教學大綱(Syllabus)-大學部

系務會議通過修訂日期：2008/01/03
updated: 2008/01/31

課程編碼 (course no.)	U007		**學分 (credits)**	3
課程名稱 (course name)	(中) 工程數學(二)			
	(Eng.) Advanced Engineering Mathematics			
開課系所班級 (dept. & year)	大二		**授課教師 (teacher)**	蔡佳霖 副教授 (Associate Prof. Jai-Lin Tsai)
課程類別 (course type)	必修 (Mandatory)	**授課語言 (language)** 中文 (Chinese)	**開課學期 (semester)**	下學期
課程簡述 (course description)	(中)本課程為工程方面相關科系之基礎課程, 因此在材料系列為必修之科目並分為上下兩學期教授,目的在使學生能夠了解如何將工程應用上之實例包含材料,電機,機械,化工,土木等領域以數學,方程式,或模型等方式加以表達並解決相關之問題.			
	(英) This course has helped to pave the way for the present development and will prepare students for the present situation and the future by the modern approach to the areas includes engineering, physics, mathematics and the ideas. Accordingly, students need solid knowledge of basic principles, method, and results and a clear perception of what engineering mathematics is all about, in modeling, solving, interpreting three phases of solving problem.			
課程目標 (course objectives)	此在材料系列為必修之科目並分為上下兩學期教授,目的在使學生能夠了解如何將工程應用上之實例包含材料,電機,機械,化工,土木等領域以數學,方程式,或模型等方式加以表達並解決相關之問題.			
	This course has helped to pave the way for the present development and will prepare students for the present situation and the future by the modern approach to the areas includes engineering, physics, mathematics and the ideas. Accordingly, students need solid knowledge of basic principles, method, and results and a clear perception of what engineering mathematics is all about, in modeling, solving, interpreting three phases of solving problem.			

先修課程(prerequisites)		
課程編碼 (course no.)	課程名稱 (course name)	與課程銜接的重要概念、原理與技能 (relation to the current course)

教學模式 (teaching methodology)	模式 (methodology)	講授 (teaching)	討論/報告 (discussion & report)	實驗/參訪 (exp./fab visit)	遠距/網路教學 (remote/web teaching)	合計 (sum)
	學分分配 (credit distrib.)					
	授課時數分配 (hour distrib.)					

授課進度與內容（週次、單元名稱與內容、習作/考試進度、備註）
(course content and homework/tests schedule)

週次 (week)	單元名稱與內容 (subject and content)	習作/考試進度 (homework and tests)	備註 (remark)
01	Matrix method for linear system		
02	Matrix method for linear system		
03	Matrix method for linear system		
04	Matrix method for linear system		
05	Vector differential Calculus, Grad, Div, Curl	Homework #1	
06	Vector differential Calculus, Grad, Div, Curl		
07	Vector differential Calculus, Grad, Div, Curl		
08	Vector differential Calculus, Grad, Div, Curl		
09	Vector integral Calculus		
10	Midterm examination	Midterm examination	
11	Vector integral Calculus		
12	Vector integral Calculus		
13	Vector integral Calculus		
14	Fourier Series, Integral, Transform	Homework #2	
15	Fourier Series, Integral, Transform		
16	Fourier Series, Integral, Transform		
17	Fourier Series, Integral, Transform		
18	Final examination	Final examination	

學習評量方式
(evaluation)

(1) Homework assignment: 20%
(2) Midterm examination: 40%

(3) Final examination: 40%

作業（Homework）：
作業共兩次，目的在評估學生對課堂講授資料以及同分組報告資料的了解程度，並且培養同學平日課後複習的習慣以及思考問題的能力。

期中考試（Midterm examination）：
目的在了解學生解題及思考之能力。

期末考試（Final examination）：
目的在了解學生解題及思考之能力。

教科書（書名、作者、書局、代理商、說明）
(textbook)

Fundamental of Differential Equations and Boundary Valve Problems, Fourth edition, Author: Nagle, Saff, and Snider, Addison Wesley, 歐亞書局

參考書目（書名、作者、書局、代理商、說明
(other references)

Advanced Engineering Mathematics, 8th edition, Erwin Kreyszig, 歐亞書局

課程教材（教師個人網址請列在本校內之網址。）
(teaching aids & teacher's website)

