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	1. Modern Control Systems (12th Edition), by Richard C. Dorf and Robert H. Bishop, Prentice Hall, 2011, ISBN 0136024580 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.	a, e, k	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	a, e, k	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	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
4. analyze and assess system stability	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
5. perform root locus analysis	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
6. use MATLAB in analyzing	a, e, k	Homework Problems

	dynamics systems and control systems		(80% of the students will earn a grade of 80% or better on these problems)

CLASS TOPICS

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)

a	b	c	d	e	f	g	h	i	j	k
3				2						2

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes