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**ALY 2010. Probability Theory and Introductory Statistics. 3 Hours.**
Introduces statistics for business analytics from an analysis-of-data viewpoint. Topics include frequency distributions; measures of location; mean, median, mode; measures of dispersion; variance; graphic presentation; elementary probability; populations and samples; sampling distributions; categorical data; regression and correlation; and analysis of variance. Explores the use of statistical software in data analysis. Emphasizes hands-on application of probability and statistics in SPSS.

**ALY 2100. Introduction to Programming for Data Analytics. 3 Hours.**
Offers a hands-on first programming course for those with no prior programming experience. Covers basic programming logic and syntax with Python. Students apply Python packages mostly used on data analytics. Offers students an opportunity to learn how to code on the most used language in the job market.

**ALY 3015. Intermediate Statistics for Data Analytics. 3 Hours.**
Expands upon the earlier introduced statistical approaches. Emphasizes more advanced analysis and multivariate methods. The goal is to provide students with the fundamental data management, review, reengineering, and exploration skills as necessary data analytical competencies.

**ALY 3040. Data Mining. 3 Hours.**
Introduces the theories and tools for data mining techniques such as rule-based learning, decision trees, clustering, and association-rule mining. Also covers interpretation of the mined patterns using visualization techniques. Offers students an opportunity to gain the knowledge and experience to apply modern data-mining techniques for effective large-scale data pattern recognition and insight discovery. Introduces data analysis software—student teams evaluate, analyze, and report data for the methods used and insights discovered during case studies.

**ALY 3070. Communication and Visualization for Data Analytics. 3 Hours.**
Offers an interdisciplinary examination of design concepts and cognitive and communication theories that support effective practices for data visualization and communication. Considers the relationship between information and audience and studies effective techniques in the written, spoken, and visual communication of complex quantitative information. Project-based activities offer students opportunities to apply these techniques in a manner that makes data understandable, compelling, and actionable. Introduces R and Python visualization packages.

**ALY 3110. Big Data and Web Mining. 3 Hours.**
Offers students an opportunity to work with very large data sets and learn how to write code to browse the internet in a methodical and automated manner to search for publicly available data.

**ALY 4000. Analytics using R. 3 Hours.**
Offers an overview of analytics concepts and practices across a diverse range of organizational contexts. Case studies of successful analytics initiatives from varied domains examine how the collection and analysis of data impacts decision making within a variety of contexts. Introduces the use of R for fundamental data analysis methods and provides context essential to preparing students to engage with the individual courses that follow.

**ALY 4020. Predictive Analytics Using R and Python. 3 Hours.**
Introduces the end-to-end data-driven statistical modeling and predictive modeling approach in R and Python with applications and case studies. Includes all the data and modeling steps in a full modeling cycle; exploratory data analysis and data cleansing for outlier imputation and data normalization; commonly applied modeling techniques such as classification, linear regression, and logistic regression; and modeling steps such as model training, validation, and testing.

**ALY 4850. Analytics Capstone. 3 Hours.**
Offers an advanced practicum in the development and delivery of data analysis for strategic decision making in organizations. Students apply the principles and tools of analytics to a comprehensive real-world problem or project within a sponsoring organization. Expects students to present analytical insights and recommendations for successful implementation of their capstone project.

**ALY 6000. Introduction to Analytics. 3 Hours.**
Offers an overview of analytics concepts and practices across a diverse range of industries and organizational contexts. Case studies of successful analytics initiatives from fields including retail, government, education, and the arts provide opportunities to examine how the collection and analysis of data impacts decision making within a variety of contexts. Offers students an opportunity to engage with the current theories, practices, and debates in the field of analytics to critically examine its practice. Distinctions among specific analytical techniques and tools, including the use of Excel for fundamental data analysis methods, provide context essential to preparing students to engage more deeply with the individual courses that follow.

**ALY 6010. Probability Theory and Introductory Statistics. 3 Hours.**
Introduces statistics for business analytics from an analysis-of-data viewpoint. Topics include frequency distributions; measures of location; mean, median, mode; measures of dispersion; variance; graphic presentation; elementary probability; populations and samples; sampling distributions; categorical data; regression and correlation; and analysis of variance. Explores the use of statistical software in data analysis. Lab sessions emphasize hands-on application of probability and statistics in Excel and data problem solving with advanced Excel techniques.

