Northeastern
College of Engineering

DAMG7275- Advanced Database Management Systems
Spring 2026

Course Information

Course Title: Advanced Database Management System
Number: DAMG 7275
Term and Year: Spring 2026
Credit Hour: 4
CRN: 18746
Course Format: On-Ground

Instructor Information

Full Name: Syed Farhan Mazhar
Email Address: s.mazhar@northeastern.edu

Instructor Biography

Syed Farhan Mazhar has over 18 years of experience in both the service provision industry and academia, where he has held leadership positions. He has a deep passion for teaching and has served as a permanent and visiting faculty member at several reputable higher education institutions, both locally and internationally. His teaching portfolio covers a wide range of subjects, including Computer Science, Software Engineering, Database Systems, Programming Languages, and Project Management.
Syed holds a Master's degree in Software Engineering with a specialization in Intelligent Systems from the University of Alberta, an M.Sc. in Electronics from Karachi University, and is currently a PhD candidate in Computer Science at McMaster University. He has also completed numerous international certifications and training programs, including PMP (Project Management Professional) from PMI, Oracle Certified Professional from Oracle, ITIL Foundations, A+ certification, Mini MBA courses, and Advanced Teaching and Learning Certificates.
His recent research interests focus on managing IT projects, discrete-event systems (including fault diagnosis and detection), formal verification of hardware and software, business process design, data analytics, data cleaning, and database systems.

TA Information:
Name:
Email:

COURSE DESCRIPTION

The Advanced Database Management Systems course is an extension of the Data Management and Database Design course. It uses a data-centric approach to cover the concepts, theories, development and management ofthe architecture, technologies, security, and solutions relevant to working with large volumes of diversified data. Both the NoSQL and relational databases will be covered. This course presents many of the valuable knowledge and skills required for dealing with the data-related challenges.

Standard Learning Outcomes

Learning outcomes common to all College of Engineering Graduate programs:

1. An ability to identify, formulate, and solve complex engineering problems.
2. An ability to explain and apply engineering design principles, as appropriate to the program's educational objectives.
3. An ability to produce solutions that meet specified end-user needs with consideration of public health, safety, and

welfare, as well as global, cultural, social, environmental, and economic factors.

The Information Systems Program accepts students of different engineering backgrounds with minimum programming skills and produces first class Information Systems engineers that operate at the intersection of real-world complexity, software development, and IT management. Graduating students will be able to construct end-to-end advanced software applications that meet business needs.

- Specific Learning Outcomes for the Information Systems program:
- Create a strong technical foundation through diverse, high-level courses
- Built crucial interpersonal skills needed to succeed in any industry
- Foster a deep level of applied learning through project based case studies

Course Outcomes and Assessment Standards

Upon successfully completing the course, students will be able to conduct the following:

- Understand and describe the Architecture of large-scale NoSQL and Relational Database Management Systems
- Design and implement Data Structure for NoSQL Databases based on the data usage pattern
- Implement and manage Data Movement, such as Transaction, Replication and Data Pipelines
- Survey major Data High Availability and Data Locality approaches
- Plan for Disaster Recovery and implement its solutions to meet the business requirements
- Architect and implement the Event-Driven Data Management
- Understand Data Governance and develop code to implement its solutions
- Explore and develop code to work with Data of Complex Relationships
- Write SQL commands to perform advanced data and table manipulation in the context of a prescribed business problem.
- Explain the basic concepts of security and the responsibilities of a database administrator.
- Write PL/SQL anonymous blocks, procedures, functions, triggers and packages to access and manipulate data.
- Create the back-end to a software application using functions, procedures, packages and triggers

PREREQUISITES

INFO 6210, INFO 5100, CSYE 6200, INFO 6205, or consent of the instructor.

BOOKS

Connolly, T. M. & Begg, C. E. (2015)
Database Systems: A Practical Approach to Design, Implementation, and Management (6th Edition) Addison-Wesley Publishing, [ISBN-10: 0-13-294326-3] The 4th or 5th Edition is also acceptable.

Database Systems Design, Implementations and Management- 13th Edition

- By Carlos Coronel, Steven Morris, Peter Rob.

