# PhD Course Requirements

## Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ROBOT 6000</td>
<td>Robotics I: Mechanics</td>
</tr>
<tr>
<td>ROBOT 6100</td>
<td>Robotics II: Control</td>
</tr>
<tr>
<td>ROBOT 6200</td>
<td>Motion Planning or CS 6300 Artificial Intelligence</td>
</tr>
<tr>
<td>CS 6640</td>
<td>Image Processing or CS 6320 Computer Vision</td>
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## Allied Courses

9-10 Cr. (as needed to reach the 30-credit hour coursework minimum requirement)

## Elective Courses

Select 3 classes from two different categories:

### Mechanics
- ROBOT 7000 Manipulation, Mobility
- ROBOT 7010 System Identification for Robotics

### Control
- ME EN 6200/ECE 6615 Classical Control Systems
- ECE 6670 Control of Electric Motors
- ME EN 6210/ECE 6652/CH EN 6203 State Space Control
- ME EN 7200 Nonlinear Control
- ME EN 7210 Optimal Control
- ECE 6570 Adaptive Control

### Design
- ROBOT 6500 Advanced Mechatronics
- ROBOT 6960 Wearable Robotics
- ECE 6780/CS 6780 Embedded System Design
- ECE 6960 Robotic Millisystems
- CS 6956 Medical Robotics

### Human-Robot Interaction
- CS 6360 Virtual Reality
- ROBOT 7400 Haptics for VR, Teleoperation, and Physical Human-Robot Interaction
- ROBOT 6400 Neural Engineering and NeuroRobotics

### Perception
- CS 7640 Adv. Image Processing
- CS 6353 Deep Learning for Image Analysis
- ECE 6530 Digital Signal Processing

## Seminars

Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ME EN 6890</td>
<td>or CS 7930</td>
</tr>
<tr>
<td>ROBOT 6800</td>
<td>Robotics Seminar (Enroll in 2 semesters for 1 credit each semester)</td>
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## Research

Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ROBOT 7970</td>
<td>PhD Dissertation (14 credits minimum)</td>
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</tbody>
</table>

## Allied Courses

9-10 Cr. (as needed to reach the 30-credit hour coursework minimum requirement)