Data Architecture and Management, MS (Seattle)

For program contact information, please visit this website (https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/).

Many MS programs in the data area deal with data collection and analysis but do not, however, address a crucial activity that data scientists, data analysts, business analysts, and many software engineers need to perform to make that data valuable—data integration. That activity may also be referred to as data preparation, data curation, application integration, and data engineering based on the integration of use cases and integration persona. The Master of Science in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

The data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so-called Big Data distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The Master of Science in Data Architecture and Management offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column databases, data science engineering, and Big Data engineering. On the software engineering side, we offer advanced Big Data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by hundredfold increases in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers can make the necessary mathematical algorithms execute quickly enough to work in these complicated areas and get the finest results.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000.

The master's thesis must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4
Complete 16 semester hours from the electives course list below. (p. 2)		16

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

ELECTIVES

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6202	Concepts of Object-Oriented Design with C#	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6255	Software Testing for Engineers	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 6700	Technical Writing and Professional Development	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7235	Model-Driven Architecture	
CSYE 7270	Building Virtual Environments	
CSYE 7280	User Experience Design and Testing	
CSYE 7300	Zero Trust Architecture for Software Engineers	
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7400	Responsible Software Engineering and AI	
CSYE 7470	Advanced Game Analytics	
CSYE 7550	Distributed Intelligent Agents in the Metaverse	
CSYE 7380	Theory and Practical Applications of AI Generative Modeling	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7105	Intelligent Data Modeling and Presentation for Engineers	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7325	Introduction to Information Technology Auditing	
DAMG 7330	Cybersecurity Audit and Compliance	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
DAMG 7390	Advances in Hybrid Data Integration and Engineering	
DAMG 7945	Master's Project	
DAMG 7976	Directed Study	
DAMG 7990	Thesis	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6106	Neural Modeling Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 6500	Managing Operational Risk for Engineering	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7110	High-Performance Coding for Fintech	

INFO 7205	Advanced Application Engineering Project
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7250	Engineering of Big-Data Systems
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7330	Information Systems for Healthcare Services Delivery
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7380	User Experience Design for Healthcare Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7410	Advanced Medical Device Software Engineering
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development
INFO 7520	Engineering of Advanced Cryptocurrency Systems
INFO 7525	Regulatory Aspects of Smart Contract Automation
INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7750	Engineering Advanced Healthcare Information Exchange Platforms
INFO 7945	Master's Project
INFO 7976	Directed Study
INFO 7990	Thesis
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330
TELE 5350	Telecom and Network Infrastructure
TELE 5360	Internet Protocols and Architecture
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 6300	Communication and Network Security
TELE 6400	Software-Defined Networking
TELE 6420	Infrastructure Automation Design and Tools
TELE 6500	Machine Learning for IoT Systems
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
TELE 6550	IoT Embedded System Design
TELE 7374	Special Topics in the Internet of Things