



**DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.**

Course Syllabus

1. Course number and name

ME 473 Automatic and control systems.

2. Credits and contact hours

(3+0) 3 credit hours, 3 contact hours

3. Course type

Blended Learning Course (2+1)

4. Instructor's or course coordinator's name

Dr. Mohammad Nasir

5. Textbook information

Modern Control Systems. R.Dorf & R. Bishop. 12 Edition. Addison-Wesley.2011.ISBN-13:978-0-13-138310-4

a. Other supplemental materials

Instructor's notes

6. Specific course information

a. Catalog description

The course contain introduction to control systems, representation of engineering systems, open and closed loop systems, the performance of control systems, stability, PID controller & design of control system

b. Prerequisites or co-requisites

Co-requisite: ME xxx Mechanical Vibration analysis

c. The course is:

Required in Mechanical Engineering program.

7. Specific goals for the course

a. Course outcomes:

After completion of the course, students are expected to be able to:

- 1- represent control system and identify feedback control and design the block diagram of control system.



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- 2- examine differential equations of systems and determine the transfer functions of control systems.
- 3- compare the performance of control systems for different input signals.
- 4- interpret stability of control systems.

b. The following student outcomes are addressed by the course:

SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.

SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Represent control system and identify feedback control and design the block diagram of control system.	-	Lectures (Example and Problems)	Midterm Exam
CO-(2): Examine differential equations of systems and determine the transfer functions of control systems.	-	Lectures (Example and Problems)	Assignment
CO-(3): Compare the performance of control systems for different input signals.	-	Lectures (Example and Problems)	Final Exam
CO-(4): interpret stability of control systems.	-	Synchronous	Project
Student Outcomes			
SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	2	Lectures (Example and Problems)	Midterm Exam



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as well as global, cultural, social, environmental, and economic factors.			
SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.	1, 3	Term Project	Term Project- Part 2
SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.	1	Term Project	Term Project- Part 1

9. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Introduction to Control systems	Lecture
	Tue (9-10)	Introduction to control system types	Lecture
	Thu (9-10)	Interactive videos- Chapter 1	synchronous active learning
2	Sun (9-10)	Control system types	Lecture
	Tue (9-10)	Control system types	Lecture
	Thu (9-10)	Case studies	Asynchronous active learning
3	Sun (9-10)	Transfer function basics	Lecture
	Tue (9-10)	Transfer function basics	Lecture
	Thu (9-10)	Block diagram representation	Online Lecture/ synchronous
4	Sun (9-10)	Differential equations of physical systems	Lecture
	Tue (9-10)	Differential equations of physical systems	Lecture
	Thu	Examples	Online Lecture



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	(9-10)		
5	Sun (9-10)	Transfer function basics	Lecture
	Tue (9-10)	Transfer function basics	Lecture
	Thu (9-10)	Block diagram representation	Online Lecture
6	Sun (9-10)	Block reduction	Lecture
	Tue (9-10)	Block reduction	Lecture
	Thu (9-10)	Examples	Online Lecture
7	Sun (9-10)	Open loop systems	Lecture
	Tue (9-10)	Closed loop systems	Lecture
	Thu (9-10)	examples	Online Lecture
8	Sun (9-10)	Feedback control system characteristics and performance	Lecture
	Tue (9-10)	Feedback control system characteristics and performance	Lecture
	Thu (9-10)	Case studies	Online Lecture
9	Sun (9-10)	Sensitivity of control systems	Lecture
	Tue (9-10)	Sensitivity of control systems	Lecture
	Thu (9-10)	Sensitivity of control systems	Online Lecture
10	Sun (9-10)	Disturbance in control systems	Lecture
	Tue (9-10)	Disturbance in control systems	Lecture
	Thu (9-10)	Examples	Online Lecture
11	Sun (9-10)	The stability of feedback control systems	Lecture
	Tue (9-10)	The stability of feedback control systems	Lecture



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	Thu (9-10)	The stability of feedback control systems	Asynchronous active learning
12	Sun (9-10)	PID controller	Lecture
	Tue (9-10)	PID controller	Lecture
	Thu (9-10)	Examples	Synchronous active learning
13	Sun (9-10)	P and ID diagram	Lecture
	Tue (9-10)	P and ID diagram	Lecture
	Thu (9-10)	Examples	synchronous active learning
14	Sun (9-10)	Discrete control systems	Lecture
	Tue (9-10)	Discrete control systems	Lecture
	Thu (9-10)	Examples	synchronous active learning
15	Sun (9-10)	Project	Lecture
	Tue (9-10)	Project	Lecture
	Thu (9-10)	Case study and project presentations	synchronous active learning

10. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7 th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	20%	1-16 th Week
- Final Examination	50%	16 th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.