

COURSE	Name	: Optimal and Robust Control Systems
	Code	: EE185520
	Credit(s)	: 2
	Semester	: (Elective Course)

## **Description of Course**

The course of Optimal and Robust Control Systems discusses the design of an integrated multivariable control system for systems that have uncertainties model from systems that will be controlled or there are external disturbances that affect system behavior. The material discussed included: Norms of signals and systems, Nominal stability and performance, H2 and optimal H-infinity control, Uncertainty modeling for robust control, Robust closed-loop stability and performance; Robust H-infinity control, Robust controller design via mu-synthesis.

#### **Learning Outcomes**

#### Knowledge

(P02) Mastering engineering concepts and principles to develop the necessary procedures and strategies for systems analysis and design in the areas of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

(P03) Mastering the factual knowledge of information and communication technology as well as the latest technology and its utilization in the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

## **Specific Skill**

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

(KK03) Being able to produce system design for problem solving by utilizing other fields of study and concerning technical standards, performance aspect, reliability, ease of application, and assurance of sustainability.

## **General Skill**

(KU07) Being able to improve the capacity of learning independently.

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

# Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

(S12) Working together to be able to make the most of his/her potential.

#### **Course Learning Outcomes**

## Knowledge

Mastering the concepts and principles of robust control to develop design procedures needed in linear system analysis and design using Matlab / Simulink.

## **Specific Skill**

Able to analyze the stability of a linear system and design a robust control system by considering the robustness aspects of the design result of the system and the ease of its application.

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## **General Skill**

Able to increase learning capacity independently through the design of a robust control system and able to use Matlab / Simulink software to design robust control systems for linear systems.

# Attitude

Shows the attitude of being responsible for the assignments given in lectures independently and can work together in teams to obtain good system design results.

## **Main Subjects**

- 1. Norms of signals and systems
- 2. Nominal stability and performance
- 3. H2 and H-infinity optimal control
- 4. Uncertainty modelling, Robust closed-loop stability and performance
- 5. Robust H-infinity control
- 6. Robust controller design via mu-synthesis

# Reference(s)

- [1] Kemin Zhou, with John Doyle, Essentials of Robust Control, Prentice-Hall, 1998
- [2] G. E. Dullerud and F. Paganini, A Course in Robust Control Theory: A Convex Approach, Springer Verlag, 2000
- [3] Frank L. Lewis, Vassilis L. Syrmos, "Optimal Control," John Wiley & Sons Inc., New York, 1995

#### Prerequisite(s)

Linear Systems Theory

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