2018   2

Course Title	( )		( )	Automatic Control

( ) Lecturer	( )		/ / (Course No. /)	004475/ /3
(/HP) Contact No.			/ (Class Hour/Venue)	/ 15:00~16:30 109
(Course Prerequisite)	' '		(Target Student)	3
E-mail (E-mail Address)			/Office Hour (Office/Office Hour)	13:30-15:00

(Objectives)	This course introduces the basic priciples of feedback control of dynamic system, related system analysis technics, and the design of the controller satisfying the given dynamic specifications. To achieve the course goals, system modeling technics descrbing the dynamic systems into mathematical differential equations, technics (root locus, Nyquist) analyzing the dynamic characteristics (stability, tranqusient response) in both time and frequency domain will be studied. Also, PID and lead-lag controller design method that makes the system dynamic characteristics satisfy the required specifications will be investigated.
CQI (Continuous Quality Improvement Plan)	
(Text book & References)	main text: Franklin, Powell, Emami-Naeini, "Feedback Control of Dynamic Systems", 7th ed., Pearson Education reference: Normal S. Nise, "Control Systems Engineering", 5th ed., Wiley Ogata, "Modern Control Engineering", 4th ed., Prentice Hall
(Assignment book)	Franklin, Powell, Emami-Naeini, "Feedback Control of Dynamic Systems", 6th ed., Pearson Education
(Lecture Methods)	Power point presentation is used in most classes The course note will be posted on the course homepage. Term-project will be given asking control system design and analysis using MATLAB.
(Assignment)	
(Reading Materials)	1. www.engin.umich.edu/class/ctms 2. textbook Matlab/Simulink code --> will be covered in the exams
(Course Grading)	[ ] (%) : 30, (%) : 30, (%) : 10, (%) : 10, Term Project : 20, midterm(30 %), final(30 %), h/w(10 %), attendance(10 %), Term project (20%) absence 10 times --> FA, tardy 2 times = 1 absence
(Etc.)	

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(Week)	(Course Contents)	(Etc.)	
1	Introduction to Feedback Control The Laplace Transform	ppt	
2	The Laplace Transform (Inverse Laplace Transform, Partial Fraction Expansion) Solving linear time-invariant differential equations using L.T.	ppt	HW#1 (Laplace Transform)
3	Transfer Functions, Impulse response block diagrams, block diagram reduction	ppt	
4	block diagram reduction, Signal flow graph Signal flow graph, Mason's rule	ppt	HW#2(System Modeling)
5	state space representation converting s.s. to a T.F. and TF to SS	ppt	
6	Linearization 1st-order system, 2nd order system	ppt	
7	2nd order system, higher order systems, Stability analysis higher order systems, Stability analysis	ppt	HW#3 (Linear System Analysis)
8	steady-state errors in unity feedback control systems	ppt	

(Week)	(Course Contents)	(Etc.)	
9	static error constant, steady-state error for nonunity feedback Root-Locus Analysis (Root-Locus plots, pole-zero cancellation)	ppt	HW#4(Steady State Error and PID controller)
10	Root-Locus Analysis (Nonminimum phase system, positive feedback system, conditionally stable system) Control Systems Design by the Root-Locus Method (Lead compensation)	ppt	
11	Control Systems Design by the Root-Locus Method (Lag compensation, Lead-Lag compensation) Control Systems Design by the Root-Locus Method (Lead-Lag compensation, paralle compensation, velocity feedback)	ppt	HW#5 Root Locus
12	Frequency Response Analysis (Bode plots of first-order factors) Frequency Response Analysis (Bode plots of first-order & quadratic factors)	ppt	
13	Frequency Response Analysis (system types and log-magnitude curve) Frequency Response Analysis (polar plots)	ppt	HW#6 Control Design by Root locus
14	Frequency Response Analysis (Nyquist stability criterion) Frequency Response Analysis (Nyquist stability criterion, relative stability)	ppt	
15	Control Systems Design by Frequency Response (Lead compensation, Lag compensation) Control Systems Design by Frequency Response (Lead-Lag compensation)	ppt	HW#7 Frequency domain analysis
16	Review	ppt	

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	Students who require special assistance (including special needs students) may contact their professors during the first week of the semester to discuss issues related to attendance, lectures, assignments and exams and request learning assistance.
1 (Additional Guide1)	Blackboard
2 (Additional Guide2)	