Thank you for joining!

Graduate Data Science Programs

INFORMATION SESSION WILL BEGIN AT NOON CT

Northwestern
SCHOOL OF
PROFESSIONAL STUDIES

Graduate Data Science Programs

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PROFESSIONAL STUDIES

Thomas W. Miller

MSDS Faculty Director

COURSES for 2023-24

Data Engineering with Go

Decision Analytics

Knowledge Engineering

Data Visualization

Capstone: Data Engineering

Education

PhD, Psychology (psychometrics), University of Minnesota

MS, Statistics, University of Minnesota

MBA, University of Oregon

MS, Economics, University of Oregon

BA, Philosophy, Ursinus College

Prior Academic Appointments

Taught marketing research and strategy at the University of Wisconsin-Madison School of Business

Additional appointments at the University of Oregon, Oregon State University, Hamline University, and the University of Minnesota

Industry Experience

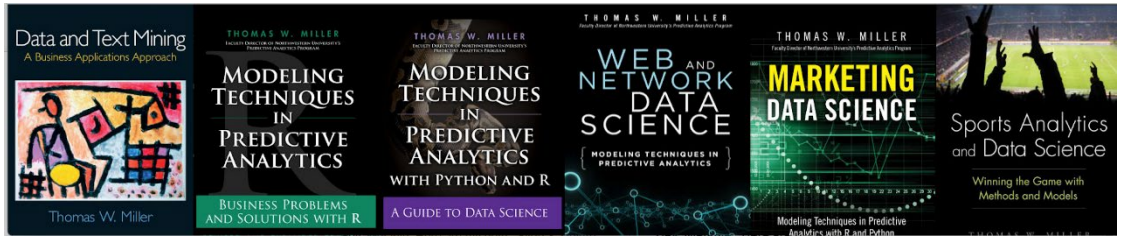
Former director of the A.C. Nielsen Center for Marketing Research

Experience with corporate IT: Hewlett-Packard and NCR Comten

Owner of Research Publishers LLC, Manhattan Beach, CA, offering publishing and consulting services) (*www.research-publishers.com*)

Editor-in-Chief, *Data Science Quarterly* (*www.data-science-quarterly.com*), promoting data science as a discipline

Author of six textbooks about data science



Founded in
1933

Ranked #10
in the country

Faculty includes:

- Northwestern scholars
- Experienced practitioners
- Industry leaders

Kathreen Fontecha

MASTER OF SCIENCE IN INFORMATION DESIGN AND STRATEGY

UC ANR

Ignatius Valentine Aloysius

MASTER OF ARTS/ FINE ARTS IN CREATIVE WRITING

SAIC

Paula Derdiger, PhD

MASTER OF ARTS IN LITERATURE

UMD

Stephanie Cisneros

MASTER OF ARTS IN LIBERAL STUDIES

Northwestern University

Henry Gabb, PhD

MASTER OF SCIENCE IN HEALTH INFORMATICS

intel

JC Kibbey

MASTER OF ARTS IN PUBLIC POLICY AND ADMINISTRATION

Union of Concerned Scientists

Brad Bauer

MASTER OF ARTS IN SPORTS ADMINISTRATION

CHICAGO BULLS

Justina Lakinger

MASTER OF SCIENCE IN DATA SCIENCE

amazon

Nancy Dandridge

MASTER OF SCIENCE IN INFORMATION SYSTEMS

SPACEX

John Barker

MASTER OF SCIENCE IN REGULATORY COMPLIANCE

Wolters Kluwer

Stephanie Kang

MASTER OF SCIENCE IN GLOBAL HEALTH

Course Length	Where	When	Courses Per Quarter	Time to Finish
10 weeks	Online	**ONLINE** Flexible scheduling with periodic coordinated web conference sessions	**AVERAGE** 1–2 **MAXIMUM** 3	2–5 years *You set the pace*

SPS Distance Learning Philosophy

Courses designed to ensure the success of every student

Learning-by-doing and case study approach to education

- Courses are grounded in theories of learning and cognition that facilitate active engagement in individual learning
- Students are immersed in vibrant discussion, applying high-end skill sets, and developing solutions to real-life problems

