

# Data Analytics

## Division of Science and Mathematics

- **BA or BS: 58 credit hours**
- **Major GPA required for graduation: 2.25**
- **All courses for the major must be completed with a grade of D or better**

### PROGRAM REQUIREMENTS:

- **Complete core requirements**
- **Capstone: Internship in Mathematics (MTH 470) or Data Analytics Capstone (MTH 485)**

**Description of Major:** Data analytics is a major that focuses on the analysis of large, complex data sets. Students utilize skills from the areas of mathematics, statistics, and computer science to analyze large data sets. They will use specific subject domain knowledge and professional writing skills to present their analysis to a broad audience.

### Student Learning Outcomes

*Students will:*

- Effectively manage and organize data sets and create solutions to analytical problems.
- Communicate analytics problems, methods, and findings: orally, visually, and in writing.
- Critically evaluate solutions to analytical problems.
- Develop subject area knowledge in a selected area.

**Preparation:** The data analytics degree builds a broad base in the areas of mathematics and data management. Students will also develop their communication skills and subject knowledge in a selected area. Students will be prepared for a position in industry.

To major in data analytics, students must complete the core requirements, plus additional requirements in one of the following tracks: social science or business.

### DATA ANALYTICS

#### MAJOR CORE REQUIREMENTS 40 crs.

MTH 210	CALCULUS I	4
MTH 211	CALCULUS II	4
MTH 340	PROBABILITY	3
MTH 341	APPLIED STATISTICS	4
MTH 344	STATISTICAL LEARNING	3
MTH 360	LINEAR ALGEBRA	3
MTH 470	INTERNSHIP IN MATHEMATICS	3
<i>or</i>		
MTH 485	DATA ANALYTICS CAPSTONE	3
CSI 131	COMPUTATIONAL THINKING	2
CSI 132	INTRODUCTION TO PROGRAMMING	3
CSI 230	INTRODUCTION TO COMPUTING	5
CSI 330	DATA STRUCTURES AND ALGORITHMS	3
ENG 360	INTERDISCIPLINARY PROFESSIONAL AND TECHNICAL WRITING (W)	3

### BACHELOR OF ARTS:

#### SOCIAL SCIENCE TRACK 18 crs.

*Complete the core requirements, plus the following:*

PSY 153	INTRODUCTION TO PSYCHOLOGY	3
PSY 301	PSYCHOLOGICAL STATISTICS	3
PSY 396	RESEARCH METHODS	3
SOC 150	INTRODUCTION TO SOCIOLOGY	3
SOC 300	SOCIAL RESEARCH METHODS (W)	3
SOC 400	SOCIOLOGICAL THEORY	3

### BACHELOR OF SCIENCE: BUSINESS TRACK 21 crs.

*Complete the core requirements, plus the following:*

BUS 324	BUSINESS ETHICS AND CORPORATE SOCIAL RESPONSIBILITY (W)	3
ECO 211	PRINCIPLES OF MICROECONOMICS	3
ECO 212	PRINCIPLES OF MACROECONOMICS	3
ACC 205	PRINCIPLES OF FINANCIAL ACCOUNTING	3
FIN 308	PRINCIPLES OF BUSINESS FINANCE	3
MGT 204	PRINCIPLES OF MANAGEMENT	3
MKT 205	PRINCIPLES OF MARKETING	3

