



**JORDAN UNIVERSITY OF SCIENCE AND
TECHNOLOGY
INDUSTRIAL ENGINEERING DEPARTMENT**



Course Number and Name	IE431: Control and Automation
Course Description	The course covers an introduction to linear feedback control theory, mathematical modeling of physical systems, transfer functions, block diagrams and signal flow graph, time domain analysis of control systems, test signals, transient response, time domain specifications, steady-state error and stability. The course also covers sensors, actuators, A/D and D/A conversion, hydraulic and pneumatic systems, Programmable Logic controllers (PLCs) and Computer Integrated Manufacturing (CIM).
Credits and contact hours	3 Credit hours; 3 hours of lectures
Pre- or Co-requisites	IE331: Engineering Measurements, EE303: Fundamentals of Electrical Engineering
Required/ Elective	Required

Text Book(s)	<ul style="list-style-type: none"> • Dorf R. C. and Bishop R. H. (2011). <i>Modern Control Systems</i>, 12th ed. Prentice Hall. • Groover M. P.(2008). <i>Automation, production systems, and computer integrated manufacturing</i>, 3rd ed. Prentice Hall.
Software tools	MATLAB
References	<ul style="list-style-type: none"> • Ogata K. (1997). <i>Modern Control Engineering</i>, 3rd ed, Prentice Hall. • Nise N. S.(2011). <i>Control Systems Engineering</i>, 6th ed, John Wiley & Sons Inc.

Course Objectives	<ul style="list-style-type: none"> • Explain the difference between open-loop and closed-loop control systems. • Derive input/output signal relationships in control systems using block diagrams. • Analyze control systems in time and frequency domains. • Check the stability of linear control systems. • Apply MATLAB/SIMULINK in solving linear control systems. • Program PLCs to perform certain actions.
Measured Outcomes	3a and 3c

Evaluation		
Assessment Tool	Expected Due Date	Weight
Quizzes and Homework		10 %
First Exam	Sunday, March 16, 2014	25 %
Second Exam	Thursday, April 24, 2014	25 %
Final Exam	According to the University final examination schedule	40 %

Topics Covered		
Week	Topics	Reading Masterial
1-2	Introduction to Control Systems	Chapter 1 (Dorf)
3-4	Mathematical Models of Systems	Chapter 2 (Dorf)
5-6	The Performance of Feedback Control Systems	Chapter 5 (Dorf)
7	The Stability of Linear Feedback Systems	Chapter 6 (Dorf)
8-9	The Root Locus Method (RLM)	Chapter 7 (Dorf)
10-11	Sensors, Actuators, and Other Control System Components	Chapter 5 (Groover)
12-13	Introduction to Hydraulics and Pneumatics	Notes
14-15	Discrete Control Using Programmable Logic Controllers and Personal Computers	Chapter 9 (Groover)