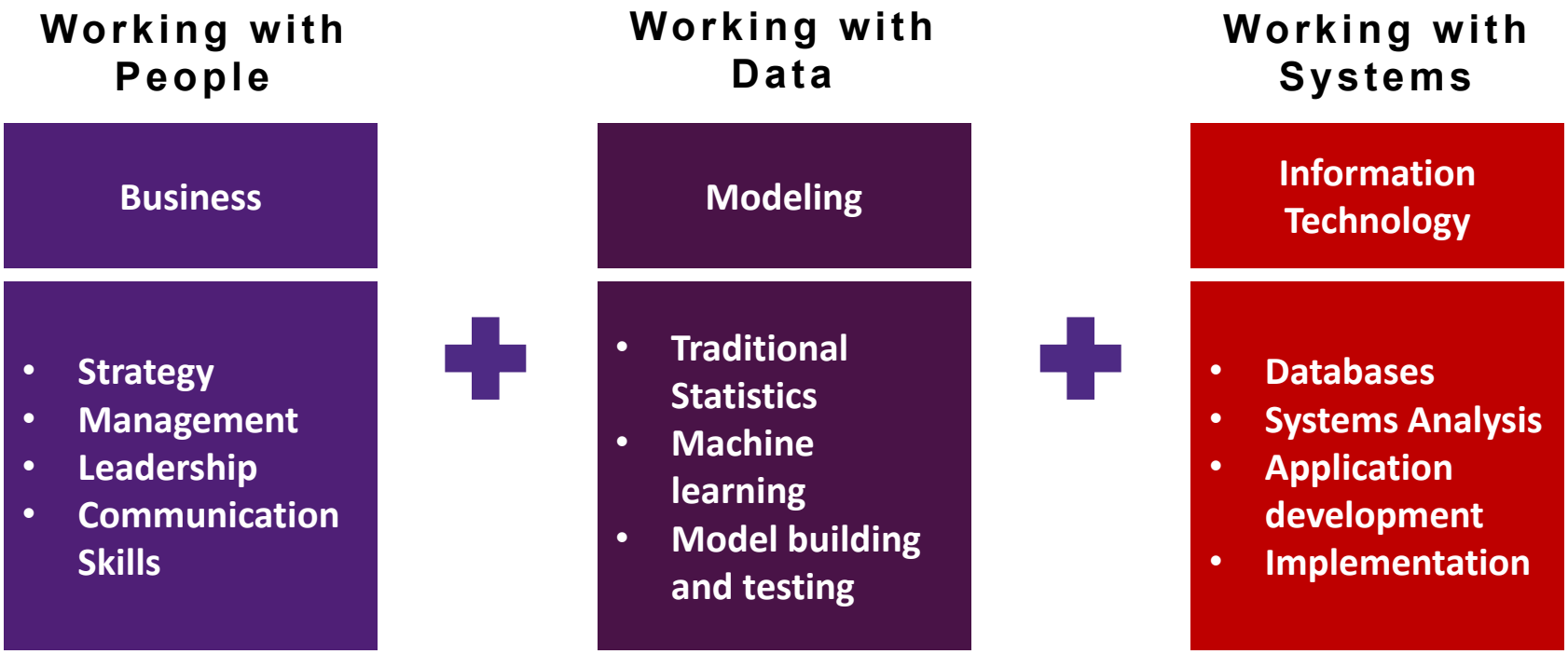
Rich distance learning experience

- Designed to promote interactions among students and faculty
- Asynchronous with live elements layered in as appropriate
- Courses continually updated with current technology

Employing universal instructional design

- Courses are designed and taught utilizing principles of universal instructional design, creating a learning environment in which every student can succeed
- Universal instructional design recognizes and respects that students bring diverse cultures, backgrounds, and learning styles to the classroom

What is Data Science?



Each component is thoroughly covered in the MSDS program

About the MSDS Program

Cutting-Edge Technology

- Named the #1 Best Online Master's in Artificial Intelligence Degree Program. See https://www.mastersinai.org/
- Brings together data management, statistical analysis, communication, and leadership
- Use Python, R. and Go for data science and data engineering
- Use state-of-the-art systems for machine learning and artificial intelligence, including TensorFlow and Keras
- Work with high-performance, enterprise-ready database systems, including relational, document, graph, and graph-relational databases
- Receive a Linux account on the Data Science Computing Cluster
- Use cloud services from many providers

Learn from Leaders in the Field

- Courses taught by distinguished Northwestern faculty and experienced data scientists
- Prepare for key roles in electronic commerce, marketing, finance, health care, operations management, and more

What makes the MSDS program special?

Noteworthy Information about the Program

- 12+ years in online analytics and data science education
- 80% of faculty with doctoral degrees
- 95% of faculty with business experience
- 2,000+ Master's degree graduates
- Five specializations and 40+ courses to choose from in MSDS
- Courses in MSIS may be selected as electives

Additional Northwestern Resources

- Extensive Library Collections
- Springer Collection of Online Resources
- Safari Online (O'Reilly, Manning, and other publishers)
- LinkedIn Training (formerly Linda.com)
- Learning Studios (Python, R, Go, Excel, and Statistics)
- The Writing Place and The Math Place

12 Courses

- 6 Core Courses
- 2 Specialization Courses (optional)
- 2 Elective Courses
- 1 Additional core course selected from eight options
- 1 Capstone Project or Thesis

5 Specializations

- Analytics Management
- Analytics and Modeling
- Artificial Intelligence
- Data Engineering
- Technology Entrepreneurship

6 Core Courses

- Math for Modelers
- Applied Statistics with R
- Data Governance, Ethics, and Law
- Database Systems
- Practical Machine Learning
- Decision Analytics

Languages for Data Science: Python, R, Go, and SQL

Students in the MSDS program gain experience with key languages for data science and data engineering and can tailor studies to their own needs and interests. Many courses provide language options.

