



LORAS DATA SCIENCE MAJOR

Division of Mathematics, Engineering & Computer Science

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Student Learning Outcomes – Data Science
1. Import and clean data from a variety of sources and qualities using appropriate technologies for storage and retrieval.
2. Select and employ appropriate mathematical, computational, or statistical methods for analyzing and visualizing data.
3. Apply appropriate models and techniques to gain insights to and answer questions from chosen disciplinary focus.
4. Effectively use knowledge (skills and conceptual understanding) from computing, mathematics, and statistics.
5. Independently learn new methodologies and technologies in the field of data science.
6. Communicate information clearly in multiple modes in audience-appropriate formats including written, oral, visual, and interactive means
7. Demonstrate a knowledge of the ethical, professional, and disciplinary standards in data science and their content focus, and consistently apply ethical processes

Courses

LDAT-100: Overview of Data Science – QR
Data Science is a developing field that combines computer science, statistics, and domain-specific knowledge. This course will introduce students to the field of Data Science via case studies and projects from various domains, including business, digital humanities, social sciences, and sports. Projects will include data visualization, summary, and prediction. Prerequisites: LMAT-091 or placement into LMAT-114+. Spring semester. 3 credits.

LCSC-115: Introduction to Programming
This course provides an introduction to the software engineering principles and tools used in the solution of problems, introduces a programming language and introduces students to social and professional concerns which arise with the use of computers. Prerequisite: LMAT-117 or above. 4 credits.

LCSC-225: Data Structures & Algorithms
This course provides an introduction to basic data structures and abstract data types. It

introduces a variety of algorithms and problem-solving strategies as well as elementary algorithm analysis. Prerequisite: LCSC-115 or LEGR-116. 4 credits.

LCSC-337: Database Programming
To Be Published

LCSC-340: Machine Learning
This course introduces students to topics in the Machine Learning area of Artificial Intelligence. It will include an introduction to some popular algorithms computers use to make decisions and predictions based on problems consisting of varied types of data. In addition to utilizing the algorithms themselves, students will learn about different methods of evaluating these algorithms and how to choose an algorithm for a particular problem. Prerequisite: LCSC-225. 3 credits.

LDAT-200: Tools & Methods for Analytics
Analytics is the study of various models, methods and tools that can be applied to gain insights from data. It involves collecting,

cleaning, analyzing, summarizing and presenting data in a scalable and generalizable manner. In this course, students will learn to implement each of these steps using appropriate programming environments. 3 credits.

L.MAT-150: Calculus of One Variable I-FM
A study of the basic concepts and techniques of analytic geometry, differential and integral calculus of functions of one variable, and applications to calculus-based models.
Prerequisite: Demonstrated competency in L.MAT-117 or equivalent or placement into L.MAT 150. 4 credits.

L.MAT-220: Introduction to Probability & Statistics-QR
A study of the fundamental techniques used in descriptive statistics as applied to real-world data and the processes associated with the design and analysis of experiments; application of theories from calculus to the construction of cumulative distributions for continuous random variables and computation of associated probabilities, expected values and variances.
Prerequisites: L.MAT-150, and one of L.MAT-160, L.CSC-115, or L.EGR-116. 3 credits.

L.MAT-250: Linear Algebra
A course which introduces abstract vector spaces, matrices and linear transformations.

Prerequisite: L.MAT-150 and one of L.MAT-160, L.CSC-115, or L.EGR-116 (these last three can be taken as co-requisite). 3 credits.

L.MAT-260: Analytic Geometry & Calculus III
A study of partial differentiation and multiple integration, elementary vector analysis and applications of these concepts. Prerequisite: L.MAT-160 or placement into L.MAT-260. 4 credits.

L.EGR-116: Intro to Programming with Robotics
This course provides an introduction to programming using a single board computer module commonly applied in small robotics projects. Students learn the basics of programming, variables, control statements, and functions as applied to programming real-time robotic systems. Prerequisite: L.MAT 117. 4 credits.

L.BAN-460: Big Data Analytics
This course introduces students to concepts behind the storage and analysis of the large and varied datasets that have become common in today's business environment. This includes the use of distributed computing to store and analyze these datasets in an efficient manner. Students will be introduced to a variety of tools used to analyze large datasets and learn how to use these tools in appropriate contexts. Prerequisite: L.CSC-225. 3 credits.

Continue to next page for major requirement

Loras College Data Science Degree Requirements:

Data Science is an interdisciplinary field of study, drawing primarily from mathematics, statistics, and computer science. The major in Data Science combines coursework from these areas with a separate disciplinary focus so that an undergraduate majoring in Data Science may have ample opportunity to apply analytical techniques to problems of interest. This major will prepare students to utilize skills and practices of data science, thereby preparing them for many careers, connecting to a wide range of areas of study. It will teach students a variety of ways to use data to discover findings and communicate those findings appropriately. This program will also contribute to the application of and growth of data science in ethical ways.

Requirements for the major in Data Science:

Req	Course	Cr's
1	L.DAT-100: Overview of Data Science-QR	3
Select one from Req 2:		
2	LCSC-115: Introduction to Programming	4
2	LEGR-116: Introduction to Robotics Programming	4
3	LMAT-150: Calculus of One Variable I-FM	4
4	LBAN-220: Data Visualization	3
5	L.DAT-200: Tools & Methods for Analytics	3
6	LMAT-220: Probability and Statistics-QR	3
7	LCSC-225: Data Structures & Algorithms	4
Select one from Req 8:		
8	LMAT-250: Linear Algebra	3
8	LMAT-260: Multivariable Calculus	4
9	LCSC-337: Database Programming	3
10	LCSC-340: Machine Learning	3
11	LMAT-420: Statistical Learning	3
12	LBAN-460: Big Data Analytics	3
13	L.DAT-490: Capstone	3
14	Content Basics within Disciplinary Focus (100-200 level course)	3-4
15	Content Basics within Disciplinary Focus (200-300 level course)	3-4
16	Content Basics within Disciplinary Focus (200-300 level course)	3-4
17	Content Basics within Disciplinary Focus (300- 400 level course)	3-4
54-59 total required credits		