

EE 517- Optimal and Adaptive Control

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr Hassan Ibrahim

TEXT BOOK:

K.J. Astrom, B Wittenmark, "Adaptive Control", Addison Wesley Pub

COURSE DESCRIPTION:

Review of modern approach of control system. Calculus of extremes and single stage decision Constrained extremes and lag range multipliers. Variational calculus and Euler-Lagrange Eq. Mathematical Modeling of optimization problem. The maximum principle. The Hamiltonian – Jacobi theory. Linear regulator problems. Minimum time problem. The discrete maximum principle Discrete linear quadratic problem. Adaptive control systems. Model reference adaptive control. Self-tuning adaptive control systems. Stability, problem in adaptive control systems

PREREQUISITE:

EE 412

RELATION OF COURSE TO PROGRAM:

Elective

COURSE INSTRUCTION OUTCOMES:

The student gains knowledge about both optimal control systems and adaptive control systems.

TOPICS COVERED:

- Review of modern control approach.
- Calculus of extrema.
- Mathematical modeling.
- Optimization techniques.
- Adaptive systems

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional Component Content			
Math and Basic Sciences	Engineering Topics	General Education	Engineering Design
	√	√	√

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course Outcomes
a.	An ability to apply knowledge of mathematics, science, and engineering.	
b.	An ability to design and conduct experiments, analyze and interpret data.	
c.	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	√
d.	An ability to function on multi-disciplinary teams.	
e.	An ability to identify, formulate, and solve engineering problems.	√
f.	An understanding of professional and ethical responsibility.	
g.	An ability to communicate effectively.	
h.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	
i.	A recognition of the need for, and an ability to engage in life-long learning.	
j.	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k.	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	√