Expected Course Offerings by Semester

ROBOTICS AND AUTONOMOUS SYSTEMS

The schedule below is based on historical patterns and expected scheduling. The semester and location in which a course may be offered **is subject to change** due to instructor availability, student demand, and the need to provide an appropriate balance of subjects and course levels in all semesters.

Course Offering Modalities

In-Person (IP)
[**01** = Homewood Campus]
[**31** = Applied Physics Lab]

Virtual-Live (VL)
[**01VL** = Synchronous at Homewood]
[**3VL** = Synchronous at APL]
[**8VL** = Synchronous Online]

Online (O)
[**81** = Asynchronous Online]

Prerequisite Courses					
Course #	**Course Name**	**Pre-Req***	**Summer**	**Fall**	**Spring**
605.201	Introduction to Programming Using Java ***OR***		O	VL/O	VL/O
605.206	Introduction to Programming Using Python		O	O	O
625.250	Multivariable Calculus and Complex Analysis		O	O	O
625.251	Introduction to Ordinary and Partial Differential Equations				O
Core Courses Group 1 (Core Group 1 courses must be completed before Core Group 2)					
685.621	Algorithms for Data Science	605.201	O	O	O
535.641	Mathematical Methods For Engineers		O	O	O
Core Courses Group 2					
605.613	Introduction to Robotics			VL	VL
535.630	Kinematics & Dynamics of Robots				O

Autonomous Systems Focus Area	***At Least Three (3) from List Below***				
Course #	**Course Name**	**Pre-Req***	**Summer**	**Fall**	**Spring**
525.637	Foundations of Reinforcement Learning			O	
605.636	Autonomic Computing				VL
605.645	Artificial Intelligence	605.621	O	O	O
605.647	Neural Networks			VL	O
605.649	Introduction to Machine Learning	605.202, 605.621 or 685.621 or 705.621	O	VL/O	O
605.715	Software Development for Real-Time Embedded Systems			O	O
605.716	Modeling and Simulation of Complex Systems				VL
605.742	Deep Neural Networks	605.647* or 625.638* or 525.670* or 605.649* or 705.601* or	O	O	O
605.746	Advanced Machine Learning	605.649	O		O
635.673	Protecting Critical Infrastructure Against Cyber Attacks				O
635.792	Entrepreneurship, Innovation, and Corporate Success			VL	
645.742	Management of Complex Systems	645.769 or 655.769	O	O	O
695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	605.202, 695.601		O	O
695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles			VL	
695.637	Introduction to Assured AI and Autonomy			O	
695.715	Assured Autonomy			VL	
705.612	Values and Ethics in Artificial Intelligence			VL/O	VL

Dynamics, Navigation, Decision, and Control Focus Area	***At Least Three (3) from List Below***				
Course #	**Course Name**	**Pre-Req***	**Summer**	**Fall**	**Spring**
525.610	Microprocessors for Robotic Systems			TBD	
525.637	Foundations of Reinforcement Learning			O	
525.642	FPGA Design Using VHDL		O	VL/O	VL/O
525.645	Modern Navigation Systems			O	O
525.661	UAV Systems and Control	525.609		O	O
525.728	Detection & Estimation Theory	525.614		VL	O
525.777	Control System Design Methods	525.666, 525.609			IP (odd)
535.622	Robot Motion Planning		O		O
535.630	Kinematics & Dynamics of Robots			O	O
535.642	Control Systems for Mechanical Engineering			O	
535.645	Digital Control and Systems Applications	535.642	O		
535.724	Dynamics of Robots and Spacecraft				O
535.726	Robot Control	535.630			IP
535.741	Optimal Control and Reinforcement Learning	535.641			O
605.716	Modeling and Simulation of Complex Systems				VL
605.724	Applied Game Theory				O
605.745	Reasoning Under Uncertainty			O	
625.615	Introduction to Optimization			O	O
625.741	Game Theory	625.609*, 625.603*		O (even)	
625.743	Stochastic Optimization & Control	625.603*			VL (odd)

See catalog of complete list and description of prerequisites.
(*indicates a suggested, non-requisite course)

Expected Course Offerings by Semester

ROBOTICS AND AUTONOMOUS SYSTEMS

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Course Offering Modalities

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General Robotics Focus Area

The General Robotics focus area is designed to accommodate the student who seeks a broad knowledge in robotics and autonomous systems, or who seeks a focus area unique to their needs in interests in robotics and autonomous systems. In this focus area, a student may choose any three courses listed in the other four focus areas, and three elective courses from among all Engineering for Professionals program (EP) courses. The student must review their course of study plan with their EP advisor and must receive their advisor's approval of the proposed course of study.

Human-Robot and Robot-Robot Teaming Focus Area — *At Least Three (3) from List Below*

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
525.747	Speech Processing	525.627, 525.614			VL
525.786	Human Robotics Interaction				IP
535.691	Haptic Interface Design			VL	
535.782	Haptic Applications		O		
585.783	Introduction to Brain-Computer Interfaces	585.615, 535.641, 585.732*	O		
605.646	Natural Language Processing			O	
635.661	Principles of Human Computer Interaction			O	
645.650	Foundations of Human Systems Engineering	645.662		O	O
645.651	Integrating Humans and Technology	645.662		O	
645.755	Methods in Human-System Performance Measurement and Analysis	645.662		O	O
705.612	Values and Ethics in Artificial Intelligence			VL	VL
705.640	Cognitive and Behavioral Foundations for Artificial Intelligence			VL	VL

Perception and Cognitive Systems Focus Area — *At Least Three (3) from List Below*

Course #	Course Name	Pre-Req*	Summer	Fall	Spring
525.637	Foundations of Reinforcement Learning			O	
525.724	Introduction to Pattern Recognition	525.614, 525.627* or 525.619* or 525.643* or 525.746*		VL	
525.728	Detection & Estimation Theory	525.614		VL	O
525.733	Deep Learning for Computer Vision				VL
525.746	Image Engineering	525.627	O	O	O
525.747	Speech Processing	525.627, 525.614			VL
525.748	Synthetic Aperture Radar	525.648		O	
535.741	Optimal Control and Reinforcement Learning	535.641			O
605.624	Logic: Systems, Semantics, and Models				O
605.646	Natural Language Processing			O	
605.647	Neural Networks			VL	O
605.649	Introduction to Machine Learning	605.202, 605.621 or 685.621 or 705.621	O	VL/O	O
605.742	Deep Neural Networks	605.647* or 625.638* or 525.670* or 605.649* or 705.601* or 605.646*	O	O	O
605.746	Advanced Machine Learning	605.649	O		O
665.681	Application of Sensing Systems	AS.110.109, 605.206		VL	
705.612	Values and Ethics in Artificial Intelligence			VL	VL

See catalog of complete list and description of prerequisites.
(*indicates a suggested, non-requisite course)