### DAT 500 Interactive Graphical Case Studies in Big Data
**3 Credits**

Students will be introduced to Data Analytics via the study of a variety of case studies of published studies, or successful commercial applications of methods. Students will also learn to replicate the graphical presentations used in these studies, and develop alternative visual representations of the data used in the studies. The R statistical language will be used, as students learn how to produce publication grade graphics that can be used throughout other courses and in their career.

**Offered:** every summer.

### DAT 501 Statistics and Econometrics
**3 Credits**

Econometrics is the science in which the tools of economic theory, mathematics and statistical inference are applied to the analysis of economic phenomena. Econometric modeling is an important research tool in Economics, Finance, and many other academic disciplines. The goal of this course is to provide you with a basic understanding of Econometric theory and practice. We will focus on model specification, estimation, and testing, using a “hands on” approach. Both Excel and EViews software will be used throughout this course.

**Offered:** every fall & occasionally spring.

### DAT 511 Data Stewardship: Preparation, Exploration and Handling of Big Data
**3 Credits**

Data stewardship refers to the process of managing collections of data in an ethical and effective manner, so that business objectives can be achieved efficiently while respecting the rights of individuals. This course will cover the substantial ethical issues related to Big Data, but will also address many technical issues related to working with large data sets. Establishing and maintaining quality data poses surprisingly large challenges and can be very time consuming, so that knowledge of effective data cleaning is a key capability for Data Analytics. Students will learn how to download, clean, and prepare data for future analysis, and document the process, as well as understanding how seemingly harmless actions can pose threats to the information security of others.

**Prerequisite:** DAT 511 or equivalent.

**Offered:** every fall.

### DAT 512 Statistical Approaches to Big Data
**3 Credits**

This course is a Core course in the Data Analytics program. It starts with a brief review of univariate statistics and then covers selected topics usually taught in courses in multivariate statistical analysis and regression analysis. It is assumed that every student in this course has completed at least one college-level statistics course. The theoretical knowledge and analytical skills gained in this course are an essential component of the Data Analytics program.

**Prerequisite:** DAT 501 or equivalent, CSC 512 or equivalent, & MAT 500 or equivalent.

**Offered:** every spring.

### DAT 514 Data Mining and Machine Learning
**3 Credits**

This course is a Core course in the Data Analytics program. It starts with a brief introduction to Data Mining and Statistical Learning, includes a brief summary of relevant methods covered in a much greater detail in other courses in this program, such as Data Stewardship and Statistical Approaches to Big Data, and then covers a number of methods essential in the modern Data Mining and Statistical Learning.

**Prerequisites:** MAT 500, CSC 511, and CSC 512 or equivalents.

**Offered:** every spring.
DAT 515 Visualization and Presentation of Advanced Analytics 3 Credits
Students will develop the ability to present complex results from Data Analytics to a range of audiences. The course will cover both real time interactive displays and tools, such as graphic user interface and dashboard design, as well as written, oral and graphical communication of analytic results. Students will complete a range of projects in each of these areas. **Prerequisites:** DAT 511 & DAT 521 (courses may be taken concurrently) and the ability to program in Python.

**Offered:** every spring.

DAT 521 Applied Integrative Projects in Data Analytics I 3 Credits
In this course, students would learn SAS. Since the focus is on hands-on, all lectures would be conducted in a computer lab. Students learn how to input various types of data into SAS, such as text, csv, binary and sas7bdat. How to clean data is an important skill students are expected to master. Students learn how to deal with missing variables and run basic sample statistics such as mean, standard deviation, minimum and maximum. Many visualization techniques would be taught. In addition, students learn how to run some basic statistical functions, such as linear regression. Since this course is a preparation for the next course (DAT 522) titled “Applied Integrative Projects in Data Analytics II”, students could start to think about their next big projects.

**Offered:** every fall.

DAT 522 Applied Integrative Projects in Data Analytics II 3 Credits
This course is supervised internship or project course. Students may chose to apply for a competitive internship position in Data Analytics with a local corporation, government or not-for-profit agency, or may apply to carry out a data analytics project with an employer or on-campus research sponsor. **Prerequisites:** DAT 500, DAT 514, DAT 521.

**Offered:** every fall, spring, & summer.

DAT 555 Seminar on Deep Learning 1 Credit
Deep Learning is a computational and mathematical approach to building "deep" or many layer neural network architectures for solving complex machine learning tasks, such as image processing, audio processing, complex time series, natural language processing and other big data problems. This course would teach students to build and training deep learning models using current state of the art tools.

**Prerequisite:** CSC 112 or CSC 512 and MAT 500 or MAT 211 or MAT 219.

**Offered:** occasionally.