- Python is the primary language in most Artificial Intelligence courses
- R is the primary language in most Analytics and Modeling courses
- Go is used extensively in Data Engineering courses along with other languages and systems. See https://msdsgo.netlify.app/
- Structured query language (SQL) used in courses with relational databases

Courses Introducing Languages for Data Sciences

Python for Data Science	Applied Statistics with R	Data Engineering with Go	Database Systems (SQL)

Analytics and Modeling

- Builds on the tradition of the Master of Science in Predictive Analytics (MSDS) program.
- Designed for data scientists seeking technical roles as data analysts, applied statisticians, and modelers. Courses focus on statistical interference and applications of predictive models.

REQUIRED COURSES

- **Supervised Learning Methods**
- **Unsupervised Learning Methods**

SUGGESTED ELECTIVE COURSES

- **Time Series Analysis and Forecasting**
- **Marketing Analytics**
- **Financial Machine Learning**
- **Applied Probability and Simulation Modeling**
- **Web and Network Data Science**
- **Research Design for Data Science**
- **Data Visualization**

Artificial Intelligence

- Designed for students seeking technical positions in machine learning and artificial intelligence (AI).
- Students develop programming skills in deep learning, as needed for computer vision, natural language processing, intelligent systems, and robotics.

SUGGESTED LANGUAGE PRELIMINARIES

- **Python Learning Studio**
- **Python for Data Science**

REQUIRED COURSES

- **Artificial Intelligence and Deep Learning**
- **Natural Language Processing**

SUGGESTED ELECTIVE COURSES

- **Computer Vision**
- **Intelligent Systems and Robotics**
- **Special Topics: Generative Artificial Intelligence**
- **Knowledge Engineering**

Data Engineering

- Designed for students seeking technical positions with a focus on data science applications, software development, and information systems analysis and deployment.
- Students learn about technologies for gathering, storing, and analyzing data in interactive, batch, and stream processing environments.

