Northeastern University
College of Engineering

Multidisciplinary Graduate Engineering
Course Syllabus

Course Information

Adv Data Management & Governance, 21377

DAMG 7374 - 02

Spring 2024

4 Credit Hour

Location

TBD

Instructor Information

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Technical/Course Materials Requirements

All Class materials will be provided.

Course Description/Prerequisite

Summary:

The Advance Data Management and Governance course provides students with a comprehensive understanding of managing, analyzing, and designing data systems. It covers topics such as data management principles, database design, statistical analysis, and data visualization. Students gain practical skills in working with databases and applying analytical techniques. The course includes hands-on exercises and projects, allowing students to apply their knowledge in real-world scenarios. Students also use Velero ETP for project management and Velero Metadata for data cataloging.

Detail Description:

The Advance Data Management and Governance course is designed to provide students with a comprehensive understanding of the principles, techniques, and tools involved in managing, analyzing, and designing data systems. The course combines theoretical knowledge with practical skills to prepare students for careers in data management, analytics, and related fields.

The course covers a wide range of topics, including data management principles, data integration, database design, data governance, statistical analysis, data visualization, and ethical considerations in data management. Students will learn about various data management

strategies, including data collection, data storage, data transformation, and data quality assurance.

The course emphasizes the application of analytical techniques to derive insights from data. Students will learn statistical methods and data mining techniques. They will also gain proficiency in data visualization tools and techniques to effectively communicate data findings to stakeholders.

Database design and management are essential components of the course. Students will learn the fundamentals of relational databases, Graph, and Document databases. They will acquire practical skills in designing and implementing efficient and secure database systems.

The course will include practical exercises, case studies, and projects to provide students with hands-on experience in working with data. They will have opportunities to apply data management techniques, conduct data analysis, design databases, develop data visualization solutions and use metadata tools. These practical activities will enable students to develop critical thinking skills and apply their knowledge in real-world scenarios.

Students will be using Velero ETP to manage their projects and Velero Metadata to enhance their understanding of the data catalog.

Student Learning/Course Outcomes (SLOs)

Upon completion of the course, students will have a solid foundation in data management principles, data analytics techniques, database design, and data governance. They will be equipped with the skills necessary to manage and analyze data effectively, make data-driven decisions, and contribute to the design and implementation of robust data systems.

Data Management, Analytics, and Design revolve around the increasing importance of data in various industries and the need for professionals who can effectively manage, analyze, and design data systems. Here are the key aspects of the course rationale:

- **Understand Data Management Principles:** The course aims to provide students with a foundational understanding of data management principles and best practices. This includes topics such as data governance, data quality, data integration, data modeling, and data lifecycle management.
- **Gain Proficiency in Data Analytics Techniques**: The objective is to equip students with the knowledge and skills to apply data analytics techniques effectively. This may involve learning various data mining techniques, data visualization, and exploratory data analysis.
- **Develop Data Visualization and Reporting Skills:** The course aims to enhance students' ability to present data insights through effective data visualization and reporting techniques. This includes understanding visualization principles, using tools for creating visualizations, and developing skills to communicate data-driven insights to stakeholders.
- **Understand Database Design and Management:** The objective is to familiarize students with database design principles using Relational, Graph, and Document databases.
- **Apply Data Management and Analytics Tools:** The objective is to provide hands-on experience with industry-standard database tools and technologies used in data management and analytics.

Students will have the opportunity to work with software such as SQL, Graph, and Document databases, and an understanding of data integration, data management, data visualization tools, and programming languages commonly used in data analysis.

- **Develop Data-Driven Decision-Making Skills:** The course aims to foster critical thinking and decision-making skills based on data insights. Students will be exposed to real-world case studies and projects where they need to analyze and interpret data to make informed decisions and solve business problems.

The class will be taught interactively, seeking discussion from the students. We will be using a portfolio management tool from Velero Technology called Velero Enterprise Transparency (Velero ETP) to manage projects. A metadata management and governance tool (Velero Metadata) will be used to provide students with an in-depth understanding of the data glossary. The in-class labs will be used to help you gain an understanding of available tools and to create the inputs to your project. We will divide our time between lectures, labs, and discussions.

Course Pre-requisite/s

We will discuss enterprise architecture and project management 101; Knowledge of Python and basic database management skills and familiarity with Business Intelligence tools are essential.

for this class. We will focus on the term project which involves the development of an end-to-end data-oriented project.

For course detailed pre-requisite please refer to the Northeaster course requirements. It is important to meet NEU pre-requisite for this course.

Attendance Policy

Active participation in class discussions is greatly appreciated and will account for 10% of the overall grade. **Students who exceed two absences will not receive any points toward their grades**. A deduction of 4 points will be applied for each missed class. The interactive nature of class discussions adds substantial worth to the course, making it imperative for all students to actively engage in these conversations. Please note that students who miss more than three classes are not expected to complete the course successfully.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus.