**ALY 6015. Intermediate Analytics. 3 Hours.**
Builds on the foundation laid in ALY 6000 and ALY 6010 by introducing fundamental data due diligence, data correction and recoding processes and practices, in addition to expanding upon the earlier introduced approaches to discerning and validating patterns in data through sound applications of the scientific method. Emphasizes hypothesis testing, the notion of statistical significance, and tests of difference. The goal of this course is to endow students with the fundamental data management, review, reengineering, and exploration skills as necessary data analytical competencies.

**ALY 6020. Predictive Analytics. 3 Hours.**
Introduces the end-to-end data-driven statistical modeling and predictive modeling approach in R with applications and case studies. Includes all the data and modeling steps in a full modeling cycle, including data ETL process, exploratory data analysis and data cleansing for outlier imputation and data normalization, commonly applied modeling techniques such as linear regression and logistic regression, modeling steps such as model training, and validation and testing. R is introduced as the data processing, analysis, and modeling tool and is used in the case studies.
ALY 6030. Data Warehousing and SQL. 3 Hours.
Focuses on the management, mining, and interpretation of patterns in large databases. Offers students an opportunity to learn how organizations construct data warehouses from operational databases, about different data warehouse architectures, how to build a data warehouse, and how to structure databases for efficient data mining. Discusses relational databases and Structured Query Language (SQL) for the fundamentals in data modeling, database management, and SQL queries. Introduces other modern database systems such as NoSQL (non SQL) and column-based databases.

ALY 6040. Data Mining Applications. 3 Hours.
Introduces the theories and tools for intensive data analysis methods and data mining techniques such as rule-based learning, decision trees, clustering, and association-rule mining. Also covers interpretation of the mined patterns using visualization techniques. Offers students an opportunity to gain the knowledge and experience to apply modern data-mining techniques for effective large-scale data pattern recognition and insight discovery. Introduces data analysis software; student teams evaluate, analyze, and report data for the methods used and insights discovered during case studies.

ALY 6050. Introduction to Enterprise Analytics. 3 Hours.
Introduces the field of enterprise data analytics, which is defined as the extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based decision making to drive business strategies and actions. Discusses a few widely practiced data analytics areas, such as marketing analytics, retail analytics, financial analytics, people analytics, as well as general industry practices in end-to-end analytics development cycles, including data management, data engineering, analytics modeling, and strategy development. Offers students an opportunity to learn how to use quantitative techniques for strategic business decision making. Introduces specific analysis techniques including forecasting, simulation, linear programming, and optimization.

ALY 6060. Decision Support and Business Intelligence. 3 Hours.
Introduces current and emerging business analytical concepts and information technologies to support decision making and business intelligence. Commercial decision support systems in various application areas are introduced and discussed using case studies, including CRM (customer relationship management) for customer management, web analytics applications, sales force management systems, etc. Introduces business intelligence technology and applications, such as OLAP (Online Analytical Processing), OBIEE (Oracle Business Intelligence Enterprise Edition), and IBM Cognos. Offers students an opportunity to gain hands-on experience using business intelligence tools, including Tableau or QlikView.

ALY 6070. Communication and Visualization for Data Analytics. 3 Hours.
Offers an interdisciplinary examination of design concepts and cognitive and communication theories that support effective practices for data visualization and communication. Considers the relationship between information and audience and studies effective techniques in the written, spoken, and visual communication of complex quantitative information. Project-based activities offer students opportunities to apply these techniques in a manner that makes data understandable, compelling, and actionable. Introduces R Shiny in the lab sessions as the tool for data visualization.

ALY 6080. Integrated Experiential Learning. 3 Hours.
Offers a practicum in the development and delivery of predictive data analysis for strategic decision making in organizations. Offers students an opportunity to apply the principles and tools of analytics to real-world problems in business organizations and to develop and present analytical insights and recommendations for successful implementation of their capstone project.

