(3-2-0; —) **Modern Control Theory** MATH-430*

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

Textbook: *Foundations of Deterministic and Stochastic Control*
by J. H. Davis (Birkhauser)
Math 430 Lab Manual

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

Instructor: R. Hirschorn

Evaluation:		
	Final examination	60%
	Homework	25%
	Lab	15%

Outline:

This course covers core topics in discrete and continuous time modern control theory; nonlinear differential equations, linearization, the algebraic theory of linear control systems which includes controllability, observability and minimal realizations; stability including Lyapunov stability and the design of robust stabilizers using control-Lyapunov functions; optimal control; state estimation via Luenberger and Kalman-Bucy filters. Laboratory experiments illustrate the lecture material, students are required to identify a high order under-actuated linear system and perform model verification experiments, and design and implement robust feedback controllers for a flexible structure, study robustness issues in controller design, and design dynamic controllers which employ state reconstruction from partial observations of the state.