

# DECISION SCIENCES (DS)

## DS 110 Calculus with Business Applications (Units: 3)

Prerequisite: First-Year Math Advising Module. For students who wish to take business calculus in one semester.

Basic quantitative reasoning and employment of fundamental mathematical principles to solve business problems. Elements of calculus, mathematics of finance, and decision-making.

### Course Attributes:

- B4: Math/QR

## DS 199 Decision Sciences Make-Up (Unit: 1)

Prerequisite: Permission of the instructor.

Additional study to make-up for partial equivalents in Decision Sciences courses. May be repeated for a total of 2 units.

## DS 212 Business Statistics I (Units: 3)

Prerequisite: DS 110\* or MATH 110\* or MATH 226\* or MATH 108\* with grades of C- or better.

Statistical methods essential in solving business problems including probability distributions, estimation and tests of hypotheses, and regression analysis.

## DS 310 Critical Data Analysis for Business (Units: 3)

Prerequisites: GE areas A2, A3, and B4 with grades of C- or better.

Explores data analysis tools and provides opportunities to investigate business topics from a social justice perspective. Critical analysis of visualizations to aid in communication and decision making. Discussion of data analyses undertaken on business topics relating to the 3 Ps of sustainability (people, planet, profit).

## DS 311 Technologies in Data Analytics (Units: 3)

Prerequisite: DS 212 or MATH 124 with a grade of C- or better, and ISYS 263; or Statistics majors with MATH 440.

Data processing and visual analytics are emerging fields concerned with extracting, cleaning, analyzing, and presenting complex high-dimensional data. Survey of state-of-the-art data processing and visualization techniques with the most updated technologies from the industry. Emphasis on practical challenges involving complex real-world data and include several hands-on group projects using different software packages. Hands-on use of software such as SQL, Tableau, R, and Python to uncover insights, communicate critical findings, and create data-driven solutions. (Plus-minus letter grade only)

## DS 312 Data Analysis with Computer Applications (Units: 3)

Prerequisite: DS 212 or MATH 124.

Interpretation and presentation of data with business applications using statistical software packages. Multiple regression, sampling techniques, design and analysis of surveys, analysis of variance, experimental design, and contingency tables. (Plus-minus letter grade only)

## DS 408 Computer Simulation (Units: 3)

Prerequisites: DS 212 or MATH 124; ISYS 263 or passing the waiver exam in basic computer proficiency and information systems; or Bachelor of Science in Statistics majors with MATH 440.

Development of computer-based simulation modeling skills, focusing on managerial cases. Experience with professional simulation software. Model formulation, execution, and interpretation of results. (Plus-minus letter grade only)

## DS 411 Decision Modeling for Business (Units: 3)

Prerequisites: DS 110, DS 212\*, and ISYS 263\* with grades of C- or better. (ISYS 263 may be satisfied by passing the waiver exam in basic computer proficiency and information systems.)

Basic concepts of spreadsheet modeling and risk analysis with applications to practical business decision-making. Topics include cost and demand modeling, risk analysis, revenue (yield) management, and implementation of decision models using spreadsheets. (This class cannot be taken after DS 601 and is not applicable to the DS major or minor.)

## DS 412 Operations Management (Units: 3)

Prerequisites: DS 110\* or MATH 108\* or MATH 110\* or MATH 226\*; DS 212\* or ISED 160\* or MATH 124\*; ISYS 263\* or passing the waiver exam in basic computer proficiency and information systems; all with grades of C- or better; or Bachelor of Science in Statistics majors with MATH 440\*.

Management of manufacturing and service operations. Use of computer-based models. Forecasting, capacity planning, linear programming, inventory management, quality management, and project management.

## DS 412SI Supplemental Instruction: Operations Management (Unit: 1)

Prerequisite: Concurrent enrollment in DS 412.

Student-centered discussion and problem-solving designed to promote understanding of key concepts and enhance student success in DS 412. May be repeated for a total of 3 units. Activity. (ABC/NC grading, CR/NC allowed)

## DS 601 Applied Management Science (Units: 3)

Prerequisites: DS 110 or MATH 108 or MATH 110; DS 212 or MATH 124; ISYS 263 or passing the waiver exam in basic computer proficiency and information systems.

Decision-making in business emphasizing computer applications. Development of spreadsheet modeling skills and the use of professional software. (Plus-minus letter grade only)

## DS 604 Applied Business Forecasting (Units: 3)

Prerequisites: DS 212 or MATH 124; DS 412; ISYS 263 or passing the waiver exam in basic computer proficiency and information systems); or Bachelor of Science in Statistics majors with MATH 440; or permission of the instructor.

Business forecasting methodology and applications including quantitative and qualitative approaches to short-, medium-, and long-range forecasting. Practical aspects of forecasting within the business environment. Interrelationships with business planning. (Plus-minus letter grade only)

**DS 612 Data Mining with Business Applications (Units: 3)**

Prerequisite: DS 311 or DS 312 or ECON 312 with a grade of C- or better.

Concepts of modeling and understanding of complex datasets based on advanced statistical methods. Discussion of various supervised and unsupervised learning techniques. Instruction in the use of statistical software such as R, SAS, Stata, etc. (Plus-minus letter grade only)

**DS 624 Quality Management (Units: 3)**

Prerequisites: DS 212 or MATH 124; ISYS 263 or passing the waiver exam in basic computer proficiency and information systems; or Bachelor of Science in Statistics majors with MATH 440.

