

CALIFORNIA STATE UNIVERSITY, CHICO
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

Course Outline: *EECE 685 Adaptive Control Systems (3 units lecture+ 1 unit Project)*

Instructor: *Dr. Adel A. Ghandakly OCNL 308*

Catalog Description: Schemes of adaptive control systems, MIT rule for Model Reference Adaptive Control, self Tuning regulator systems, Recursive Least Squares for system real time identification, Minimum Variance, PID and other controller design techniques for STR systems.
Prerequisite: EECE 682

Objective : Fundamentals of Adaptive Control Systems Design with main emphasis on Self Tuning Regulator (STR) techniques.

Reference : "Adaptive Control", K. J. Astrom & B. Wittenmark, Addison Wesley, 1995.

TOPICS:

1. The Need for, and the Concept of Adaptive Controllers
2. General Schemes of Adaptive Controllers
3. On-line Gain Scheduling as an Adaptive Controller
4. The MIT rule for Model Reference Adaptive Control (MRAC) systems
5. Self Tuning Regulator (STR) systems
 - i. *IDENTIFICATION*
 - Least Squares identification of dynamic systems
 - Recursive Least Squares identification of dynamic systems
 - ii. *DETERMINISTIC STR CONTROLLERS*
 - Pole Placement and Model Following Controller design
 - PID Controller design
 - Deadbeat (time optimal) Controller design
 - iii. *STOCHASTIC STR CONTROLLERS*
 - Minimum Variance Controller design
 - Generalized Minimum Variance Controller design
6. Individual Student Design Projects: application of the STR techniques to practical systems.

Individual Student Design Project:

1. Literature Search to identify a dynamic system (in your area of research) which is a candidate system of Adaptive Control application
2. Investigate the system with some non-adaptive control as indicated in the literature
3. Design Adaptive Controller schemes from the course
4. Provide design details and a performance assessment report for the designed controllers