ROBOTICS
THE UNIVERSITY OF UTAH

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 Control Core Area*
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 Credits

☐☐☐ Select 3 classes from two different categories

Allied Courses ** 9-10 Credits

☐ Remaining courses to reach the 30-credit hour coursework minimum requirement

Seminar Requirement 3 Credits

☐ *Department Seminar | 1 Credit*
ME EN 6890 OR ECE 6900-001 OR CS 7930-001
(Enroll in the seminar associated with your thesis advisor)

☐☐ *ROBOT 6800 Robotics Seminar | 2 Credits*
(Enroll in 2 semesters for 1 credit each semester)

Dissertation Requirement *** 14 Credits

☐ *ROBOT 7970 Ph.D. Dissertation| 14 Credits* (Advisors' section)

Elective Course Requirement * 9 Cr

Select 3 classes from ***two*** 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

Robot Design Category
☐ ROBOT 6500 Advanced Mechatronics
☐ ROBOT 6960 | Wearable Robotics
☐ ECE 6780 OR CS 6780 | Embedded System Design
☐ ECE 6960 | Robotic Millisystems
☐ 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

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 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.

Course Work | Research | Required Milestone | Optional | Post-BS =6970 Post-MS = 7970

Pre-Candidacy

Year 1

(1) Fall	(2) Spring
ROBOT 6000 3 cr	ROBOT 6100 3 cr
Elective 3 cr	Elective 3 cr
Department Seminar 1 cr	Robotics Seminar 1 cr
Robotics Seminar 1 cr	ROBOT 6970 or 7970 2 cr
ROBOT 6970 or 7970 1 cr	Residency Enrollment must be reached
Establish Faculty Advisor	

Qualifying Exam

Year 2

(3) Fall	(4) Spring
Perception Core: CS 6640 or CS 6320 3 cr	*Cognition Core: ROBOT 6200 (or CS 6300 in fall) 3
*Cognition Core: CS 6300 (or ROBOT 6200 in spring) 3	Allied 3 cr
Robotics Seminar 1 cr	Robotics Seminar 1 cr
ROBOT 6970 or 7970 2 cr	ROBOT 6970 or 7970 2 cr
	Form Supervisory Committee
	Take Written Qualifier Exam

Advance to Candidacy

Year 3

(5) Fall	(6) Spring
Allied 3 cr	Allied 3 cr
ROBOT 7970 6 cr	ROBOT 7970 6 cr
Read Thesis Handbook	
Dissertation Proposal (Oral Qualifier)	

Dissertation

Year 4

(7) Fall	(8) Spring
ROBOT 7970 9 cr	ROBOT 7970 9 cr
Final Program of Study Approved by Commitee	

Graduation!

Year 5

(9) Fall	(10) Spring
ROBOT 7970 9 cr	ROBOT 7970 3 cr
Apply for Graduation	Dissertation Defense (Final Oral Exam)
Submit Preliminary Review to Thesis Office	Manuscript Approval
	Dissertation Release

* Only 1 Cognition Core option is required. If not completing both, substitute 1 with an elective course (3 electives required)