Northeastern College of Engineering

DAMG 6210: Data Management and Database Design
Fall 2025

Course Information
Course Title: Data Management and Database Design
Course Number: DAMG 6210 SEC 01
Term and Year: Spring 2025
Credit Hour: 4 SH
CRN: 17593
Course Format: On-Ground

Instructor Information
Full Name: David de Hilster
Email Address: d.dehilster@northeastern.edu
Office Hours: 2-3 pm Wednesdays

Instructor Biography
David de Hilster has over 40 years of experience in the area of practical natural language processing, databases, and user interfaces. He is co-author of the computer programming language and framework NLP++, including VisualText, an IDE for developing rule-based NLP systems which is a VSCode language extension for NLP++. Most recently, David was part of the supercomputing group at LexiswNexis Risk where he implemented an NLP++ plugin for the HPCC Supercomputing Platform. While at LexisNexis, he mentored university intern students in the area of NLP and Machine Learning in universities around the world. David is also founder of the Natural Language Understanding Global Initiative. David holds a BS in mathematics and a MA in linguistics where he taught undergraduate linguistics from Ohio State University.

Teaching Assistant Information
Full Name: TBD
Email Address:TBD
Office Hours:TB D

Course Prerequisites
None
Course Description
Studies design of information systems from a data perspective for engineering and business applications; data modeling, including entity-relationship (E-R) and object approaches; user-centric information requirements and data sharing; fundamental concepts of database management systems (DBMS) and their applications; alternative data models, with emphasis on relational design; SQL; data normalization; data-driven application design for personal computer, server-based, enterprise wide, and Internet databases; and distributed data applications.

Course Learning Outcomes

1) Understand Data Modeling Principles: Students will be proficient in data modeling techniques, including entity-relationship (E-R) and object-oriented approaches, to design effective information systems for engineering and business applications.
2) Master Relational Database Concepts: Students will gain a comprehensive understanding of fundamental concepts of relational database management systems (DBMS), relational algebra, SQL, and data normalization; and be able to apply these concepts to design and implement relational databases.
3) Design Data-Driven Applications: Students will be equipped with the skills to design data-driven applications tailored to various computing environments, including personal computer, server-based, and Internet databases.

Required Tools and Course Textbooks.

Jeffrey A. Hoffer, Ramesh, Heikki Topi
Modern Database Management Global Edition, 13th Edition
Prentice Hall, [ISBN-13: 978-0134773650]

Course Schedule/Topics Covered. Students will need to download and install SQL Server database engine and SQL Server Management Studio to their local computers or in a cloud environment (Azure, Google, AWS etc.). The Developer Edition of SQL Server 2019/22 is recommended. Entity-Relationship Diagram (ERD) tool of your choice is mandatory. Recommended ERD tools include draw.io, ERWin, and Microsoft Visio.

Week	Date	Deliverables	In Class Topic	Assignment Due
1	09/03		General database purpose and development history	Chapter 1: "Database Environment and Development Process"
2	09/10		Entity-Relationship Modeling	Chapter 2: "Modeling Data in the Organization"
3	09/17	P1 – Topic Selection		
4	09/24		Enhanced Entity–Relationship Modeling (EER)	Chapter 3: "The Enhanced E-R Model"
5	10/01	P2 - Conceptual Model		
6	10/08			Chapter 5: "Introduction to SQL"
7	10/15	Mid-Term	Mid-Term	
8	10/22	P3 - Logical ER Model		
	10/29			Chapter 6: "Advanced SQL"
9	11/05	P4 - Schema Implementation		

10	11/12		Persistent Stored Module: Stored Procedures and User-Defined Functions, SQL/PSM: Triggers	Chapter 6: "Advanced SQL"
11	11/19	P5 - PSM Implementation		
12	11/26			TBD
13	12/03	Final Exam	Final Exam	
14	12/10	Project Work		
15	12/17		Final Presentation	

Assignment Grading
Please insert all assignment grades and weights for the course. Example below:
- Mid-Term: 20%
- Final: 25%
- Participation: 5%
- Homework: 10%
- Quizzes: 10%
- Database project : 30%

Database Project
Students will develop a relational database based on reading and class lectures. The project will have the following deliverables:
- P1. Topic and Objectives 5%
- P2. Database Design, Conceptual ERD 5%
- P3. Logical (normalized) ERD 5%
- P4. Schema Implementation 5%
- P5. PSM Implementation 5%
- P6. Presentation 5%
- Total Project 30%

The rubrics for the project grading is Completeness 40%, Correctness 40%, and Creativity 20%.

