OMS Analytics
Fall 2017 Courses

CS 6400 – Database Systems Concepts and Design
This course presents an example of applying a database application development methodology to a major real-world project. All the database concepts, techniques, and tools that are needed to develop a database application from scratch are introduced. In parallel, learners in the course will apply the database application development methodology, techniques, and tools to their own major class team project. In addition, this course will include instruction in the Extended Entity Relationship Model, the Relational Model, Relational algebra, calculus and SQL, database normalization, efficiency and indexing. Finally, techniques and tools for metadata management and archival will be presented.

CS 7641 – Machine Learning
Machine Learning is the area of Artificial Intelligence that is concerned with computational artifacts that modify and improve their performance through experience. The area is concerned with issues both theoretical and practical. This particular class takes care to present algorithms and approaches in such a way that grounds them in larger systems. We will cover a variety of topics, including: statistical supervised and unsupervised learning methods, randomized search algorithms, Bayesian learning methods, and reinforcement learning. The course also covers theoretical concepts such as inductive bias, the PAC and Mistake-bound learning frameworks, minimum description length principle, and Ockham’s Razor. In order to ground these methods the course includes some programming and involvement in a number of projects.

CSE 6040 – Introduction to Computing for Data Analysis (foundational course)
This course is your hands-on introduction to basic programming techniques relevant to data analysis and machine learning. Beyond programming languages and best practices, you’ll learn elementary data processing algorithms, numerical linear algebra, and numerical optimization. You will build the basic components of a data analysis pipeline: collection, preprocessing, storage, analysis, and visualization. You will program in some subset of Python, R, MATLAB, and SQL, at the faculty’s discretion. This course aims to fill in gaps in your programming background, in preparation for other programming-intensive courses in the OMS Analytics program. If you come to the program with a significant programming background already, you may be eligible for exemption from this course.

CSE 6250 – Big Data Analytics in Healthcare
In this course we introduce the characteristics of medical data and associated data mining challenges in dealing with such data. We cover various algorithms and systems for big data analytics. We focus on studying those big data techniques in the context of concrete healthcare analytic applications such as predictive modeling, computational phenotyping and patient similarity. We focus on studying those big data techniques in the context of concrete healthcare analytic applications such as: 1. Predictive modeling: e.g., how to predict disease risks on individual patients 2. Computational phenotyping: e.g., how to convert patient data from electronic health records into meaningful clinical concepts (phenotypes) 3. Patient similarity: e.g., how to measure similarity between patients within a specific context. We also study big data analytic technology: 1. Scalable machine learning algorithms such as online learning and fast similarity search; 2. Big data analytic systems: a. Hadoop family (MapReduce, Hive, Pig, HBase) b. Spark (SparkSQL, MLLib and GraphX)
ISYE 6414 – Statistical Modeling and Regression Analysis
By the end of this class students will learn the basics of regression analysis, such as linear regression, model selection and logistic regression, as well as more advanced topics including generalized linear regression and nonparametric regression. Students will be given fundamental grounding in the use of some widely used tools, but much of the energy of the course is focused on individual investigation and learning. Assignments will include both theoretical and computer problems. Topics include simple linear regression, multiple linear regression, variance-bias decomposition and variable selection, logistic regression, generalized linear regression, and nonparametric regression.

ISYE 6501 – Introduction to Analytics Modeling (foundational course)
This course gives a basic introduction to a wide variety of analytics models and techniques, including the basic ideas behind the models, experience using software to solve/analyze them, and case studies dealing with combining models to find a complete solution. Modeling approaches covered include classification, clustering, change detection, time series modeling, regression models, design of experiments, probability distributions, probability-based models and simulation, PCA, and optimization. Cross-cutting topics like data preparation, model validation, and variable selection are also covered.

ISYE 6644 – Simulation
The course has three main topics: (a) Introduction to discrete-event simulation models and simulation studies; (b) Organization of simulation languages, and modeling with Arena, a comprehensive simulation package with animation capabilities; and (c) Statistical aspects of simulation, including input analysis, random variate generation, output analysis, and variance reduction techniques. The course will include a small probability/statistics review; hand simulation, spreadsheet simulation, and Arena simulation; general modeling concepts and examples; random variate generation including single random variable generation and random processes, input and output analysis, comparisons of systems, and variance reduction.

MGT 8803/6754 - Business Fundamentals for Analytics (foundational course)
The overall objective of the course is to provide an accelerated introduction to the basics of management and the language of business, and to provide a framework that will enhance the student’s effectiveness as a manager in the business world. The course is taught as a series of business disciplinary modules and the professors who teach the modules represent a diversity of functional areas: Financial Accounting, which relates to financial reporting and the use of accounting data for internal-to-the-business and external-to-the-business purposes; Managerial Accounting, which is the use of accounting data for product costing and management decision-making purposes; Using Financial Analysis Techniques for Decision Making, which provides a general introduction to finance and capital structure; Entrepreneurial Finance, which includes various venture valuation methods and common sources for venture funding; Marketing, including strategy and the development of tactics to create and harvest demand for the business’s products and services; and Business Strategy, including how businesses develop competitive advantage in the marketplace and innovation as a key strategic weapon for driving firm revenue growth and profitability.