## Mathematics (MTH)

<p><b>MTH 101</b> <span style="float: right;"><b>1</b></span>  <b>EXCEL I</b>            An introductory course in Excel. Topics covered: cells and data input, formatting, Excel mathematics, functions, graphs, and filters. Each semester. Same as BUS 101.</p>	<p><b>MTH 211</b> <span style="float: right;"><b>4</b></span>  <b>CALCULUS II</b>            Techniques of integration, applications of integration, parametric equations, polar coordinates, and infinite sequences and series. Prerequisite: MTH 210.</p>
<p><b>MTH 102</b> <span style="float: right;"><b>1</b></span>  <b>EXCEL II</b>            An advanced course in Excel. Topics covered: intermediate and advanced level functions, names and comments, pivot tables, advanced conditional formatting filters, and matrix functions. Each semester. Same as BUS 102.</p>	<p><b>MTH 212</b> <span style="float: right;"><b>4</b></span>  <b>CALCULUS III</b>            The calculus of vector functions and functions of several variables. Prerequisite: MTH 211.</p>
<p><b>MTH 105</b> <span style="float: right;"><b>3</b></span>  <b>INTERMEDIATE ALGEBRA</b>            This course is for students who have had no more than one year of high school algebra or who have not had mathematics for some time. The course consists of a review of elementary algebra and additional work in linear and quadratic equations, factoring, exponents, polynomials, graphing, and linear systems.</p>	<p><b>MTH 280-289</b> <span style="float: right;"><b>1-3</b></span>  <b>SPECIAL TOPICS IN MATHEMATICS</b></p>
<p><b>MTH 133</b> <span style="float: right;"><b>3</b></span>  <b>PRECALCULUS</b>            The study of linear, quadratic, exponential, logarithmic, trigonometric, and inverse trigonometric functions and applications of such functions. These functions will be studied from a numerical, graphical, and analytical approach. A brief general study of functions will also be included. Prerequisite: MTH 105 or equivalent.</p>	<p><b>MTH 300</b> <span style="float: right;"><b>3</b></span>  <b>TRANSITION TO ADVANCED MATHEMATICS</b>            Introduction to the methods of proof through the study of sets, logic, relations, mappings, cardinality, and elementary structures. Prerequisite: MTH 210 or instructor consent.</p>
<p><b>MTH 150</b> <span style="float: right;"><b>3</b></span>  <b>QUANTITATIVE LITERACY</b>            In this course, students are introduced to problem solving and analysis. Topics include representing and analyzing data, using logic and logical statements in arguments, estimating and approximating to judge the reasonableness of an answer, and appropriate tools and approaches to real-world problems in areas such as business and finance.</p>	<p><b>MTH 320</b> <span style="float: right;"><b>3</b></span>  <b>FINANCIAL MATHEMATICS</b>            Interest rate measurement, annuities, loan repayment, bond valuation, measuring rate of return of investment, term structure of interest rates, cash flow duration and immunization, and other topics as found on Actuarial Exam FM/2. Prerequisite: MTH 211.</p>
<p><b>MTH 170</b> <span style="float: right;"><b>3</b></span>  <b>STATISTICS</b>            This is an introductory course in descriptive and inferential statistics, approached through intuition, algebra, and problem solving. Understanding of central concepts and methods is stressed. Practical applications in the fields of social and physical sciences are studied. Real-world problems are solved through use of statistical computer packages such as SPSS, SAS, or MINITAB. Prerequisites: MTH 105 and computer literacy.</p>	<p><b>MTH 340</b> <span style="float: right;"><b>3</b></span>  <b>PROBABILITY</b>            Probability axioms, random variables, commonly used discrete and continuous distributions, expectation, moment generating functions, transformations, and multivariate distributions. Prerequisite: MTH 211 or instructor consent.</p>
<p><b>MTH 210</b> <span style="float: right;"><b>4</b></span>  <b>CALCULUS I</b>            The calculus of single-variable algebraic, exponential, logarithmic, and trigonometric functions culminating in the Fundamental Theorem of Calculus. Prerequisite: MTH 133, high school precalculus with a C or better, or instructor consent.</p>	<p><b>MTH 341</b> <span style="float: right;"><b>4</b></span>  <b>APPLIED STATISTICS</b>            The concepts of sampling distributions with random sampling and statistical inference. The main methods of estimation and the properties of estimators: matching moments, percentile matching, and maximum likelihood. The construction of confidence intervals for the mean, differences of two means, variances, and proportions. Hypothesis testing for the mean, variance, contingency tables, goodness of fit, and regression models. Prerequisite: MTH 211 or instructor consent.</p>
	<p><b>MTH 344</b> <span style="float: right;"><b>4</b></span>  <b>STATISTICAL LEARNING</b>            Multiple regression, classification and resampling methods. Linear model selection, tree-based methods, and unsupervised learning. Prerequisite: MTH 341 or instructor consent.</p>
	<p><b>MTH 360</b> <span style="float: right;"><b>3</b></span>  <b>LINEAR ALGEBRA</b>            An introduction to the techniques of linear algebra. Topics include vector spaces, linear independence, basis, dimension, linear transformations, eigenvalues, and eigenvectors. Prerequisite MTH 300 or instructor consent.</p>

## Mathematics (MTH)

### **MTH 366** **3**

#### **NUMERICAL ANALYSIS**

An introductory course in numerical methods, including computational techniques for locating roots of equations, interpolation, differentiation, integration, approximation, and systems of linear equations; to include detection, prediction, and control of computational errors. Problem solving using mathematical computer programs and computer programming of algorithms is stressed. Prerequisite: MTH 212 and CSI 230. Same as CSI 366.

### **MTH 370** **3**

#### **DIFFERENTIAL EQUATIONS AND MODELING**

An introductory course in the solutions of elementary differential equations and their applications in a variety of real-world contexts. A general study of mathematical modeling is included. Prerequisite: MTH 211 or instructor consent.

### **MTH 376** **3**

#### **GRAPH THEORY**

Introductory concepts and definitions, trees, planar graphs, chromatic numbers, matchings, and Ramsey theory. Prerequisite: MTH 211.

### **MTH 380-389** **1-3**

#### **SPECIAL TOPICS IN MATHEMATICS**

### **MTH 392** **3**

#### **INTRODUCTION TO ANALYSIS**

Introduction to analysis on the real line with emphasis on careful development of limits, continuity, and differentiation. Prerequisites: MTH 211, 300.

### **MTH 393** **3**

#### **INTRODUCTION TO MODERN ALGEBRA**

An introduction to the basic notions of modern algebra. Topics covered include the integers, groups, rings, fields, homomorphisms, and related notions. Prerequisite: MTH 300.

### **MTH 470** **3-8**

#### **INTERNSHIP IN MATHEMATICS**

### **MTH 480** **1-4**

#### **INDEPENDENT STUDY IN MATHEMATICS**

### **MTH 485** **3**

#### **DATA ANALYTICS CAPSTONE**

Topics drawn from a variety of advanced topics in data analytics. Prerequisite: MTH 344 or instructor consent.

### **MTH 490** **3**

#### **SEMINAR IN MATHEMATICS**

Topics drawn from a variety of advanced topics in mathematics. Prerequisite: Instructor consent.