ENGINEERING DATA ANALYTICS, CERTIFICATE

This certificate is designed to enhance the skills of engineering students in the field of Data Analytics, which is in high demand across all engineering fields. Students may choose from a wide variety of courses from each of the four main areas: Foundations of Data Analytics, Applications of Data Analytics, Data Science, and Machine Learning. The culminating course in the program focuses on ethical issues in Data Analytics and provides students with principled solutions to address these modern societal challenges.

The program is open to any degree-seeking undergraduate engineering student with a plan of study that fulfills the certificate requirements. Applications can be submitted at any time, but students are encouraged to apply early to ensure a smooth and successful completion of the program.

HOW TO GET IN

All current undergraduate students in the College of Engineering are eligible to complete the Certificate in Engineering Data Analytics. Students should meet with the Certificate Advisor to discuss their intention to pursue the certificate and submit an online declaration form: https://engineering.wisc.edu/programs/certificates/engineering-data-analytics/declaration (https://engineering.wisc.edu/programs/certificates/engineering-data-analytics/declaration/).

Students declared in the Certificate in Data Science are not eligible to declare the Certificate in Engineering Data Analytics.

REQUIREMENTS

Select one course from each area. The ethics course must be taken after the other four courses are completed.

Code	Title	Credits
Foundations of Data Analytics		3
Applications of Data Analytics		3-4
Data Science		3
Machine Learning		3
Ethics (Complete last)		3
I SY E/E C E 570	Ethics of Data for Engineers	
Total Credits		15

FOUNDATIONS OF DATA ANALYTICS

Code	Title	Credits
E C E 203	Signals, Information, and Computation	3
E C E 204	Data Science & Engineering	3
I SY E 210	Introduction to Industrial Statistics	3
I SY E 312	Data Management and Analysis for Industrial Engineers	3
E C E 331	Introduction to Random Signal Analysis and Statistics	3
I SY E 412	Fundamentals of Industrial Data Analytics	3

APPLICATIONS OF DATA ANALYTICS

Code	Title	Credits
E C E 334	State Space Systems Analysis	3
M S & E 401	Special Topics in Materials Science and Engineering (Topic: Data Science in Materials)	3
E C E 431	Digital Signal Processing	3
E C E 432	Digital Signal Processing Laboratory	3
E C E 454	Mobile Computing Laboratory	4
I SY E/M E 512	Inspection, Quality Control and Reliability	3
I SY E 517	Decision Making in Health Care	3
E C E/COMP SCI 533	Image Processing	3
I SY E 575	Introduction to Quality Engineering	3

DATA SCIENCE

Code	Title	Credits
I SY E 516	Introduction to Decision Analysis	3
E C E/COMP SCI/I SY E 524	Introduction to Optimization	3
E C E/COMP SCI 561	Probability and Information Theory in Machine Learning	3
I SY E 620	Simulation Modeling and Analysis	3
I SY E 624	Stochastic Modeling Techniques	3
I SY E/MATH/OTM/STAT 632	Introduction to Stochastic Processes	3

MACHINE LEARNING

Code	Title	Credits
E C E/COMP SCI/M E 532	Matrix Methods in Machine Learning	3
E C E/COMP SCI/M E 539	Introduction to Artificial Neural Networks	3
I SY E 521	Machine Learning in Action for Industrial Engineers	3
I SY E 562	Human Factors of Data Science and Machine Learning	3

ETHICS

Code	Title	Credits
I SY E/E C E 570	Ethics of Data for Engineers	3

CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

LEARNING OUTCOMES

1. Apply tools and methods to understand, analyze, and interpret data from a variety of sources
2. Apply tools and methods to draw conclusions from and make decisions based on analysis of data
3. Articulate the potential impact of a data-driven decision in the context of ethics, fairness, and equity
4. Identify how engineers apply data analytics in practice using machine learning, data science, and other fundamental tools of data analytics