SUGGESTED LANGUAGE PRELIMINARIES

Go Learning Studio

Data Engineering with Go

REQUIRED COURSES

Foundations of Data Engineering

Analytics Application Engineering

SUGGESTED ELECTIVE COURSES

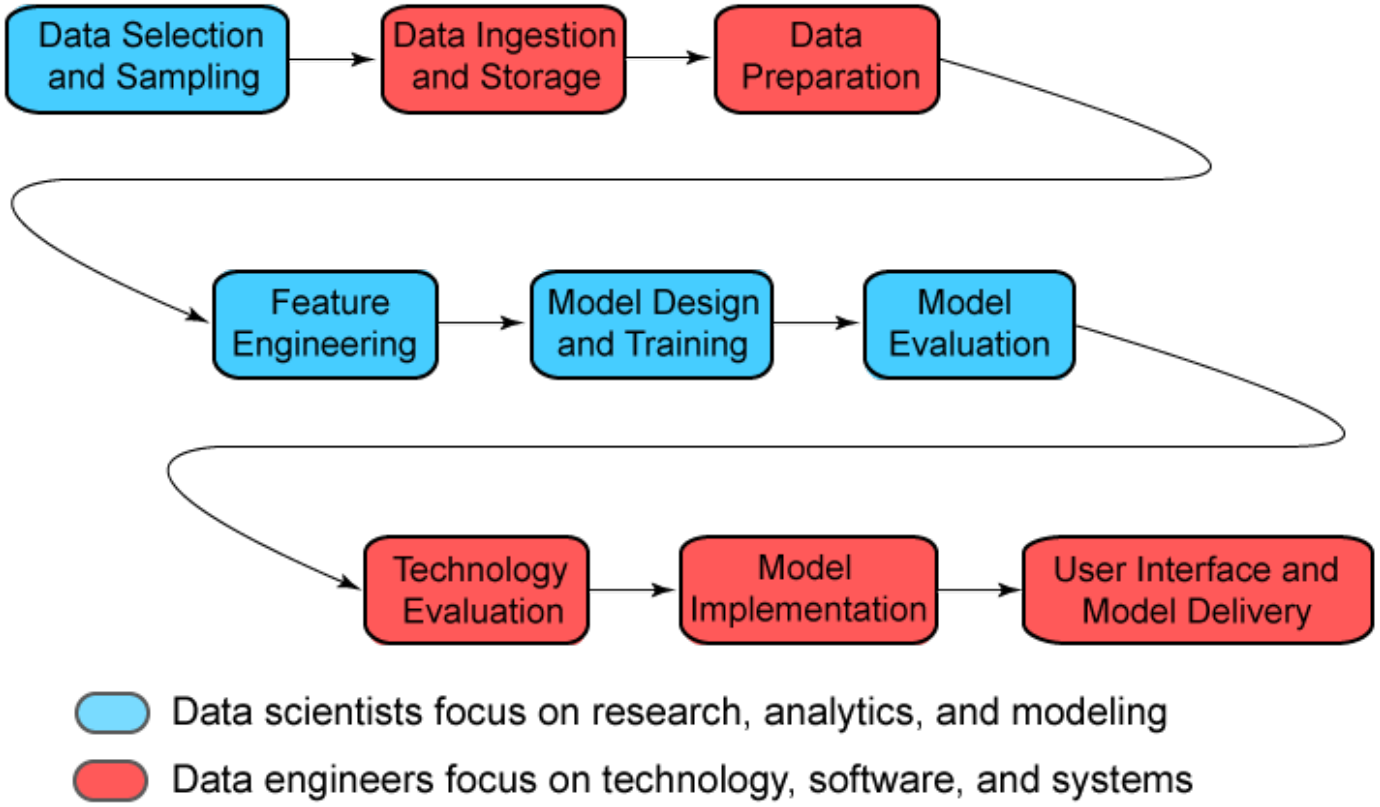
Analytics Systems Engineering

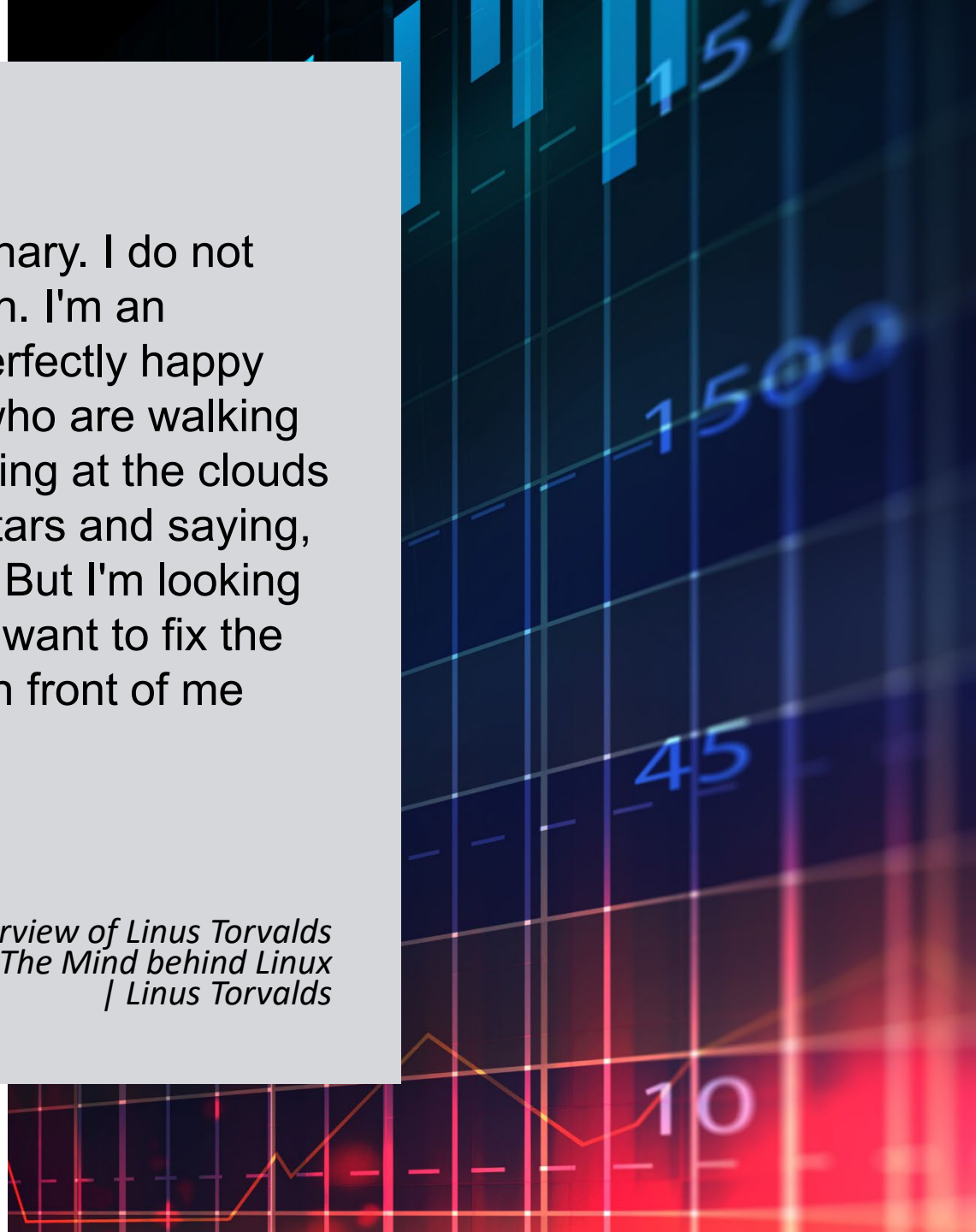
Full-Stack Data Engineering

Data Pipelines and Stream Processing

Knowledge Engineering

Putting Data Science into Practice: Roles of Data Scientists and Engineers





“. . . I am not a visionary. I do not have a five-year plan. I'm an engineer. . . . I'm perfectly happy with all the people who are walking around and just staring at the clouds and looking at the stars and saying, "I want to go there." But I'm looking at the ground, and I want to fix the pothole that's right in front of me before I fall in.”

