Data Analytics and Decision Support (DADS)

DADS 1990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions.

DADS 2990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions.

DADS 3990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions.

DADS 4990. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions.

DADS 5200. Mathematics for Machine Learning. (4 Hours)
Covers mathematical concepts essential for understanding machine learning algorithms. Builds foundational knowledge in linear algebra, analytic geometry, matrix decompositions, probability, optimization, and specific models such as Gaussian mixture models.

Prerequisite(s): (IE 3412 with a minimum grade of C- or IE 4515 with a minimum grade of C- or MATH 3081 with a minimum grade of C-) or graduate program admission

DADS 6205. Deterministic Operations Research. (4 Hours)
Introduces the theory, computation, and application of deterministic models to represent industrial operations. Includes linear programming formulation and solution using spreadsheet and algebraic languages software; simplex, big-M, two-phase, revised simplex, and dual simplex algorithms for solving linear programs; introduction to the theory of simplex, fundamental insight, duality, and sensitivity analysis; transportation, assignment, and transshipment problems; shortest path, minimum spanning tree, maximum flow, minimum cost network flow problems and project networks; and discrete-state and continuous-state dynamic programming models and applications. Requires knowledge of linear algebra.

DADS 6400. Foundations for Data Analytics. (4 Hours)
Introduces fundamental concepts and methods in data analytics engineering, with a focus on probability, eigenvalues and eigenvectors, cluster analysis, text mining, and time series analysis. Covers modern data structures and computational techniques for data cleaning and wrangling. Prepares students for advanced coursework in data analytics.

DADS 6600. Computation and Visualization for Analytics. (4 Hours)
Explores visualization tools and techniques for data exploration, knowledge discovery, data storytelling, and decision making in engineering, healthcare operations, and manufacturing. Covers Python and R for data mining and visualization. Examines static and interactive visualization methods that reveal patterns, interactions, and comparisons, with a focus on color encoding, shape selection, spatial layout, and annotation.

DADS 6700. Data Management for Analytics. (4 Hours)
Covers the theory and applications of database management to support data analytics, data mining, machine learning, and artificial intelligence. Discusses the fundamental concepts and emerging technologies in database design and modeling, database systems, data storage, and the evolving world of data warehousing and data governance. Presents a balanced theory-practice focus. Covers relational databases, NoSQL databases, data integration, data quality, data governance, Big Data, and data processing for analytics.

DADS 6962. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions.

DADS 7275. Machine Learning and Data Analytics. (4 Hours)
Covers the theory and applications of machine learning in data analytics. Reviews fundamental concepts and key principles of machine learning, explores essential data analytics techniques, and presents algorithms for their implementation. Focuses on techniques for data preprocessing, feature selection, classification, regression, clustering, and advanced data exploration in data-driven decision making. Discusses applications of machine learning and data analytics in various domains including manufacturing, healthcare, medicine, business, and other service sectors.

Prerequisite(s): IE 5374 with a minimum grade of D or IE 5374 with a minimum grade of C (Graduate) or IE 6200 with a minimum grade of C or IE 6400 with a minimum grade of C or MATH 7241 with a minimum grade of C

DADS 7305. Machine Learning Operations. (4 Hours)
Focuses on the integration of machine learning with production-level infrastructure, emphasizing the full life cycle of model development, deployment, and monitoring. Highlights tools and best practices for scalable, reproducible, and automated ML operations. Covers continuous integration and delivery, containerization, orchestration, experiment tracking, and automated retraining using platforms such as TFX, MLflow, Airflow, Docker, Kubernetes, and Google Cloud Platform.

Prerequisite(s): CS 6120 with a minimum grade of C or CS 6140 with a minimum grade of C or CS 6180 with a minimum grade of C or CS 6220 with a minimum grade of C or CS 7140 with a minimum grade of C or CS 7150 with a minimum grade of C or IE 7300 with a minimum grade of C

DADS 7650. Deep Generative Models. (4 Hours)
Examines theoretical foundations of generative AI across natural language processing and computer vision. Covers deep learning architectures including autoencoders, GANs, diffusion models, and transformers. Investigates applications such as text generation, image synthesis, and retrieval-augmented generation. Reinforces concepts through a structured lab sequence that supports practical understanding and ethical considerations in AI development.

Prerequisite(s): CS 6140 with a minimum grade of C+ or IE 7300 with a minimum grade of C+