教學大綱(Syllabus)-研究所

系務會議通過修訂日期：2007/9/12
updated: 2008/9/1

課程編碼 (course no.)	M059			**學分 (credits)**	3
課程名稱 (course name)	(中) 太陽光電科技導論				
	(Eng.) Introduction to Applied Photovoltaics				
開課系所班級 (dept. & year)	材料科學與工程學系碩士班一年級			**授課教師 (teacher)**	武東星
課程類別 (course type)	選修	**授課語言 (language)**	中文	**開課學期 (semester)**	下學期
課程簡述 (course description)	(中) 介紹太陽電池的基本原理與應用等，並進一步對太陽電池之元件製程與模組發電設計與應用做講解，使學生對太陽光電科技與未來產業發展趨勢有整體性之認識。				
	(Eng.) Photovoltaic Engineering focuses on the manufacture and use of PV modules and the implementation of PV systems for the purpose of powering virtually any electrical load. It can also serve as a basic knowledge for students who need the overall view of photovoltaic industry and technology developments.				
課程目標 (course objectives)	(中) 本課程目標包含跨領域之各項工程知識，但可歸納為五大部份： 1. 元件與系統模組之研發 2. 精密製程、品質控制與可靠度 3. 太陽光電系統設計與實現 4. 能源需求與國家經濟政策 5. 各種再生能源之比較與設置考量				
	(Eng.) This course covers a broad range of engineering tasks and disciplines but it can be summarized into 5 main areas. 1. Device and system research and development. 2. Manufacturing, quality control and reliability. 3. PV system design (computer based), modeling, integration, analysis, implementation, fault diagnosis and monitoring. 4. Policy, financing, marketing, management, consulting, training and education. 5. Using the full range of renewable energy technologies including alternate energy technologies (such as wind, biomass and solar thermal) solar architecture, energy efficient building design and sustainable energy.				

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)
	普通物理	光學
	近代物理	半導體 物理

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.)	3				3
	授課時數分配 (hour distrib.)	3				3

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	Characteristics of Sunlight		
02-03	Semiconductors and P-N Junctions		
04-05	The Behavior of Solar Cells		
06-07	Cell Properties and Design		
08	PV Cell Internconnection and Module Fabrication		
09	Designing Stand Alone and Grid Interactive Photovoltaic Systems		
10	Mid-term Examination		
11	Building Integrated Photovoltaics		
12-14	Specific Purpose Photovoltaic Applications		
15-16	Lab Visiting & Experiment Practice		
17	Economic Issues and Government Policy Issues for Photovoltaics		
18	Final Examination		

學習評量方式
(evaluation)

1. 期中考 (40%)　2. 期末/實習報告 (20%)　3. 期末考 (40%)

教科書（書名、作者、書局、代理商、說明）
(textbook)

Applied Photovoltaics、Wenham Green & Watt、UNSW、*ISBN: 0 86758 909 4*

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

Solar Cells: Operating Principles Technology、Green Martin、UNSW、*ISBN: 0 85823 580 3*

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

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) 特定材料之專業知識
Specialized knowledge in Materials science and Engineering
(B) 策劃及執行專題研究之能力
Ability to plan and execute a research project
(C) 撰寫專業論文之能力
Ability to write journal articles
(D) 創新思考及獨立解決問題之能力
Ability to do innovative thinking and independent problem solving
(E) 跨領域協調整合之能力
Ability to work in an interdisciplinary setting
(F) 國際觀及綠色材料意識
A fine international scope and general concept of eco-material
(G) 領導、管理及規劃之能力
Ability in leadership, management, and organization
(H) 終身自我學習成長之能力
Ability for life-long learning
(I) 學術專業倫理
Professional ethics in Science and Engineering

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	目標二	目標三	目標四	目標五
	提供材料性質、製程與應用及跨領域知識與訓練	培育具獨立思考、創新與實作能力之材料科技人才	培養團隊合作精神與溝通協調整合能力	建立多元價值與國際觀	強調綠色材料科技教育
請勾選關聯性☑	☑	☑	☑☐	☑	☑
Characteristics of Sunlight	1	0	0	0	1
Semiconductors and P-N Junctions	1	1	0	0	0
The Behavior of Solar Cells	1	1	0	0	0
Cell Properties and Design	1	1	0	0	0
PV Cell Internconnection and Module Fabrication	1	1	0	0	1
Designing Stand Alone and Grid Interactive Photovoltaic Systems	1	1	0	0	1
Building Integrated Photovoltaics	1	1	0	0	1
Specific Purpose Photovoltaic Applications	1	1	0	0	1
Lab Visiting & Experiment Practice	1	1	1	0	1
Economic Issues and Government Policy Issues for Photovoltaics	0	0	0	1	1
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(研究所)

授課進度與內容	核心能力								
	A	B	C	D	E	F	G	H	I
	特定材料之專業知識	策劃及執行專題研究之能力	撰寫專業論文之能力	創新思考及獨立解決問題之能力	跨領域協調整合之能力	國際觀及綠色材料意識	領導、管理及規劃之能力	終身自我學習成長之能力	學術專業倫理
請勾選關聯性☑	☑	☐	☐	☑	☑	☑	☐	☐	☐
Characteristics of Sunlight	1	0	0	0	0	1	0	0	0
Semiconductors and P-N Junctions	1	0	0	1	1	0	0	0	0
The Behavior of Solar Cells	1	0	0	1	1	0	0	0	0
Cell Properties and Design	1	0	0	1	1	0	0	0	0
PV Cell Internconnection and Module Fabrication	1	0	0	1	1	1	0	0	0
Designing Stand Alone and Grid Interactive Photovoltaic Systems	1	0	0	1	1	1	0	0	0
Building Integrated Photovoltaics	1	0	0	1	1	1	0	0	0
Specific Purpose Photovoltaic Applications	1	0	0	1	1	1	0	0	0
Lab Visiting & Experiment Practice	1	0	0	1	1	1	0	0	0
Economic Issues and Government Policy Issues for Photovoltaics	0	0	0	1	1	1	0	0	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。