Hashemite University
College of Engineering
Department of Mechatronics
Advanced Control110405531
(3 Credit Hours)[1]

Instructor

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Office hours:	TBD

Grading info

Test 1	30
Test 2	30
Final	40

Class Info

Time	9:30-11
Location	E2022

Course

Course Number:	110405531
Prerequisite:	110405331 and 110405426
Textbook:	Richard C. Dorf, and Robert H. Bishop "Modern Control Systems," 12th Ed., Pearson Education Inc., 2011.
Course Description (as in the catalog):	Background, PID controllers, Design of feedback control systems, Frequency response analysis methods, Stability in the frequency domain, Design in Frequency Response, Design of state variable feedback systems, and digital control systems.
Specific Outcomes of Instruction (Course Outcomes):	1.Review andTuning the PID controllers. (Outcomes A, C, E and K) 2. Design Lead/Lag compensators using Root locus approach. (Outcomes C, E and K) 3. Plot the logarithmic magnitude and phase frequency responses of linear feedback control systems. (Outcomes K) 4. Learn the procedure of frequency test, and determine the approximated TF from the frequency response. (OutcomesE) 5. Derive and utilize control system performance specifications in the frequency domain.. (Outcome E) 6.Investigate system stability using Bode diagram, Nyquist criterion, and plot the magnitude-phase frequency locus curve. (Outcomes Eand K) 7. Design linear feedback control systems utilizing phase-lead and phase-lag techniques using Bode diagrams and root locus methods.(Outcomes C and E) 8. Define controllability and observability of state variable feedback systems, and realize full-state feedback control design.(Outcomes C, E and K) 9. Finding the control law in digital form.(Outcomes A and C) 10. Using Matlab Software for analysis and design. (OutcomesD and K)

References:

K. Ogata, "Modern Control Engineering", 5th edition, Prentice Hall, 2009

Major Topics Covered and Schedule in Weeks:

	Topic	**# Contact hours**
1. Background	1,2	
2. PID controllers: tuning and structures	3,4, 5	6
3. Design of feedback control systems.	5,6, 7	8
4. First Exam	7	6
5. Frequency response analysis.	8, 9, 10	1
6. Stability and performance specifications in frequency domain	10, 11	8
7. Second Exam	12	4
8. Control design in the frequency domain	12, 13	1
9. Nichols Chart	14	5
7. Introduction to design of state variable feedback systems.	15	3
8. Introduction to digital control	15	1,5
Total	**15**	1.5
Course Policy		**45**
- Attendance is mandatory and absence is allowed up to 15% of the lectures; around 8		

	one-hour lectures		
-	First Exam [30 Points] Tue, 19/2/2019		
-	Second Exam [30 Points A Th ,11/4/2018		
-	Final [40 Points] TBD		

Student Outcomes (SO) Addressed by the Course:

#	*Outcome Description*	*Contribution*
(a)	an ability to apply knowledge of mathematics, science, and engineering	***L***
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints	***H***
(d)	an ability to function on multidisciplinary teams	***L***
(e)	an ability to identify, formulate, and solve engineering problems	***M***
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	***L***
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	***L***
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	***L***

H=High, **M**= Medium, **L**=Low

Prepared by
Dr. Asma Al-Tamimi