Submission instruction:

Project submission instructions:
Please upload required project documents into Drive/GitHub and make the URL " public viewable " and share the URLs as Summary sheet (pdf or doc) on Canvas.

Your summary sheet should include links to all required documents submitted.
*One submission per team

P1. Topic and Objectives
Each team will collaborate to decide a database topic. The database topics may be something like a Book Store, University Registration, etc. Each team will also establish the mission statement and

identify the mission objectives that the database will accomplish. The mission objectives may be like a Book Sale, Inventory Control, etc.

P2. Conceptual ERD
Based on reading and class lectures, each team will create an initial Entity-Relationship diagram (ERD) that depicts a database for a real or fictitious business. This database will allow for data collection, processing, and reporting for an organization. It is strongly suggested that each team model a database for a type of organization that they have deep understanding---such as the current or previous work experience or a personal hobby. In the past, students have created databases to capture data about video rental stores, bike repair shops, beer tasting/review professionals, athletic leagues, and airlines. Students are encouraged to use their imagination!

Each team will submit an ERD for the database of their choosing. The target for the initial ERD is 10 entities or more. In addition to the ERD, students should submit a database design document containing the description of the business problems being addressed by their database, list all entities and how they are related to each other, and key design decisions.

For the part of the business problems being addressed, this section could be like the mission objective document completed earlier. Additionally, and more importantly, this document should contain your team's key database design decisions, such as why an entity is included and how that entity is related to other entities.

* Entity-Relationship Diagramming tool, Microsoft Visio or Toad Data Modeler can be downloaded for free. You may also use free tools such as: GitMind, Gliffy, Visual Paradigm, Draw.io, Lucidchart, SqlDBM, DBDiagram.io and QuickDBD

P3 - Logical ERD
Based on the instructor's feedback of the conceputal ERD, each team will make improvements to the Conceptual ERD, and convert to a logical model. These changes will be regarding further 'normalization' of the database entities, reducing redundant data, and recognizing additional entities.

In addition to submitting a fine-tuned ERD, each team will also submit a brief description identifying the changes made to the initial ERD. It is also important to update the design document to reflect the modern design changes. Resubmission of the updated design document is not required at this time.

P4 – Schema Implementation
Each team is required to submit the SQL code necessary to implement the database design, including the insertion of a minimal amount of data (at least ten rows per table) using SQL INSERT statements or the Data Import Wizard.

Teams are expected to create the following database objects:
- At least three table-level CHECK constraints.
- Each table must have a primary key.
- Relationships between tables must enforce foreign key constraints.
- Appropriate rules, such as nullability, must be enforced.
- Each column should be assigned the appropriate data type.
- Include an identity column or equivalent mechanism for automatic ID generation.

P5 - PSM Implementation

Each team is required to submit the SQL code necessary to meet the database requirements. Teams are expected to create the following database objects:

- At least 3 stored procedures with input and output parameters.
- At least 3 views, often used for reporting purposes.
- At least 1 DML trigger.
- Computed columns based on a user-defined function (UDF), with the base table altered via DDL to enforce the calculation.
- Column data encryption.
- At least 3 non-clustered indexes.
- Data visualization using Power BI or Tableau.
- A graphical user interface (GUI) for CRUD operations is a plus (optional).

P6 -Project Presentation

Each team will present the database design project to the class. The presentation should include the following items.

1) A Power Point slide deck, containing highlights, to highlight the project
2) The design documents
3) The final ERD
4) Sample DDL statements for implementing the database (stored procedures, views, triggers)
5) Visualizations created (Using PowerBI/Tableau/SSRS)
6) Live demo of the project displaying the database, and the visualization layer

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: 617-373-4357

Outreach, Engagement, Belonging

Northeastern University is committed to fostering a community of belonging, which is essential to the advancement of Northeastern University's mission of teaching and research. Our university is stronger as a result of the varied backgrounds, experiences, and perspectives that all members of our global community bring to the pursuit of knowledge. Embracing this pluralism is not the work of one office, department, or academic unit. It is a shared responsibility that spans disciplines and boundaries. By harnessing the power of our differences, we will continue to light the path to bold new ideas and life-changing discoveries.

It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diverse experiences that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and belonging environment for every other member of the class. Your suggestions are encouraged and appreciated.

Please visit Belonging at Northeastern – Northeastern Provost for complete information.

Title IX
Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance. Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff. In case of an emergency, please call 911.

The Office for University Equity and Compliance (OUEC) leads Northeastern University's efforts in maintaining compliance with all federal, state, and provincial civil rights laws and prohibits discrimination within any of its programs, activities, and services. Please visit https://ouec.northeastern.edu/ for more information and for the link to file a report.

on- and off-campus.