

## 课程大纲 COURSE SYLLABUS

1.	<b>课程代码/名称 Course Code/Title</b>	MSE5032, 材料表面与界面 <b>Surface and Interface of Materials</b>
2.	<b>课程性质 Compulsory/Elective</b>	专业核心课 <b>MSE Compulsory Course</b>
3.	<b>课程学分/学时 Course Credit/Hours</b>	3 学分/48 学时 <b>3 Credit/48 Hours</b>
4.	<b>授课语言 Teaching Language</b>	英文 <b>English</b>
5.	<b>授课教师 Instructor(s)</b>	叶飞 <b>Ye Fei</b>
6.	<b>是否面向本科生开放 Open undergraduates or not</b> to	是 <b>Yes</b>
7.	<b>先修要求 Pre-requisites</b>	无
8.	<b>教学目标 Course Objectives</b>	
	<p>本课程主要讲授材料表面与界面相关基础知识及其近期研究进展，具体包括液体表面、固体表面、固-液界面、固-固界面。介绍了典型材料中的界面，包括金属材料表面、无机非金属材料表面、高分子材料表面、复合材料界面。此外，本课程将介绍界面设计中常用的合成方法，包括分子自组装、物理/化学气相沉积，原子层沉积、分子层沉积等。学生通过本课程学习将掌握各种材料表面与界面的结构和性质及其基本研究方法，为柔性电子、光电器件、电池、催化、复合材料、生物材料等表面与界面相关领域的研究工作提供理论和实验基础。</p> <p>This course mainly covers the basic knowledge and recent research progress of material surface and interface, including liquid surface, solid surface, solid-liquid interface, solid-solid interface. The interfaces of typical materials are introduced, including surface of metal material, surface interface of inorganic nonmetallic material, surface interface of polymer material and composite material. In addition, this course will introduce common synthesis methods used in interface design, including molecular self-assembly, physical/chemical vapor deposition, atomic layer deposition, molecular layer deposition, etc. Through this course, students will master the structure and properties of various materials' surfaces and interfaces and their basic research methods, which will provide theoretical and experimental basis for the research of flexible electronics, optoelectronic devices, batteries, catalysis, composite materials, biological materials and other surface and interface related fields.</p>	
9.	<b>教学方法 Teaching Methods</b>	
	<p>本课程着重强调学科交叉教学。比如，深入讨论不同物理概念之间的联系，或同一物理概念在不同领域的意义关联和差别。课程内容将根据学生的研究背景和兴趣动态调整，鼓励学生积极参与文献阅读、综述和汇报。</p> <p>This course will emphasize interdisciplinary teaching. For example, discussing connections between different concepts, and the different roles of one concept in varied contexts. Lectures will be carefully chosen based on the research backgrounds and interests of students. Students will actively participate in literature reviews and topic presentations.</p>	
10.	<b>教学内容 Course Contents</b>	
	(如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)	
	<b>Section 1</b>	Introduction 引言

	<b>Section 2</b>	Basic Concepts 基本概念
	<b>Section 3</b>	Liquid Surface 液体表面
	<b>Section 4</b>	Solid-Gas Interface 固-气界面
	<b>Section 5</b>	Solid-Liquid Interface 固-液界面
	<b>Section 6</b>	Midterm Presentation 期中文献综述和汇报
	<b>Section 7</b>	Homophase Solid-Solid Interface 同相固-固界面
	<b>Section 8</b>	Heterophase Solid-Solid Interface 异相固-固界面
	<b>Section 9</b>	Experimental Characterization of Surfaces and Interfaces 表面与界面的实验表征
	<b>Section 10</b>	Surfaces and Interfaces in Typical Materials 典型材料中的表面与界面
<b>11.</b>	<b>课程考核</b> <b>Course Assessment</b>	
	课后作业/出勤 20%；期中文献综述和汇报 30%；期末考试 50% Homework/Attendance 20%; Midterm Presentation 30%; Final Exam 50%	
<b>12.</b>	<b>教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
	教材 Textbook J. M. Howe, Interfaces in Materials, John Wiley & Sons, 1997.	
	参考书 Supplementary readings 胡福增, 陈国荣, 杜永娟, 材料表界面 (第二版), 华东理工大学出版社, 2008 Intermolecular and Surface Forces. Israelachvili, J.N., 3rd ed. 2011 Hans Lüth, Solid Surfaces, Interfaces and Thin Films, Springer, 2014.	