

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.

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| 1. | 课程名称 Course Title | 能源材料学 Introduction to Energy Materials | | | | |
| 2. | 授课院系 Originating Department | 材料科学与工程系 Department of Materials Science and Engineering | | | | |
| 3. | 课程编号 Course Code | MSE334 | | | | |
| 4. | 课程学分 Credit Value | 2 | | | | |
| 5. | 课程类别 Course Type | 专业核心课 Major Core Courses | | | | |
| 6. | 授课学期 Semester | 春季 Spring | | | | |
| 7. | 授课语言 Teaching Language | 英文 English | | | | |
| 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) | 梁永晔, 教授, 材料科学与工程系 Dr. Yongye Liang, Associate Professor, Dept. of Materials Science and Engineering liangyy@sustc.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) | | | | | |
| 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 | 32 | | | | 32 |

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| 12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements | MSE001 材料科学与工程基础 Fundamentals of Materials Science and Engineering MSE336 能源材料学实验 Experiments for Energy Materials (同修课) |
| 13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite | |
| 14. 其它要求修读本课程的学系 Cross-listing Dept. | 化学系 CH、物理系 PHY、电子与电气工程系 EE |

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

本课程主要介绍应用于能源采集、转换以及存储的材料系统的基本概念、原理。课程还会介绍能源材料的研究和发展现状，新能源材料的主要任务及面临的关键课题，新能源材料研究未来发展前景。

This course aims to introduce the basic concepts and principles of a variety of materials applied in energy harvesting, conversion and storage, such as solar cells, fuel cells, and batteries. The state-of-art research and development of new energy materials, as well as the major challenges facing energy materials and new perspectives of development related to new energy materials, will be covered.

16. **预达学习成果 Learning Outcomes**

通过本课程的学习，使学生认识并理解材料相关的能源问题。学生可以熟悉有关新能源材料的基本类型，掌握新能源材料的基本特征和基本性质。课程将可以帮助学生建立识别、制定和解决能源材料问题的能力。了解新能源材料在国民经济中的重要地位和发展前景，了解新能源材料在现代人们生活中的广泛应用，了解新能源材料的基本制备方法以及一些常见与新能源材料有关的装备和器件的工作原理。

Students will know and understand contemporary issues pertaining to energy from material perspectives. Students will be familiar with the basic types of new energy materials, master the basic characteristics and properties of new energy materials. Students will develop the ability to identify, formulate and solve simple to complex problems of energy materials.

pertaining to the energy, environment and society from global perspectives.

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 Energy general & solar energy (2 Credit hours)/能源常识与太阳能
 Week2 Solar cells: Fundamentals(2 hours)/太阳能电池常识
 Week3 Solar cells: Crystalline solar cells (2 Credit hours)/太阳能电池：晶体电池
 Week4 Solar cells: Thin film and next generation approaches (2 Credit hours)/太阳能电池：薄膜与下一代技术
 Week5 Photosynthesis(2 Credit hours)/光合成
 Week6 Solar fuel (2 Credit hours)/太阳燃料
 Week7 Biofuel (2 Credit hours)/生物燃料
 Week8 Midterm (2 Credit hours)/期中考试
 Week9 Hydrogen energy (2 Credit hours)/氢能
 Week10 Fuel cells (2 Credit hours)/燃料电池
 Week11 Battery fundamentals (2 Credit hours)/电池常识
 Week12 Batteries: Lithium ion-1 (2 Credit hours)/电池：锂离子-1
 Week13 Batteries: Lithium ion-2 (2 Credit hours) /电池：锂离子-2
 Week14 Batteries: Beyond lithium (2 Credit hours) /电池：非锂离子
 Week15 Supercapacitors (2 Credit hours) /超级电容器
 Week16 Recent advances on batteries and supercapacitors (2 Credit hours)/电池与超级电容器最新进展

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

指定教材：

[1] Fundamentals of Materials for Energy and Environmental Sustainability, David S. Ginley and David Cahen. 2011, Cambridge University Press. ;

推荐参考资料：

[1] 新能源材料：基础与应用. 艾德生, 高喆编著. 北京:化学工业出版社, 2010.

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 | | 5 | | |
| 课堂表现 Class Performance | | | | |
| 小测验 Quiz | | 5 | | |
| 课程项目 Projects | | | | |
| 平时作业 Assignments | | 30 | | |
| 期中考试 Mid-Term Test | | 30 | | |
| 期末考试 Final Exam | | 30 | | |
| 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