

BHA-Statistics & Machine Learning

Fall 2023

Bachelor of Humanities and Arts (BHA)

Dietrich College (DC) Concentration in Statistics & Machine Learning **87 units (minimum)**

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In the BHA concentration in Statistics & Machine Learning, students develop and master a wide array of skills in computing, mathematics, statistical theory, and the interpretation and display of complex data. In addition, students with a BHA concentration in Statistics & Machine Learning gain experience in applying statistical tools to real problems in other fields and learn the nuances of interdisciplinary collaboration. This program is geared towards students interested in statistical computation, data science or “Big Data” problems.

BHA students take at least 9 courses in their DC concentration, for a minimum of 81 units. A completed DC Concentration Declaration Sheet must be approved by the concentration advisor and submitted to the BXA office by spring mid-semester break of the student’s sophomore year. BHA students who are admitted through internal transfer must have chosen a DC concentration at the time of their application, which serves as declaration.

Prerequisites

These five courses are not counted as part of your DC Concentration. They may be used to satisfy general education or free elective requirements.

21-120	Differential and Integral Calculus	10
21-127	Concepts of Mathematics	12
21-256	Multivariate Analysis	9
or 21-259	Calculus in Three Dimensions (10)	
21-240	Matrix Algebra with Applications	10
or 21-241	Matrices and Linear Transformations (11)	
or 21-242	Matrix Theory (11)	
15-112	Fundamentals of Programming and Computer Science	12

Note: 21-240/241/242 and 21-256/259 must be completed before taking 36-401 Modern Regression. 21-241 and 21-242 are intended only for students with a very strong mathematical background.

Statistics Core **(5 courses, 45 units)**

36-235	Probability and Statistical Inference I (recommended)	9
or 36-225	Introduction to Probability Theory	
36-236	Probability and Statistical Inference II (recommended)	9
or 36-226	Introduction to Statistical Inference	
36-350	Statistical Computing	9
36-401	Modern Regression	9
36-402	Advanced Methods for Data Analysis	9

Data Analysis Electives **(1 course, 9 units)**

Students must take one course from the Statistics Electives listed below. Students will consult with the concentration advisor to select the Special Topics and Electives courses that best fit for their areas of interest.

36-303	Sampling, Survey and Society	9
36-311	Statistical Analysis of Networks	9
36-313	Statistics of Inequality and Discrimination	9
36-315	Statistical Graphics and Visualization	9
36-318	Introduction to Causal Inference	9
36-46x	Special Topics (topics and offerings vary)	9
36-490	Undergraduate Research	9
36-493	Sports Analytics Capstone	9
36-497	Corporate Capstone Project	9

Machine Learning Core **(2 courses, 24 units)**

15-122	Principles of Imperative Computation (C or higher)	12
10-301	Introduction to Machine Learning (undergrad)	12

Machine Learning Elective **(1 course, 9 units minimum)**

Students must take one course from the ML Electives listed below. Students will consult with the concentration advisor to choose an elective that best fits their area of interest. This course may have additional pre-requisites. Keep in mind this is not an exhaustive list and other applicable courses can be reviewed to be approved as an ML elective—please speak with the concentration advisor about this.

02-510/710	Computational Genomics	12
05-317	Design of Artificial Intelligence Products	12
05-434/11-344	Machine Learning in Practice	12
10-403/703	Deep Reinforcement Learning & Control	12

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10-405/605	Machine Learning with Large Datasets	12
10-414	Deep Learning Systems: Algorithms and Implementation	12
10-417	Intermediate Deep Learning	12
10-418/618	Machine Learning for Structured Data	12
10-613	Machine Learning Ethics and Society	12
10-707	Advanced Deep Learning	12
10-708	Probabilistic Graphical Models	12
11-324/624	Human Language for Artificial Intelligence	12
11-411	Natural Language Processing	12
11-441	Machine Learning for Text and Graph-based Mining	9
11-485	Introduction to Deep Learning	9
11-661/761	Language and Statistics	12
15-281	Artificial Intelligence: Representation and Problem Solving	12
15-386	Neural Computation	9
15-387	Computational Perception	9
15-482	Autonomous Agents	12
16-311	Introduction to Robotics	12
16-385/720	Computer Vision	12
17-445	Machine Learning in Production	12
85-419	Introduction to Parallel Distributed Processing	9