

DATA SCIENCE (DATA)

DATA 2500 Data Science I

[3 credit hours]

Introduction to data science concepts, computer programming to transform raw information into structured data, and analysis of data to answer questions using popular programming and analytic software packages.

Term Offered: Spring, Fall

DATA 4260 Data Visualization

[3 credit hours]

This course introduces students to the principles, techniques, and tools used in data visualization for effective communication and analysis of data. Students will learn how to design and create visualizations that convey insights, patterns, and trends in data. The course will cover both theoretical concepts and practical applications, equipping students with the skills needed to visualize and interpret data in a meaningful way.

Prerequisites: DATA 2500 with a minimum grade of C

Term Offered: Spring, Fall

DATA 4500 Data Science II

[3 credit hours]

Advanced data science concepts, computer programming to build sophisticated analytic databases using multiple source files, engineering and visualization of large data sets. Application of multivariate analysis using popular programming and analytic software packages to report data findings.

Prerequisites: DATA 2500 with a minimum grade of C

Term Offered: Spring, Fall

DATA 4910 Undergraduate Research in Data Science

[1-3 credit hours]

Faculty directed research. Course may be repeated for credit with program permission.

Term Offered: Spring, Summer, Fall

DATA 4940 Internship in Data Science

[1-6 credit hours]

Experiential learning course in which students apply knowledge of data science through an approved internship experience in business, industry, government, or academia. Course may be repeated for credit with program permission.

Term Offered: Spring, Summer, Fall

DATA 4980 Advanced Topics in Data Science

[1-3 credit hours]

Advanced course for Data Science majors in a specialized topic. May be repeated for credit in different specialties.

Term Offered: Spring, Summer, Fall

DATA 5300 Introduction to Data Science

[3 credit hours]

Introductory course in data science: regression, classification, and Bayesian methods; Python and R in cloud-based notebook environments; workflows for basic data wrangling, model training; and ethical considerations in data science and AI.

Term Offered: Spring, Summer, Fall

DATA 5310 Mathematical and Statistical Foundations for Data Science

[3 credit hours]

Fundamentals of applied linear algebra, statistical learning, and optimization for a theoretical foundation of data science.

Prerequisites: DATA 5300 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5320 Programming for Data Science

[3 credit hours]

Programming skills for applied data science using Python and cloud-based notebook platforms: constructing data pipelines; implementing supervised and unsupervised machine learning models; and critically evaluating performance. Emphasis is placed on interpreting results, using AI as a collaborative tool for debugging and code explanations, and developing reproducible workflows.

Prerequisites: DATA 5300 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5330 Data Analytics and Visualization

[3 credit hours]

Exploratory data analysis, data wrangling, and visualization techniques using R, Python, and visualization platforms such as Tableau: creating analytic databases from multiple sources, building dashboards, and visual storytelling. Use of generative AI as a collaborative tool to critique and enhance visualizations. Emphasis on proper application of statistical and visualization methods with real-world, complex datasets.

Prerequisites: DATA 5300 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5340 Machine Learning for Data Science

[3 credit hours]

Advanced methods in machine learning and deep learning, with a focus on practical model building in cloud environments. Neural network architectures, including CNNs, RNNs, transformers, and autoencoders. Deep learning, reinforcement learning, and neural network training workflows. Generative AI as a collaborative tool to generate performance comparisons, model critiques, and explanatory summaries.

Prerequisites: DATA 5300 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5410 Generative AI for Data Science

[3 credit hours]

Introduction to generative AI with an emphasis on large language models and applications to data science. Natural Language Processing, Transformer architectures, retrieval-augmented generation, prompt engineering, and productivity applications for data science workflows.

Prerequisites: DATA 5300 with a minimum grade of B- and DATA 5310 with a minimum grade of B- and DATA 5320 with a minimum grade of B- and DATA 5330 with a minimum grade of B- and DATA 5340 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5420 Data Ethics and Professional Practice

[3 credit hours]

Ethical, legal, and social dimensions of data science and AI, including bias, fairness, privacy, responsible AI, and data governance. Topics include compliance, security, and best practices for professional conduct.

Prerequisites: DATA 5300 with a minimum grade of B- and DATA 5310 with a minimum grade of B- and DATA 5320 with a minimum grade of B- and DATA 5330 with a minimum grade of B- and DATA 5340 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5430 Databases and SQL for Data Science

[3 credit hours]

Ethical Principles of database design, querying, and optimization in data science contexts. Relational databases (SQL) and NoSQL databases. Focus on data modeling, schema design, query optimization, and data integration. Emphasis on trade-offs between relational and non-relational approaches, building efficient queries, and integrating databases with Python and cloud-based platforms.

Prerequisites: DATA 5300 with a minimum grade of B- and DATA 5310 with a minimum grade of B- and DATA 5320 with a minimum grade of B- and DATA 5330 with a minimum grade of B- and DATA 5340 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 5440 Big Data Systems and Cloud Computing

[3 credit hours]

Principles of big data systems and cloud computing for large-scale data science applications. Distributed computing frameworks, streaming systems, and cloud-native architectures. Emphasis on scaling data pipelines, data management, and cloud services for storage, processing, and machine learning workflows.

Prerequisites: DATA 5300 with a minimum grade of B- and DATA 5310 with a minimum grade of B- and DATA 5320 with a minimum grade of B- and DATA 5330 with a minimum grade of B- and DATA 5340 with a minimum grade of B-

Term Offered: Spring, Summer, Fall

DATA 6900 Data Science Capstone

[3 credit hours]

Design and implementation of a substantial data science project that addresses a real-world, data-driven problem using statistical and machine learning, databases, cloud platforms, and visualization tools. Emphasis on ethical practice, reproducibility, and effective communication of results.

Term Offered: Spring, Summer, Fall