Ph.D. Requirements (minimum total of 30 credits post-M.S., 47 credits for post B.S. students)

Core Course Requirement - 12 Credits
- Robotics Mechanics Core Area
  ROBOT 6000 Robotics I: Mechanics | 3 Credits
- ROBOT 6100 Robotics II: Control | 3 Credits
- Cognition Core Area (Pick One)
  ROBOT 6200 Motion Planning | 3 Credits (spring)
  CS 6300 | Artificial Intelligence | 3 Credits (fall)
- Perception Core Area (Pick One)
  CS 6640 | Image Processing | 3 Credits (fall)
  CS 6320 | Computer Vision | 3 Credits (fall)

Elective Course Requirement * 9 Cr
Select 3 classes from two different categories

Robot Mechanics Category Electives
- ROBOT 7000 Manipulation and Mobility
- ROBOT 7010 System Identification for Robotics

Robot Control Category Electives
- ME EN 6200 OR ECE 6615 | Classical Control Systems
- ECE 6670 | Control of Electric Motors
- ME EN 6210 OR ECE 6652 OR CH EN 6203 | State Space Control
- ME EN 7200 | Nonlinear Control
- ME EN 7210 | Optimal Control
- ECE 6570 | Adaptive Control

Cognition Category
- CS 6350 | Machine Learning
- CS 6958 | Robot Learning

Perception Category
- CS 7640 | Advanced Image Processing
- CS 6353 | Deep Learning for Image Analysis

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

All electives are 3 credits, with the exception of ROBOT 6400, 6500, ECE/CS 6780 (which are each 4 credits).

Core courses not used to fulfill a core area requirement may also be considered.

Allied Courses ** 9-10 Credits
- Remaining courses to reach the 30-credit hour coursework minimum requirement

Dissertation Requirement *** 14 Credits
- ROBOT 7970 Ph.D. Dissertation | 14 Credits (Advisors’ section)
- ROBOT 6800 Robotics Seminar | 2 Credits
  (Enroll in 2 semesters for 1 credit each semester)

Robot Design Category
- ROBOT 6500 Advanced Mechatronics
- ROBOT 6960 | Wearable Robotics
- ECE 6780 OR CS 6780 | Embedded System Design
- CS 6956 | Medical Robotics

Other Supporting Elective Category
- ME EN 6035 | Design of Experiments
- ME EN 6100 | Ergonomics
- ECE 6540 | Estimation Theory
- CS 6540 | Human-Computer Interaction
- ME EN 6410 | Intermediate Dynamics
- CS 6340 | Natural Language Processing
- ME EN 6205 | System Dynamics

Remaining courses to reach the 30-credit hour coursework minimum requirement may be chosen from core courses, preapproved electives, supporting electives, lecture-based engineering/science courses (e.g., excluding seminars, projects, thesis), or approved non-engineering/science courses. Subject to supervisory committee approval.
Example Program of Study for an Ph.D. (Post-B.S.) in Robotics

Below is one possibility for a program of study that satisfies the Ph.D. degree and milestone requirements. At least 9 credits per semester is required to qualify for tuition benefit. Course selections may change based on faculty advisement.

Pre-Candidacy

Qualifying Exam

Advance to Candidacy

Dissertation

Graduation!

Year 1
(1) Fall
ROBOT Mechanics Core 3 cr
Elective 3 cr
Department Seminar 1 cr
Robotics Seminar 1 cr
Establish Faculty Advisor & Mentor Committee

Year 2
(2) Spring
ROBOT Control Core 3 cr
Elective 3 cr

Year 3
(3) Fall
ROBOT Perception Core 3 cr
Elective 3 cr

Year 4
(4) Spring
ROBOT Cognition Core 3 cr
Allied 3 cr
Allied 3 cr

Year 5
(5) Fall
Allied 3 cr
Dissertation Credits 3 cr
Apply for Graduation
Dissertation Defense final oral exam

(6) Spring
Dissertation Credits 3 cr

(7) Fall
Dissertation Credits 3 cr
Manuscript Approval

(8) Spring
Dissertation Credits 3 cr

(9) Fall
Dissertation Credits 3 cr
Final Program of Study Approved by Committee

(10) Spring
Dissertation Release

1 cr
1 cr
1 cr
1 cr
1 cr

Course Work
Research
Required Milestone

Form Supervisory Committee
Submit Initial Program of Study
Submit Preliminary Review to Thesis Office

Take written Qualifier Exam
Dissertation Proposal (Oral Qualifier)

Complete Teaching requirement
Read Thesis Handbook

Final Program of Study Approved by Committee

Dissertation Defense final oral exam

Residency Enrollment Requirement must be reached