

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	材料基因组学 Material genomics				
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	MSE341				
4.	课程学分 Credit Value	3 Three				
5.	课程类别 Course Type	专业选修课 Major Elective Courses (请保留相应选项 Please only keep the relevant information)				
6.	授课学期 Semester	春季 Spring				
7.	授课语言 Teaching Language	英文 English (请保留相应选项 Please only keep the relevant information)				
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)	项晓东、材料科学与工程系、电话: 15800899229。 X. D. Xiang、Department of Materials Science and Engineering、Tel: 15800899229。				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	助教联系方式 Please list all Tutor/TA(s) 李清绮: 15813704300 (请保留相应选项 Please only keep the relevant information)				
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	42	6			48

<p>12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements</p>	<p>PHY105B 大学物理 B（下）、固体物理、电动力学、光学 PHY105B college physics, solid state physics, electrodynamics, optics</p>
<p>13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite</p>	<p>高等固体物理，统计物理 Advanced solid state physics, statistical physics</p>
<p>14. 其它要求修读本课程的学系 Cross-listing Dept.</p>	<p>物理，化学 Physics, Chemistry</p>

教学大纲及教学日历 SYLLABUS

15. 教学目标 **Course Objectives**

1. 了解材料基因组学的基本概念和核心思想，对材料基因组学有基本认识。
 2. 了解基于连续和分立掩膜技术的高通量离子束溅射、热蒸发、磁控溅射、等离子体增强化学气相沉积技术，以及基于材料基因组学思想的电、光、磁、热等性质的高通量表征技术。
 3. 理解并掌握利用材料基因组学实现材料高通量筛选的基本实验手段。
 4. 通过英语教学，培养学生的专业英语能力，掌握课程核心词汇，能够阅读英语专业文献。
 5. 介绍材料基因组学的发展现状和前沿领域，培养学生自主学习和终身学习的意识。
1. Understand the basic concepts and core ideas of material genomics, and have a basic understanding of material genomics.
 2. Understand high-throughput ion beam sputtering, thermal evaporation, magnetron sputtering, plasma-enhanced chemical vapor deposition, based on continuous and discrete masking techniques. Also understand electrical, optical, magnetic, and thermal properties based on high-throughput characterization technology of material genomics.
 3. Understand and master the basic experimental methods of material genomics for high-throughput screening.
 4. Through English teaching, students can cultivate their professional English ability, master the core vocabulary of the course, and read English professional literature.
 5. This course introduces the development status and frontier fields of material genomics, and cultivates students' consciousness of independent learning and lifelong learning.

16. 预达学习成果 **Learning Outcomes**

1. 掌握材料科学与工程专业的的基础理论知识，并能将其用于解决材料复杂工程问题的能力。
2. 具有综合运用材料科学与工程专业知识，分析材料复杂工程问题的能力。具有开发、选择与使用现代专业检测技术和设备，分析材料专业复杂工程问题的能力，并能够理解其局限性。
3. 能够熟练应用外语阅读专业文献资料，撰写报告和陈述发言，具有国际视野和跨文化交流

能力。

4. 对自我探索和学习的必要性有正确认识，具有自主学习和终身学习的意识。

1. Master the basic theoretical knowledge of material science and engineering, and be able to use it to solve complex engineering problems of materials.

2. Ability to apply material science and engineering expertise to analyze complex engineering problems. Ability to develop, select and use modern professional testing techniques and equipment to analyze complex engineering problems of material major and to understand their limitations.

3. Proficient in reading professional literature in a foreign language, writing reports and statements and have an international perspective and cross-cultural communication skills.

4. Have a correct understanding of the necessity of self-exploration and learning, also have the consciousness of independent learning and lifelong learning.

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.)

Class time	weekly	credit hours	content of courses
1	1	3	introduction(1) Material gene map
2	2	3	introduction (2) Material genetic engineering
3	3	3	Preparation of material gene chip (1)
4	4	3	Preparation of material gene chip (2)
5	5	3	Overview of high throughput optical characterization techniques
6	6	3	The interaction of light with matter(1)

7	7	3	The interaction of light with matter(2)
8-9	8-9	6	interim report
10	10	3	Elliptical polarization technique
11	11	3	Magneto-optic Kerr technique
12	12	3	High through-put thermal characterization
13	13	3	High through-put mechanical characterization
14	14	3	X-ray and high through-put characterization
15	15	3	Synchrotron radiation and neutron technology
16	16	3	Artificial intelligence and material genomics

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

- (1) 项晓东论文集. Collection of Xiang Xiaodong's essays
- (2) 材料基因组论文. Materials genome paper
- (3) 固体光谱学, 方容川, 2003, 中国科学技术大学出版社. Solid State Spectroscopy
- (4) Handbook of Applied Solid State Spectroscopy, D.R. Vij, 2006, Springer.
- (5) 固体物理导论, 基泰尔, 2005, 化学工业出版社. Introduction to Solid State Physics Charles Kittel
- (6) Elements of Modern X-ray Physics, Second Edition, Jens Als-Nielsen, 2011, Wiley.
- (7) An Introduction to Synchrotron Radiation: Techniques and Applications, Willmott P., 2011, John Wiley & Sons, Ltd.

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	每次 every time	5		
课堂表现 Class Performance	每次 every time	5		
小测验 Quiz				
课程项目 Projects	第八周 eighth week	30		
平时作业 Assignments	每次 every time	10		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation	考试周 exam week	50		
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				

University

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

田颜清, 程鑫, 张璧

SUSTech