DAEN 210 Uncertainty Modeling
Credits 3. 3 Lecture Hours.
Models and methods for exploration of data based on probability and statistics; random variables, expectation, data collection, distribution fitting, goodness of fit tests, point estimates and interval estimates and central limit theorem.
Prerequisite: Grade of C or better STAT 211.

DAEN 300 Data Engineering Coding Experience I
Credit 1. 0 Lecture Hours. 3 Lab Hours.
Application of computational tools to model and solve data engineering problems primarily involving machine learning and optimization techniques.
Prerequisite: Grade of C or better in DAEN 211 or ECEN 360; concurrent enrollment in DAEN 321 and DAEN 331; junior or senior classification.

DAEN 301 Data Engineering Coding Experience II
Credit 1. 0 Lecture Hours. 3 Lab Hours.
Application of computational tools to model and solve data engineering problems involving stochastic systems, reinforcement learning, ensemble learning and data visualization.
Prerequisite: Grade of C or better in DAEN 300; concurrent enrollment in ISEN 413, DAEN 323, and DAEN 328; junior or senior classification.

DAEN 321 Quantitative Models for Statistical and Machine Learning
Credits 3. 3 Lecture Hours.
Principles of parameter estimation, confidence interval, p-values, hypothesis testing, design of experiments, model building, multiple regression, ANOVA, statistical quality control, Shewhart charts, CUSUM, EWMA, and residual-based control charts.
Prerequisite: Grade of C or better in DAEN 321 or ECEN 360; junior or senior classification.

DAEN 323 Statistical Learning and Decisions
Credits 3. 3 Lecture Hours.
Stochastic systems components; stochastic process models using Markov chains; Markov-decision processes; use of multi-armed bandit problems; exploration and exploitation; reinforcement learning; Bayesian updates; ensemble learning with bagging, boosting and stacking.
Prerequisite: Grade of C or better in DAEN 321; junior or senior classification.

DAEN 328 Data Engineering for Humans
Credits 3. 3 Lecture Hours.
Human considerations and constraints for data engineering, including human factors of data visualization; data processing and analysis of human physiological, psychological and performance data; the role of human biases in model development, analysis and interpretation; human factors of interactions with machine learning-based artificial intelligence tools in complex systems such as healthcare, manufacturing and transportation.
Prerequisite: Concurrent enrollment in ISEN 413; junior or senior classification.
DAEN 429 Data Analytics II
Credits 3. 3 Lecture Hours.
Deep learning, including basic machine learning, supervised learning, logistic regression, loss functions, neural networks, optimization, error back-propagation, regularization and generalization, convolutional neural networks, recurrent neural networks, attention models, applications to natural language processing and computer vision.
Prerequisite: Grade of C or better in ISEN 413, DAEN 323, and DAEN 301; junior or senior classification.

DAEN 430 Forecasting Using Machine-Learning Approaches
Credits 3. 3 Lecture Hours.
Forecasting principles and methods, including point and interval forecasts; accuracy; statistical methods in the context of forecasting, including exponential smoothing and Auto Regressive Integrated Moving Average (ARIMA), exogenous variables, seasonality and trends; tree-based models for predictions, prophet models, probabilistic forecasts and predictive and prescriptive analytics.
Prerequisite: Grade of C or better in DAEN 321 and ISEN 413; junior or senior classification.

DAEN 459 Capstone Senior Design Planning
Credits 2. 1 Lecture Hour. 3 Lab Hours.
First in a two-course sequence for the capstone senior design experience; formation of a senior design team, visitation with the team sponsor, preparation of the groundwork for the project, preparation of the project charter and collection or acquisition of initial set of data; provision of instructions on different aspects of capstone design, including ethics, design constraints, applicable standards, project management, report writing specifications and requirements, and oral and visual presentations.
Prerequisite: Grade of C or better in DAEN 301; concurrent enrollment in DAEN 400, ISEN 427/DAEN 427, and DAEN 429.

DAEN 460 Capstone Senior Design
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Second course in a two-course sequence for the capstone senior design experience; continuation of work on the senior design project in teams; data collection, analysis, application of data engineering methods and tools and development of recommendations considering design constraints, evaluation of alternative design, and application of relevant standards; engagement in oral presentations and creation of the project report, with relevant feedback provided during the semester.
Prerequisite: Grade of C or better in DAEN 459.

DAEN 489 Special Topics in...
Credits 1 to 4. 0 Lecture Hours. 1 to 4 Other Hours.
Selected topics in an identified area of data engineering. May be repeated for credit.
Prerequisite: Junior or senior classification; approval of instructor.