# Robotics

## Master of Engineering: 30 Credits / 10 Courses

Students pursuing this option must successfully complete 4 core courses, at least 1 ENPM Robotics Programming elective, at least 2 ENPM Robotics specific electives and up to 3 technical electives from the approved list of courses. Students should consult with their advisor prior to registering and have pre-approval for all technical electives. There is no research or thesis required for this degree.

### Robotics Core Courses (take four): recommended for your first year of study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offering</th>
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</thead>
<tbody>
<tr>
<td>ENPM661</td>
<td>Planning for Autonomous Robots</td>
<td>(every spring)</td>
</tr>
<tr>
<td>ENPM662</td>
<td>Introduction to Robot Modeling*</td>
<td>(every fall)</td>
</tr>
<tr>
<td>ENPM667</td>
<td>Control of Robotic Systems*</td>
<td>(every fall)</td>
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<tr>
<td>ENPM673</td>
<td>Perception for Autonomous Robots</td>
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### Robotics Programming Elective (take at least one): recommended for your first year of study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offering</th>
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</thead>
<tbody>
<tr>
<td>ENPM809Y</td>
<td>Introductory Robot Programming*</td>
<td>(every fall)</td>
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<tr>
<td>ENPM809E</td>
<td>Python Applications for Robotics**</td>
<td>(every spring)</td>
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<tr>
<td>ENPM808X</td>
<td>Software Development for Robotics [ENPM809Y]</td>
<td>(every fall)</td>
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</tbody>
</table>

*ENPM809Y is a prerequisite for ENPM808X, and cannot be taken concurrently or subsequently

** ENPM 809E can’t be taken after completion of ENPM808X

Note: Any taken over the 1 required count as other Robotics or technical electives

### Robotics Electives (take at least two): recommended for your first year of study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offering</th>
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</thead>
<tbody>
<tr>
<td>ENPM690</td>
<td>Robot Learning</td>
<td>(every spring)</td>
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<tr>
<td>ENPM640</td>
<td>Rehabilitation Robotics</td>
<td>(every fall)</td>
</tr>
<tr>
<td>ENPM645</td>
<td>Human Robot Interaction</td>
<td>(every fall)</td>
</tr>
<tr>
<td>ENPM809T</td>
<td>Autonomous Robots</td>
<td></td>
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</tbody>
</table>

Note: Any taken over the 2 required count as technical electives

### Pre-approved Technical Electives (choose up to three): recommended for consideration in your second year of study

#### Technical Elective Notes
- 1. Additional ENPM Robotics Electives can also be counted as Technical Electives

#### ENPM Electives
- ENPM808A Introduction to Machine Learning
- ENPM808B Data Science
- ENPM808C AI-based Software Systems
- ENPM611 Software Engineering
- ENPM809F Internet of Things
- ENPM809N Data Mining
- ENPM691 Hacking of C programs and Unix Binaries
- ENPM808 (3 credits) Advanced Topics in Engineering

** For Non-ENPM technical electives, please refer to page 2.

NOTE: Any courses not listed above must be approved by the Senior Academic Advisor PRIOR to registration.

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**Disclaimer:** All offerings are tentative and subject to change.

Updated 2/9/2021
# Non-ENPM Technical Electives

<table>
<thead>
<tr>
<th>Non-ENPM Technical Elective Notes</th>
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</thead>
<tbody>
<tr>
<td>1. For non-ENPM courses, permission must be obtained from the professor before enrolling to confirm the student has the appropriate background to be successful in the course</td>
</tr>
<tr>
<td>2. MAGE cannot guarantee a spot in a non-ENPM course. Students should have back-up courses prepared if they are interested in non-ENPM courses</td>
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</tbody>
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## Vision and Perception
- CMSC733 Computer Processing of Pictorial Information
- CMSC734 Information Visualization
- ENEE631 Digital Image and Video Processing
- ENEE633 Statistical Pattern Recognition
- ENEE731 Image Understanding
  *CMSC426 covers content very similar to ENPM673 and will not be approved towards the M.Eng. degree

## Performance Analysis and Design Methods
- ENME600 Engineering Design Methods
- ENME695 Failure Mechanisms and Reliability
- ENAE697 Space Human Factors and Life Support
- ENSE621 Systems Engineering Concepts and Processes: A Model-Based Approach

## Optimization and Algorithms
- CMSC 651 Analysis of Algorithms
- CMSC712 Distributed Algorithms and Verification
- CMSC722 Artificial Intelligence Planning
- ENAE681 / ENME610 Engineering Optimization
- ENME607 Engineering Decision Making
- ENEE662 Convex Optimization

## Modeling, Systems and Control
- ENME605 Advanced Systems Control
- ENME664 Dynamics
- ENME808T Network Control Systems
- ENEE660 System Theory
- ENEE661 Nonlinear Control Systems
- ENEE664 Optimal Control
- ENEE765 Adaptive Control
- ENAE646 Advanced Dynamics
- ENAE743 Applied Nonlinear Control

## Specialty
- ENME489L Bio-Inspired Robotics
- ENME746 Medical Robotics
- ENSE698E Sensor Systems
- ENAE 692 Introduction to Space Robotics
- ENAE788X Planetary Surface Robots
- ENCE622 Construction Automation & Robotics
- ENPM808 (3 credits) Advanced Topics in Engineering

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