



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

State-Space Control Systems

ECE 5551

Credit Hours:

3.00 - 3.00

Course Levels:

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Discrete-time state variable representations; pole placement via state-feedback; introduction to realization theory; observer design; introduction to Kalman filtering; linear quadratic regulator theory.

Prerequisites and Co-requisites:

Prereq: 3050 and Stat 3470; or Grad standing.

Course Goals / Objectives:

- Learn feedback control systems design by pole placement (state feedback) and state observers
 - Introduce students to Kalman filtering and Linear Quadratic Regulator (optimal control)
 - Develop tools for analysis and design of discrete-time control systems, from a state-variable viewpoint
 - Exposure to computer-aided analysis and design (using Matlab) and simulation
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Course Topics:

- State variable models
 - Continuous state variable models, sample and hold, system delays in state variable representations
 - State variable representation in discrete time, solution of state variable difference equations
 - Design using discrete equivalents, numerical integration methods
 - State space models, stability, and control design (controllability and pole placement)
 - Estimator design and observability
 - Separation principle, inclusion of reference input and integral control
 - Introduce students to advanced topics of realization theory, Kalman filtering, and Linear Quadratic Regulator (optimal control)
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Designation:

Elective