Students must communicate with the faculty before the deadline if they anticipate work will be submitted late. Late submission (<3 hours) will result in a 10% reduction in the grade.

Work submitted late without prior communication and authorization from faculty will not be graded.

Grading/Evaluation Standards

Grade Scale

95-100%	**A**	**87-89.9%**	**B+**	**77-79.9%**	**C+**	
		84-86.9%	**B**	**74-76.9%**	**C**	69.9% or below F
90-94.9%	**A-**	**80-83.9%**	**B-**	**70-73.9%**	**C-**	

Grade Breakdown:

Individual Project: This assignment will test your overall knowledge of Big Data Architecture, Data Governance, and organization skills. This will be worth 70% of your total grade.
Team Projects & Class Assignments: This will be worth 20% of your total grade.
Class Discussion and attendance: 10% of your grade will be allocated to your class participation and attendance.
Course Schedule - The course schedule is subject to change based on the class size.

Class #	Topic / Learning Objectives	Readings / Assignments	Comments
Week 1	Overview of the course syllabus, tools, and expectations ○ Q&A ○ Each Student will introduce themselves and talk about their background, experience, and expectation.		
Week 2	Recap from Class 1 **Lecture #1** ○ Data life cycle ○ Introduction to Velero ETP product ○ Review how Velero ETP products will be used during this semester.	**Assignment Due Week 3:** **Data Selection -** Instruction for this assignment will be provided in this week's lecture including the criteria.	
Week 3	Student Presentation of their proposed files. The presentation time will be pending on the classroom size –5 minutes per student. **Lecture #2** ○ Data-driven projects, and Data-oriented project management.	**Term Assignment to do**– You will be provided the instructions to create your term project in Velero	Students are to install the required software.

Class #	Topic / Learning Objectives	Readings / Assignments	Comments
Week 4	**Lecture #3** ○ Data Governance & Metadata ○ Data Governance – Building Data Glossary ○ Deploying Metadata ○ Velero Metadata (VDM) Demo	**Student Progress Report** – Students will provide their progress reports. On Data Profiling	*You will be provided a user id & PWD to access Velero.*
Week 5	**Lecture #4** ○ How to create business metadata in VMD products. Students will load their Business metadata to VMD.	**Student Progress Report** – Students will provide their progress reports. i.e., Business metadata	
Week 6	**Lecture #5** ○ Graph, and Document database design concepts	**Student Progress Report** – Students will provide their progress reports. i.e., the Data Cleansing Process	
Week 7	**Lecture #6** ○ Data Management framework – data managements matrix data collection	**Student Progress Report** – Students will provide their progress reports. i.e., Database design	
Week 8	Discussion – RDBMS VS Graph database	**Student Progress Report** – Students will provide their progress reports. i.e., Database design, Data Management	
Week 9	**Lecture #7** ○ Neo4J Script: How to create a database. ○ Review Relational database design principles	**Student Progress Report** – Students will provide their progress reports. i.e., Database design, Data Management	

Class #	Topic / Learning Objectives	Readings / Assignments	Comments
Week 10	☐ **Lecture #8** ○ How to extract and load technical metadata to Velero MD.	**Student Progress Report** – Students will provide their progress reports. i.e., Database creation and the load of Neo4J	
Week 11	☐ **Lecture #9** ○ How to extract and load technical metadata to Velero MD from SQL Server.	**Student Progress Report** – Students will provide their progress reports. i.e., SQL Server Database creation and load. Neo4J Load technical metadata to VMD	
Week 12	☐ **Lecture #10** ○ How to define reports in Velero MD. ○ Building a Data Lineage	**Student Progress Report** – Students will provide their progress reports. i.e., Present the list of reports to be created and how they will be used. SQL Server Load technical metadata to Velero MD	
Week 13	☐ **Lecture #11** ○ How to Build a Bridge between Business and Technical Metadata	**Student Progress Report** – Students will provide their progress reports. i.e., a Progress report on report creation	
Week 14	Students' presentation		
Week 15	Final Project Reviews		

***Note**: We will be using the Neo4J & CouchDB database, Python, PowerBI/Matlab.*

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.

Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

Student Accommodations

Northeastern University and the Disability Resource Center (DRC) 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 through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit http://www.northeastern.edu/drc/getting-started-with-the-drc/.

Library Services

The Northeastern University Library is 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 Education specific resources, visit http://subjectguides.lib.neu.edu/edresearch.

Diversity and Inclusion

Northeastern University is committed to equal opportunity, affirmative action, diversity, and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration, and an awareness of global perspectives on social justice.

Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion

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, and transgender students, faculty, and staff.

In case of an emergency, please call 911.

Please visit www.northeastern.edu/titleix for a complete list of reporting options and resources both on- and off-campus.