Robotics Graduate Certificate Requirements

Minimum total of 18 credits

4 Core Courses, 1 Elective, 1 Robotics Seminar, 2 Credits of Graduate Project or Project-Intensive Course

Course Number	Course Title	Cross-listings	Offered
CORE COURSE REQUIREMENT (Complete at least one course from each core area):			
Robot Mechanics Core Area (Required):			
ROBOT 6000	Robotics I: Mechanics (formerly Intro to Robotics)	CS 6310, ECE 6650, ME EN 6220	Fall
Robot Control Core Area (Required):			
ROBOT 6100	Robotics II: Control (formerly Intro to Robot Control)	CS 6330, ECE 6651, ME EN 6230	Spring
Cognition Core Area (Pick one):			
ROBOT 6200	Motion Planning	CS 6370, ME EN 6225	Spring
CS 6300	Artificial Intelligence		Fall
Perception Core Area (Pick one):			
CS 6640	Image Processing	BME 6640, ECE 6532	Fall
CS 6320	Computer Vision		Fall
ELECTIVE COURSE REQUIREMENT: Select 1 course from any category; core courses listed above that are not used to fulfill a core area requirement may also be considered.	**Course Title**	**Cross-listings**	**Offered**
Robot Mechanics Category Electives:			
ROBOT 7000	Manipulation and Mobility	ME EN 7230, CS 7310	Spring, odd years
ROBOT 7010	System ID for Robotics	CS 7320, ME EN 7220	Fall, odd years
Robot Control Category Electives:			
ME EN 6200 or ECE 6615	Classical Control Systems		Fall
ECE 6670	Control of Electric Motors		Spring
ME EN 6210 or ECE 6652 or CH EN 6203	State Space Control		Spring
ME EN 7200	Nonlinear Control		Fall, even years
ME EN 7210	Optimal Control		Spring, even years
ECE 6570	Adaptive Control		Varies
Cognition Category:			
CS 6350	Machine Learning		Fall, Spring
CS 6958	Robot Learning (currently special topics)		Varies
Perception Category:			
CS 7640	Advanced Image Processing		Varies
CS 6353	Deep Learning for Image Analysis		Fall

	ECE 6530	Digital Signal Processing		Fall
	Human-Robot Interaction Category:			
	CS 6360	Virtual Reality		Fall
	ROBOT 7400	Haptics for VR, Teleoperation, Physical Human-Robot Interaction	ME EN 7240	Fall, odd years
	ROBOT 6400	Neuro-Robotics (will be cross listed with BME 6440)	BME 6440, ECE 6654	Fall
	Robot Design Category:			
	ROBOT 6500	Advanced Mechatronics	ME EN 6240	Spring, even years
	ROBOT 6510	Wearable Robotics		Fall, even years
	ECE 6780 or CS 6780	Embedded System Design		Spring
	ECE 6960	Robotic Millisystems		Fall, odd years
	CS 6956	Medical Robotics (currently special topics)		Spring, even years
	SEMINAR REQUIREMENT	**Course Title**	**Cross-listings**	**Offered**
	ROBOT 6800	Robotics Seminar (enroll in one semester for 1 credit)	CS 7942, ECE 6868, ME EN 6892	Fall, Spring
	PROJECT or MIXED OPTION	**(Pick 1 option to equal 2 credits)**	**Cross-listings**	**Offered**
	ROBOT 6920	Graduate Project		
	ROBOT 6920 + other	Graduate Project + Course Projects or Internship		