**ROBOTICS, MSE**

The master's degree in Robotics (ROBO) is a multi-disciplinary program jointly sponsored by the Departments of Computer and Information Science, Electrical and Systems Engineering, and Mechanical Engineering and Applied Mechanics.

Housed and administered by the GRASP Lab, one of the top robotics research centers in the world, Penn’s ROBO master’s program educates students in the science and technology of robotics, vision, perception, control, automation, and machine learning. Our students hail from a variety of engineering, scientific, and mathematical backgrounds, united by a passion for robots and a desire to advance robotic technologies to benefit humanity. Our program provides an ideal foundation for jobs in a variety of industries including robotics, aerospace, automotive, industrial automation and defense; it also provides a solid basis for further graduate studies.

For more information: https://www.grasp.upenn.edu/academics/masters

![Curriculum Table](http://catalog.upenn.edu/attributes/emrt/)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Course Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational Courses</td>
<td>Select 3 Foundational courses from 3 of the 4 following areas:</td>
<td>3</td>
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</table>
| Artificial Intelligence
  - CIS 5190  | Applied Machine Learning            |              |
  - CIS 5200  | Machine Learning                     |              |
  - CIS 5210  | Artificial Intelligence              |              |
  - ESE 6500  | Learning in Robotics                 |              |
| Robot Design
  - MEAM 5100 | Design of Mechatronic Systems       |              |
  - MEAM 5200 | Introduction to Robotics             |              |
  - MEAM 6200 | Advanced Robotics                    |              |
| Control
  - ESE 5000  | Linear Systems Theory                |              |
  - ESE 5050  | Feedback Control Design and Analysis |              |
  - MEAM 5130 | Feedback Control Design and Analysis |              |
  - MEAM 5170 | Control and Optimization with Applications in Robotics | |
  - ESE 6190  | Model Predictive Control             |              |
| Perception
  - CIS 5800  | Machine Perception                   |              |
  - CIS 5810  | Computer Vision & Computational Photography | |
  - CIS 6800  | Advanced Topics in Machine Perception|              |
| Technical Electives | Select 5 Technical electives (courses with Attribute=EMRT) | 5 |
| General Elective | Select 2 General electives (courses with Attribute=EMRE) | 2 |

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2024 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.