國立東華大學
教學計劃表　Syllabus

課程名稱(中文) Course Name in Chinese	自動控制系統AB			學年/學期 Academic Year/Semester		113/1
課程名稱(英文) Course Name in English	Automatic Control Systems					
科目代碼 Course Code	EE__3360AB	系級 Department & Year	學三	開課單位 Course-Offering Department		電機工程學系
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)		3.0/3.0		
授課教師 Instructor	/蘇仲鵬					
先修課程 Prerequisite						

課程描述　Course Description

講授 自動控制系統的重要觀念及相關理論，使同學能具備回授控制系統的特性分析、控制器設計、與系統模擬的能力，使應用於包括馬達驅動控制、多軸機器臂運動控制等重要領域。課程內容包括連續時間系統的物理數學模型建立、穩定性分析、動態響應、根軌跡方法、PID控制器設計、頻率響應分析，相位領先、與相位滯後的設計，並介紹系統狀態空間模型與狀態回授的概念與方法。

課程目標　Course Objectives

學習控制系統之穩定度分析、控制器設計方式、以及控制相關軟硬體設備之
認識與應用

	系專業能力 Basic Learning Outcomes	課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A	培育具備工程、應用數學與物理科學等數理知識之基本能力。To cultivate the basic knowledge of engineering, applied mathematics and physics	●
B	培育系統分析、模擬驗證、實作實現之能力。To cultivate the basic ability of analysis, verification and implementation of systems.	●
C	訓練軟體工具使用與硬體實務驗證相互輔助之能力。To train the auxiliary ability between the utilization of software tool and the verification of the hardware practice	○
D	訓練電機本知學能技術與工程實務相互結合運用之能力。To train the integrate ability between professional instinct in learning technique and engineering practice.	●
E	落實專題製作之群體合作與團隊競爭之能力。To fulfill the ability of group cooperation and teamwork competition.	○
F	落實發掘問題、邏輯分析、克服瓶頸與持續學習之能力。To fulfill the ability of question finding, logical analyzing, bottleneck overcoming and continuous learning	●
G	了解學術倫理與智慧財產觀念，掌握產業更迭需求與具備多元專長之能力。To obtain the ability of multi-specialization and to meet the industry demand as well as to have the ability of academic ethics and concept of intellectual property	○
H	了解國內外市場變化，具備基本科技英文閱讀溝通之能力。To understand the change of global market and the have the basic ability of reading and conversation in English.	○

圖示說明Illustration ：● 高度相關 Highly correlated ○中度相關 Moderately correlated

授 課 進 度 表 Teaching Schedule & Content

週次Week	內容 Subject/Topics	備註Remarks
1	控制系統介紹、Laplace transform	

2	Transfer Function、Mathematical Models 、Block Diagram	
3	Transfer Function、Mathematical Models 、Block Diagram	
4	Stability and Dynamic Response	
5	Stability and Dynamic Response	
6	The Root Locus Method	
7	Steady-State Error Effect of Disturbance	
8	Plant Parameter Uncertainty Effect of Measurement Noise Control Constraints	
9	期中考試週 Midterm Exam	
10	Time-Domain Design - Design Specifications, Design by Gain Adjustment	
11	Design by Cascade Compensation Lead and PD Controller Lag and PI Controller, Lead-Lag and PID Controller Tuning PID Controllers and Anti-Windup Schemes	
12	Frequency Response Methods Bode Plots	
13	Frequency Response Methods Nyquist Criterion Relative Stability Relations between Frequency-Domain and Time-Domain Responses	
14	Frequency-Domain Design Design Specifications Design by Gain Adjustment	
15	Lead Compensation Lag Compensation PI Compensation Lead-Lag Compensation Advantages of the Frequency-Domain Approach	
16	State-Space Models Solution of the State Equations	
17	Transfer Function of a State-Space Model State-Space Model of a Transfer Function	
18	期末考試週 Final Exam	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture   ☐ 分組討論Group Discussion   ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous: <u>課堂講授、課後作業、程式模擬</u>

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☐ 問題導向學習(PBL)   ☐ 團體合作學習(TBL)   ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom   ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice   ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching   ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)	10%								
期中考成績 Midterm Exam	30%								
期末考成績 Final Exam	30%								
作業成績 Homework and/or Assignments	30%								
其他 Miscellaneous (MATLAB 程式)	10%								

評量方式補充說明
Grading & Assessments Supplemental instructions

控制系統設計需要使用MATLAB，程式作業外加至多10%至總成績

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

(1) Hassan K. Khalil

Control Systems: An Introduction, Michigan Publishing, 2023

(2) Norman S. Nise,

Control Systems Engineering

8th Ed., John Wiley & Sons, 2017.

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information.
Personal website can be listed here.)

東華e-學院

其他補充說明 (Supplemental instructions)