Robotics

Department Information

- **Department Web Site:**
  www.ndsu.edu/coe/ (http://www.ndsu.edu/coe/)
- **Credential Offered:**
  Minor
- **Program Overview:**
  catalog.ndsu.edu/programs-study/undergraduate/robotics/ (http://catalog.ndsu.edu/programs-study/undergraduate/robotics/)

Minor Requirements

Minor: Robotics

Required Credits: 18

Code	Title	Credits
Part One - Core Content Areas: Nine (9) credits of core courses are aligned in four areas:		
1) Robotics Principles Area (Required)		
ENGR 321	Introduction to Robotics	3
Take six credits (two courses) from any two of the remaining core areas.		6
2) Core Programming Area		
ME 213	Modeling of Engineering Systems	
CSCI 122	Visual BASIC	
CSCI 227	Computing Fundamentals in Python I	
ECE 173	Introduction to Computing	
3) Controls and Robot Applications Area		
ABEN 358	Electric Energy Application in Agriculture	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
ECE 461	Control Systems I	
ECE 463	Modern Control	
IME 482	Automated Manufacturing Systems	
ME 475	Automatic Controls	
4) Measurements and Actuation Systems Area		
ABEN 479	Fluid Power Systems Design	
ABEN 482	Instrumentation & Measurements	
CE 782	Introduction to Intelligent Infrastructure *	
ECE 483	Instrumentation for Engineers	
ME 412	Engineering Measurements	
ME 476	Mechatronics	
Part Two - Approved Additional Courses		
Select 9 credits from the following:		9
Artificial Intelligence & Machine Learning:		
CE 494	Individual Study	
CSCI 345	Topics on Personal Computers	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 436	Intelligent Agents	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
CSCI 488	Human-Computer Interaction	
IME 774	Neural Networks *	
Perception & Data Processing		
ABEN 482	Instrumentation & Measurements	
ECE 444	Applied Digital Signal Processing	

ECE 448	Image Analysis I
ECE 483	Instrumentation for Engineers
ME 412	Engineering Measurements
Electric Machines and Control Systems	
ECE 376	Embedded Systems
ECE 461	Control Systems I
ECE 463	Modern Control
ECE 476	Advanced Embedded Systems
ME 475	Automatic Controls
ME 476	Mechatronics
Kinematics & Dynamics of Machineries	
ABEN 478	Machinery Analysis & Design
ABEN 479	Fluid Power Systems Design
ME 442	Machine Design I
ME 489	Vehicle Dynamics
ECE 761	Advanced Control Theory I *
Applications of Unmanned Systems	
ABEN 358	Electric Energy Application in Agriculture
ABEN 452	Bioenvironmental Systems Design
IME 437	Methods for Precision Manufacturing
IME 482	Automated Manufacturing Systems
PAG 115	Introduction to Precision Agriculture
PAG 315	Electronic Systems in Precision Ag
PAG 454	Applications of Precision Agriculture
CE 425	Bridge Evaluation and Rehabilitation
CE 452	Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance
CE 782	Introduction to Intelligent Infrastructure *
IME 782	Robotics/CAD/CAM/Control Systems *
IME 784	Computer Integrated Manufacturing *
Total Credits	**18**

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Taking a graduate level courses will require the student to make application to the Graduate School before enrolling.

Program Notes

- Any course used to satisfy *Part One: Core Courses* may not use that course to satisfy any of the nine credits for *Part Two: Approved Courses*.