國立中正大學機械工程學系 111 學年度第一學期教學大綱表

課程名稱：(中文) 線性系統 (英文) Linear System					開課單位	前瞻
					課程代碼	4456011
授課教師	洪博雄	學分數	3	選修	開課年級	大四、碩博士班

先修科目或先備能力：Basic knowledge of linear algebra

課程概述：

The course deals with the theoretical aspects of linear dynamic systems as they apply to engineering modeling, analysis and design. The mathematical concepts of time and complex frequency domain representation of linear dynamic systems are covered in detail. Furthermore, the theoretical foundations and application of system stability are discussed thoroughly. Finally, the properties of controllability and observability are studied in order to apply them to both feedback controller and observer design.

目標：

Students are expected to learn multiple linear system models and understand some of the issues and challenges facing attempts at linear system while being exposed to the pragmatics of implementing the control of linear systems.

教科書	Chi-Tsong Chen, Linear System Theory and Design, Oxford University Press, 2012. Ref: Norman S. Nise, Control Systems Engineering, 5th ed., John Wiley & Sons, Inc., 2008

課程大綱		分配時數				可達成核心能力
單元主題	內容綱要	講授	示範	習作	其他[1]	
Introduction	Scope of this course	3				D1, D2, D4
Mathematical Descriptions of Systems	Linear systems	3				D1, D2, D4
Linear Algebra	Diagonal and Jordan Form, Lyapunov Equations	9				D1, D2, D4
State-Space Solutions and Realizations	LTI state equations, solutions and realizations	9				D1, D2, D4
Stability	Input-output stability, Lyapunov Theorem	9				D1, D2, D4
Controllability and Observability	Canonical decomposition, Jorden-form equations	9				D1, D2, D4
Minimal Realizations and Coprime Fractions	Minimal realizations, Realizations from matrix coprime fractions	9				D1, D2, D4

可達成核心能力		核心能力達成指標
D1	具備機械領域之專業知識	具線性系統領域之專業知識。Well established advanced knowledge in linear system

D2	策劃及執行機械及其相關領域專題研究之能力	具備策劃及執行線性系統及其相關領域專題研究之能力 Competence in planning and conducting research and development projects in linear system and related disciplines
D4	創新思考及獨立解決機械問題之能力	創新思考及獨立解決線性系統問題之能力。Capacity of innovative thinking and independent problem solving for linear system problems

教學要點概述:

上課時間	上課地點	學習成果評量方式	Office hour	教學品質評量方式
二 10-12	214 左	Homework25% Midterm I 25% Midterm II 25% Final exam 25%	星期五 19:00-21:00	教學意見調查核心能力重要性及達成度分析問卷

週次	教 學 與 作 業 進 度	備 註
1	Introduction	
2	Mathematical Descriptions of Systems	
3~5	Linear Algebra	
6~8	State-Space Solutions and Realizations	Midterm exam I
9~11	Stability	
12~14	Controllability and Observability	Midterm exam II
15~17	Minimal Realizations and Coprime Fractions	
18	Final Exam	Final exam

其他: