Introduction
The focused MSE concentration in Control Systems provides students with broad and rigorous training in control system analysis and design, covering linear, nonlinear and hybrid systems, as well as feedback control mechanisms in biological systems. Additionally, it offers the students multi-departmental exposure to robotic control systems, optimization, signal processing, information theory, and relevant branches of applied mathematics.

General Requirements
Students are expected to satisfy all the requirements of the ECE Master’s program. In addition, they are expected to satisfy the following requirements:

- Completion of eight one-semester graduate courses (400-799 level) satisfying each of the following three conditions:
  - Four courses must be from List A of core classes below.
  - Six courses must be from Lists A or B below.
  - Six courses must be from Lists A or C below.
- Completion of (1) two additional graduate courses, or (2) a master’s essay, or (3) a special research project approved by an ECE faculty member.

List of Courses Relevant to the Concentration (based on current course schedule)

List A: Core classes in ECE
520.654 Control Systems Design (Iglesias)
520.601 Introduction to Linear Systems Theory (Iglesias)
520.621 Introduction to Nonlinear Systems (Iglesias)
520.629 Networked Dynamical Systems (Mallada)
520.636 Feedback Control in Biological Signaling Pathways (Iglesias)

List B: Complementary classes in ECE
520.419 Iterative Algorithms (Meyer)
520.447 Information Theory (Khudanpur)
520.622 Principles of Complex Networked Systems (Goutsias)
520.635 Digital Signal Processing (Weinert)
520.646 Wavelets & Filter Banks (Tran)
520.651 Random Signal Analysis (Khudanpur)
520.648 Compressed Sensing and Sparse Recovery (Tran)
520.652 Extraction of Signals from Noise (Weinert)

List C: Relevant classes in other departments
530.420 Robot Sensors and Actuators
530.485 Physics and Feedback in Living Systems
530.646 Robot Devices, Kinematics, Dynamics and Control
530.647 Adaptive Systems
530.649 System Identification
530.678 Nonlinear Control and Planning in Robotics
550.453 Mathematical Game Theory
550.661 Foundations of Optimization
550.692 Matrix Analysis and Linear Algebra
600.461 Computer Vision

**ECE Activity in Control Systems**

**Core Faculty**
- Pablo Iglesias
- Enrique Mallada
- Noah Cowan (Secondary appointment in ECE)
- René Vidal (Secondary appointment in ECE)

**Research Areas**
- Systems and control theory
- Mathematical and computational biology
- Control of cyber-physical systems
- Feedback control in biological signal transduction
- Control of logistic networks
- Model complexity reduction
- Sensorimotor control and sensor-based robot control systems
- Computer vision and vision based control

**Contact Information**
Debbie Race, Academic Program Administrator
Johns Hopkins University
Dept. of Electrical and Computer Engineering
3400 N. Charles St., Barton Hall 105
Baltimore, MD 21218
Phone: 410-516-4808
Fax: 410-516-5566