An introduction to the state-space approach to linear control systems. An advanced controls lab is part of the course.

**Textbook:** *Systems and Control*  
by S. Zak (Oxford University Press)

**Prerequisite:** MATH-237*; MATH 312* and MATH 326*.

**Instructor:** R. Hirschorn

**Evaluation:**  
IF Final Examination \( \geq 40\% \)  
  Final Examination \( 65\% \)  
  Homework \( 25\% \)  
  Labs \( 10\% \)  
  OR Final Examination \( 100\% \)

**Outline:**

1. Discrete and continuous time systems
2. Controllability, observability and minimal realizations
3. Lyapunov stability
4. Linear quadratic regulator and design of robust controllers
5. Design and implementation of sliding mode controllers
6. State estimation via Luenberger and deterministic Kalman-Bucy filters