From Chris Anderson's interview of Linus Torvalds on YouTube, May 3, 2016: The Mind behind Linux | Linus Torvalds

Strategic Initiatives of the MSDS Program

Data Engineering: Technology Leadership

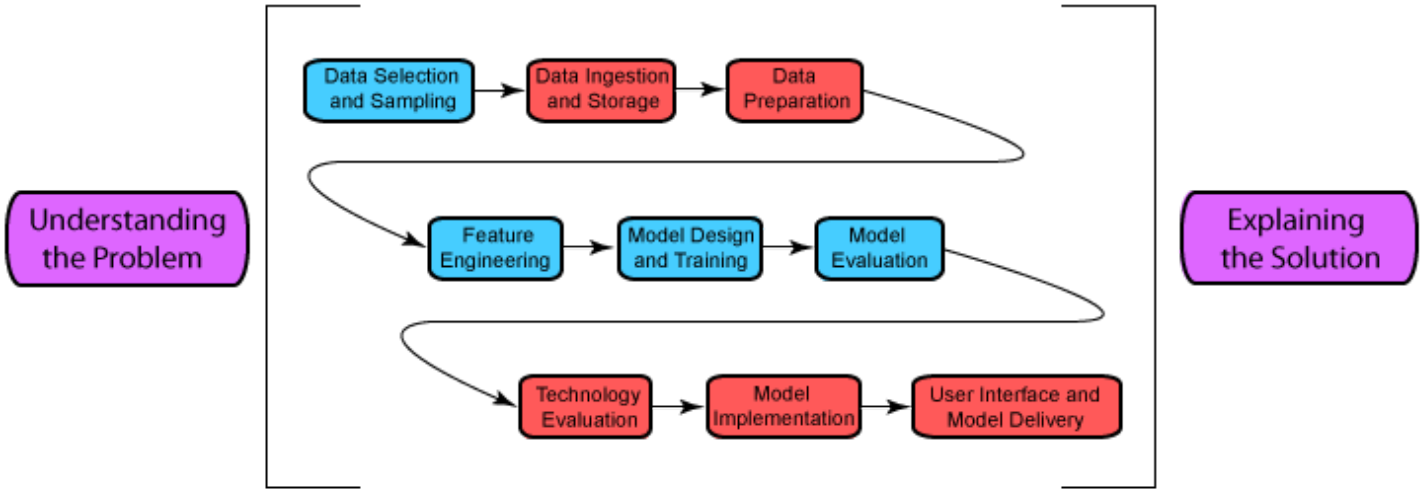
- Database systems: PostgreSQL, Elasticsearch, Neo4j, and EdgeDB
- Go programming language complements Python and R
- Software engineering with containers, microservices, version control systems, various cloud platforms, cloud-native development, . . .
- Client/server and desktop solutions, Svelte frontend, Go backend, Wails
- Data pipelines for batch, interactive, and streaming environments
- Systems engineering focused on infrastructure and performance

Putting Data Science into Practice

- Many courses with a business/organizational focus: Accounting and Finance for Technology Managers, Business Process Analytics, . . .
- Learning-by-doing and case study approach to education
- Students develop personal portfolios and personal websites
- Analytics Management specialization
- Technology Entrepreneurship specialization

Learn more at https://msds-program.netlify.app/

Putting Data Science into Practice: Technology Management Plays a Key Role



Data scientists focus on research, analytics, and modeling

Data engineers focus on technology, software, and systems

Building and Managing Teams | Technology Selection | Technology managers

Analytics Management

- Designed for students seeking technical leadership and data science management positions.

REQUIRED COURSES

- Accounting and Finance for Technology Managers
- Business Process Analytics

SUGGESTED ELECTIVE COURSES

- Data Science and Digital Transformation
- Management Consulting
- Project Management
- Business Leadership and Communication
- Research Design for Data Science
- Data Visualization

Technology Entrepreneurship

- Entrepreneurship involves creating a new business or business function where one did not exist before.
- Data science, machine learning, and artificial intelligence provide new business opportunities. This specialization shows students ways of building successful, innovation-driven startups.

