DATA ANALYTICS (AS) - 60 CREDITS

OVERVIEW

WHY CHOOSE DATA ANALYTICS?
The demand for professionals in Data Analytics is on the rise while the supply remains low. This creates great job opportunities for individuals within this field. As the demand steadily increases and the supply remains low, data analytics professionals are being paid more and more. This degree provides an introduction to data science by combining the tools of basic statistics, computer programming, and mathematical analysis with foundational concepts from a specific domain area. It will give students sufficient knowledge to enter the job market and to transfer credits to a baccalaureate program at a four-year institution.

REQUIREMENTS

This degree provides an introduction to data science by combining the tools of basic statistics, computer programming, and mathematical analysis with foundational concepts from a specific domain area. It will give students sufficient knowledge to enter the job market and to transfer credits to a baccalaureate program at a four-year institution.

CORE COURSES - 33-35 CREDITS

Completion of this degree is dependent upon a grade of C or higher in each of the following courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 1111</td>
<td>Introduction to Programming in C</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2001</td>
<td>Computer Programming Concepts</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2002</td>
<td>Algorithms and Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>COMT 118</td>
<td>Database Management Systems</td>
<td>3</td>
</tr>
<tr>
<td>DSCI 2000</td>
<td>Introduction to Data Science</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2080</td>
<td>Statistical Modeling</td>
<td>3</td>
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COMPLETE ONE OF THE FOLLOWING COURSES:

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 1090</td>
<td>Introduction to Statistics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1090</td>
<td>STATWAY Statistics</td>
<td>4</td>
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COMPLETE TWO OF THE FOLLOWING MATH COURSES GROUPED AS FOLLOWS:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 1100 and College Algebra and Probability</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 1400</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1500</td>
<td>Pre-Calculus</td>
<td>5</td>
</tr>
<tr>
<td>and MATH 1010</td>
<td>Calculus 1</td>
<td>3</td>
</tr>
</tbody>
</table>

ADDITIONAL REQUIRED COURSES - 25-27 CREDITS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGC 1101</td>
<td>Freshman Composition</td>
<td>4</td>
</tr>
<tr>
<td>COMM 1100</td>
<td>Introduction to Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 1101</td>
<td>Fundamentals of Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 1111</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>ECON 2201</td>
<td>Principles of Microeconomics</td>
<td>3</td>
</tr>
</tbody>
</table>

Completed a minimum of six additional credits from at least two of the following MnTC Goals: 3, 6, 7, 8 or 10.

Complete additional courses to reach 60 college-level credits total. Suggested courses for domain specialization areas are listed below. (9-11 credits)

OTHER DEGREE REQUIREMENTS

- Complete additional courses to reach 60 credits total. Suggested courses for domain specialization areas are listed below.
- Earn a minimum cumulative grade point average (GPA) of 2.0 for college-level coursework (courses numbered 1000 and above) completed at Normandale.
- Earn a minimum of 20 college-level credits at Normandale.

Coursework in this degree program satisfies a portion of the Minnesota Transfer Curriculum (MnTC). Please see MnTC Degree Audit Report.

Sample Domain Specialization Areas for the A.S. in Data Analytics

Four-year data science programs and employers want students to be prepared to specialize in a chosen domain area. The domain specialties below represent a few possible areas of interest. Students should consult with faculty and advisors, including those at possible transfer institutions, for further information.

- **Bioinformatics**
  - BIOL 1501, CHEM 1020, PHIL 1150, ENGC 2102

- **Finance**
  - ACCT 2251, ACCT 2254, ECON 2202, PHIL 1170, ENGC 2102

- **Law Enforcement/Government**
  - PSYC 1110, SOC 1100, SOC 2130, POLS 1195, ENGC 2102, COMM 1141

- **Marketing**
  - BUSN 2254, BUSN 2400, ECON 2202, PHIL 1170, ENGC 2102, COMM 1141
Mathematics:
GEOG 1050, PHIL 1140, GEOG 1104, MATH 1520, MATH 2400

Others:
Students can also develop other domain specialization areas in consultation with their advisor and faculty.

COURSES

COMM 1100 INTRODUCTION TO HUMAN COMMUNICATION | 3 CR
Recommended: Eligible for ENGC 1101, and READ 1106 MnTC Goals: 1
A broad-based communication course which introduces the student to three areas of skills: interpersonal communication, public speaking, and small group communication. Students may still register for COMM 1101, 1111, or 1121 after taking 1100.

Credits: 3 Semesters: Fall, Spring

COMM 1101 FUNDAMENTALS OF PUBLIC SPEAKING | 3 CR
Recommended: Eligible for ENGC 1101, and READ 1106 MnTC Goals: 1
The primary purpose of this course is to provide instruction and practical experience in the basic fundamentals of effective public speaking. Students will prepare, perform, and evaluate a variety of speeches throughout the semester.

Credits: 3 Semesters: Fall, Spring

COMM 1111 INTERPERSONAL COMMUNICATION | 3 CR
Recommended: ENGC 1101, and READ 1106 MnTC Goals: 1
The primary purpose of this course is to assist the student in examining and developing competence as an interpersonal communicator. Students will practice skills and learn strategies to develop and manage relationships more effectively in a variety of contexts.

Credits: 3 Semesters: Fall

COMT 1181 DATABASE MANAGEMENT SYSTEMS | 3 CR
Prereq: COMT 1107
Various database models with emphasis on the relational model. Data relationships and attributes, the use of entity relationship diagrams, and data mapping operations. Must be completed within the last seven years prior to receiving the AAS degree or certificate in Computer Technology.

