

國立中正大學機械工程學系 114 學年度第二學期教學大綱表

課程名稱：(中文) 自動控制 (二) (英文) Automatic Control II					開課單位	機械系				
					課程代碼	4223751 4213555				
授課教師	陳世樂	學分數	3	選修	開課年級	大三				
全英文授課 EMI	<input checked="" type="checkbox"/> 是 <input type="checkbox"/> 否									
課程類別 course type	<input type="checkbox"/> 人文關懷課程 <input type="checkbox"/> 競賽專題課程 <input type="checkbox"/> 問題導向課程 <input checked="" type="checkbox"/> 專題導向課程 <input type="checkbox"/> 總整課程 <input type="checkbox"/> 實作課程 <input type="checkbox"/> 實習 <input type="checkbox"/> 其他									
先修科目或先備能力：自動控制 (一)										
課程概述： <ul style="list-style-type: none"> Part 0. Introduction <ul style="list-style-type: none"> The class is designed for mechanical engineering students who after taking Automatic Control I would like to build up his/her expertise as a control engineer. The subjects covered are broadly divided into two parts: root-locus analysis and design and Nyquist analysis and design. Part I. Root-locus analysis and design <ul style="list-style-type: none"> In this section, we will learn a graphical method, named the root-locus method, for determining pole locations of LTI systems with one unknown parameter. We will then apply this method to design feedback control satisfying the stability and tracking requirements. Part II. Nyquist analysis and design <ul style="list-style-type: none"> In this section, we will learn a frequency-domain based tool, called the Nyquist method, for performance analysis and control design for LTI systems. 										
目標：使學生具備以古典控制理論設計控制器之能力										
教科書	<ul style="list-style-type: none"> 自編講義 Norman S. Nise, Control Systems Engineering, 6th ed., John Wiley & Sons, 2011 Ogata, K., Modern Control Engineering, 4th ed., Prentice Hall, 2002 									
教學要點概述										
教材編選 teaching materials	<input checked="" type="checkbox"/> 自製簡報(ppt) <input checked="" type="checkbox"/> 課程講義 <input type="checkbox"/> 自編教科書 <input type="checkbox"/> 教學程式 <input type="checkbox"/> 自製教學影片 <input type="checkbox"/> 其他									
教學方法 teaching methods	<input checked="" type="checkbox"/> 講述 <input type="checkbox"/> 小組討論 <input type="checkbox"/> 學生口頭報告 <input type="checkbox"/> 問題導向學習 <input type="checkbox"/> 個案研究 <input type="checkbox"/> 其他									
評量工具 Evaluation tools	<input checked="" type="checkbox"/> 期中考 <input checked="" type="checkbox"/> 期末考 <input type="checkbox"/> 隨堂測驗 <input type="checkbox"/> 隨堂作業 <input type="checkbox"/> 課後作業 <input type="checkbox"/> 期中報告 <input type="checkbox"/> 期末報告 <input type="checkbox"/> 專題報告 <input type="checkbox"/> 評量尺規 <input type="checkbox"/> 其他									
教學資源 teaching resources	<input checked="" type="checkbox"/> 課程網站 <input type="checkbox"/> 教材電子檔供下載 <input type="checkbox"/> 實習網站									

教師相關訊息 instructor's information						
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	
Root-locus analysis	<ul style="list-style-type: none"> Introduction to root-locus analysis 	12				B1, B3
Root-locus based control design	<ul style="list-style-type: none"> Lead-lag control design PID control design 	12				B1, B3
Nyquist analysis	<ul style="list-style-type: none"> Introduction to Nyquist analysis 	12				B1, B3
Sinusoidal tools based control design	<ul style="list-style-type: none"> Performance specifications in terms of frequency response Lead-lag control design 	15				B1, B3, B4
可達成核心能力		核心能力達成指標				
B1	具備基本工程數學、固體力學、熱流力學、自動控制、材料科學及光機電整合工程實務分析的能力	具備控制系統分析的能力				
B3	執行固力實驗、熱流實驗、機械專題實作、光電工程實驗和分析數據的能力	了解如何設計控制器的能力				
B4	撰寫程式語言與電腦輔助設計的能力	撰寫 MATLAB 程式語言的能力				

教學要點概述：				
上課時間	上課地點	評量方式	Office hour	教學品質評量方式
三 7-9	工 B 214 左	<ul style="list-style-type: none"> 2 exams (1 midterms + 1 final) Homework 10% Quiz 30% Midterms: 30%, Final: 30% 		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			
	● Review of specifications for control design			
2	● What is root-locus? Plotting root-locus			
3	● Plotting root-locus			
4	● Plotting root-locus			
5	● Root-locus design of PI control for improvement of steady-state error			

6	● Root-locus design for lead-lag control	
7	● Root-locus design for lead-lag control	
8	● Root-locus design for PID control	
9	● Principle of argument of complex functions	
10	● Nyquist stability analysis	
11	● Sketching a Nyquist plot	
12	● Sketching a Nyquist plot	
13	● Performance specifications in terms of frequency response	
14	● Performance specifications in terms of frequency response	
15	● Sinusoidal tools design for lead-lag control	
16	● Sinusoidal tools for lead-lag control	
17	● Sinusoidal tools for lead-lag control	
其他: attendance will be considered as extra credit.		