Concepts, methods, and current practices ensuring product and service quality. Applications in manufacturing and service industries: quality as a system, customer-driven quality, continuous process improvement, implementation approaches, and ethical issues. (Plus-minus letter grade only)

**DS 655 Sustainable Supply Chain Optimization (Units: 3)**

Prerequisite: DS 212.

Design and management of supply chains, cost-effectiveness, environmental and social responsibility. Includes global facility and network design, aggregate planning, transportation, inventory management. (Plus-minus letter grade only)

**DS 660GW Communications for Business Analytics - GVAR (Units: 3)**

Prerequisites: Decision Sciences majors and minors; GE Area A2; DS 412 and at least two DS electives, one of which may be taken concurrently.

Capstone course in Decision Sciences. Communication standards, supply chain management, quality, ethics, and sustainability. Focus on quantitative analysis and communication. Use of computer-based models. (ABC/NC grading only)

**Course Attributes:**

- Graduation Writing Assessment

**DS 699 Independent Study (Units: 1-3)**

Prerequisite: Permission of the instructor, adviser, and department chair. Open only to upper-division students who have demonstrated the ability to do independent work.

Intensive problem analysis under the direction of a decision sciences faculty member.

**DS 776 Data Analysis for Managers (Units: 3)**

Prerequisite: Restricted to graduate Business students; graduate students in other programs permitted with the permission of the Faculty Director of Graduate Programs.

Spreadsheet-based statistical tools to support decision-making in operations, finance, and marketing. Graphical and descriptive tools for data analysis, correlation, regression, estimation, probability distributions, and hypothesis testing. (Plus-minus letter grade only) [Formerly BUS 776]

**DS 786 Operations Analysis (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 776; graduate students in other programs permitted with the permission of the Faculty Director of Graduate Programs.

Production management and control with related computer applications: production and distribution planning, inventory control, and demand forecasting. Quantitative analysis. (Plus-minus letter grade only) [Formerly BUS 786]

**DS 816 Seminar in Business Forecasting (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 786; or permission of the instructor; graduate students in other majors admitted with the permission of the Faculty Director of Graduate Programs.

Theory and practice of short, medium, and long-range forecasting within business environments. Quantitative and qualitative forecasting methods. Mathematical methods covered include time series models, decomposition models, linear and multiple regression models, and may include ARIMA and data mining. (Plus-minus letter grade only)

**DS 852 Managerial Decision-Making (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 786; graduate students in other majors admitted with the permission of the Faculty Director of Graduate Programs.

Model building for business decision-making through data-driven analysis. Creation of spreadsheet models to identify choices, formalize trade-offs, specify constraints, perform sensitivity analyses, and analyze the impact of uncertainty. Effective spreadsheet design and use. (Plus-minus letter grade only.)

**DS 853 Applied Multivariate Analysis (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 776; graduate Business Analytics students with concurrent enrollment in ISYS 812; or permission of the instructor; graduate students in other majors admitted with the permission of the Faculty Director of Graduate Programs.

Methods of multivariate data analysis applied to business problems. Mathematical methods covered include simple and multiple regression models, logistic regression models, and time series analysis. Theory and practice within business environments. Project using real data. (Plus-minus letter grade only)

**DS 855 Supply Chain Management (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 786; or permission of the instructor; graduate students in other majors admitted with the permission of the Faculty Director of Graduate Programs.

Supply chain design, planning, and operation. Concepts of competitive strategy and sustainability; aggregate planning and management of the marketing/operations interface; inventory management and procurement strategy; design of supply chain networks; the role of information technology. (Plus-minus letter grade only)

**DS 856 Seminar in Project Management (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 786; or permission of the instructor; graduate students in other majors admitted with the permission of the Faculty Director of Graduate Programs.

The full range of issues faced by project managers. The project life cycle; technical, human, and organizational issues; planning, scheduling, and controlling the timing, resources, and costs of a project; software usage; case studies. (Plus-minus letter grade only)

**DS 861 Data Mining and Advanced Statistical Methods for Business Analysts (Units: 3)**

Prerequisites: Restricted to graduate business students; DS 853\* and ISYS 812\*; graduate students in other programs admitted with the permission of the Faculty Director of Graduate Programs.

Focus on concepts of modeling and understanding of complex datasets based on advanced statistical methods with various supervised and unsupervised learning techniques. Includes an overview of relevant algorithms while emphasizing business applications of these tools and statistical software commonly used in practice, such as R, Python, SAS, Stata, etc. (Plus-minus letter grade) [Formerly DS 812]

**DS 862 Machine Learning for Business Analysts (Units: 3)**

Prerequisites: Restricted to graduate Business students; DS 861\*; graduate students in other programs permitted with the permission of the Faculty Director of Graduate Programs.

Focus on advanced machine learning methods including supervised and unsupervised learning techniques used to extract valuable information from quantitative and text data. Includes an overview of relevant algorithms while emphasizing business applications of the tools with a focus on commonly-used statistical software, e.g., R and Python, and how to apply the techniques learned in class. (Plus-minus letter grade)

**DS 899 Independent Study (Units: 1-3)**

Prerequisites: Restricted to graduate Business students; permission of the instructor, adviser, and department chair; open only to graduate students who demonstrate the ability to work independently.

Intensive study of a particular problem under the direction of a business analysis faculty member. (Plus-minus letter grade only)