

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	光伏基础 Fundamentals of Photovoltaics
2.	授课院系 Originating Department	电子电气工程系 Department of Electrical and Electronic Engineering
3.	课程编号 Course Code	EE336
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业核心课 Major Core Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	中英双语 English & Chinese
8.	授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	Aung Ko Ko Kyaw Department of Electrical and Electronic Engineering 755-8801-8531 aung@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	已确定的实验员/助教联系方式 Please list all Tutor/TA(s) 李文辉 Wenhui Li, liwh@sustech.edu.cn
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	25

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	48		16		64

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	半导体器件导论 Introduction to semiconductor devices (EE204)				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	NA				
14. 其它要求修读本课程的学系 Cross-listing Dept.	NA				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

This course is designed for the students who want to take optoelectronic or microelectronic majors and, so they are encouraged to take this course although it is an elective subject. The course aims:

- to give a basic concept of solar spectrum and light
- to understand the operation principles of solar cell
- to learn the fabrication process, characterization, materials and device design of various types of solar cells

16. 预达学习成果 Learning Outcomes

Upon completion of the course, the students will be able to demonstrate:

- An understanding of solar spectrum and light in harvesting solar energy
- An ability to track the solar path to receive the highest power from the sun
- An ability to design and fabricate different types of solar cells
- An ability to test and analyse the performance of solar cells
- An ability to apply the optic theory to improve the efficiency of solar cells
- An understanding of the operation principles of various kinds of solar cells
- A knowledge of various light absorbing materials used in different kinds of solar cells
- A recognition of Shockley–Queisser limit and techniques to overcome the limitation

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Section 1	Introduction (environmental issue, energy demand, overview of photovoltaic technologies, history, status, trend and future) (Week 1)
Section 2	Basic of light and solar spectrum (Week 2)
Section 3	Semiconductor Materials and Their Properties (Week 3-4)
Section 4	Operation Principle of Photovoltaics (Week 5-6)
Section 5	Silicon Solar Cells (Week 7-8)
Section 6	Dye-sensitized Solar Cells (Week 9-10)
Section 7	Organic Solar Cells (Week 11-12)
Section 8	Perovskite Solar Cells (Week 13)
Section 9	Thin Film and other solar cells (Week 14)
Section 10	Light Management in Solar Cells (Week 15)
Section 11	PV Modules and Systems (Week 16)

LAB

Lab1 : Sun position simulation

Lab2 & 3: Fabrication of Organic Solar Cell

Lab 4 : Characterization and Performance Analysis of Organic Solar Cell

Lab 5 : Transfer matrix simulation

Lab 6 & 7: Fabrication of Perovskite Solar Cell

Lab 8 : Characterization and Performance Analysis of Perovskite Solar Cell

18. 教材及其它参考资料 **Textbook and Supplementary Readings**

1. S. M. Sze and Kowk K. Ng, Physics of Semiconductor Devices, Chapter 13 (Photodetectors and solar cells)
2. Lewis Fraas and Larry Partain, Solar Cells and Their Application
3. Angele Reinders, Pierre Verlinden, Wilfried van Sark, Alexandre Freundlich, Photovoltaic Solar Energy: from fundamentals to applications, ISBN 9781118927465
4. www.pveducation.org

课程评估 ASSESSMENT

19. 评估形式 评估时间 占考试总成绩百分比 违纪处罚 备注

Type of Assessment	Time	% of final score	Penalty	Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects	Week 6 and 14	20		
平时作业 Assignments	Every alternate week	20		
期中考试 Mid-Term Test	Week 9	20		
期末考试 Final Exam	Week 17	40		
期末报告 Final Presentation				
其它 (可根据需要改写以上评估方式) Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制 (通过/不通过) Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
 This Course has been approved by the following person or committee of authority