CONNECTED SYSTEMS ENGINEERING, MS

The MS program in Connected Systems Engineering is a 31-credit Capstone-based program which is offered by the Industrial and Manufacturing Engineering Department in the College of Engineering and Applied Sciences, in collaboration with UWM's Connected Systems Institute (CSI) and the Lubar School of Business. This program, the first of its kind in the state of Wisconsin, is designed for graduates with at least a bachelor's degree in engineering and related fields, to reskill or upskill, and gain key knowledge that is necessary for current and future jobs in the manufacturing and service industries. The program entails courses in Industrial Internet of Things (IoT), data acquisition and data analytics, machine learning and artificial intelligence (AI), robotics/automation and digital twins as well as the sustainability in technological advances, taking ethical and social ramifications. A unique aspect of this program is that the majority of the hands-on-experiential learning will take place in the state-of-the-art manufacturing testbeds and software that are available in the CSI. The technical elective courses will lead concentrations in industrial engineering, manufacturing engineering, enterprise resource planning, digital supply chain management, mechatronics and robotics, artificial intelligence and machine learning, and cybersecurity.

Admission Requirements

Application Deadlines

Application deadlines vary by program, please review the application deadline chart (http://uwm.edu/graduateschool/program-deadlines/) for specific programs. Other important dates and deadlines can be found by using the One Stop calendars (https://uwm.edu/onestop/dates-and-deadlines/).

Admissions Eligibility Requirements

Applicants must meet UWM's Graduate School's mandated admissions requirements (https://uwm.edu/graduateschool/students/admission/). In addition:

1. Applicants should have a baccalaureate degree in engineering or related fields (mathematics, data science, statistics or a natural science) from an accredited college or university.
2. Applications will be reviewed by the Industrial and Manufacturing Engineering Department Faculty Committee to assess academic achievement and ability to do intensive graduate-level work.

Credits and Courses

The program consists of 18 credits of required core courses, 3 credits of the capstone completion course, 1 credit of writing effectiveness and 9 credits of elective courses from a one or a mix of several focus areas as follows:

Code	Title	Credits
Academic degree program or major course requirements (22 Credits)		
IND ENG 540G	Foundations of Systems Engineering	3
IND ENG 555	Manufacturing Systems Integration	3
IND ENG 715	Data Acquisition and Visualization for Decision Making	3
IND ENG 716	Engineering Statistical Analysis	3
IND ENG 741	Foundational Technologies for Connected Systems	1
IND ENG 742	Cloud Architecture for Connected Systems	1
IND ENG 999	Advanced Independent Study	3
BUS ADM 788	Tracking and Tracing	1
BUS ADM 811	Process and Work-Flow Management	3
EAS 701	Effective Academic Writing	1
Technical Electives (Pick 9 credits from one or a mix of the following focus areas)		**9**
Industrial Engineering Focus		
IND ENG 455G	Operations Research I	
IND ENG 465G	Optimization Under Uncertainty	
IND ENG 475G	Computer Simulation	
IND ENG 571G	Quality Assurance	
IND ENG 575G	Design of Experiments	
IND ENG 717	Operations Research in Engineering Management	
IND ENG 765	Operations Research Methods	
IND ENG 777	Scheduling and realtime resource management	
IND ENG 890	Advanced Topics in Industrial and Systems Engineering: [1]	
Manufacturing Engineering Focus		
IND ENG 550G	Control of Automated Manufacturing Systems	
IND ENG 572G	Reliability Engineering	
IND ENG 587G	Lean Production Systems	
IND ENG 751	Flexible Manufacturing Systems	
IND ENG 890	Advanced Topics in Industrial and Systems Engineering: [1]	
Enterprise Resource Planning Focus		
BUSMGMT 733	Enterprise Simulation Game	
BUS ADM 781	Enabling Supply Chains Using SAP	
BUS ADM 816	Business Intelligence Technologies & Solutions	
BUS ADM 818	Information Systems Practicum	
Digital Supply Chain Management Focus		
BUS ADM 782	Supply Chain Technology and Simulation	
BUS ADM 783	Modeling and Analytics in Supply Chains	
BUS ADM 787	Managing Connected Supply Chains	
BUS ADM 789	Service Operations Management	
IND ENG 890	Advanced Topics in Industrial and Systems Engineering: [1]	
Mechatronics/Robotics/Digital Twin Focus		
MECHENG 476G	Introduction to Robotics	
MECHENG 479G	Advanced Mechatronics	
MECHENG 733	Sensors and Systems	
COMPSCI 725	Robot Motion Planning	

COMPSCI 746	Immersive Technologies and 3D User Interfaces
IND ENG 890	Advanced Topics in Industrial and Systems Engineering: [1]
AI/Machine Learning Focus	
COMPSCI 425G	Introduction to Data Mining
COMPSCI 710	Artificial Intelligence
COMPSCI 711	Introduction to Machine Learning
COMPSCI 715	Programming for Machine Learning
INFOST 582G	Introduction to Data Science
Cybersecurity Focus	
COMPSCI 469G	Introduction to Computer Security
INFOST 583G	Survey of Information Security
INFOST 695G	Ethical Hacking I
INFOST 696G	Ethical Hacking II
INFOST 784	Information Security Management
IND ENG 890	Advanced Topics in Industrial and Systems Engineering: [1]
Total Credits	**31**

[1] Qualifying topics include Global Supply Chain and Sustainable Technologies: Social and Ethical Impacts.

Additional Requirements

Major Professor as Advisor

The student is assigned an initial faculty advisor at the time of admission. The student selects a faculty member as as their capstone advisor after consultation with that faculty member. Any change in faculty advisor requires the documented permission of the new faculty member and their department. An initial Program of Study with student, advisor and department approval should be completed prior to the completion of 9 credits in the program. The final Program of Study must be approved by the initial advisor or capstone advisor as appropriate.

Financial Aid

Students enrolled in this program are not eligible for financial aid from the Industrial and Manufacturing Engineering department including research assistantships, teaching assistantships, project assistantships, fellowships and/or tuition waivers. However, such students are still eligible for financial aid available elsewhere on the campus.

Time Limit

All students must complete the degree requirements within five years of initial enrollment. A student requiring more time must submit a request for exemption to the graduate school.