

# MECHATRONICS, BS

## Program Description

Mechatronics is an interdisciplinary area of engineering technology that combines mechanical, electrical, computer, robotics, and computer science. Mechatronics engineering technologists use a combination of mechanical, electrical, computer, software, and robotics skills to work with technologies such as automated and computer-integrated manufacturing systems, industrial robots, mobile robots, smart sensors, actuators, and control systems.

The BS degree program in Mechatronics was developed at Lake Superior State University based on the need for our engineering technology graduates to serve industrial partners in an environment that is rapidly progressing toward digitally-applied technologies. Similar to our other engineering technology programs, this Mechatronics program will build upon a solid foundation of courses in mathematics, sciences, English, humanities, and the social sciences. In addition to the theoretical background presented in the program's core courses by full-time faculty members in small class settings, the students will have the opportunity to strengthen their hands-on skills in laboratory courses. Mechatronics students will gain valuable experience working with industry standard equipment including industrial robots, PLCs, vision systems, conveying systems, simulation software, CNC and manual machining centers, end-of-arm tooling, and sensors. At the heart of the mechatronics core courses, students will learn the application of artificial intelligence, Industry 4.0 principles, industrial control systems, and cyber-physical systems and security.

## Program Learning Outcomes

- An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.
- An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.
- An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
- An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
- An ability to function effectively as a member as well as a leader on technical teams.

## Degree Requirements

Code	Title	Hours
<b>Mechatronics Core Requirements</b>		
CSCI 265	Int to Artificial Intelligence	3
ECON 302	Managerial Economics	4
EGEE 125	Digital Fundamentals	4
EGET 270	Applied Electricity	4
EGET 275	Applied Electronics	4
EGME 110	Manufacturing Processes	3
EGME 141	Solid Modeling	3
EGMT 225	Statics, Strength of Materials	4
EGNR 101	Introduction to Engineering	2
EGNR 140	Linear Alg Num Apps Engineers	2

EGNR 245	Calculus Applications For Tech	3
EGNR 265	C Programming (C or better required)	3
EGRS 105	Robotics Applications & Trends	1
EGRS 215	Introduction to Robotics	2
EGRS 235	Industry 4.0	4
EGRS 325	Industrial Control Systems	3
EGRS 365	Programmable Logic Controllers	3
EGRS 375	Cyber-Physical Sys & Security	3
EGRS 380	Robotics Technology	2
EGRS 381	Robotics Technology Lab	1
EGRS 480	Manufacturing Automation	3
EGRS 481	Manufacturing Automation Lab	1
CHEM 108	Applied Chemistry	3
CHEM 109	Applied Chemistry Lab	1
MATH 111	College Algebra (C or better required)	3
MATH 112	Calculus Business/Life Science (C or better required)	4
MATH 131	College Trigonometry (C or better required)	3
MATH 207	Prin of Statistical Methods	3
PHYS 221	Principles of Physics I	4
<b>Total Hours</b>		<b>83</b>

## Senior Year Experience

Complete one of the following three sequences:

Code	Title	Hours
<b>Industrial Project</b>		
EGNR 491	Engineering Design Project I	3
EGNR 495	Engineering Design Project II	3
<b>Cooperative Project</b>		
EGNR 250	Cooperative Education	2
EGNR 450	Cooperative Educ Project I	4
EGNR 451	Cooperative Educ Project II	3
EGNR 491	Engineering Design Project I	3
<b>Research Project</b>		
EGNR 260	Engineering Research Methods	2
EGNR 460	Engineering Res Project I	4
EGNR 461	Engr Research Project II	2

## Electives

Code	Title	Hours
<b>Technical Electives</b>		
Select 7 credits minimum from the following:		7
CSCI 105	Intro to Computer Programming	
CSCI 221	Computer Networks (or higher level CSCI course)	
EGEE 250	Microcontroller Fundamentals	
EGEE 300	or higher level EGEE course	
EGME 240	Assembly Modeling and GD&T (or higher level EGME course)	
EGMT 216	CAM with CNC Applications (or higher level EGMT course)	
EGNR 261	Energy Systems/Sustainability (or higher level EGNR course)	
EGRS 300	or higher level EGRS course	

EGNR 496 Senior Directed Project

**Systems Integration Elective**

Select one of the following: 3

EGEE 355 Microcontroller Systems

EGRS 372 Mobile Robotics

EGRS 430 Sys Integration/Machine Vision

**General Education:** All LSSU bachelor's degree candidates must complete the LSSU General Education Requirements.

A minimum of 124 credits (at the 100 level or higher) must be earned for graduation with a cumulative gpa of 2.00 or higher. A gpa of 2.00 or higher is also required in your Major, as well as in your General Education Requirements.