

Data Science (DSCI)

DSCI 500 Database and Information Retrieval 3 Credits (3,0)

Various database management systems (DBMS), emphasizing relational, non-SQL, and graph databases. Practical deployment of DBMS using cloud computing, containerization, and web scraping techniques.

Course Offered at: Daytona Beach

DSCI 505 Statistics for Data Science 3 Credits (3,0)

Statistical techniques for data analysis. Sampling distributions, regression and classification analysis, AI models from a statistical perspective, and statistical software packages.

Course Offered at: Daytona Beach

DSCI 540 Data Mining 3 Credits (3,0)

Types of data; data quality; preprocessing. Classification models: decision trees, K-nearest neighbors, support vector machines, Naive Bayes classifiers. Ensemble models: random forests, AdaBoost. Unsupervised learning: association, clustering, anomaly detection. Imbalanced classes and their impact.

Prerequisites: Only open to M.S. in Data Science students

Course Offered at: Daytona Beach

DSCI 544 Data Visualization 3 Credits (3,0)

Information and scientific visualization; computer graphics and related mathematics. Representation of data graphically; exploratory data analytics for insight. Use of software for interactive display, analysis, and finding solutions to data intensive research problem.

Course Offered at: Daytona Beach

DSCI 565 Data-Intensive Distributed Computing 3 Credits (3,0)

Distributed data systems, scalable architectures, and data-intensive applications. Semantic web design, knowledge graphs, RDF, SPARQL, and Cypher. NoSQL and NewSQL data models, intelligent search, and ML-driven data integration. Tools and platforms including Neo4j, GraphDB, MongoDB. Distributed computing for large-scale machine learning workloads. Privacy, interoperability, and ethical considerations in data systems.

Prerequisites: DSCI 500

Course Offered at: Daytona Beach

DSCI 599 Special Topics in Data Science 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in data science.

Course Offered at: Daytona Beach, Prescott

DSCI 602 Big Data Analytics for Cybersecurity 3 Credits (3,0)

Big data analytics techniques for cybersecurity. Application of statistical and computational methods to secure data infrastructure. Emphasis on detecting cyber threats and providing actionable cybersecurity decisions.

Course Offered at: Daytona Beach

DSCI 615 Data Modeling 3 Credits (3,0)

Mathematical principles underpinning neural networks. Decision-making processes of neural networks. Exercises with PyTorch; cutting-edge explainable AI methods.

Course Offered at: Daytona Beach

DSCI 625 Data Compression for Image and Signal Processing 3 Credits (3,0)

Algorithms for data compression, digital signal processing, image processing, and telecommunications. Arithmetic complexity, time complexity, stability, performance analysis of algorithms.

Course Offered at: Daytona Beach

DSCI 635 Generative Data Modeling 3 Credits (3,0)

Unifying principles of generative modeling including prediction and generation. Mathematical foundations: probability, optimization, function approximation. Introduction to large language models, and diffusion models. Transformer architecture, pretraining and fine-tuning, in-context learning, prompt engineering, and Retrieval-Augmented Generation. Alignment and evaluation of generative NLP systems. Evaluation metrics for generative models: fidelity, diversity, and task performance

Prerequisites: DSCI 540

Course Offered at: Daytona Beach

DSCI 645 Reinforcement Learning for Intelligent Decision Systems 3 Credits (3,0)

Markov Decision Processes, Bellman equations, exploration vs. exploitation, temporal difference learning. Tabular Q-learning and OpenAI Gym environments. Deep Q-Networks, policy gradients, Actor-Critic methods. Neural network function approximation, experience replay, target networks. Model-based, multi-agent, offline, and meta-RL. Applications in robotics, finance, and recommendation systems. Course project and research paper replication

Prerequisites: MATH 506 and DSCI 540

Course Offered at: Daytona Beach

DSCI 690 Graduate Research Project in Data Science 3 Credits (3,0)

Application of mathematics, statistics, and computer science to business problems. Data mining, visualization, modeling, problem assessment, data collection, analysis, programming, and technical communication.

Prerequisites: DSCI 500 and DSCI 540

Course Offered at: Daytona Beach

DSCI 699 Special Topics in Data Science 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in data science.

Course Offered at: Daytona Beach, Prescott

DSCI 700 Graduate Thesis 1-9 Credit (3,0)

Master-level research project in data science conducted under supervision of research advisor and thesis committee approved by the program coordinator. Thesis committee approval of an oral defense and final thesis report is required at the culmination of the research project.

Course Offered at: Daytona Beach