# Robotics, MS

MS Robotics is a multidisciplinary Master of Science program offered by the College of Engineering (COE) and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

| Code | Title | Hours |
|---|---|---|
| **Mechanical Engineering** | | |
| Complete one of the following: | | 4 |
| ME 5659 | Control Systems Engineering | |
| ME 5250 | Robot Mechanics and Control | |
| **Electrical and Computer Engineering** | | |
| Complete one of the following: | | 4 |
| EECE 5550 | Mobile Robotics | |
| EECE 5554 | Robotics Sensing and Navigation | |
| **Computer Science** | | |
| Complete one of the following: | | 4 |
| CS 5180 | Reinforcement Learning and Sequential Decision Making | |
| CS 5335 | Robotic Science and Systems | |

## Concentrations

Complete one of the following concentrations:

- Mechanical Engineering (p. 1)
- Electrical and Computer Engineering (p. 1)
- Computer Science (p. 1)

### MECHANICAL ENGINEERING

| Code | Title | Hours |
|---|---|---|
| **Required Course** | | |
| Complete additional ME course not used to fulfill the core requirements: | | 4 |
| ME 5659 | Control Systems Engineering | |
| ME 5250 | Robot Mechanics and Control | |
| **Options** | | |
| Complete one of the following options: | | 16 |
| *Course Work Option* | | |
| Complete four of the following from the mechanical engineering course list. (p. 2) | | |
| *Thesis Option* | | |
| ME 7990 | Thesis | |
| Complete two of the following from the mechanical engineering course list. (p. 2) | | |
| *Project Option* | | |
| ME 7945 | Master's Project | |
| Complete three of the following from the mechanical engineering course list. (p. 2) | | |

### ELECTRICAL AND COMPUTER ENGINEERING

| Code | Title | Hours |
|---|---|---|
| **Required Course** | | |
| Complete additional EECE course not used to fulfill the core requirements: | | 4 |
| EECE 5698 | Special Topics in Electrical and Computer Engineering | |
| EECE 5698 | Special Topics in Electrical and Computer Engineering | |
| **Options** | | |
| Complete one of the following options: | | 16 |
| *Course Work Option* | | |
| Complete four of the following from the electrical and computer engineering course list. (p. 2) | | |
| *Thesis Option* | | |
| EECE 7990 | Thesis | |
| Complete two of the following from the electrical and computer engineering course list. (p. 2) | | |
| *Project Option* | | |
| EECE 7674 | Master's Project | |
| Complete three of the following from the electrical and computer engineering course list. (p. 2) | | |

### COMPUTER SCIENCE

| Code | Title | Hours |
|---|---|---|
| **Required Course** | | |
| Complete additional CS course not used to fulfill the core requirements: | | 4 |
| CS 5180 | Reinforcement Learning and Sequential Decision Making | |
| CS 5335 | Robotic Science and Systems | |
| **Options** | | |
| Complete one of the following options: | | 16 |
| *Course Work Option* | | |
| Complete four of the following from the computer science course list. (p. 2) | | |
| *Thesis Option* | | |
| CS 7990 | Thesis (complete twice for a total of 8 credits) | |
| Complete three of the following from the computer science course list. (p. 2) | | |
| *Project Option* | | |
| CS 8674 | Master's Project | |
| Complete three of the following from the computer science course list. (p. 2) | | |

## Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

## Course Lists

### MECHANICAL ENGINEERING COURSE LIST

| Code | Title | Hours |
|---|---|---|
| ME 5240 | Computer Aided Design and Manufacturing | |
| ME 5245 | Mechatronic Systems | |
| ME 5250 | Robot Mechanics and Control | |
| ME 5655 | Dynamics and Mechanical Vibration | |
| ME 5659 | Control Systems Engineering | |
| ME 5665 | Musculoskeletal Biomechanics | |
| ME 6200 | Mathematical Methods for Mechanical Engineers 1 | |
| ME 6201 | Mathematical Methods for Mechanical Engineers 2 | |
| ME 7210 | Elasticity and Plasticity | |
| ME 7247 | Advanced Control Engineering | |
| ME 7253 | Advanced Vibrations | |
| IE 5630 | Biosensor and Human Behavior Measurement | |
| IE 7280 | Statistical Methods in Engineering | |
| IE 7315 | Human Factors Engineering | |

### ELECTRICAL AND COMPUTER ENGINEERING COURSE LIST

| Code | Title | Hours |
|---|---|---|
| EECE 5550 | Mobile Robotics | |
| EECE 5552 | Assistive Robotics | |
| EECE 5554 | Robotics Sensing and Navigation | |
| EECE 5580 | Classical Control Systems | |
| EECE 5639 | Computer Vision | |
| EECE 5642 | Data Visualization | |
| EECE 5644 | Introduction to Machine Learning and Pattern Recognition | |
| EECE 7150 | Autonomous Field Robotics | |
| EECE 7263 | Humanoid Robotics | |
| EECE 7323 | Numerical Optimization Methods | |
| EECE 7337 | Information Theory | |
| EECE 7370 | Advanced Computer Vision | |
| EECE 7397 | Advanced Machine Learning | |

### COMPUTER SCIENCE COURSE LIST

| Code | Title | Hours |
|---|---|---|
| CS 5006 | Algorithms | |
| CS 5100 | Foundations of Artificial Intelligence | |
| CS 5320 | Digital Image Processing | |
| CS 5330 | Pattern Recognition and Computer Vision | |
| CS 5340 | Computer/Human Interaction | |
| CS 6110 | Knowledge-Based Systems | |
| CS 6120 | Natural Language Processing | |
| CS 6130 | Affective Computing | |
| CS 6140 | Machine Learning | |
| CS 6350 | Empirical Research Methods | |
| CS 7140 | Advanced Machine Learning | |
| CS 7170 | Seminar in Artificial Intelligence | |
| DS 5220 | Supervised Machine Learning and Learning Theory | |