國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	數值分析			學年/學期 Academic Year/Semester	112/1
課程名稱(英文) Course Name in English	Numerical Analysis				
科目代碼 Course Code	AM__71300	系級 Department & Year	博士	開課單位 Course-Offering Department	應用數學系
修別 Type	選修 Elective	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					

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.

	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	具備專業知識及邏輯推理能力。Have well-founded expertise and be capable of logical reasoning.	○
B	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.	●
C	具備獨立思考與解決問題的能力。 Be capable of independent thinking and have the problem-solving skills.	●

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	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 ☑ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous:

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 General Performance	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 (_____)									

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)