課本內容及講義

與學系教育目標之關聯性(材料系)
(relation to educational objective of materials engineering department)

1. 提供材料性質、製程與應用及跨領域知識與訓練
   To provide interdisciplinary know-how and training on materials properties, processing, and applications
2. 培育具獨立思考、創新與實作能力之材料科技人才
   To train materials technology students for independent thinking, innovation, and practical skills
3. 培養團隊合作精神與溝通協調整合能力
   To cultivate the spirit of teamwork and the capacity of integrated cooperation
4. 建立多元價值與國際觀
   To inculcate multifarious values and cosmopolitan worldview
5. 強化綠色材料科技教育
   To implement educational programs in eco-materials technology

與學系教育核心能力之關聯性(材料系)
(relation to educational core abilities for materials engineering department)

(A) 運用數學、科學及材料工程知識能力
Ability to apply knowledge of mathematics, science, and materials engineering
(B) 設計與執行材料實驗及分析數據之能力
Ability to design and conduct experiments, as well as analyze data
(C) 執行材料工程實務所需之技術與能力
Ability to use techniques and skills for materials engineering practices
(D) 製程整合及及元件實作之能力
Ability to integrate process and make devices
(E) 溝通協調之能力與團隊合作之精神
Ability to communicate effectively and cultivate the spirit of teamwork
(F) 獨立思考及解決問題之能力
Ability to think independently and solve problems
(G) 培養國際觀及認識綠色材料對全球環境的影響
Cultivation of cosmopolitan worldview and understanding effects of eco-materials on global environment
(H) 終身學習之習慣與能力
Ability to cultivate life-long learning habit
(I) 瞭解材料工程人員的社會責任與專業倫理
Understanding materials engineers' social responsibility and professional ethics

課程內涵達成學系【教育目標】比對資料

授課進度與內容	教育目標				
	目標一 提供材料性質、製程與應用及跨領域知識與訓練	目標二 培育具獨立思考、創新與實作能力之材料科技人才	目標三 培養團隊合作精神與溝通協調整合能力	目標四 建立多元價值與國際觀	目標五 強調綠色材料科技教育
請勾選關聯性☑	☑	☑	☑	☑	☐
Matrix method for linear system	1	1	1	1	0
Matrix method for linear system	1	1	1	1	0
Matrix method for linear system	1	1	1	1	0
Matrix method for linear system	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	0
Vector integral Calculus	1	1	1	1	0
Midterm examination	1	1	1	1	0
Vector integral Calculus	1	1	1	1	0
Vector integral Calculus	1	1	1	1	0
Vector integral Calculus	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	0
Final examination	1	1	1	1	0
總計(%)					

註：
1. 所有必修課均須填寫此表。
2. 矩陣中請填入關聯性； 1 表示相關，0 表示無相關。
3. 學系教育目標項次請依據表1填寫。

課程內涵達成學系【核心能力】比對資料(大學部)

授課進度與內容	核心能力								
	A 運用數學、科學及材料工程知識能力	B 設計與執行材料實驗及分析數據之能力	C 執行材料工程實務所需之技術與能力	D 製程整合及及元件實作之能力	E 溝通協調之能力與團隊合作之精神	F 獨立思考及解決問題之能力	G 培養國際觀及認識綠色材料對全球環境的影響	H 終身學習之習慣與能力	I 瞭解材料工程人員的社會責任與專業倫理
請勾選關聯性☑	☑	☑	☑	☑	☑	☑	☑	☑	☐
Matrix method for linear system	1	1	1	1	1	1	1	1	0
Matrix method for linear system	1	1	1	1	1	1	1	1	0
Matrix method for linear system	1	1	1	1	1	1	1	1	0
Matrix method for linear system	1	1	1	1	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	1	1	1	1	0
Vector differential Calculus, Grad, Div, Curl	1	1	1	1	1	1	1	1	0
Vector integral Calculus	1	1	1	1	1	1	1	1	0
Midterm examination	1	1	1	1	1	1	1	1	0
Vector integral Calculus	1	1	1	1	1	1	1	1	0
Vector integral Calculus	1	1	1	1	1	1	1	1	0
Vector integral Calculus	1	1	1	1	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	1	1	1	1	0
Fourier Series, Integral, Transform	1	1	1	1	1	1	1	1	0
Final examination	1	1	1	1	1	1	1	1	0
總計(%)									

註：
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