

# 上海交通大学研究生专业课程信息收集表

## Information Form for SJTU Graduate Profession Courses

课程基本信息 Basic Information				
<b>*课程名称</b> Course Name	(中文 Chinese) 先进连接技术			
	(英文 English) Advanced Joining Technologies			
<b>*学分</b> Credits	2	<b>*学时</b> Teaching Hours	32 (1 学分=16 课时)	
<b>*开课学期</b> Semester	春季学期 Spring	<b>*是否跨学期</b> Cross-semester?	否 No	跨 Spanning over 一个学期 Semesters (含夏季学期)。
<b>*课程类型</b> Course Type	专业选修课 Program Elective Course	<b>*课程分类</b> Course Type	全日制课程 For full-time students	
<b>*课程性质</b> Course Category	专业课 Specialized Course	课程层次 Targeting Students	硕博共用 All graduates	
<b>*授课语言</b> Instruction Language	中文 Chinese	主要授课方式 Teaching Method	课堂教学 In class teaching	
<b>*成绩类型</b> Grade	等第制 Letter grading	主要考核方式 Exam Method	论文 Essay	
<b>*开课院系</b> School	材料科学与工程学院			
所属学科 Subject	材料加工工程			
<b>负责教师</b> Person in charge	姓名 Name	工号 ID	单位 School	联系方式 E-mail
	唐新华		材料学院	xhtang@sjtu.edu.cn
课程扩展信息 Extended Information				
<b>*课程简介</b> (中文) Course Description	(分段概述课程定位、教学目标、主要教学内容、先修课程等；不少于 200 字。)			
	<p>随着科学的进步和技术的发展，材料连接技术日新月异，许多前沿技术在材料连接中得到应用，催生了许多新的连接方法与技术。“先进连接技术”是一门介绍国内外先进连接技术的课程。内容主要涉及近年来在材料科学与工程、数字化、传感器、信息与智能控制等领域前沿新技术的推动下，从传统连接技术衍生出来，并在汽车、船舶、航空航天、核电等装备制造领域获得应用的新型高效连接技术，其中包括但不限于：高效多丝电弧焊、窄间隙焊、超窄间隙激光焊、搅拌摩擦焊、熔钎焊、电弧螺柱焊、瞬态液相扩散焊、电磁脉冲焊等，主要介绍它们的技术原理、特点、以及国内外研究热点、应用现状和技术发展趋势，使学生对先进制造领域材料连接技术的发展现状有一个新的认识高度。本课程是一门以介绍先进连接技术为主要内容的多学科交叉的综合课程，需有本科阶段的材料科学基础、材料加工原理以及材料连接模块课程作为预修课程，适合材料科学与工程专业的硕士、博士研究生作为专业选修课学习，为丰富其在材料连接方面的专业知识，拓展该技术领域的视野，正确把握科学研究的方向提供帮助和启迪。</p>			
<b>*课程简介</b> (English) Course Description	(须与中文一致，翻译请力求信达雅。)			
	<p>With the progress of science and the development of technology, the material joining technology is updated quickly. Many innovative technologies are applied in the material joining to produce a lot of new joining methods and technologies. The “Advanced Joining Technologies” is a course to introduce the present advanced joining technologies over the world. It is mainly involved in the new high efficient joining methods and technologies applied in the manufacturing fields of automobile, shipbuilding, aerospace, nuclear power, etc. These technologies may have been derived from the traditional joining technologies under the impetus of the innovative technologies in material science and engineering, digitalization, sensor, information and intelligent control. They include but are not limited to the high efficient multi-wire arc welding,</p>			

