ELECTRICAL ENGINEERING: MACHINE LEARNING AND DATA SCIENCE, BS

The Machine Learning and Data Science option in Electrical Engineering prepares students for a career in electrical engineering with an emphasis on machine learning and data science. The purpose of this option is to provide guidance and recognition for students pursuing this career path. The option uses 18 of the elective credits within the 120-credit Electrical Engineering BS degree program to focus on the mathematics, tools, and practices associated with machine learning and data science in engineering. Students selecting this option must submit an option declaration form to the dean's office in Engineering Hall.

REQUIREMENTS

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MACHINE LEARNING AND DATA SCIENCE REQUIRED COURSES

Code	Title	Credits
E C E 204	Data Science & Engineering [1]	3
E C E 331	Introduction to Random Signal Analysis and Statistics (typically offered fall) [2]	3
Choose one:		3
MATH 320	Linear Algebra and Differential Equations [3]	
MATH 340	Elementary Matrix and Linear Algebra [3]	
MATH 341	Linear Algebra [3]	
E C E/COMP SCI/ M E 532	Matrix Methods in Machine Learning [4]	3
E C E/COMP SCI/ I SY E 524	Introduction to Optimization	3
Total Credits		**15**

[1] This course can be taken as a Professional Elective.

[2] This course fulfills the Probability requirement.

[3] This course can be taken as a Professional Elective and meets the advanced math auxiliary condition. MATH 375 Topics in Multi-Variable Calculus and Linear Algebra and MATH 376 Topics in Multi-Variable Calculus and Differential Equations taken in sequence will fulfill the requirement for MATH 340 Elementary Matrix and Linear Algebra.

[4] This course can be taken as an Advanced Elective and meets the advanced math auxiliary condition.

MACHINE LEARNING AND DATA SCIENCE ELECTIVE

Code	Title	Credits
Choose one as an Advanced or Professional Elective:		3-4
E C E 431	Digital Signal Processing (typically offered fall)	
E C E/ COMP SCI 533	Image Processing (typically offered fall)	
E C E/COMP SCI/ M E 539	Introduction to Artificial Neural Networks	
E C E/ COMP SCI 561	Probability and Information Theory in Machine Learning (typically offered fall)	
E C E/I SY E 570	Ethics of Data for Engineers	
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	
COMP SCI 540	Introduction to Artificial Intelligence	
COMP SCI 564	Database Management Systems: Design and Implementation [1]	
COMP SCI/ B M I 567	Medical Image Analysis [1]	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
COMP SCI 577	Introduction to Algorithms [1]	
I SY E 412	Fundamentals of Industrial Data Analytics	
I SY E 521	Machine Learning in Action for Industrial Engineers	
L I S 461	Data and Algorithms: Ethics and Policy	
MATH/I SY E/ OTM/STAT 632	Introduction to Stochastic Processes [1]	
MATH 635	An Introduction to Brownian Motion and Stochastic Calculus [1]	
M S & E 460	Introduction to Computational Materials Science and Engineering [1]	
STAT 421	Applied Categorical Data Analysis [1]	
STAT/M E 424	Statistical Experimental Design [1]	
STAT 456	Applied Multivariate Analysis [1]	
STAT 461	Financial Statistics [1]	

[1] This course has additional requisites not required for the BS in Electrical Engineering.

FOUR-YEAR PLAN

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SAMPLE FOUR-YEAR PLAN

First Year

Fall	Credits	Spring	Credits
MATH 221	5	PHYSICS 201	5
CHEM 103	4	MATH 222	4
E C E 210	2	Communications A or Liberal Studies Elective	3

Liberal Studies Elective or Communications A	3	E C E/COMP SCI 252	3
	14		**15**

Second Year

Fall	Credits	Spring	Credits
PHYSICS 202	5	E C E 222	4
MATH 234	4	E C E 230	4
E C E 203	3	E C E 270	1
E C E 204	3	E C E 330	3
Free Elective	1	Liberal Studies Elective	3
	16		**15**

Third Year

Fall	Credits	Spring	Credits
COMP SCI 300	3	ECE Advanced Elective	3
E C E 331	3	E C E/PHYSICS 235	3
E C E 340	3	EE Advanced Lab (3XX)	1
E C E 271	1	INTEREGR 397	3
E C E/COMP SCI 352	3	Liberal Studies Elective	3
		MATH 320	3
	13		**16**

Fourth Year

Fall	Credits	Spring	Credits
E C E/COMP SCI/ I SY E 524	3	ECE Advanced Elective (4XX)	3
E C E 370	2	ECE Advanced Elective (4XX)	3
ECE Advanced Elective	3	Machine Learning and Data Science Elective	3
ECE Advanced Elective	4	E C E/COMP SCI/ M E 532	3
Liberal Studies Elective	3	Liberal Studies Elective	3
EE Advanced Lab (3XX)	1		
	16		**15**

Total Credits 120