

OFFICIAL SYLLABUS
MATH 563/ECE 563/ME 563: OPTIMAL CONTROL

Adopted – Spring 2013; Committee: C. Gu, Y. Shang, E. Sewell, K.H. Leem

Catalog Description: Description of system and evaluation of its performance; dynamic programming, calculus of variations and Pontryagin's minimum principle, iterative numerical techniques.

Prerequisite: ECE 465 or ME 450 or Math 305 & Math 466 or Math 305 & Math 450.

A. Course Description

This course is designed to learn description of system and evaluation of its performance; calculus of variations and Pontryagin's minimum principle, linear quadratic regulator, state constrained control, dynamic programming, iterative numerical techniques.

B. Course Objectives

To learn various approaches of optimal control theory and numerical techniques in solving optimal control problems

C. Textbook

Optimal Control, 3rd edition, by Frank L. Lewis, Draguna L. Vrabie, and Vassilis L. Sirmos, WILEY, 2012

D. Course Outline and Topics

Instructor should cover the fundamental topics and if time permits, optional topics can be covered.

Fundamental Topics:

Pontryagin Maximum Principle
Linear Quadratic Regulator
State Constrained Control
Dynamic Programming

Optional Topics:

Kalman filter
Differential Games
Optimal adaptive control
Optimal robust control
Selected advanced topics

E. Supplemental: Instructor can choose any of the following options as a textbook.

- Applied Optimal Control; Optimization, Estimation, and Control by Arthur E. Bryson, Jr. and Yu-Chi Ho, Hemisphere Publishing Corporation, 1975

- Geometric Optimal Control; Theory, Methods and Examples, by Heinz Schattler and Urszula Ledzewicz, Springer, 2012, with the provision that the instructor should make copies of related chapters available to class in reduced price with special arrangement with the publisher.