	<p>the narrow gap welding, the ultra-narrow gap laser welding, the friction stir welding, the fusion brazing, the arc stud welding, the transient liquid phase diffusion welding, the electromagnetic pulse welding, etc. It focuses on the introduction of the principles, characteristics, research hotspots, application status and development trends of these technologies, to give students a new vision of present innovative development of the material joining technology in advanced manufacturing. The course is a multidisciplinary comprehensive course, mainly introducing the advanced joining technologies. The prerequisite courses for learning this course include the fundamentals of material science, the principle of material processing, and the modular curriculum of material joining science. It is suitable for the postgraduate students and doctoral candidate in material science and engineering. It may help them to enrich the expertise in material joining technology and to expand the vision in this field, as well as to guide them to grasp the scientific research direction correctly.</p>																														
<p>*教学大纲 (中文) Syllabus</p>	<p>(建议列表形式, 各列内容: 章节、主要内容、课时数、教学方式等)</p> <table border="0"> <tr> <td>第1章 绪论</td> <td>1 学时</td> <td>课堂教学</td> </tr> <tr> <td>第2章 高效多丝电弧焊</td> <td>3 学时</td> <td>课堂教学</td> </tr> <tr> <td>第3章 窄间隙焊接</td> <td>6 学时</td> <td>课堂教学+实验</td> </tr> <tr> <td>第4章 高功率激光焊</td> <td>6 学时</td> <td>课堂教学+实验</td> </tr> <tr> <td>第5章 搅拌摩擦焊</td> <td>4 学时</td> <td>课堂教学</td> </tr> <tr> <td>第6章 熔钎焊</td> <td>4 学时</td> <td>课堂教学+实验</td> </tr> <tr> <td>第7章 螺柱焊</td> <td>2 学时</td> <td>课堂教学</td> </tr> <tr> <td>第8章 扩散连接</td> <td>2 学时</td> <td>课堂教学</td> </tr> <tr> <td>第9章 电磁脉冲焊</td> <td>2 学时</td> <td>课堂教学</td> </tr> <tr> <td>第10章 先进机械连接</td> <td>2 学时</td> <td>课堂教学</td> </tr> </table>	第1章 绪论	1 学时	课堂教学	第2章 高效多丝电弧焊	3 学时	课堂教学	第3章 窄间隙焊接	6 学时	课堂教学+实验	第4章 高功率激光焊	6 学时	课堂教学+实验	第5章 搅拌摩擦焊	4 学时	课堂教学	第6章 熔钎焊	4 学时	课堂教学+实验	第7章 螺柱焊	2 学时	课堂教学	第8章 扩散连接	2 学时	课堂教学	第9章 电磁脉冲焊	2 学时	课堂教学	第10章 先进机械连接	2 学时	课堂教学
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<p>*课程要求 (中文) Requirements</p>	<p>(课程考核方式、考核标准等; 不少于 50 字)</p> <p>通过本课程的学习, 使学生了解先进制造领域材料连接技术的最新发展现状, 掌握目前主流的先进连接技术的原理、特点、国内外研究热点、应用现状和技术发展趋势。通过对这些连接技术的探究和学习, 了解与之相关的其他交叉学科的技术发展及其对材料连接技术发展的推动和影响, 拓展视野、丰富知识, 从而为学生在材料连接科学领域掌握科学的研究方法、把握正确的研究方法提供帮助和启迪。</p>																														
<p>*课程要求 (English) Requirements</p>	<p>(须与中文一致, 翻译请力求信达雅。)</p> <p>By learning of this course, the students may understand the latest development of material joining technology in advanced manufacturing, grasp the principles, characteristics and research hotspots, application status and development trend of current mainstream advanced joining technologies. Through exploration and study of these new advanced joining technologies, the students would understand the promotion and influence of development of related other interdisciplinary technology on material joining technology, enrich the knowledge and expand the vision in this field. It is helpful for the students to master the scientific research methods, and to enlighten them to grasp the correct research direction in the material joining science field.</p>																														

<p>*课程资源 (中文) Resources</p>	<p>(教材、教参、网站资料等。)</p> <p>教学参考书:</p> <ol style="list-style-type: none"> <li>1) 陈裕川、李少农等, 现代高效焊接方法及其应用, 机械工业出版社, 2015.11</li> <li>2) 张洪涛、陈玉华, 特种焊接技术, 哈尔滨工业大学出版社, 2013.8</li> <li>3) 林三宝、范成磊等, 高效焊接方法, 机械工业出版社, 2012.3</li> <li>4) 上海焊接学会、上海焊接协会, 焊接先进技术, 上海科学技术文献出版社, 2010.8</li> <li>5) John Norrish 著, 史清宇等译, 先进焊接方法与技术, 机械工业出版社, 2010.7</li> <li>6) 张柯柯、涂益民, 特种先进连接方法, 哈尔滨工业大学出版社, 2008.6</li> <li>7) 张义 等, 螺柱焊焊接技术及其应用, 机械工业出版社, 2009.10</li> <li>8) Seiji Katayama, Handbook of laser welding technologies, Woodhead Publishing Ltd., 2013</li> <li>9) Flemming Ove Olsen, Hybrid laser-arc welding, Woodhead Publishing Ltd., 2009</li> <li>10) Nasir Ahmed, New development in advanced welding, Woodhead Publishing Ltd., 2005</li> </ol> <p>课程网站: <a href="https://oc.sjtu.edu.cn/courses/20850">https://oc.sjtu.edu.cn/courses/20850</a></p>
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<p>备注 Note</p>	<p>原课程代码: MT26020      新的课程代码: MSE8322</p>