Credits: 3 Semesters: Fall

CSCI 1111 INTRODUCTION TO PROGRAMMING IN C | 4 CR
Prereq: CSCI 1101
Problem solving using the C programming language. Topics will include the syntax of the language, operators and expressions, control structures, scoping rules, functions, parameter passing, arrays, strings, pointers, structures, type definitions, file handling, libraries.

Credits: 4 Semesters: Fall, Spring

CSCI 2001 COMPUTER PROGRAMMING CONCEPTS | 4 CR
Prereq: CSCI 1101, and MATH 1510, or concurrent registration
Introduces students to the fundamental principles of programming. Procedures, recursion, and iteration will be presented as algorithmic development techniques. Abstract data types, modularity and the use of abstraction to hide program details will be emphasized throughout the course. The computer language Python is used as a formal way of expressing algorithms and data.

Credits: 4 Semesters: Fall, Spring

CSCI 2002 ALGORITHMS AND DATA STRUCTURES | 4 CR
Prereq: CSCI 1111, and CSCI 2001
Reinforces the concepts presented in CSCI 2001, such as data abstractions, from an object-oriented programming perspective. Introduces data structures such as stacks, queues, and trees, and introduces sorting algorithms. Students will implement data structures and their operations as abstract data types using an object-oriented approach. The programming language Java is used to express the concepts of the course.

Credits: 4 Semesters: Fall, Spring

DSCI 2000 INTRODUCTION TO DATA SCIENCE | 3 CR
Prereq: MATH 1080, or MATH 1090, and CSCI 1111, (C or higher)
An introduction to Data Science and Data Analytics. Various mathematical and statistical techniques and software tools will be used to analyze a variety of data sets in order to develop basic skills and gain a general understanding of the field.

Credits: 3 Semesters: Fall, Spring

ECON 2201 PRINCIPLES OF MICROECONOMICS | 3 CR
Recommended: READ 1106 MnTC Goals: 5, 9
Theories of how various types of product, service, and resource markets operate and resulting implications for public policy. Decision-making by consumers, business firms, and government. Price determination, resource allocation, and income determination via markets.

Credits: 3 Semesters: Fall, Spring
MATH 1080 INTRODUCTION TO STATISTICS | 4 CR
Prereq: MATH 0050, or eligible for MTC Goals: 4
Concepts and application of descriptive and inferential statistics. Measures of central tendency and variation: z-scores and percentiles, normal distribution, and central limit theorem. Estimation, hypothesis testing, t and z tests, chi-square tests, analysis of variance (ANOVA), and linear regression.

Credits: 4 Semesters: Fall, Spring

MATH 1090 STATWAY STATISTICS 2 | 4 CR
Prereq: MATH 0990 MTC Goals: 4
This course is the second in a two semester sequence designed to guide students in completing the topics covered in both beginning algebra and college-level introductory statistics in one year. The two semester sequence is useful to students whose academic program is satisfied by an introductory statistics course. STATWAY Statistics 2 covers sampling distributions, Central Limit Theorem, confidence intervals, and hypothesis testing for population proportions, population means, and means of paired differences. Chi-square tests for one and two way tables and ANOVA methods are also covered, as well as necessary topics from beginning algebra. The curriculum is based on student collaborative group learning. Students must commit to completing MATH 0990 and MATH 1090 as a required sequence of courses. MATH 0990 in one semester and MATH 1090 in a subsequent semester.

Credits: 4 Semesters: Fall, Spring

MATH 1100 COLLEGE ALGEBRA | 4 CR
Prereq: MATH 0700, or eligible for MATH 1100 MTC Goals: 4
This is a college-level algebra course that emphasizes properties of functions and their graphs. Linear, quadratic, polynomial, rational, exponential and logarithmic functions are covered. Other topics include: solving equations and inequalities, and systems of equations and inequalities. This course also includes a basic introduction to right triangle trigonometry.

Credits: 4 Semesters: Fall, Spring

MATH 1400 SURVEY OF CALCULUS | 4 CR
Prereq: MATH 1100, (C or higher) or eligible for MATH 1500 MTC Goals: 4
Concepts and techniques of differential and integral calculus for those who do not need the comprehensive calculus sequence (MATH 1510-1520). Principal applications from business, technology, social science, and statistics.

Credits: 4 Semesters: Fall, Spring

MATH 1500 PRE-CALCULUS | 5 CR
Prereq: MATH 1100, (C or higher) and high school geometry or eligible for MATH 1500 MTC Goals: 4
Preparation for student success in a multiple-term calculus sequence. This is an accelerated treatment of functions and trigonometry. All elementary functions are covered and trigonometry is developed completely. Emphasis on graphing and problem solving parallels algebraic skill development.

Credits: 5 Semesters: Fall, Spring

MATH 1510 CALCULUS 1 | 5 CR
Prereq: MATH 1150, (C or higher), MATH 1500, (C or higher) or eligible for MATH 1510 MTC Goals: 4
Topics include functions, limits, derivatives, and an introduction to integration. Applications include but are not limited to science, engineering, economics, and ecology.

Credits: 5 Semesters: Fall, Spring

MATH 2080 STATISTICAL MODELING | 3 CR
Prereq: MATH 1080, or MATH 1090 MTC Goals: 4
This course provides an introduction to statistical model building including simple linear regression, non-linear models, logistic regression, and multiple regression models. Optionally, an instructor may include an introduction to artificial neural net models. Examples of modeling problems will be used from a variety of disciplines and thus the course should be useful to students interested in physical sciences, biology, economics, finance, and data science.

Credits: 3 Semesters: Fall, Spring

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