

COMPUTER SCIENCE COMPREHENSIVE MAJOR: APPLIED MACHINE LEARNING EMPHASIS

Machine learning/artificial intelligence is one of the fastest growing areas in the industry, driven by the demand for computer vision, self-driving cars, large language models, data analytics, fraud detection, and many other exciting applications. In the Applied Machine Learning Comprehensive Major, students will take a deep dive into data analytics, machine learning algorithms, deep learning models, large language models, and other cutting-edge algorithms.

Western students have the option to pursue the 45-credit Standard Program or one of the following Comprehensive Majors: the 63-credit Software Engineering Major, the 60-credit Information Security Major, the 65-credit Scientific Computing Major, or the 63-credit Applied Machine Learning Major. Course work in the Applied Machine Learning Major will cover modern tools and frameworks such as OpenCV, TensorFlow, Scikit, SpaCy, and NLTK. Students will learn to build real-world applications related to deep learning, computer vision systems, and large language models. The Applied Machine Learning Major will require the 33-credit Computer Science Core, along with the 30-credit Applied Machine Learning Major emphasis courses.

A minimum of 63 credits is required, including the 33-credit Computer Science Core and the following:

Code	Title	Credits
Computer Science Core		
CS 190	Computer Science I	3
CS 191	Computer Science II	3
CS 195	Database Management Systems	3
CS 250	Web Applications Development I	3
CS 280	Data Structures	3
CS 330	Operating Systems and Architecture	3
CS 370	Systems Programming in C	3
CS 412	Software Engineering	3
CS 470	Algorithms	3
CS 495	Senior Project	3
MATH 200	Discrete Mathematics	3
Total Credits		33

Code	Title	Credits
CS 220	Data Analytics	3
CS 303	Machine Learning	3
CS 385	Natural Language Processing	3
CS 420	Computer Vision	3
CS 421	Neural Network Engineering	3
MATH 213	Probability and Statistics (GT-MA1)	3
MATH 260	Applied Linear Algebra	3

And 9 credits of upper-level CS courses outside of the Computer Science Core/Applied Learning emphasis courses, or any of the following: CS 235, ENG 302, MATH 251, MATH 252, MATH 313, MATH 314, MATH 358, MATH 360, MATH 380.

Total Credits **30**

Course	Title	Credits
Year One		
Fall		
CS 190	Computer Science I	3
Elective	Elective or minor course	3
ENG 102	Writing and Rhetoric I (GT-CO1)	3
Gen Ed	Arts & Humanities	3
HWTR 100	First Year Seminar	1
MATH 141 or MATH 151	Precalculus (GT-MA1) or Calculus I (GT-MA1)	4
Credits		17
Spring		
CS 191	Computer Science II	3
CS 195	Database Management Systems	3
Elective	Elective or minor course	3
Gen Ed	Arts & Humanities	3
Gen Ed	Social Sciences	3
Credits		15
Year Two		
Fall		
CS 280	Data Structures	3
CS 330 or CS 250	Operating Systems and Architecture or Web Applications Development I	3
MATH 213	Probability and Statistics (GT-MA1)	3
MATH 260	Applied Linear Algebra	3
Gen Ed	Natural Sciences w/lab	4
Credits		16
Spring		
ENG 103	Writing and Rhetoric II (GT-CO2)	3
CS 220	Data Analytics	3
CS 303	Machine Learning	3
Gen Ed	Natural Sciences w/lab	4
MATH 200	Discrete Mathematics	3
Credits		16
Year Three		
Fall		
CS 250 or CS 330	Web Applications Development I or Operating Systems and Architecture	3
CS 385 or CS 421	Natural Language Processing or Neural Network Engineering	3
Elective	Elective	3
Gen Ed	Social Sciences	6
Credits		15
Spring		
CS 370	Systems Programming in C	3
CS 412	Software Engineering	3
CS 420	Computer Vision	3
Elective	Elective	3
Gen Ed	Arts & Humanities	3
Credits		15
Year Four		
Fall		
CS 470	Algorithms	3
CS 385 or CS 421	Natural Language Processing or Neural Network Engineering	3
CS Elective	CS Elective (upper-division)	3

2 Computer Science Comprehensive Major: Applied Machine Learning Emphasis

Elective	Elective	6
	Credits	15
Spring		
CS 495	Senior Project	3
CS Elective	CS Elective (upper-division)	6
Elective	Elective	3
	Credits	12
	Total Credits	121