

CALIFORNIA STATE UNIVERSITY, CHICO
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

**Course Outline: EECE 682 *Computer Control of Dynamic Systems*
3 Units Lecture + 1 Unit Project**

Instructor : Dr. Adel A. Ghandakly

References : “Digital Control of Dynamic Systems”, Franklin et al, Addison-Wesley.
“Digital Control Applications, Illustrated with MATLAB”, Hemchandra Madhusudan Shertukde, CRC Press.

Goals : Fundamental Techniques for designing computer control systems for Single Input Single Output (SISO) and Multiple Input Multiple Output (MIMO) dynamic systems.

Prerequisite : EECE/MECA 482 Control System Design

TOPICS :

1. Hardware Structure and Functional Blocks of Digital Control Systems
2. Modeling of Digital Control Systems and an overview of the ‘Z’ transform
3. Analysis of Digital Control systems (Steady State, Dynamic & Stability Performance)
4. Design of SISO digital controllers by transform (classical) techniques:
 - i. *Indirect Methods (discrete equivalents)*
 - ii. *Direct Methods*
 - iii. *Processor difference equation Code*
5. Design of digital controllers by Time Domain (Control Law) techniques:
 - i. *Pole Placement with Ackermann’s formula*
 - ii. *Full and Reduced Order State Estimator design*
 - iii. *Systems with a reference input (Servo Control)*
 - iv. *Processor Code*
6. Design of MIMO digital controllers by Time Domain (Control Law) techniques:
 - i. *Optimal Controller Design*
 - ii. *Processor Code*
7. Introduction To Adaptive Control
 - i. *The Need for, and the Concept of Adaptive Controllers*
 - ii. *Schemes of Adaptive Controllers*