

# Robotics

## Department Information

- **Official Program Curriculum:**  
bulletin.ndsu.edu/programs-study/undergraduate/robotics/

## Minor Requirements

### Robotics Minor

Required Credits: 18

| Code  | Title  | Credits |
|---|--|---------|
| <b>Part One - Core Content Areas: Nine (9) credits of core courses are aligned in four areas:</b> |  |         |
| 1) Robotics Principles Area (Required)  |  |         |
| PREFIX  | Introduction to Robotics   | 3       |
| Take six credits (two courses) from any two of the remaining core areas.                          |  | 6       |
| 2) Core Programming Area  |  |         |
| CSCI 122  | Visual BASIC   |         |
| CSCI 277  | Introduction to UNIX   |         |
| 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   |         |
| <b>Part Two - Approved Additional Courses: Nine (9) credits from the following:</b>               |  | 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  |  |         |
| 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                        |   |

\* Graduate level courses will require the student to obtain a class permit from the department teaching the class 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.