

The University of Jordan
School of Engineering
Department of Mechatronics Engineering
1st Semester – A.Y. 2019/2020



Course:	Control Laboratory– 0908453 (1 Cr. – Core Course)
Instructor:	Eng. Nisreen Amayreh <i>Office:</i> Mechatronics Engineering Department <i>Email:</i> n.alamayreh@ju.edu.jo
Course Website:	http://elearning.ju.edu.jo
Catalog Data:	The lab consists of experiments that are related to: First and second order system analysis control experiments, Servo Systems, Stability of dynamical systems. System identification. Design and tuning of PID controller in closed-loop Systems. Simulation of systems using Simulink or Matlab.
Prerequisites by Course:	Automatic Control Systems (0908353)
Prerequisites By Topic:	Students are assumed to have sufficient knowledge pertaining to the following: <ol style="list-style-type: none">1. Modeling and Simulation of Physical systems.2. Control System Analysis and Design3. Programming with MATLAB.
Textbook:	Experiments Handouts and Lectures Notes
References:	<ul style="list-style-type: none">• <i>Control Systems Engineering</i>, by Norman S. Nise, 6th Edition, John Wiley• <i>Modern Control Systems</i> . Richard Drof and Robert Bishop, 12th Edition, Prentice Hall.• <i>Modern Control Engineering</i> , Katsuhiko Ogata, 5th Edition n, Prentice Hall• <i>Automatic Control Systems</i> by Benjamin C. Kuo, Farid Golinaraghi. 9th Edition. Wiley
Schedule & Duration:	11-12 Weeks, 10 lab sessions (150 minutes each) plus exams.
Minimum Student Material:	Lab manual, class handouts, and an access to Personal Computer with MATLAB
Instructional Methods	<ol style="list-style-type: none">1. Pre-lab2. Conducting experiements3. Writing lab reports
Minimum College Facilities:	Lab room with whiteboard and laboratory instrumentation
Course Objectives:	<ol style="list-style-type: none">1.To teach students the concept of Control System Design, and the Introduction to Model-Based Design usign MATLAB and SIMULINK.2. To teach students the techniques to Simulation and Modeling the Control System using the SimScape (Physical Modelg in MATLAB)3. To let students analysis and design a controller for Control system

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should:

1. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. [5]
2. Design and Implement controller for different systems (Temperature, TWIN Rotor, Coupled Tanks, DC Servo Motor) and analyse the results. [6]

Course Topics:

	Topic Description	Week
1.	Orientation and going over the lab rules and safety	1
2.	Introduction to Control System Design, Model Based Design	1
3.	Mathematical Modeling Using Simulink	1
4.	Physical Modeling using SimScape and Simulink (Electrical System)	1
5.	Physical Modeling using SimScape and Simulink (Mechanical System)	1
6.	System Identification Concept and Using Toolbox (First Order, Second Order)	2
7.	Method of Design a Controller (PID)	1
Mid-Term Exam		
8.	DC-Servo	1
9.	Temperature Control System	1
10.	Fuzzy Logic Control	1
11.	Twin Rotor Control System	1
Final Exam		

Ground Rules:

- **Attendance:**

Students are expected to attend EVERY CLASS SESSION and they are responsible for all material, announcements, schedule changes, etc., discussed in class. The university policy regarding the attendance will be strictly adhered to.

Assessments:

Exams, Quizzes, Reports, and lab work.

Grading policy:

Assessments	Weight
Quizzes, Reports & Lab work	35%
Midterm Exam	25 %
Final Exam	40 %
Total	100 %

Last Updated:

September, 2019