

COURSE NUMBER	ME 455		
COURSE TITLE	Introduction to Automatic Controls		
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)		
COURSE COORDINATOR	Z. Ji		
COURSE DESCRIPTION	Introduction to modern control methods applied to mechanical, manufacturing, and mechatronic systems.		
PREREQUISITE(S)	ME 305 – System Dynamics		
COREQUISITE(S)	None		
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Elective		
REQUIRED MATERIALS	<ol style="list-style-type: none"> 1. Modern Control Systems (13th Edition), by Richard C. Dorf and Robert H. Bishop, Pearson, 2016, ISBN-13: 978-0134407623 ISBN-10: 0134407628 2. MATLAB with Control Toolbox 		
Other supplemental materials (not Required)	None		
COMPUTER USAGE	MATLAB software with Control Toolbox		
COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:	Course Learning Outcomes	SOs*	Expected Performance Criteria
	1. model dynamic systems through block diagrams and signal flow graphs.	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	2. understand state variable models of feedback control systems	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	3. analyze characteristics of dynamics systems and measures of their performances	1	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	4. analyze and assess system stability	1, 2	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	5. perform root locus analysis	1, 2	Exam Question (80% of the students will

						earn a grade of 70% or better on this question)	
	6. use MATLAB in analyzing dynamics systems and control systems	1, 2	Home work Problems (80% of the students will earn a grade of 70% or better on these problems)				
CLASS TOPICS	<ol style="list-style-type: none"> 1. Introduction; MATLAB Basics 2. Block Diagram, Signal Flow Graph and Transfer Function 3. State Variable Models 4. Control System Characteristics 5. Measures of Performance 6. Stability: Routh–Hurwitz method 7. Root Locus Method 8. Frequency Response: Bode Diagrams 9. Stability: Nyquist Criterion 						
STUDENT OUTCOMES (SCALE: 1-3)	1	2	3	4	5	6	7
	3	2					
	3 – Strongly supported 2 – Supported 1 – Minimally supported						

* Student Outcomes