Data Science Undergraduate Certificate

Certificate Requirements

The undergraduate certificate in Data Science is a five-course (15 credit hour) program. It provides skills, both statistical and computational, and technologies for the growing and popular fields involving data science and analysis. A student pursuing this certificate can choose from one of the two tracks, the computational track or the statistical track. Each track consists of three required courses (9 credit hours) and two additional elective courses (6 credit hours).

Computational Track

Required Courses		
CMP SCI 4200	Python for Scientific Computing and Data Science	3
CMP SCI 4340	Introduction to Machine Learning	3
CMP SCI 4342	Introduction to Data Mining	3
Electives		
Choose two of the following courses:		6
CMP SCI 3411	Introduction to Data Visualization	
CMP SCI 4030	Introduction to Intelligent Web	
CMP SCI 4151	Introduction to Statistical Methods for Data Science	
CMP SCI 4370	Introduction to Biological Data Science	
CMP SCI 4390	Introduction to Deep Learning	
CMP SCI 4610	Database Management Systems	
MATH 4005	Exploratory Data Analysis with R	
MATH 4090	Introduction to High-dimensional Data Analysis	
MATH 4220	Bayesian Statistical Methods	
MATH 4225	Introduction to Statistical Computing	
MATH 4260	Introduction to Stochastic Processes	
Total Hours		**15**

Statistical Track

Required Courses		
MATH 4200	Mathematical Statistics I	3
MATH 4210	Mathematical Statistics II	3
MATH 4250	Introduction to Statistical Methods in Learning and Modeling	3
or CMP SCI 4340	Introduction to Machine Learning	
Electives		
Choose two of the following courses:		6
CMP SCI 4030	Introduction to Intelligent Web	
CMP SCI 4200	Python for Scientific Computing and Data Science	
CMP SCI 4300	Introduction to Artificial Intelligence	
CMP SCI 4320	Introduction to Evolutionary Computation	
CMP SCI 4340	Introduction to Machine Learning (if course not used above)	
CMP SCI 4342	Introduction to Data Mining	
CMP SCI 4370	Introduction to Biological Data Science	
CMP SCI 4390	Introduction to Deep Learning	
MATH 4005	Exploratory Data Analysis with R	
MATH 4090	Introduction to High-dimensional Data Analysis	
MATH 4220	Bayesian Statistical Methods	
MATH 4225	Introduction to Statistical Computing	
MATH 4250	Introduction to Statistical Methods in Learning and Modeling (if course not used above)	
MATH 4260	Introduction to Stochastic Processes	
Total Hours		**15**

A minimum of three courses must be taken from UMSL. Courses may be substituted with the permission of the certificate coordinator. For more information, contact the department chair or email info@arch.umsl.edu.

Learning Outcomes

Upon completion the program, certificate earners will be able to:

- Identify, interpret, and manage the computational issues involved in the handling of large volumes of data
- Apply algorithmic principles and statistical theories to analyze data-sets
- Build and evaluate data-based models
- Apply machine learning techniques to data-mining problems