REQUIRED COURSES

Technology Entrepreneurship

Accounting and Finance for Technology Managers

SUGGESTED ELECTIVE COURSES

Project Management

Business Leadership and Communications

Data Governance, Ethics, and Law

Management Consulting

Business Process Analytics

Special Topics Product Prototyping

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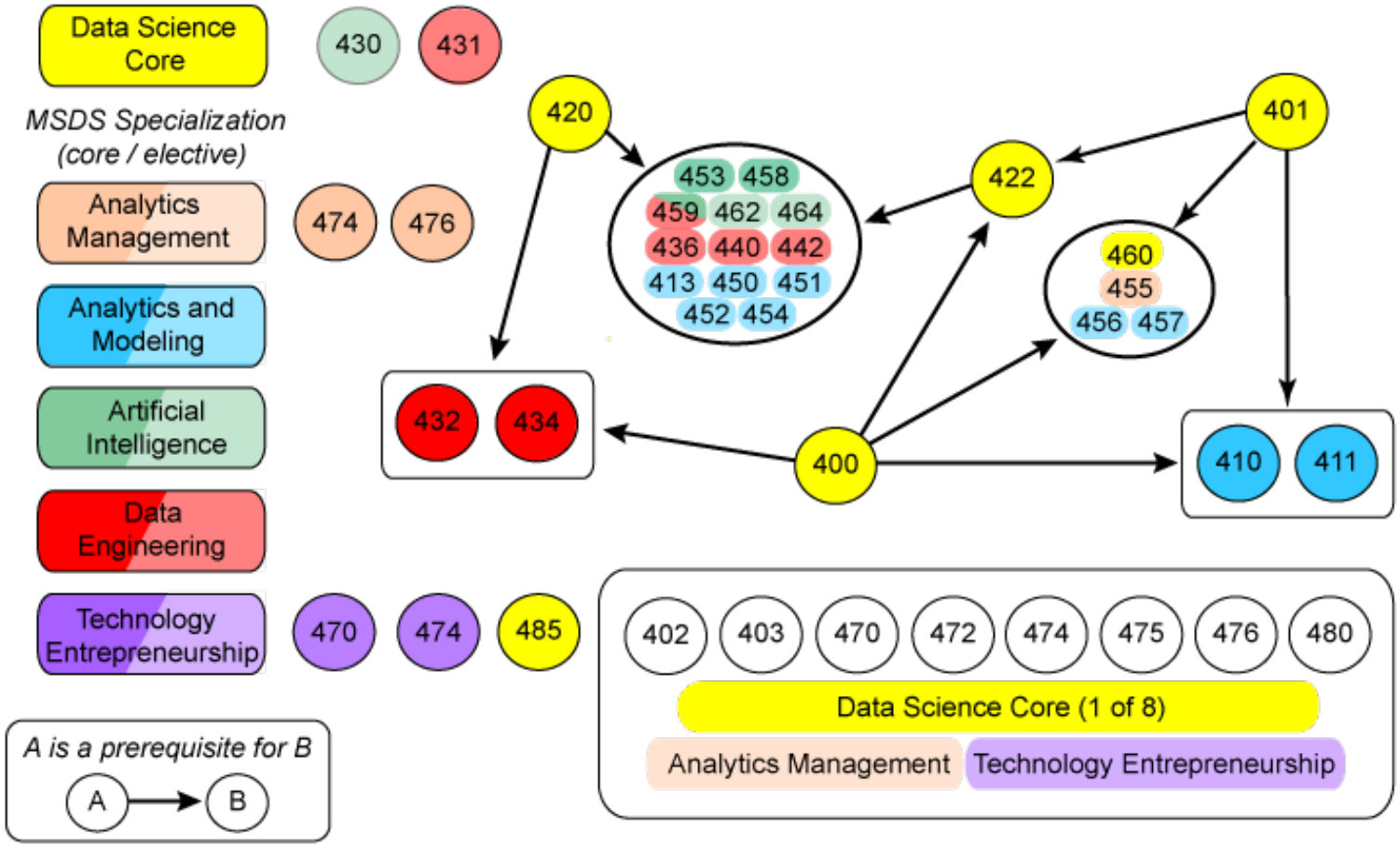
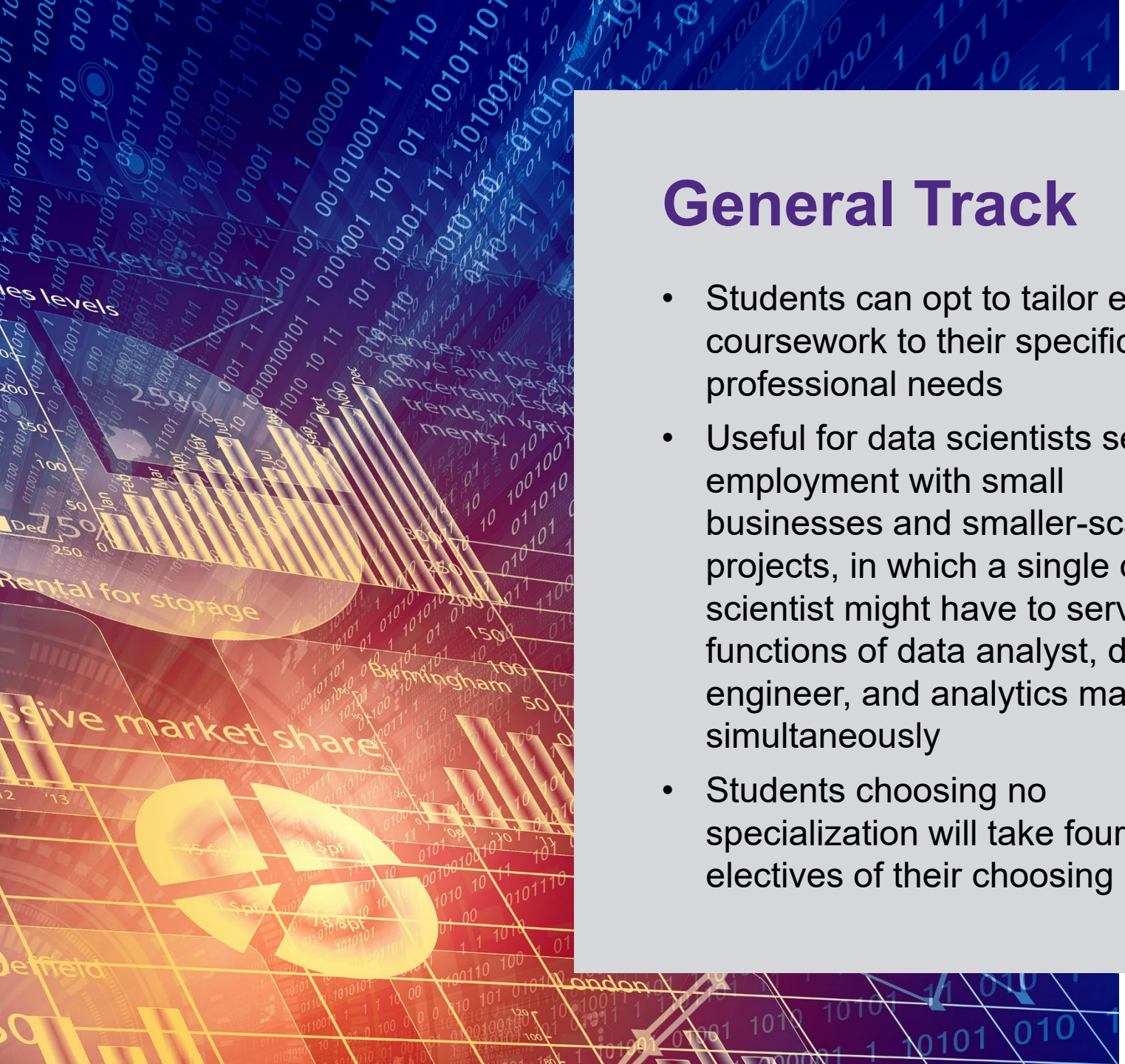
Curriculum Map for Graduate Courses in Data Science



