

Ministry of Higher Education and Scientific research



Department of Electrical Engineering

College of Engineering

Salahaddin University – Erbil

Subject: Robust Control

Course Book – Postgraduate Studies (PhD)

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

Academic Year: 2020 -2021

Semester : Fall

Course Book

1. Course name	Robust Control
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: Feedback control systems are widely used in manufacturing, mining, automobile and other hardware applications. In response to increased demands for increased efficiency and reliability, these control systems are being required to deliver more accurate and better overall performance in the face of difficult and changing operating conditions.</p> <p>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. A standard technique of improving the performance of a control system is to add extra sensors and actuators. This necessarily leads to a multi-input multi-output (MIMO) control system. Accordingly, it is a requirement for any modern feedback control system design methodology that it be able to handle the case of multiple actuators and sensors.</p> <p>Robust means durable, hardy, and resilient</p>	
<p>8. Course Objective:</p> <p>The objective of this course is to provide students with an understanding of the important problems associated with multivariable feedback control. The use of advanced mathematics will be introduced in a control-engineering framework, having as final goal the design and analysis of robust multivariable controllers. The interlocking nature of theory and application is a central theme, and this course contains an overview of the existing approaches and tools available to a working control engineer when faced with a multivariable control problem.</p>	
<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%
Midterm Exam + Daily + assignments + Quizzes + Article Review + Seminar	
Final Exam	50%
Total	100%

12. Course Reading List:

1. Gu, Da-Wei, Petkov, Petko, Konstantinov, Mihail M, Robust Control Design with MATLAB, Second Edition, Springer, 2013
2. Michael Green, David Limebeer, Linear Robust Control, Dover Edition, 2012
3. Kemin Zhou, with John Doyle, Essentials of Robust Control, Prentice-Hall, 1998.

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

Week	Subject
1 st	Introduction
2 nd	Classical feedback control Part One
3 rd	Classical feedback control Part Two
4 th	Linear Multivariable System Theory
5 th	H_2 , H_∞ Spaces
6 th	Performance Specifications and Limitations
7 th	Uncertainty and Robustness
8 th	μ Analysis and Synthesis
9 th	Midterm Exam
10 th	PID Controller
11 th	LQR, Kalman Filter, and LQG
12 th	Seminar Presentation
13 th	Dead Week
14 th	Final Exam
15 th	Final Exam