EEL 5613 Modern Control

Credits: 3 credits

Textbook, Title, Author, and Year: Linear System Theory and Design, International 3rd. edition, C.T. Chen, Oxford University Press, 2009

Reference Materials: Handouts, including journal articles

Specific Course Information

Catalog Description: Fundamentals of linear systems theory and practice as applied to multi-input and multi-output feedback control systems: state variable models, stability, controllability, observability, state feedback and estimation, linear quadratic regulators, computer aided analysis and design (using Matlab control systems toolbox)

Prerequisites: Linear Algebra, Engineering Graduate Standing

Specific Goals for the Course:
- The student will be able to understand the principles and concepts of modern control
- Understand and the mathematical and analytical tools of modern control
- Understand and apply simulation techniques for control system design in the state space
- Experience with in projects to deal with semi-real world projects
- The student will be able to effectively communicate in writing a computer project report

Brief List of Topics to be covered:

1. Introduction to the mathematical description of systems: Linear vs. nonlinear, time-varying vs. time-invariant, continuous-time vs. discrete-time
2. Review of Linear Algebra and Matrix Theory: Basis, representation and orthonormalization; linear algebraic equations, similarity transformation; diagonal form and Jordan form; functions of a square matrix; Lyapunov equation; quadratic form and positive definiteness; singular-value decomposition; norms of matrices
3. Linear dynamic equations and state-space solutions and realizations
4. Controllability and observability
5. State Feedback and state estimators
6. Stability of Linear Systems
7. Linear Quadratic Regulators