ALY 6100. Data-Driven Decision Making. 3 Hours.
Designed to provide an in-depth focus on data-driven decision making in organizations. Examines the models, tools, techniques, and theory of data-driven decision making that can improve the quality of business leadership decisions through solution-based case studies.

ALY 6110. Data Management and Big Data. 3 Hours.
Designed to provide the student with the core concepts of data collection and management. Topics include systems for collecting data and implications for practice; types of data (textual, quantitative, qualitative, etc.); and storing data with privacy and security issues in mind. Offers students an opportunity to obtain a high-level understanding of big data technologies for data accessibility, efficiency, and security of data management at scale, including big data storage and computing technologies and big data analytics applications. Students create a working system for data acquisition and management using publicly available data sets and evaluate traditional data warehouse platforms as well as cloud-based big data storage and computing technologies. Azure is also introduced and used in the lab sessions.

ALY 6120. Leadership in Analytics. 3 Hours.
Covers analytical leadership principles for the structure and dynamics of organizations, combining relevant research to offer students an opportunity to deepen their understanding of effective change in business analytical decision making.

ALY 6130. Risk Management for Analytics. 3 Hours.
Seeks to provide a conceptual overview of analytic risk management. Offers students an opportunity to evaluate and analyze financial, technical, and other business risk-assessment and risk-modeling techniques and tools.

ALY 6140. Analytics Systems Technology. 3 Hours.
Presents a selection of analytics systems technologies that are deployed in lab sessions throughout the analytics program. A multitude of analytics systems technologies are used for different purposes to describe data numerically and graphically, for data visualization, file systems (HFS) for a large data mart, applications of structured query language, and filtering and transforming to ingest the data through scripting languages. Some of the tools are taught in greater detail (e.g., Python, machine learning), whereas others are introduced more broadly.

ALY 6150. Healthcare/Pharmaceutical Data and Applications. 3 Hours.
Introduces a selection of healthcare/pharmaceutical data used for a variety of purposes, and its specific application in data-driven business decision making. Healthcare/Pharmaceutical data is collected as part of Medicare and Medicaid databases and as mandated by the PPACA (Patient and Affordable Care Act) and the PPSA (Physicians Payment Sunshine Act). Data is available in the form of medical records, social networks, outcomes databases, syndicated data reports, epidemiological data, demographic data, analyst information, RD Pipeline Database, market data, and online journals and newsletters. Organizations, corporations, and companies use these varieties of data for a host of different reasons - to better profile and segment customers, to answer performance questions, and to identify and capture key opportunities.
ALY 6160. Business Intelligence in Healthcare/Pharmaceutical. 3 Hours.
Focuses on the use of and interplay between secondary data, primary market research, competitive intelligence, and forecasting within healthcare/pharmaceutical organizations. Introduces excellence in analytics on the pathway to market and launch planning. Discusses the approach and contribution of competitive intelligence as a critical component to the success of creating business insight. Also discusses excellence in forecasting and how the different business intelligence components of data, primary market research, and competitive intelligence shape sales and demand forecasts.

ALY 6170. Decision Makers. 3 Hours.
 Discusses the fundamentals and applications of modern analytics. Shares real-world examples to illustrate excellence in analytics and how a complete understanding of its potential and power can translate into data-driven decision making that mitigates risk in decision making via efficient processes and has the potential to create competitive advantages for an organization. Offers decision makers (C-Suite, product managers, etc.) that instruct and receive analytics an opportunity to obtain a comprehensive understanding and the opportunities of modern analytics, allowing them to ask better questions, make better-informed decisions quicker, and achieve more efficient outcomes. Introduces students to what modern analytics and the Black Box is capable of, without deconstructing the Black Box and the advanced analytics tool itself.

ALY 6980. Capstone. 3 Hours.
Offers an advanced practicum in the development and delivery of predictive data analysis for strategic decision making in organizations. Students apply the principles and tools of analytics to a comprehensive real-world problem or project within a sponsoring organization. Expects students to present analytical insights and recommendations for successful implementation of their capstone project.

ALY 6983. Topics. 3 Hours.
 Discusses contemporary topics in analytics for a rotating variety of industries (nonprofit and for-profit).