Text Book(s):

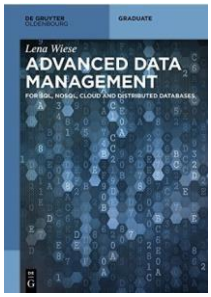
Casteel, Joan. 2013. Oracle 11g: PL/SQL Programming, 2nd Edition. Cengage Learning.
ISBN-13: 9781133947363

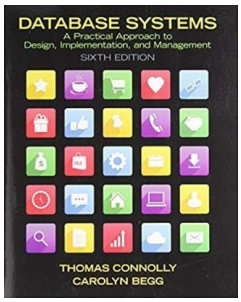
Reference Books:

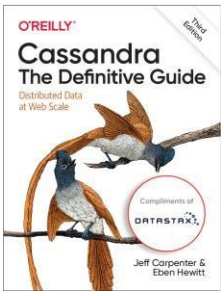
Jeff Carpenter and Eben Hewitt (2020)
Cassandra: The Definitive Guide, 3rd Edition
Published by O'Reilly Media, Inc.

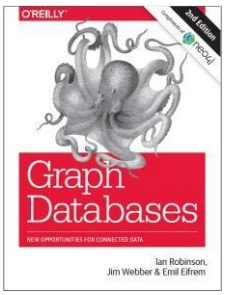
Lena Weise (2015)
Advanced Data Management: For SQL, NoSQL, Cloud and Distributed Databases
De Gruyter, [ASIN: B019LFN2MM]

Ian Robinson, Jim Webber, and Emil Eifrem (2015)
Graph Databases, 2nd Edition
Published by O'Reilly Media, Inc.









These textbooks have been selected because of their breadth and depth of coverage of databases. They are well written and contain many examples. Students should find these books to be useful for several years to come.

Software: Students will need to download and install SQL Oracle database engine or SQL Server Management Studio to their local computers or in a cloud environment (Azure, Google, AWS etc.).
Entity-Relationship Diagram (ERD) tool of your choice is mandatory. Recommended ERD tools include draw.io, ERWin, and Microsoft VisiO

Course Schedule/Topics Covered.

Important Note: Changes may occur to the syllabus at the instructor's discretion. When changes are made,students will be notified via Canvas and/or in-class announcement.

Week	Date	In Class Topic
1	01/08/2026	**Introduction** **Review of Data Hierarchy and Aggregation** **Reading** • chapter 1: "Background" (Advanced Data Management)
2	(01/08/2026	**Overview of Multiple Database** **Reading** • chapter 2: "Relational Database Management Systems" (Advanced Data Management) • chapter 3: "New Requirements, Not only SQL and the cloud" (Advanced Data Management)
3	01/15/2026	Multi-Model Database • Management Systems NoSQL • Database Design • Introduction to PL/SQL
4	01/22/2026	**Selected Database Issues:** • Security and Administration • Professional, Legal, and Ethical Issues in Data • Management
5	02/06/2026	**Selected Database Issues:** • Transaction Management • Query Processing
6	02/13/2026	MongoDB (Graph/Document/Key-Value Models) Data Modeling for MongoDB Database
7	02/20/2026	Property Graphs vs Knowledge Graphs ADBMS- LAB including PL/SQL Procedure and Function
8	02/27/2026	**Distributed DBMSs and Replication:** Distributed DBMSs—Concepts and Design
9	03/03/2026	Cosmos DB SQL API Database (Document Data Model) SQL and JSON ADBMS-Transaction Management and concurrency Control II
10	03/10/2026	Cassandra Database (Columnar Data Model) Data Modelling for Cassandra Database
11	03/17/2026	**The Web and DBMSs:** • Web Technology and DBMSs • Semistructured Data and XML • Database Performance
12	04/07/2026	**Business Intelligence:** • Data Warehousing Concepts • Data Warehousing Design • New Database Technologies

		• Data High Availability, Data Locality and Disaster Recovery
13	03/24/2026	**Business Intelligence:** • OLAP • Data Mining • XML Database and XML
14	04/01/2026	
15		

EVALUATION:

Assignments balance between theory and practice and between individual and group work.

