

## EE 412 Control Systems (2)

### COURSE INFORMATION

Prerequisites	Academic Year & Level		Teaching Methods			Credit Hrs.
	Year	Semester	Lecture	Tutorial	Lab.	
EE 411	4	8	2	2		3

### COURSE AIM

To exercise approaches related to state variables represent of both SISO and MIMO.  
 To explore the stability analysis and design of a class of nonlinear control systems using describing function technique and phase – plane.

### COURSE WEEKLY CONTENTS

- 1 Revision on State Space Representation for Continuous Systems
- 2 State Space Solution and Properties of Transition Matrix
- 3 System Controllability & Observability
- 4 Eigen values, stability and state feedback
- 5 Pole placement in state feedback and System Observers
- 6 Difference equation and modeling of discrete system
- 7 7th week exam + Z-transform and its properties + Midterm Exam
- 8 Z-transform and its properties
- 9 Error Analysis and stability of Discrete Control Systems
- 10 Root locus of Discrete Control Systems
- 11 State Space representation in Discrete systems
- 12 Applicable case study e.g DC motor position control
- 13 Properties of Transition Matrix in Discrete systems
- 14 System Controllability & System Observability in Discrete systems
- 15 State Feedback Control System in Discrete systems

### STUDENT GRADING & ASSESSMENT

Weeks	Exams	Assign.	Quizzes	Reports	Present.	Lab.	Total
1 to 7	20 Midterm	←	10	MARKS		→	30
To be freely distributed among possible assessments							
8 to 12	←		20	MARKS		→	20
13 to 15	←		10	MARKS		→	10
16 or 17	40 Final						40
Total	Exams	Assign.	Quizzes	Reports	Present.	Lab.	100

### REFERENCES

- Textbook Benjamin C. Kuo, "Automatic Control Systems", Prentice Hall  
 Other Richard C. Dorf "Modern Control Systems"  
 Katsuhko Ogata "Modern Control Engineering", 2012.