

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 | 陶瓷材料 Ceramic 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 | MSE317 |
| 4. | 课程学分 Credit Value | 3 |
| 5. | 课程类别 Course Type | 专业核心课 major-core Course |
| 6. | 授课学期 Semester | 秋季 Fall |
| 7. | 授课语言 Teaching Language | 英语 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) | 任富增 助理教授, Dr. Ren 材料科学与工程系, Department of Materials Science and Engineering renfz@sustc.edu.cn; 88018995 |
| 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 | 48 | | | | 48 |
| 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 | | | | |
| 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. | | | | | |

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

通过学习本课程，使学生理解陶瓷材料（含结构陶瓷和功能陶瓷）的微观结构-加工工艺-性能-实际工程应用之间的关系，掌握晶体/玻璃的结构、相图、以及表面、界面、晶界的基本知识，熟悉陶瓷材料的加工制备方法和烧结原理，掌握陶瓷材料力学、光学、热学、电学、磁学以及生物学性能以及在工程实际中的具体应用，培养学生设计和开发新型陶瓷材料的能力。

This course is designed to deliver the basic principles and understanding of Structure-Processing-Properties-Applications relations in both structural and functional ceramics;

Knowledge of crystal/glass structures, phase diagrams, surface, interface and grain boundaries; the production of ceramic raw materials including powders, whiskers, platelets, fibers and single crystals will be demonstrated;

Processing approach (Forming, shaping and sintering); Mechanical, thermal, optical, electrical (dielectric, piezoelectric, ferroelectric), magnetic (ferromagnetic) and biological properties of ceramic materials and practical applications of both traditional and advanced ceramics in modern industry will be illustrated;

This course will also help to foster the students' ability to design new ceramic materials for engineering applications.

16. 预达学习成果 Learning Outcomes

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.)

Course Contents:

1. Introduction to ceramic materials; (2 Credit hours)
2. Crystal structure of ceramics; (4 Credit hours)
3. Structure of glass; (4 Credit hours)
4. Point defects in ceramics; (4 Credit hours)
5. Planar defects in Ceramics (Surface, interfaces, grain boundaries and phase boundaries); (4 Credit hours)
6. Equilibrium phase diagrams of ceramics; (4 Credit hours)
7. Processing of ceramic materials; (4 Credit hours)
8. Sintering and grain growth; (2 Credit hours)
9. Forming and shaping of glass; (2 Credit hours)
10. Mechanical properties of ceramic materials; (4 Credit hours)
11. Thermal properties of ceramic materials; (4 Credit hours)
12. Optical properties of ceramic materials; (2 Credit hours)
13. Electrical properties of ceramic materials (including dielectric, piezoelectric, and ferroelectric); (4 Credit hours)
14. Magnetic properties of ceramic materials; (2 Credit hours)
15. Biological properties and applications of ceramic materials; (2 Credit hours)

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

Textbook: Rolf E. Hummel, Electronic Properties of Materials, 4th Edition, 2011

Supplemental reference textbook: Laszlo Solymar et al., Electrical Properties of Materials, 9th Edition, 2014 (earlier edition is acceptable)

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 | | 15 | | |
| 课堂表现 Class Performance | | | | |
| 小测验 Quiz | | 10 | | |
| 课程项目 Projects | | | | |

| | | | | |
|---|--|----|--|--|
| 平时作业 Assignments | | 20 | | |
| 期中考试 Mid-Term Test | | 30 | | |
| 期末考试 Final Exam | | | | |
| 期末报告 Final Presentation | | 25 | | |
| 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**

| |
|---|
| <input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading <input type="checkbox"/> 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

| |
|--|
| |
|--|

