

Data Science (DSC)

DSC 381 Probability and Simulation-Based Inference for Data Science 3 Hours

Introduction to inference, through the simulation process. Explore probability, exponential families, conditional probabilities and Bayes theorem, inference and Maximum Likelihood estimation, confidence intervals, and hypothesis testing (emphasis on simulation).

DSC 382 Foundations of Regression and Predictive Modeling 3 Hours

Introduction to the basics of regression-based modeling. Explore simple and multiple regression, interpretation of models and coefficients, prediction and estimates, regularization processes, and generalized linear models.

DSC 383 Advanced Predictive Models for Complex Data 3 Hours

Explore advanced techniques used in practice for regression-based models. Examine time series and longitudinal data, repeated and mixed models, spatially correlated data, and Random Forest models.

DSC 384 Design Principles and Causal Inference 3 Hours

Explore the field of "big data" and the rigors of determining applicable design structures from that data. Examine classic design structures, non-typical data structures and novel design processes, and causal inference, and explore data-based decision making.

DSC 385 Data Exploration, Visualization, and Foundations of Unsupervised Learning 3 Hours

Examine visualization techniques used in practice to discover insights about data. Explore data quality and relevance, data ethics and providence, clustering, dimension reduction, and reproducibility.

DSC 387 Topics in Statistics for Data Sciences 3 Hours

Explore topics in data science with a general overview of statistics theory and application.

DSC 388 Natural Language Processing 3 Hours

Explore computational methods for syntactic and semantic analysis of structures representing meanings of natural language, the study of current natural language processing systems, and methods for computing outlines and discourse structures of descriptive text.

DSC 388G Algorithms: Techniques and Theory 3 Hours

Explore algorithm design and analysis including algorithmic paradigms, maximum flow, randomized algorithms, data structures, NP-completeness and approximation algorithms.

DSC 388J Optimization 3 Hours

Explore a background on convex sets and functions, linear programming, convex programming, and iterative first-order and second-order methods.

DSC 389 Data Structures 3 Hours

Examine programming skills, including testing, debugging, and the basics of programming methodology. Explore fundamental concepts in data structures and algorithms.

DSC 391L Principles of Machine Learning 3 Hours

Examine computing systems that automatically improve their performance with experience, including various approaches to inductive classification such as version space, decision tree, rule-based, neural network, Bayesian, and instance-based methods; as well as computational learning theory, explanation-based learning, and knowledge refinement.

DSC 394D Deep Learning 3 Hours

Explore the basic building blocks and intuitions behind designing, training, tuning, and monitoring of deep networks. Examine both the theory of deep learning, as well as hands-on implementation sessions in pytorch. Explore a series of application areas of deep networks in: computer vision, sequence modeling in natural language processing, deep reinforcement learning, generative modeling, and adversarial learning.

DSC 394R Reinforcement Learning 3 Hours

Introduction to the theory and practice of modern reinforcement learning, with emphasis on temporal difference learning algorithms.

DSC 395T Topics in Computer Science for Data Sciences 3 Hours

Explore topics in data science with a general overview of computer science application.