

# **EE 515- Computer Control of Dynamic Systems**

## **CREDIT HOURS**

3 Hours

## **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

## **COURSE COORDINATOR**

Dr Hassan Ibrahim

## **TEXT BOOK:**

K.J. Astrom & B. Wittenmark, "Computer Controlled Systems: Theory and Design",  
Prince –Hall

## **COURSE DESCRIPTION:**

Review state-space description of discrete time systems. Solution of discrete time state equations. Derivation of transfer function from state-space model. Controllability and observability of discrete time systems. Realization theory. Minimal representation digital redesign of continuous time controllers. Digital implementation of the PID controller. Pole assignment of discrete systems. Implementation of state observers for the use with state feedback control.

## **PREREQUISITE:**

EE 411 or EE 418

## **RELATION OF COURSE TO PROGRAM:**

Elective

## **COURSE INSTRUCTION OUTCOMES:**

The student is capable to implementing the PID controller on the microprocessor lab, as well as using MATLAB to design discrete-time controller for a selected plant.

## **TOPICS COVERED:**

- Introduction to computer control
- State variable representation of discrete time systems
- Controllability, observability and realization of discrete time systems
- Digital redesign of continuous controllers
- State space approach for discrete control design
- PC based data acquisition systems. Applications

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional Component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Engineering Design</b>
	√	√	√

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course Outcomes</b>
<b>a.</b>	An ability to apply knowledge of mathematics, science, and engineering.	
<b>b.</b>	An ability to design and conduct experiments, analyze and interpret data.	
<b>c.</b>	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.	√
<b>d.</b>	An ability to function on multi-disciplinary teams.	
<b>e.</b>	An ability to identify, formulate, and solve engineering problems.	√
<b>f.</b>	An understanding of professional and ethical responsibility.	
<b>g.</b>	An ability to communicate effectively.	
<b>h.</b>	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
<b>i.</b>	A recognition of the need for, and an ability to engage in life-long learning.	
<b>j.</b>	A knowledge of contemporary issues within and outside the electrical engineering profession.	
<b>k.</b>	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	√