Assessment	**% Grade**
Ind Lab Exercises	20%
Midterm	15
Discussion	5%
Database project	30%
Final Exam	30%

DATABASE PROJECT

Students will form teams of 4 and develop a relational database based on reading and class lectures. The project will have the following deliverables:

Grading Scale

Please note: This is the department's standardized grading scale. While we understand that some classes may apply a curve, faculty must establish and include a clear grading scale within the syllabus, regardless of the chosen grading method.

Percentage Range	Letter Grade	Grade Point Equivalent
95.0–100.0%	A	4.000
90.0–94.9%	A-	3.667
87.0–89.9%	B+	3.333
84.0–86.9%	B	3.000
80.0–83.9%	B-	2.667
77.0–79.9%	C+	2.333
74.0–76.9%	C	2.000
70.0–73.9%	C-	1.667
69.9% and Below	F	0.000

Incomplete Grades

An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor. **Instructors may deny requests for an incomplete grade.** If the missing assignment(s) have not been submitted to the instructor within 30 days from the end of the term in which the course was offered, or the agreed upon due date, the grade entered will reflect the student's grade in the course for the work completed and the missing assignments receiving no credit toward the final grade.

Attendance/Late Work Policy
Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. **Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.**

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course,** with 3 or more absences resulting in an 'F' for that course. Course instructors are not expected to make accommodations and students are expected to inform their instructors of any absences in advance of the class. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave and accommodations in accordance with the University's academic and global entry expectations. Students may be asked to share communications about class absences with their Academic Advisor. If a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor (coe-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. International students should review the Office of Global Services webpage to understand their visa compliance requirements.
Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.
Late Work Policy
Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

Course Evaluations
Student feedback on their learning experience is valuable and helps improve future courses. We encourage all students to complete the course evaluation surveys when they become available.

Surveys are distributed at both the midterm mark and the end of the term via email and are completely anonymous and confidential. Any questions about the surveys can be directed to mgen-programs@coe.northeastern.edu

MGEN Student Feedback
Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

Academic Integrity
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational

experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity:

Cheating: The University defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

Fabrication: The University defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

Plagiarism: The University defines plagiarism as using as one's own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has "forgotten" to document ideas or material taken from another source does not exempt one from plagiarizing.

Unauthorized Collaboration: The University defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual's independent work unless the instructor has explicitly granted permission for group work.

Participation in Academically Dishonest Activities: The University defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

Facilitating Academic Dishonesty: The University defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Please visit https://osccr.sites.northeastern.edu/academic-integrity-policy/ to access the full academic integrity policy.

University Health and Counseling Services
As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit https://www.northeastern.edu/uhcs.

Student Accommodations/Disability Access Services (DAS)
Northeastern University and the Disability Access Services (DAS) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations,

students must provide appropriate documentation as provided by the DAS office.

If the course is conducted in an on-ground (in-person) format, students are expected to attend class physically as scheduled. Professors are **not required to provide virtual attendance links** unless a student has documented accommodation approved by the **Disability Access Services (DAS) office** and their **Academic Advisor**. If a student requires accommodation for remote participation, they must submit a formal request through the **Disability Office** and coordinate with their **Academic Advisor** prior to the course start date.

For more information, visit https://disabilityaccessservices.sites.northeastern.edu/

Office of Global Services
As an F-1, J-1, or Study Permit student, you must meet certain obligations in order to maintain lawful nonimmigrant status. Maintaining status is necessary in order to retain eligibility for the benefits of F-1 or J-1 status, such as employment authorization and program extension, and can be crucial to a successful application for a change or adjustment of nonimmigrant status in the future. Failure to maintain your nonimmigrant status can result in serious problems with immigration and *could lead to deportation from the U.S. or Canada.*

Students must maintain on-ground presence throughout the academic term. At Northeastern, there are four different defined instructional methods: Traditional, Hybrid, Live Cast, and Online. Traditional, Hybrid, and Live Cast courses meet the Visas' on-ground presence requirements. **Online courses do not meet the Visas' on-ground presence requirements.**

Students enrolled in Summer courses should adhere to OGS guidelines on maintaining status during the Summer term.

For more information please visit, https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/

Library Services
The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit https://library.northeastern.edu
Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help
For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu
Canvas Student Resources: https://canvas.northeastern.edu/student-resources/
For assistance with my Northeastern e-mail, and basic technical support:
Visit ITS at https://its.northeastern.edu
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-43