

Ministry of Higher Education and Scientific research



Department of Electrical Engineering

College of Engineering

Salahaddin University – Erbil

Subject: Design of Feedback Control Systems

Course Book – Postgraduate Studies (MSc.)

Lecturer's name: Assist Prof. Dr. Fadhil Toufick Aula

Academic Year: 2020 -2021

Semester : Spring

Course Book

1. Course name	Design of Feedback Control Systems
2. Lecturer	Assist Prof. Dr. Fadhil Toufick Aula
3. Department/ College	Electrical / Engineering
4. Contact	e-mail: Fadhil.aula@su.edu.krd
5. Time (hr. / week)	3 hrs/week
6. Office hours	6
<p>7. Course overview:</p> <ul style="list-style-type: none"> • Feedback control systems are widely used in manufacturing, mining, automobile and other hardware applications. • In response to increased demands for increased efficiency and reliability, control systems are being required to deliver more accurate and better overall performance in difficult and changing operating conditions. • In order to design control systems to meet the needs of improved performance and robustness when controlling complicated processes, control engineers will require new design tools and better control theory. • This course develops the fundamentals of feedback control using linear transfer function system models. • It covers analysis in time and frequency domains; design in the s-plane (root locus) and in the frequency domain (loop shaping) • Describing functions for stability of certain non-linear systems; extension to state variable systems and multivariable control with observers; discrete and digital hybrid systems and the use of z-plane design. 	
<p>8. Course Objective:</p> <ul style="list-style-type: none"> • Analyzing control systems in frequency domain • Analyzing control systems in time domain • Designing control systems using root-locus method • Designing control systems using bode, polar, and Nyquist methods • Designing PID Controller • Linearization of nonlinear control systems 	
<p>9. Student's Obligation</p> <ul style="list-style-type: none"> ➤ Regular attendance is required according to the university rules. ➤ The use of mobile phone during the class is prohibited. ➤ Only the students who are officially enrolled can attend the class, guests and children are not admitted. ➤ Daily participation and conducting assignments are required. 	

10. Forms of Teaching

Teaching methods include overhead project presentation, online materials, classroom website, in class whiteboard usage.

11. Assessment Scheme

Annual	50%
Article Review	
Final Exam	50%
Total	100%

12. Course Reading List:

1. K. Ogata, Modern Control Engineering, 5th Edition, Prentices Hall, 2010
- A. Mutambara, Design and Analysis of Control Systems, CRC Press, 1999

15 Weeks: From the 1st of November to 10th of February

Week	Subject
1 st	Introduction
2 nd	Frequency Domain Modeling and Analyzing
3 rd	Root-Locus Analysis
4 th	Root-Locus Design Part 1
5 th	Root-Locus Design Part 2
6 th	Frequency-Response Analysis
7 th	Frequency-Response Design
8 th	State-Space Modeling and Analyzing
9 th	State-Space Design Part 1
10 th	State-Space Design Part 2
11 th	PID Controller
12 th	Nonlinear Systems
13 th	Dead Week
14 th	Final Exam
15 th	Final Exam