The MSDS degree requires twelve courses, including a capstone course or master's thesis. Registration for the capstone (MSDS 498) or thesis (MSDS 590) requires prior completion of core courses and all but one elective course. This curriculum map shows hard prerequisites as checked by the registration system.



General Track

- Students can opt to tailor elective coursework to their specific professional needs
- Useful for data scientists seeking employment with small businesses and smaller-scale projects, in which a single data scientist might have to serve the functions of data analyst, data engineer, and analytics manager simultaneously
- Students choosing no specialization will take four electives of their choosing

Graduate Certificate Programs

- For the student with a bachelor's degree
- Admission requirements similar to the MSDS program
- Four to six graduate courses selected from the MSDS program

Courses:

- Analytics and Modeling
- Analytics Management
- Artificial Intelligence
- Data Engineering
- Sports Analytics
- Technology Entrepreneurship

Advanced Data Science Certificate

For the student with a master's degree in data science or a quantitative field, including training in database systems and machine learning

Four to six graduate courses selected from the MSDS program:

Corporate Certificate Program

Data science and technology education tailored for each company

Focus on issues especially relevant to the company, such as digital transformation

Courses available from MSDS specializations and from the MSIS program

Credits transferable to the full MSDS program

MSDS Accelerated Option

EARN YOUR DEGREE IN ONE YEAR

- Course load is three courses per quarter
  - Six core courses
  - Data governance course
  - Four required courses corresponding to a declared specialization
- Choose from five specializations
  - Analytics and Modeling
  - Artificial Intelligence
  - Data Engineering
  - Analytics Management
  - Technology Entrepreneurship

THE SPS COURSE EXPERIENCE

- Students move through a cohort, building strong relationships learning with a diverse group of professionals – many of whom are highly-placed in their fields
- Schedule offers flexibility and balance that allows for part-time internships and policy-related roles with area organizations

Students' Background

- Manufacturing
- Finance
- Marketing/Sales and Service
- Information Technology
- Government and Public Administration
- Business Management and Administration

Post-graduation

- Data Scientist
- Data Engineer
- Analytics Manager
- Business Intelligence and Analytics Manager
- Director, Analytics and Modeling
- Marketing Analytics

Application Requirements

- **Completed online application**
- **Nonrefundable $75 application fee**
- **Official Transcripts**
- **Two letters of recommendation**
- **Statement of Purpose**
- **Current resume**
- **Applicants with international credentials also need:**

  Course-by-course evaluation by an accredited NACES member

  Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS)*

** Test scores are required for international applicants who did not complete a degree in which the courses were taught in English*

Winter 2024

APPLICATION DEADLINE
October 15, 2023

CLASSES BEGIN
January 3, 2024

Spring 2024

APPLICATION DEADLINE
January 15, 2024

CLASSES BEGIN
March 26, 2024

Summer 2024

APPLICATION DEADLINE
April 15, 2024

CLASSES BEGIN
June 20, 2024

Fall 2024

APPLICATION DEADLINE
July 15, 2024

CLASSES BEGIN
September 24, 2024

- Academic planning and course selection
- Career coaching
- Resume and cover letter guidance
- Career workshops and events
- Student experience support

