

上海交通大学研究生课程开设申请表

New Graduate Course Application Form, SJTU

课程基本信息 Basic Information				
*课程名称 Course Name	(中文 Chinese) 材料的微纳力学表征			
	(英文 English) Micro-/Nano-Mechanical Characterization of Materials			
*学分 Credits	2	*学时 Teaching Hours	32 (1 学分≥16 课时)	
*开课学期 Semester	春季学期 Spring	*是否跨学期 Cross-semester?	否 No	跨 Spanning over 一个学期 Semesters (含夏季学期)。
*课程性质 Course Category	专业课 Specialized Course	*课程分类 Course Type	全日制课程 For full-time students	
*授课语言 Instruction Language	中文 Chinese	主要授课方式 Teaching Method	课堂教学 In class teaching	
*成绩类型 Grade	等第制 Letter grading	主要考核方式 Exam Method	论文 Essay	
*开课院系 School	材料科学与工程学院 School of Materials Science and Engineering			
所属学科 Subject	材料科学与工程 Materials Science and Engineering			
负责教师 Person in charge	姓名 Name	工号 ID	单位 School	联系方式 E-mail
	郭强 GUO Qiang		材料科学与工程学院 School of Materials Science and Engineering	guoq@sju.edu.cn
课程扩展信息 Extended Information				
*课程简介 (中文) Course Description	<p>(分段概述课程定位、教学目标、主要内容、先修课程等；不少于 200 字。)</p> <p>随着材料制备技术水平的提升，低维度（纳米颗粒、纳米线、纳米管、纳米带等）和多相跨尺度（宏观-微观-介观-纳观）结构的新材料不断出现。微纳力学表征技术使得低维纳米材料的力学行为的探索成为可能，也能够用于研究薄膜和宏观块体材料中特定局域结构的力学性能响应机理。在材料科学与工程专业本科阶段所学《材料科学基础》、《材料力学行为》和《材料组织结构表征》等专业课程的基础上，针对材料相关专业的硕、博新生开设此课程。通过本课程学习，学生将能够掌握微纳力学表征相关的基本原理，并能够运用微纳力学表征方法解决科学研究中的问题。</p> <p>课程将重点依次介绍微纳力学表征相关的基本原理、不同的微纳力学表征方法和特点，以及不同微纳力学表征方法在新材料研究中应用的最新进展。最后，基于实验室研究平台，开展纳米压痕和电镜中原位微纳力学表征的实验演示和上机操作的教学。</p>			
*课程简介 (English) Course Description	<p>(须与中文一致，翻译请力求信达雅。)</p> <p>With the improvement of material preparation technology, new materials with low-dimensional (nanoparticles, nanowires, nanotubes, nanoribbons, etc.) and multi-phase multi-scale (macro-micro-meso-nano) structures have emerged in science and industry. Micro-nano mechanical characterization technology makes it possible to explore the mechanical behavior of low-dimensional nanomaterials, and can also be used to study the mechanical response of specific structures in thin films and macroscopic bulk materials. On the basis of courses such as Fundamentals of Materials Science, Mechanical Behavior of Material and Characterization of Material Microstructure, which were learned at the undergraduate level, this course is offered for master and doctoral freshmen in material-related majors. Through the study of this course, students will not only be able to master the basic principles of micro- and nano-mechanical characterization, but also be able to solve problems in practical scientific research by these characterization approaches.</p> <p>The course will focus on the basic principles of micro-nano mechanical characterization, different characteristics of micro-nano mechanical characterization methods, and the latest</p>			

	progress in the application of different micro- and nano-mechanical characterization methods in the research of new materials. Finally, based on the laboratory research platform, the experimental demonstration and self-operation about nanoindentation and in-situ micro-nano mechanical characterization will be carried out.																																																																				
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*课程要求 (中文) Requirements	<p>(课程考核方式、考核标准等; 不少于 50 字)</p> <ol style="list-style-type: none"> 1、平时成绩 40%: 不随意迟到早退, 缺课, 积极参与课堂互动和课堂测验, 按时完成作业。 2、期末大作业 60%: 每位同学可结合自己的研究课题或感兴趣的研究方向, 充分调研文献, 写一个微纳力学表征在该领域研究进展的读书报告。 			
*课程要求 (English) Requirements	<p>(须与中文一致, 翻译请力求信达雅。)</p> <ol style="list-style-type: none"> 1. Usual performance: 40% of the final grade, including attendance and participation in class discussions and quizzes, and the timely submission of homework; 2. Final assignment: 60% of the final grade, including extensive literature research, and writing a report on the research progress of micro- and nano-mechanical characterization in combination with your own research project or research area of interest 			
*课程资源 (中文) Resources	<p>(教材、教参、网站资料等。)</p> <ol style="list-style-type: none"> 1. Anthony C. Fischer-Cripps, Nanoindentation, Third Edition, Springer, New York, 2011. 2. Atul Tiwari, Sridhar Natarajan, Applied Nanoindentation in Advanced Materials, Wiley, 2017. 3. Fuqian Yang, James C.M. Li, Micro and Nano Mechanical Testing of Materials and Devices, Springer, New York, 2008. 4. Haidou Wang, Lina Zhu, Binshi Xu, Residual Stresses and Nanoindentation Testing of Films and Coatings, Science Press, Springer, Beijing, 2018. 5. 王海斗, 朱丽娜, 徐滨士. 纳米压痕技术检测残余应力, 科学出版社, 2016. 6. 张泰华. 微纳米力学测试技术——仪器化压入的测量、分析、应用及其标准化, 科学出版社, 2013. 7. 张泰华. 微纳米力学测试技术及其应用, 机械工业出版社, 2005. 			
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