DATA SCIENCE (DS)

Any experimental courses offered by DS can be found at:
registrar.iastate.edu/faculty-staff/courses/explistings/ (http://www.registrar.iastate.edu/faculty-staff/courses/explistings/)

Courses primarily for undergraduates:

DS 110: Orientation to Data Science
Cr. R. F.
Introduction to the procedures and policies of Iowa State University and the Data Science program, test-outs, honorary societies, etc. Issues relevant to student adjustment to college life will also be discussed. Offered on a satisfactory-fail basis only.

DS 201: Introduction to Data Science
Cr. 3. F.S.Alt. SS., offered irregularly.
Prereq: 1-1/2 Years of High School Algebra
Data Science concepts and their applications; domain case studies with applications in various fields; overview of data analysis; major components of data analysis pipelines; computing concepts for data science; descriptive data analysis; hands-on data analysis experience; communicating findings to stakeholders, and ethical issues in data science.

DS 202: Data Acquisition and Exploratory Data Analysis
Cr. 3. F.S.
Prereq: DS 201
Data acquisition: file structures, web-scraping, database access; ethical aspects of data acquisition; types of data displays; numerical and visual summaries of data; pipelines for data analysis: filtering, transformation, aggregation, visualization and (simple) modeling; good practices of displaying data; data exploration cycle; graphics as tools of data exploration; strategies and techniques for data visualizations; basics of reproducibility and repeatability; web-based interactive applets for visual presentation of data and results. Programming exercises.

DS 301: Applied Data Modeling and Predictive Analysis
Cr. 3. F.S.
Prereq: DS 202, one of STAT 101, 104, 105, 201, 226, 231, 305, 322, 330
Elements of predictive analysis such as training and test sets; feature extraction; survey of algorithmic machine learning techniques, e.g. decision trees, Naïve Bayes, and random forests; survey of data modeling techniques, e.g. linear model and regression analysis; assessment and diagnostics: overfitting, error rates, residual analysis, model assumptions checking; communicating findings to stakeholders in written, oral, verbal and electronic form, and ethical issues in data science. Participation in a multi-disciplinary team project.

DS 303: Concepts and Applications of Machine Learning
Cr. 3. F.
Prereq: DS 202; MATH 207; MATH 265; STAT 301
Machine learning concepts such as training and test sets; feature extraction; principles of machine learning techniques; regression; pattern recognition methods; unsupervised learning techniques; assessment and diagnostics: overfitting, error rates, residual analysis, model assumptions checking, feature selection; ethical issues in data science; communicating findings to stakeholders in written, oral, visual and electronic form.

DS 401: Data Science Capstone
Cr. 3. Alt. F., offered irregularly.Alt. S., offered irregularly.
Prereq: DS 301 or DS 303
Students work as individuals and teams to complete the planning, design, and implementation of a significant multi-disciplinary project in data science. Oral and written reports.