nwmissouri.edu/policies/academics/Academic-Integrity.pdf>. In addition, the document entitled [Academic Integrity in CSIS Classes](#), posted on the course website, clearly explains those types of behavior that would be considered academic dishonesty. You are responsible for reading both documents, and abiding by the guidelines described therein.

Note that plagiarism includes, but is not limited to, failure to give credit for help received on a homework assignment. Also note that all assignments are to be done individually, unless specified otherwise. You may talk to classmates and other students about an assignment, but you must do all the work yourself from beginning to end. Two or more students may sit down together and discuss an assignment as they are working on it, but each student must do his/her own work in completing the assignment. You cannot copy another person's code or written work. You cannot copy database objects or any portion of a database from another student's files.

Failure to follow these guidelines and the remaining guidelines described in the *CSIS Academic Integrity Policy* will be subject to the penalties described in the catalog.

**Learning or Living Accommodations Request Process:** Northwest Missouri State University complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 [ADA] and the ADA Amendments Act of 2008 [ADAAA]. If a student has a documented disability that qualifies under the ADA/ADAAA and requests accommodations, they should review the Accessibility and Accommodations webpage at <https://www.nwmissouri.edu/titleixequity/accessibility/index.htm> for guidance, including the accommodations application and supporting documentation requirements. Contact [ada@nwmissouri.edu](mailto:ada@nwmissouri.edu) or 660.562.1873 for further assistance. For the university policy on disability accommodation refer to <http://www.nwmissouri.edu/policies/student/Disability-Accommodation.pdf>

**Non-discrimination and anti-harassment policy:** Northwest Missouri State University is committed to maintaining an environment for all faculty, staff, students, and third parties that is free of illegal discrimination and harassment. Please refer to the Non-Discrimination and Anti-Harassment Policy at <http://www.nwmissouri.edu/diversity/titlevi.htm>

**Family Education Rights and Privacy Act (FERPA) policy:** Family Educational Rights and Privacy Act of 1974, as amended (commonly known as the Buckley Amendment), is a federal law which provides that colleges and universities will maintain the confidentiality of student education records. Please refer to the Family Educational Rights and Privacy Act (FERPA) Policy at <http://www.nwmissouri.edu/policies/academics/Family-Educational-Rights-and-Privacy-Act.pdf>

**Behavior and Wellness:** Northwest focuses on student success—every student, every day. The Wellness Center, 660.562.1348, offers free counseling for students coping with depression, anxiety, alcohol or drug misuse, relationships, and other emotional, social, and academic stressors. In addition, faculty, staff, and students who are concerned with student wellbeing can report their concerns, including anonymously, to the Behavioral Intervention Team, so that the student can be offered relevant support, at thislink: [Concerning Behavior Reporting Form](#). If you are concerned about the immediate safety of a student, please call the University Police, who have specialized training in intervention, at 660.562.1254.

**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.