The Hashemite University
Faculty of Engineering
Course Syllabus
Department of Mechanical Engineering

Course Title:	**Control Systems (3,0, 0)**	**Course Number:**	110402434
Designation:	Compulsory	**Prerequisite(s):**	110402433
Instructor:	Dr. Rami Al-Jarrah	**Instructor's e-mail:**	**ramia@hu.edu.jo**

LECTURE TIME AND LOCATION : ONLINE LECTURES USING MICROSOFT TEAMS

Course Description (catalog): This course will introduce the concepts of automatic control systems to the mechanical engineering students. It addresses the subject of control and its real applications. It also explains how to represent a control system, gives the function of its various components, and describes the general process for designing a control system. Controller objectives, design and performance are discussed conceptually and mathematically. A special attention is given to PID controllers which are widely used in industry.

Textbook(s) and/or Other Supplementary Materials:

Modern Control Systems, Richard C. Dorf and Robert H. Bishop, Prentice Hall. 12th ED., 2011, ISBN-13:978-0-13-602458-3, ISBN-10:0-13-602458-0.

References:

System Dynamics, Katsuhiko Ogata, Pearson; 4th edition, 2003, ISBN-10: 0131424629, ISBN-13: 978-0131424623.

Attendance: Like all engineering courses attendance is very important in this course. Especially, the course is considered as a very basic science course in the mechanical engineering curriculum. Therefore, students must try to attend all lectures and those who are absent 6 lectures and more during the semester will not be admitted to the final exam, and will fail the course.

Major Topics Covered:

Topic	# of Weeks	Contact hours*
Introduction to Control Systems.	1	5
Mathematical Models of Systems.		
Transfer function, block diagram and stability	1	5
Modeling in the Frequency Domain	1	5
Modeling in the Time Domain	1	5
Root Locus Techniques	2	10
Feedback Compensator design	1	5
Bode diagrams and Nyquist criterion	1	5
Lead, Lag and Lead-Lag Compensation		
Total	**8**	**40**

*Contact hours include lectures, quizzes and exams

Specific Outcomes of Instruction (Course Learning Outcomes):

After completing the course, the student will be able to:

1. Enhance systematic problem solving, intellectual skills and practical skills (a, e).
2. Describe the concepts of different control systems used in industry as well as select the function, suitability of different sensors and actuators (a, c).
3. Recognize a few control applications and basic techniques (a).
4. Collect information and design controllers that achieve tracking, stabilization and system transition for real applications (c, e).
5. Select the best control system for a specified problem, regarding accuracy and dynamic behavior (e).
6. Evaluate control systems types and have the ability to collect information about them, then, use effectively the needed information (i).

Student Outcomes (SO) Addressed by the Course:

#	Outcome Description	Contribution
	General Engineering Student Outcomes	
(a)	an ability to apply knowledge of mathematics, science, and engineering	H
(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 such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	M
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	H
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(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	L
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	
	H=High, **M**= Medium, **L**=Low	

Grading Plan:

Mid Exam	30 Points	**To be announce later**
Others	20-30 Points	
Final exam	40-50 Points	

Prepared by: Dr. Rami Al-Jarrah Date: 10th October 2020