

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	先进材料表征技术 Advanced Materials Characterization Techniques				
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	MSE403				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major-Elective Course				
6.	授课学期 Semester	春季 Spring semester				
7.	授课语言 Teaching Language	中英双语 Bilingual				
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，材料科学与工程系 Dr. Fuzeng Ren, Assistant Professor, Dept. of Materials Science and Engineering, SUSTC 0755-88018995 renfz@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	48	0	0	0	48

12. 先修课程、其它学习要求
Pre-requisites or Other Academic Requirements

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**

This course is to provide advanced knowledge and practical operations of advanced XRD, scanning electron microscopy, transmission electron microscopy, XPS and atomic force microscopy and a variety of other characterization methods to explore the structure and properties of materials. The main purpose is to enable students to master the test methods of material analysis, to understand the basic structure, working principle of a variety of analytical instruments, and applications of analytical instruments on the material characterization. This is useful for materials science research.

16. 预达学习成果 **Learning Outcomes**

Understand the background knowledge of several commonly used materials characterization techniques. Master the basic operations of several analytical instruments on the material characterization

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.)

- Lecture 1-2. X-Ray Diffraction - Principles and practice (6 hours)
- Lecture 3. Scanning Electron Microscopy- Imaging and Analysis (3 hours)
- Lecture 4. Transmission Electron Microscopy - Basics (3 hours)
- Lecture 5. Transmission Electron Microscopy - Diffraction (3 hours)
- Lecture 6. Transmission Electron Microscopy - Imaging (3 hours)
- Lecture 7. Transmission Electron Microscopy - Spectrometry (3 hours)
- Lecture 8. X-ray photoelectron spectroscopy (XPS) (3 hours)
- Lecture 9. Secondary ion mass spectrometry (SIMS) (3 hours)
- Lecture 10. Vibrational Spectroscopy (FTIR and Raman) (3 hours)
- Lecture 11. Scanning tunneling and Atomic Force Microscopy (STM & AFM) (3 hours)
- Lecture 12. Mechanical Testing at small scales (FIB and Nanoindentation) (3 hours)

Lecture 13. Thermal Analysis (TGA, DTA and DSC) (3 hours)

Lecture 14. Fluorescence and Confocal Microscopy (3 hours)

Lecture 15. High Resolution Micro-CT in Biomedical Applications (3 hours)

Lecture 16. Open Topics (3 hours)

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

No textbook;

Supplementary readings including:

David B. Williams, C. Barry Carter. Transmission Electron Microscopy—A textbook for Materials Science. Second Edition

Stephen J. Pennycook, Peter D. Nellist. Scanning Transmission Electron Microscopy, Springer-Verlag New York Inc.; 2011 edition (2011/3/22)

Peter Vandenabeele. Practical Raman Spectroscopy: An Introduction, Wiley; 1 edition (2013/9/10)

References: Notes handed out by lectures

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		10		
课堂表现 Class Performance		0		
小测验 Quiz		15		
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		0		
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**



- 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

