Data Science and Statistics- Bachelor of Science

For information, contact the Department of Statistics (statistics@miamioh.edu), 311 Upham Hall, 513-529-7828.

Data Science and Statistics combines knowledge of concepts from statistics, computer science, and mathematics to extract meaning from data to inform evidence-based decisions. Students select a concentration in statistics or in data science. The two concentrations share a core of coursework in mathematics, statistics and programming. The concentration in statistics develops skills for preparing and analyzing data in a wide variety of observational and experimental contexts. The concentration in data science focuses on methods needed for exploring, managing and analyzing complex or enormous data sets.

All STA courses and related-hours courses must be taken for grades rather than credit/no-credit. A GPA of at least 2.00 is required for the STA courses.

Students majoring in Data Science and Statistics may not minor in Statistics or Statistical Methods, nor major in Mathematics and Statistics.

Program Requirements

Prerequisites for this program include Introductory Statistics, Calculus 1, and Calculus 2.

Code	Title	Credit Hours
Core Courses - required for both concentrations		
CSE 174	Fundamentals of Problem Solving and Programming	3
MTH 252	Calculus III	4
MTH 222	Introduction to Linear Algebra	2-3
or MTH 222T	Introduction to Linear Algebra (Honors)	
STA 363	Introduction to Statistical Modeling	3
STA 401	Probability	3
STA 402	Statistical Programming	3
STA 462	Inferential Statistics	3
STA 463	Regression Analysis	4
Concentration		
Select one of the two concentrations shown below		27-31
Total Credit Hours		**52-57**

Concentration in Data Science

Code	Title	Credit Hours
CSE 271	Object-Oriented Programming	3
CSE 274	Data Abstraction and Data Structures	3
CSE 385	Database Systems	3
STA 404	Advanced Data Visualization	3
STA 467	Statistical Learning	3
Select one of the following:		**3**
STA 427	Introduction to Bayesian Statistics	
STA 483	Analysis of Forecasting Systems	
Select three of the following:		**9-10**
BIO 466	Bioinformatics Computing Skills	
BIO 485	Bioinformatics Principles	
CSE 273	Optimization Modeling	
CSE 372	Stochastic Modeling	
CSE 432	Machine Learning	
CSE 485	Advanced Database Systems	
GEO 441	Geographic Information Systems	
GEO 442	Advanced Geographic Information Systems	
GTY/POL 491	Social Network Analysis	
ISA 414	Managing Big Data	
MTH 432	Optimization	
MTH 435	Mathematical Modeling Seminar	
MTH 438	Theory and Applications of Graphs	
MTH 439	Combinatorics	
STA 427	Introduction to Bayesian Statistics [1]	
STA 466	Experimental Design Methods	
STA 483	Analysis of Forecasting Systems [1]	
Total Credit Hours		**27-28**

[1] A Student completing both STA 427 and STA 483 can apply one to the three elective course requirement.

Concentration in Statistics (also requires a selection of Related Hours)

Code	Title	Credit Hours
STA 466	Experimental Design Methods	4
STA 475	Data Analysis Practicum	3
Select two of the following:		**6**
STA 333	Nonparametric Statistics	
STA 365	Statistical Monitoring and Design of Experiments	
STA 404	Advanced Data Visualization	
STA 427	Introduction to Bayesian Statistics	
STA 432	Sampling Design and Analysis	
STA 467	Statistical Learning	
STA 483	Analysis of Forecasting Systems	
Select one of the following, chosen so it is not also used for the related hours requirement:		**3**
CSE 273	Optimization Modeling	
CSE 274	Data Abstraction and Data Structures	
CSE 372	Stochastic Modeling	
CSE 432	Machine Learning	
ISA 414	Managing Big Data	
MTH 432	Optimization	
MTH 435	Mathematical Modeling Seminar	
Related Hours [1]		
Select one of the lists of related hours shown below [2]		12-15
Total Credit Hours		**28-31**

[1] The related hours requirement for the concentration in Statistics is waived for students who complete the requirements for a major, co-major, or minor outside of the Department of Statistics.

[2] **Related Area Hour Reduction**: Some students may want to have the flexibility to include in their program an additional elective course in mathematics or statistics. To that end, the cluster of related courses required for the concentration in statistics can be reduced by up to 3 hours (of the 6 advanced hours) by taking the same number of hours in MTH or STA (numbered 400 or higher and not a service course). This decision is made in consultation with the Chief Departmental Advisor.

Related Hours Lists for the concentration in Statistics.

Actuarial Science (See the requirements for the Actuarial Sciences Minor also.)

Code	Title	Credit Hours
ACC 221	Introduction to Financial Accounting	3
ACC 222	Introduction to Managerial Accounting	3
ECO 201	Principles of Microeconomics	3
ECO 202	Principles of Macroeconomics	3
FIN 301	Introduction to Business Finance	3
See the requirements for the Actuarial Sciences Minor		
Total Credit Hours		**15**

Economics

Code	Title	Credit Hours
ECO 201	Principles of Microeconomics	3
ECO 202	Principles of Macroeconomics	3
ECO 317	Intermediate Macroeconomic Theory	3
ECO 418	Monetary Theory and Policy	3
Total Credit Hours		**12**

Computer Science and Software Engineering

Code	Title	Credit Hours
CSE 271	Object-Oriented Programming	3
CSE 274	Data Abstraction and Data Structures	3
Select one of the following:		3
CSE 252	Web Application Programming	
CSE 385	Database Systems	
Select three hours above the 174 level		3
Total Credit Hours		**12**

Geospatial Systems

Code	Title	Credit Hours
GEO 441	Geographic Information Systems	3
Select three of the following:		**9**
GEO 442	Advanced Geographic Information Systems	
GEO 443	Python Programming for Geospatial Applications	
GEO 444	GIScience Techniques in Landscape Ecology	
GEO 448	Techniques and Applications of Remote Sensing	
Total Credit Hours		**12**

Information Systems and Analytics

Code	Title	Credit Hours
ISA 235	Information Technology and the Intelligent Enterprise	3
ISA 245		3
ISA 401	Business Intelligence and Data Visualization	3
ISA 414	Managing Big Data	3
Total Credit Hours		**12**

Operations Research

Code	Title	Credit Hours
CSE 273	Optimization Modeling	3
CSE 372	Stochastic Modeling	3
Select two of the following:		**6**
MTH 432	Optimization	
MTH 435	Mathematical Modeling Seminar	
MTH 437	Game Theory and Related Topics	
MTH 438	Theory and Applications of Graphs	
MTH 439	Combinatorics	
Total Credit Hours		**12**

Other

Code	Title	Credit Hours
Create a related area [1]		12
Total Credit Hours		**12**

[1] 12 or more credit hours in any area, with at least 6 of the hours numbered 300 or higher (200 or higher in Chemistry, Physics, Engineering, or Computer Science and Software Engineering). Such program must be approved by the Chief Departmental Adviser *in advance of applying for graduation*.