

## 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.	<b>课程名称 Course Title</b>	材料科学与工程高等实验 II Advanced Experiments for Materials Science and Engineering II
2.	<b>授课院系 Originating Department</b>	材料科学与工程系 Department of Materials Science and Engineering
3.	<b>课程编号 Course Code</b>	MSE346
4.	<b>课程学分 Credit Value</b>	1
5.	<b>课程类别 Course Type</b>	专业基础课 Major Foundational Courses
6.	<b>授课学期 Semester</b>	春季 Spring
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>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 &amp; Contact (For team teaching, please list all instructors)</b>	章剑波, 材料科学与工程系, 电子邮箱: zhangjb@sustech.edu.cn 李艳艳, 材料科学与工程系, 电子邮箱: liyy@sustech.edu.cn 李慧丽, 材料科学与工程系, 电子邮箱: lihl@sustech.edu.cn 王海鸥, 材料科学与工程系, 电子邮箱: wangho@sustech.edu.cn Zhang Jianbo, Department of MSE, Email: zhangjb@sustech.edu.cn Li Yanyan, Department of MSE, Email: liyy@sustech.edu.cn Li Huili, Department of MSE, Email: lihl@sustech.edu.cn Wang Haiou, Department of MSE, Email: wangho@sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	无 NA
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	无 NA

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours			32		32
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 MSE002 材料科学与工程基础实验 MSE 001 Fundamentals of Materials Science and Engineering MSE 002 Experiments for 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	无 NA				
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

《材料科学与工程高等实验 II》是材料科学与工程专业开设的专业基础实验课程。该课程以材料的制备与加工为核心，包括金属材料的表面强化处理、半导体薄膜制备与器件、数控加工设备搭建和材料加工等 3 个综合性实验。通过这些实验，学生将掌握表面热处理和涂层技术、半导体薄膜沉积技术、数控加工技术等材料先进制备和加工方法，并应用这些技术和方法设计得到相应的器件和产品。同时，通过综合性实验，培养学生运用科学的方法解决材料复杂工程问题能力；通过双语教学，英文文献资料阅读、报告撰写和陈述发言，培养学生国际视野和跨文化交流能力。

“Advanced Experiments for Materials Science and Engineering II” is a professional basic experiment course for the major of materials science and engineering. This course focuses on the preparation and processing of materials, including three comprehensive experiments: surface strengthening treatment of metal materials, semiconductor film preparation and devices, construction of numerical control machining equipment and material processing. Through these experiments, students will master advanced materials preparation and processing methods, such as surface heat treatment and coating techniques, deposition techniques of semiconductor films, numerical control machining. The corresponding devices and products are designed by using these technologies and methods. At the same time, through comprehensive experiments, students are trained to use scientific methods to solve complex engineering problems of materials. Through bilingual teaching, English literature reading, and report writing and presentation, students can develop international vision and cross-cultural communication skills.

#### 16. 预达学习成果 Learning Outcomes

1. 掌握表面热处理和涂层技术、半导体薄膜沉积技术、数控加工技术等材料先进制备和加工方法。
2. 掌握通过材料制备和加工获得具有特定性能和功能的材料和器件的基本方法。
3. 培养运用科学的方法解决科学和复杂工程问题的能力。
4. 通过中英双语教学，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. 在分组实验中，能够有效地表达和交流，合作完成实验。
6. 能够理解并遵守实验安全、环保等相关实验规定，遵守相应的实验操作规范。

1. Master advanced materials preparation and processing methods, such as surface heat treatment and coating technology, semiconductor film deposition technology and numerical control processing technology.

2. Master the basic methods of obtaining materials and devices with specific properties and functions through material preparation and processing.
3. Cultivate the ability to use scientific methods to solve scientific and complex engineering problems.
4. Through bilingual teaching in Chinese and English, students can develop their professional English ability, master the core vocabulary of the course, and be able to read English literature.
5. Be able to express and communicate effectively in group experiments, and cooperate to complete the experiments.
6. Be able to understand and abide by experimental safety, environmental protection and other relevant experimental regulations, and comply with the corresponding experimental operation specifications.

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.)**

实验一：材料表面热处理和表面涂覆涂层技术及性能表征（8学时）

Surface heat treatment and coating of materials and property characterization (8 credit hours)

主要内容：

- 1、了解常见表面强化方法；
- 2、金属表面渗碳实验；
- 3、金属表面涂层实验；
- 4、加工制备出相应产品，并进行性能表征。

Contents:

1. Understand common surface strengthening methods;
2. Carburizing experiment on metal surface;
3. Coating experiment on metal surface;
4. processing and preparation of the corresponding products, and performance characterization.

实验二：半导体导电薄膜的制备及性能表征（12学时）

Preparation and characterization of semiconductor conductive film (12 credit hours)

主要内容：

- 1、掌握半导体导电薄膜及导电原理；
- 2、掌握不同导电薄膜的制备方法；
- 3、设计制备工艺，制备半导体导电薄膜及性能表征。

Contents:

1. Master the composition and conduction principle of semiconductor conductive film;
2. Master the preparation methods of different conductive films;
3. Design the preparation process, prepare the semiconductor conductive film and characterize its performance.

实验三：数控精密雕刻机组装和材料加工（12学时）

Assembly of precision engraving machine and material machining (12 credit hours)

主要内容：

- 1、了解数控加工基础；
- 2、初步掌握加工设备的结构和组装；
- 3、学习工业加工软件和设计软件；
- 4、利用所学知识按要求加工材料。

Contents:

1. To understand the basics of numerical control machining;
2. To preliminarily master the assembly of processing equipment;
3. To learn industrial processing software and design software;
4. To process materials as required.

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

自编实验讲义  
Self-designed experimental notes

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		15		
实验报告 Lab Reports		40		
实验操作 Lab Operation		40		
期末考试 Final Exam				

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