

課務系統課程大綱格式

課程：能源材料 (Energy Materials)

教師：吳志明

項目	此科目對應之系所課程規畫所欲培養之核心能力 Core capability to be cultivated by this course	權重 (百分比) Percentage
1	運用數學、科學及材料科學與工程知識的能力 The ability to employ the knowledge of mathematics, science, and materials science & engineering.	50
2	設計及執行實驗，以及分析解釋數據的能力 The ability to design and execute experiments, analyze and interpret data.	0
3	執行實驗所需技術、技巧及使用實驗工具解決問題之能力 The ability to employ the techniques and tools that are needed in executing experiments and in solving problems.	0
4	設計工程系統或製程之能力 The ability to design engineering systems or processes.	10
5	有效溝通及團隊合作的能力 The ability to communicate and cooperate in team works.	10
6	發掘、分析及處理問題的能力 The ability to discover, analyze, and solve problems.	10
7	認識當代材料問題，瞭解材料對於環境、社會及全球的影響，並培養持續學習的習慣與能力 The ability to know contemporary materials issues, to realize the influences of materials on the environment, the society, and the globe, and to keep the habit of learning continuously.	10
8	瞭解專業倫理及社會責任 The ability to realize professional ethics and social responsibility.	10

一、課程說明(Course Description)

本課程目的在培養學生對能源材料與環境應用技術的認識，使學生了解能源材料與環境應用等理論及相關技術。課程內容涵蓋五部分，分別為：再生能源與傳統能源、能帶結構、半導體與電子物理特性、太陽能電池材料、壓電材料與晶體結構、奈米能源、環境應用技術與複合式能源系統設計(期中報告)。

二、指定用書(Text Books)

自製講義與筆記

三、參考書籍(References)

自製講義

Reference Books:

1. Energy: Its Use and the Environment, 3th Edition. THOMSON, 2002, Authors: Roger A. Hinrichs and Merlin Kleinbach
2. Electronic Properties of Materials, 4th Springer Rolf E. Hummel
3. Energy Materials, Wiley 2011, Authors : Duncan W. Bruce, Dermot O'Hare, Richard I. Walton
4. Sustainable Energy-Choosing Among Options, Authors: Jefferson W. Tester, Cambridge, MIT Press
5. Renewable Energy-Power for a Sustainable Future, Authors: Godfrey Boyle, Oxford University.
6. Renewable Energy-Power for a Sustainable Future, Oxford University, Godfrey Boyle, Solar photovoltaic.

四、教學方式(Teaching Method)

投影片與手寫黑板

五、教學進度(Syllabus)

本課程之授課內容，主要可分為下列幾點：

1. Introduction to greenhouse effect and the importance of renewable energy
2. The category of energy: energy mechanics, renewable energy and non-renewable energy
3. Band structure, Semiconductor, and Electrical Properties: Fundamental theory
4. Photovoltaic materials: Si based, thin-film based, III-V based solar cell, DSSC.
5. Nano energy and Piezoelectric materials: Piezoelectric properties, noncentrosymmetric and centrosymmetric materials, piezoelectric energy and energy harvesting application, Nanostructured materials, processing, properties, and potential applications in energy related fields.

六、成績考核(Evaluation)

Homework or Quiz and Attendance rate:10%

Mid-term report 20% and Oral Presentation: 20%

Final exam:50%

七、可連結之網頁位址