

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	能源半导体器件物理 Semiconductor Physics for Energy Devices
2.	授课院系 Originating Department	机械与能源工程系 Department of Mechanical and Energy Engineering
3.	课程编号 Course Code	ME272
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业基础课 Major Foundational Courses
6.	授课学期 Semester	春季 Spring
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)	陈熹翰, 副教授, 机械与能源工程系 Email: chenxh@sustech.edu.cn Xihan Chen, Associate Professor, Department of Mechanical and Energy Engineering, Email: chenxh@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	30

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				48
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	大学物理下 (PHY106)				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	光电光化学转化原理 (ME371)				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

- 了解固体半导体材料的基本性质，合成方法及表征方法。
Understand the basics of solid and semiconductor, including physical properties, synthesis and characterization
- 了解半导体掺杂的基本概念以及半导体结的物理性质。
Understand the basic principles of doping and junctions
- 了解半导体器件在新能源领域的应用。
Understand the application of semiconductors in renewable energy

16. 预达学习成果 Learning Outcomes

通过该课程的教学使学生了解固体半导体器件的基本原理以及其最新发展状况，对其工作原理和应用有更广泛的理解和认识。提高学生在半导体能源器件系统方向理论知识积累，培养学生的工程分析及设计能力。通过该课程的教学使本科生掌握半导体物理的关键原理，为后续科研工作中专业能力的提升及发展奠定一定的基础。

To enable students to understand the basic principles of solid and semiconductor devices, and the latest development. To have a broader understanding of the scientific principles of solid semiconducting devices and applications. Through the teaching of this course, undergraduate students can master the basic principles and the key technologies for semiconductor systems, lay a certain foundation for the promotion and development of professional ability in the follow-up scientific research work.

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.)

Week1 固体及半导体介绍 Introduction to solid and semiconductors

Week2 固体晶体结构 Crystal Lattices

Week3 晶体生长 Crystal Growth

Week4 原子及电子 Atoms and electrons

Week5 半导体能带结构 Energy Bands in solids

Week6 载流子 Carriers

Week7 费米能级及电导 Fermi-level and conductivity

Week8 期中考试 Mid-term Exam

Week9 非平衡态载流子 Excess Carriers

Week10 非平衡态载流子 Excess Carriers

Week11 p-n 节 p-n junctions

Week12 p-n 节 p-n junctions

Week13 晶体管 transistors

Week14 场效应晶体管 field-effect transistors

Week15 半导体光电子器件 Semiconductor optoelectronic devices

Week16 半导体光电子器件 Semiconductor optoelectronic devices

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

Solid State Electronic Devices by Ben G. Streetman, Sanjay Kumar Banerjee

课程评估 ASSESSMENT				
19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance	Every Lecture	10		
课堂表现 Class Performance				
小测验 Quiz	Every 3 weeks	10		

课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test	8 th Week	40		
期末考试 Final Exam	Final Week	40		
期末报告 Final Report				
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

