DATA SCIENCE - MASTER OF SCIENCE (MS) ONLINE

The online Master of Science degree in Data Science (MS-DS) is an interdisciplinary degree program offered through the University of Colorado Boulder and hosted online through Coursera’s learning platform. With performance-based admissions and no application process, the MS-DS is ideal for individuals with a broad range of undergraduate education and/or professional experience in computer science, information science, mathematics and statistics.

Data science is a multidisciplinary field that focuses on the extraction of knowledge and insight from large datasets. Data scientists are tasked with using a range of skills in applied mathematics, statistics, and computer science, and in domain applications such as information science, geography, business, media and the humanities.

The MS-DS on Coursera provides learners with a strong foundation in acquiring, cleaning and managing data. Students will learn to analyze large datasets using data mining and machine learning techniques. Students will also design, conduct, and run statistical experiments and models; draw rational conclusions from data using probability theory and statistics; and more.

Graduates of the MS-DS on Coursera program will be well-prepared to apply data science skills to a specific domain area. Graduates will also be able to clearly communicate the results of data science analysis to a non-technical audience; structure effective meetings and projects using collaboration skills; and act ethically in the role of professional data scientist.

Topic Areas

General Data Science
Data science is a multidisciplinary field that uses scientific methods, processes, applications, algorithms and systems to extract knowledge and insights from structured and unstructured data.

Applied Mathematics
The Department of Applied Mathematics in the College of Arts and Sciences offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology, nonlinear phenomena, physical applied mathematics, and probability and statistics.

Computer Science
Computer science is an exciting and challenging field that has an impact on many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, advance the computational techniques and write the software that supports scientists in their study of the world around us. Many new applications of computing technology remain to be discovered. Computing will be at the heart of future revolutions in business, science and society. Students who study computer science will be at the forefront of these important advances.

Information Science
Information science considers the relationships between people, places and technology and the information those interactions yield. The internet is a broad example of a socio-technical system that is comprised of hardware and software, but in daily life is better understood as a constantly changing social infrastructure upon which complex forms of human-human and human-information interaction rest. Scholars and students of information science develop new methods to study these socio-technical phenomena, and translate those findings to the design and development of useful and meaningful technology.

Program Policies

This specialized program does not align with standard campus policies. Please refer to the Specialized Programs (catalog.colorado.edu/specialized-programs/) section of the catalog for more information.

Requirements

Admission Requirements
Performance-Based Admission
To be admitted to the MS-DS as a degree-seeking student, students must enroll in and complete a pathway specialization with a 3.0 GPA or better. The pathway is a series of 3 one-credit courses with a focus on either statistics or computer science—students choose the pathway that is right for them. The courses in their chosen pathway are part of the required curriculum, so students make direct progress toward their degree as they complete their pathway.

Prerequisite Knowledge
There are no formal prerequisites for the MS-DS, but students should be knowledgeable in the following:
• Python
• R programming
• Calculus including derivatives and integrals
• Linear algebra including matrix multiplication, matrix inversion and solving linear systems using matrices

If students do not yet feel ready to complete their pathway courses, the department suggests reviewing courses on the Coursera platform and/or enrolling in a pathway specialization as a non-credit learner, which gives them the option of previewing course content.

Required Courses and Credits
The MS-DS is a non-thesis degree that requires 30 credit hours of coursework. Students must complete 21 credits of core coursework in statistics, computer science, and general core concepts as well as 9 credits of elective coursework. Students will also participate in practical, hands-on projects that utilize cloud-based programming environments and Jupyter Notebooks. Coursework includes access to real-world big data sets to prepare students for their future careers.

Learner Journeys
Students may complete courses in any order, but are advised to follow one of the recommended learner journeys below.

Statistics Pathway
We recommend that students who are skilled in statistics complete their courses in the following order:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>DTSA 5001</td>
<td>Statistical Inference for Data Science Courses</td>
<td>3</td>
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<tr>
<td>DTSA 5002</td>
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<tr>
<td>DTSA 5003</td>
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</table>
### Core Concepts in Data Science Courses
- DTSA 5301
- DTSA 5302
- DTSA 5303

### Core Courses
Complete in any order

#### Statistical Modeling for Data Science Courses
- DTSA 5011
- DTSA 5012
- DTSA 5013

#### Data Structures and Algorithms Courses
- DTSA 5501
- DTSA 5502
- DTSA 5503
- DTSA 5504

#### Data Mining Courses
- DTSA 5504
- DTSA 5505
- DTSA 5506

#### Machine Learning Courses
- DTSA 5509
- DTSA 5510
- DTSA 5511

#### Big Data Architecture Courses
- DTSA 5507
- DTSA 5508

### Data Science Elective Courses
10

### Total Credit Hours
30

### Computer Science Pathway
We recommend that students who are skilled in computer science complete their courses in the following order:

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