

課號 : 522 U5040
類別 : 選修
名稱 : 線性控制系統
英文名稱 : Linear Control System.
學分 : 3
適修年級 : 大四、研究所

課程大綱 : **This course consists of three parts:**

(1) State-space control design

- a) State-space realization of systems, operation of systems, similarity transformation
- b) Solutions of LTI, LTV systems.
- c) Stability of systems, Lyapunov stability theory.
- d) Controllability and observability.
- e) Eigenvalue assignment and LQ control.
- f) Observer design and Kalman filter.

(2) Transfer function control design

- a) Pole placement
- b) Internal modeling principle.
- c) Model matching (2 DOF design).

(3) Robust Control

- a) Introduction: robust stability and robust performance.
- b) Small-Gain theorem.
- c) Robust stability test.

預修課程 : 自動控制 (一)。

授課老師 : 王富正

課程說明 : This course is designed as a continued course of Automatic Control. Compared to Automatic Control which introduces some classical control methods, the first part of this course focuses on "modern control" techniques using state-space methods. We will study state-space realization, solutions, stability, controllability and observability, eigenvalue assignment, and observer design. The second part of this course discusses advanced transfer function methods, such as pole assignment, internal model principle, and model matching design. Lastly, we introduce the basic ideas of robust control.

評分考試 : 小考 20%, 第一次期中考 20%, 第二次期中考 25%, 期末考 35%.

使用書籍 :

1. C.T. Chen, *Linear Systems, Theory and Design*, 3rd Ed.
2. J. Dwight Aplevich, *The Essentials of Linear State-Space Systems*.
3. J.C. Doyle, B.A. Francis and A.R. Tannenbaum, *Feedback Control Theory*,
Downloadable from: <http://www.control.utoronto.ca/people/profs/francis/dft.html>.

注意事項 : Students are expected to spend at least **3 hours/week** to review and practice the materials.