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## ②图玄束華大學

# 教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	數值分析AA				學年/學期 Academic Year/Semester		114/1
課程名稱(英文) Course Name in English	Numerical Ana	lysis					
科目代碼 Course Code	AM5210AA	系級 Department 碩士 & Year		開課單位 Course-Offering Department	應用數學系		
修別 Type	必修 Required	學分數/時間 Credit(s)/Hour(s)			3.0/3.0		
授課教師 Instructor	/吳建銘						
先修課程 Prerequisite							
		en halt C					

#### 課程描述 Course Description

This course focuses on fundamental numerical methods and advanced iterative approaches for intelligence numerical computation. It will first introduce numerical and symbolic integration, differentiation and iterative approaches respectively for solving hyper-plane fitting, linear systems and nonlinear systems, further addressing on nonlinear function approximation, unconstrained optimizations based on the gradient method, the Newton-Gauss method and the Levenberg-Marquardt method and annealed Kullback-Leibler divergence minimization for solving data clustering, density estimation, independent component analysis, computational self-organization and classification

#### 課程目標 Course Objectives

介紹解決非限制最佳化問題及限制最佳化問題的進階數值方法,並探討在非線性系統、函數近似、整數規劃、及混合整數規劃之相關應用

The course objective is to introduce advanced numerical approaches for unconstrained optimization and constrained optimization and explore applications for solving nonlinear systems, function approximation, integer programming and mixed integer programming.

		課程目標與系專業能
		力相關性
	系專業能力	Correlation between
		Course Objectives
	Basic Learning Outcomes	and Dept.'s
		Education
		Objectives
A	具備專業機率、統計知識與應用分析能力。Have well-founded expertise in probability and	$\cap$
11	statistics, and good analytical ability in solving real problems.	$\cup$
В	具備程式設計與統計計算能力。Have the computer programming and statistical computing	
	skills.	
С	具備學習其它學科的能力,以期能邁向跨領域研究。Be able to study other fields of	
	science so as to conduct interdisciplinary research in the future.	

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	Introduction	
2	Matlab programming	
3	Linear and Nonlinear System Solvin	
4	Line fitting, hyperplane fitting, quadratic-surface fitting	

5	Function approximation					
6	Newton method and Newton-Gauss method					
7	Levenberg-Marquardt metho					
8	Recursive function approximation					
9	期中考試週 Midterm Exam					
10	Differential equation approximation					
11	11 Classification I					
12	Classifiaction II					
13	Kullback-Leibler divergence minimization					
14	Mean field annealing					
15	Clsutering and density function approximatio					
16	Self-organization					
17	Applications					
18	期末考試週 Final Exam					
	教學策略 Teaching Strategies					
✓ 課堂講	授 Lecture	Field Trip				
	教 學 創 新 自 評 Teaching Self-Evaluation					
創新教學(	Innovative Teaching)					
問題導	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						
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 othe	r:					

學期成績計算及多元評量方式 Grading & Assessments									
配分項目	配分比例	多元評量方式 Assessments							
Items	Percentage	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%		<b>~</b>						
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 ()									

評量方式補充說明

Grading & Assessments Supplemental instructions

## 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.)

Numerical mathematics and computing, four Edition, Cheney & Kincaid

Numerical methods with MATLAB: Implementation and application, G. Rechtenwal

## 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.)

http://134.208.26.59/AdvancedNA/2006.htm#1

其他補充說明	(Supplemental	instructions)
	Coupplemental	THOU UCLIONS /