ALY 2010. Probability Theory and Introductory Statistics. (3 Hours)
Introduces statistics for data 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.

Prerequisite(s): MTH 1100 with a minimum grade of D- or MTH 1200 with a minimum grade of D-
ALY 2100. Introduction to Programming for Data Analytics. (3 Hours)
Offers students an opportunity to learn how to code on the most used language in the job market.

Prerequisite(s): MTH 2400 with a minimum grade of D- or PHL 2310 with a minimum grade of D-
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.

Prerequisite(s): ALY 2010 with a minimum grade of D-
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.

Prerequisite(s): ALY 2100 with a minimum grade of D-; ALY 3015 with a minimum grade of D-
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.

Prerequisite(s): ALY 2100 with a minimum grade of D-; ALY 3015 with a minimum grade of D-
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; and categorical data. Includes a preliminary introduction
to regression and correlation. Uses statistical software (for data analysis
during analytic project assignments) to provide a hands-on experience
to observe how probability and statistics, scripting, and basic data
management impact decision making at all levels within a corporation.

Prerequisite(s): ALY 6000 (may be taken concurrently) with a minimum
grade of C-

ALY 6015. Intermediate Analytics. (3 Hours)
Builds on the foundation provided in ALY 6000 and ALY 6010 by exploring
at greater depth the tools of data correction and recoding, as well as
those of statistics and R. Offers students an opportunity to learn to
discern and validate meaningful and statistically significant patterns in
data through sound applications of the scientific method. Emphasizes
initial mastery of correlation and regression, ANOVA, GLM, and logistic
regression. Introduces the more advanced techniques of multivariable
regression and nonparametric statistics and sampling. The goal of this
course is to offer students an opportunity to master the fundamental
skills of data management, analysis, and communication, which are
the core data analytical competencies required of today's analytic
professionals.

Prerequisite(s): ALY 6000 with a minimum grade of C-; ALY 6010 with a
minimum grade of C-

ALY 6020. Predictive Analytics. (3 Hours)
Introduces the end-to-end, data-driven statistical 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 k-nearest neighbors, GLM, random forest, neural networks,
and Naive Bayes are heavily utilized and explained using advanced
visualization techniques and simplified mathematical derivations to
enhance understanding. Predictive analytic modeling steps such as
model training, validation, and testing are widely utilized, as are R and
Python for data processing, analysis, and modeling.

Prerequisite(s): ALY 6015 with a minimum grade of C-; ALY 6070 with a
minimum grade of C-

ALY 6030. Data Warehousing and SQL. (3 Hours)
Focusses 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.

Prerequisite(s): ALY 6000 with a minimum grade of C-; ALY 6015 with a
minimum grade of C-

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.

Prerequisite(s): (ALY 6000 with a minimum grade of C-; ALY 6010 with a
minimum grade of C-) or (EAI 6000 with a minimum grade of C-; EAI 6010
with a minimum grade of C-)
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.

Prerequisite(s): ALY 6015 with a minimum grade of C-; ALY 6050 with a minimum grade of C-; ALY 6070 with a minimum grade of C-

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.

Prerequisite(s): (ALY 6000 with a minimum grade of C-; ALY 6010 with a minimum grade of C-) or (EAI 6000 with a minimum grade of C-; EAI 6010 with a minimum grade of C-)

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.

Prerequisite(s): (ALY 6000 (may be taken concurrently) with a minimum grade of C-; ALY 6010 with a minimum grade of C-) or (EAI 6000 with a minimum grade of C-; EAI 6010 with a minimum grade of C-)

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.

Prerequisite(s): ALY 6000 (may be taken concurrently) with a minimum grade of C-; ALY 6010 with a minimum grade of C-

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.

Prerequisite(s): ALY 6000 with a minimum grade of C; ALY 6010 with a minimum grade of C
**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 and their individual project proposal.

**Prerequisite(s):** ALY 6080 with a minimum grade of C-; ALY 6040 with a minimum grade of C-; ((ALY 6110 with a minimum grade of C-; ALY 6020 with a minimum grade of C-) or (ALY 6060 with a minimum grade of C-; ALY 6120 with a minimum grade of C-) or (ALY 6030 with a minimum grade of C-; ITC 6015 with a minimum grade of C-)); ALY 6000 with a minimum grade of C-; ALY 6010 with a minimum grade of C-; ALY 6015 with a minimum grade of C-; ALY 6050 with a minimum grade of C-; ALY 6070 with a minimum grade of C-

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

**Prerequisite(s):** ALY 6000 with a minimum grade of C-; ALY 6010 with a minimum grade of C-

**ALY 6995. Project. (1-4 Hours)**
Focuses on an in-depth project in which a student conducts research or produces a product related to the student's major field.