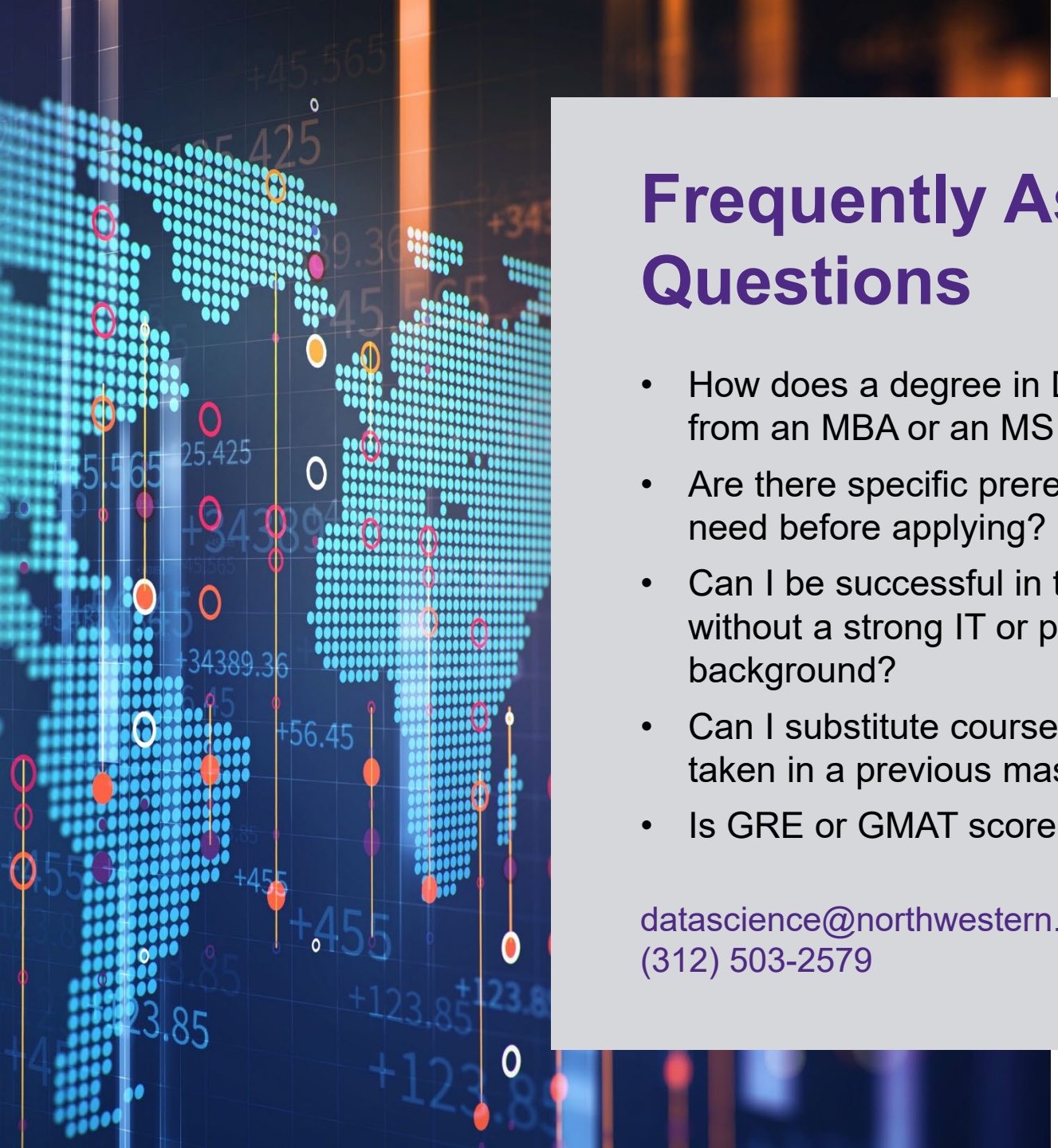
- Quantitative coursework support (The Math Place)
- Writing and editing assistance (The Writing Place)
- In-course TA Assistance
- Access to science, language, and ESL tutoring
- Independent tutor referral

- Student Alliance Board (SAB)

Northwestern University Alumni Association

Founded 140 years ago, the NAA offers a rich array of career resources and services

- Connect to a global alumni community of over 200,000
- Access to Handshake—Northwestern's central platform for job listings, internships, and career development workshops
- Notice of career fairs and networking events



Frequently Asked Questions

- How does a degree in Data Science differ from an MBA or an MS in Statistics?
- Are there specific prerequisite courses I need before applying?
- Can I be successful in the program without a strong IT or programming background?
- Can I substitute courses that I've already taken in a previous masters program?
- Is GRE or GMAT score required to apply?

datascience@northwestern.edu
(312) 503-2579

Help is Available

ADMISSIONS ADVISER

- datascience@northwestern.edu
- 312-503-2579

TRANSCRIPTS SUBMISSION

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- MSDS Graduate Admissions
  Northwestern University School of Professional Studies
  Wieboldt Hall, Sixth Floor
  339 East Chicago Avenue
  Chicago, Illinois 60611-3008

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