國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	薄膜太陽能電池			學年/學期 Academic Year/Semester	113/2
課程名稱(英文) Course Name in English	Thin-film solar cells				
科目代碼 Course Code	EE__M0210	系級 Department & Year	碩士	開課單位 Course-Offering Department	電機工程學系
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/黃家華				
先修課程 Prerequisite					

課程描述 Course Description

The fundamental concepts and operation principles of thin-film photovoltaics are introduced. The required properties of semiconductor materials for the thin-film photovoltaics are discussed. The technologies of various photovoltaic devices including amorphous Si solar cells, CdTe solar cells, CIGS-based solar cells, dye-sensitized solar cells, organic solar cells, and perovskite solar cells are presented.

課程目標 Course Objectives

The thin-film solar cells are classified. The semiconductor materials and their related properties for various types of solar cells are introduced. In addition, the device structures and the design concepts associated with the device performance are addressed. The deposition techniques of the semiconductors and fabrication processes of thin-film solar modules are highlighted.

	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	培育具備電機電子資訊工程等專業技術研發之能力。To cultivate the research and developing ability of electrical, electronics and information engineering。	●
B	培育系統分析、模擬驗證、實作實現之能力。To cultivate the advanced 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	訓練電機電子資訊專業知識與工程實務相互結合運用之能力。To train the integrate ability between professional EECS knowledge and engineering practice	●
E	落實論文研究之群體討論與團隊合作之互助能力。To fulfill the research ability in thesis by group discussion and teamwork cooperation	○
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，掌握國內外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，具備科技英文閱讀溝通與科技論文寫作之能力。To understand the change of global market and to have the ability of reading, conversation and technical writing 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	Introduction of thin-film solar cells	
2	Classification of thin-film solar cells	
3	Substrates for thin-film solar cells, Cell configurations	
4	Module fabrication	
5	Materials for thin-film solar cells	
6	Operation principles of thin-film solar cells	
7	Dye-sensitized solar cells and organic solar cells	
8	期中考試 Midterm Exam	
9	amorphous Si solar cells	
10	amourphous Si solar cells	
11	CdTe solar cells	
12	CdTe solar cells	
13	CIGS-based solar cells	
14	CIGS-based solar cells	
15	Oral presentation	
16	期末考試 Final Exam	
17	Perovskite solar cells	
18	Perovskite/Si or CIGS tandem solar cells	

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(含出缺席) General Performance (Attendance Record)									
期中考成績 Midterm Exam	35%								
期末考成績 Final Exam	35%								
作業成績 Homework and/or Assignments									
其他 Miscellaneous (專題口頭報告和書面報告)	30%								

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.)

1. “Handbook of Photovoltaic Science and Engineering,” John Wiley & Sons.
2. “The Physics of Solar Cells,” Jenny Nelson, Imperial College Press.
3. “Photovoltaic Materials,” Richard H. Bube, Imperial College Press.

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.)

其他補充說明 (Supplemental instructions)