

课程名称 "材料工程" 课程 "ULVW" 课程 "材料工程" 课程

课程名称 "材料工程"				
* Course Name	Chinese			
	English	Advanced Joining Technologies		
* Credits	2	* Teaching Hours	32 1 =16	
* Semester	Spring	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	For full-time students	
* Course Category	Specialized	In class teaching		
* Grade	Letter grading	Exam Method	Essay	
* School				
Subject				
Person in charge	Name	ID	School	E-mail
				xhtang@sjtu.edu.cn
课程简介 "材料工程"				
* () Course Description	200 “ ”			
* English Course Description	<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>* () Syllabus</p>	<table> <tr><td>1</td><td>1</td><td></td></tr> <tr><td>2</td><td>3</td><td></td></tr> <tr><td>3</td><td>6</td><td>+</td></tr> <tr><td>4</td><td>6</td><td>+</td></tr> <tr><td>5</td><td>4</td><td></td></tr> <tr><td>6</td><td>4</td><td>+</td></tr> <tr><td>7</td><td>2</td><td></td></tr> <tr><td>8</td><td>2</td><td></td></tr> <tr><td>9</td><td>2</td><td></td></tr> <tr><td>10</td><td>2</td><td></td></tr> </table>	1	1		2	3		3	6	+	4	6	+	5	4		6	4	+	7	2		8	2		9	2		10	2	
1	1																														
2	3																														
3	6	+																													
4	6	+																													
5	4																														
6	4	+																													
7	2																														
8	2																														
9	2																														
10	2																														
<p>* English Syllabus</p>	<table> <tr><td>Chapter 1 Introduction</td><td>1 hr.</td><td>lecture</td></tr> <tr><td>Chapter 2 High efficient multi-wire arc welding</td><td>3 hrs.</td><td>lecture</td></tr> <tr><td>Chapter 3 Narrow gap welding</td><td>6 hrs.</td><td>lecture + experiment</td></tr> <tr><td>Chapter 4 High-power gap laser welding</td><td>6 hrs.</td><td>lecture + experiment</td></tr> <tr><td>Chapter 5 Friction stir welding</td><td>4 hrs.</td><td>lecture</td></tr> <tr><td>Chapter 6 Fusion brazing</td><td>4 hrs.</td><td>lecture + experiment</td></tr> <tr><td>Chapter 7 Stud welding</td><td>2 hrs.</td><td>lecture</td></tr> <tr><td>Chapter 8 Diffusion joining</td><td>2 hrs.</td><td>lecture</td></tr> <tr><td>Chapter 9 Electromagnetic pulse welding</td><td>2 hrs.</td><td>lecture</td></tr> <tr><td>Chapter 10 Advanced mechanical joining</td><td>2 hrs.</td><td>lecture</td></tr> </table>	Chapter 1 Introduction	1 hr.	lecture	Chapter 2 High efficient multi-wire arc welding	3 hrs.	lecture	Chapter 3 Narrow gap welding	6 hrs.	lecture + experiment	Chapter 4 High-power gap laser welding	6 hrs.	lecture + experiment	Chapter 5 Friction stir welding	4 hrs.	lecture	Chapter 6 Fusion brazing	4 hrs.	lecture + experiment	Chapter 7 Stud welding	2 hrs.	lecture	Chapter 8 Diffusion joining	2 hrs.	lecture	Chapter 9 Electromagnetic pulse welding	2 hrs.	lecture	Chapter 10 Advanced mechanical joining	2 hrs.	lecture
Chapter 1 Introduction	1 hr.	lecture																													
Chapter 2 High efficient multi-wire arc welding	3 hrs.	lecture																													
Chapter 3 Narrow gap welding	6 hrs.	lecture + experiment																													
Chapter 4 High-power gap laser welding	6 hrs.	lecture + experiment																													
Chapter 5 Friction stir welding	4 hrs.	lecture																													
Chapter 6 Fusion brazing	4 hrs.	lecture + experiment																													
Chapter 7 Stud welding	2 hrs.	lecture																													
Chapter 8 Diffusion joining	2 hrs.	lecture																													
Chapter 9 Electromagnetic pulse welding	2 hrs.	lecture																													
Chapter 10 Advanced mechanical joining	2 hrs.	lecture																													
<p>* Requirements</p>	<p>50</p>																														
<p>* English Requirements</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 style="text-align: center;">*</p> <p style="text-align: center;">Resources</p>	<ol style="list-style-type: none"> 1) , , , , 2015.11 2) , , , , 2013.8 3) , , , , 2012.3 4) , , , , 2010.8 5) John Norrish , , , , 2010.7 6) , , , , 2008.6 7) , , , , 2009.10 8) Seiji Katayama, Handbook of laser welding technologies, Woodhead Publishing Ltd., 2013 9) Flemming Ove Olsen, Hybrid laser-arc welding, Woodhead Publishing Ltd., 2009 10) Nasir Ahmed, New development in advanced welding, Woodhead Publishing Ltd., 2005 <p style="text-align: center;">https://oc.sjtu.edu.cn/courses/20850</p>
<p style="text-align: center;">*</p> <p style="text-align: center;">English Resources</p>	<ol style="list-style-type: none"> 1) Chen Yuchuang, Li Shaonong, et al., Modern high-efficient welding methods and their applications, Mechanical Industry Press, 2015.11 (In Chinese) 2) Zhang Hongtao, Chen Yuhua, Special welding technology HIT press 2013.8 (In Chinese) 3) Lin Shanbao, Fan Chenlei, et al., High-efficient welding methods, Mechanical Industry Press, 2012.3 (In Chinese) 4) Shanghai Welding Society, Welding advanced technology, Shanghai Sci.& Tech. Literature Press, 2010.8 (In Chinese) 5) John Norrish, translated by Shi Qinyu et al., Advanced welding methods and technologies, Mechanical Industry Press, 2010.7 (In Chinese) 6) Zhang Keke, Xu Yimin Special advanced joining methods, HIT Press, 2008.6 (In Chinese) 7) Zhang Yi, et al., Stud welding technology and its applications, Mechanical Industry Press, 2009.10 (In Chinese) 8) Seiji Katayama, Handbook of laser welding technologies, Woodhead Publishing Ltd., 2013 9) Flemming Ove Olsen, Hybrid laser-arc welding, Woodhead Publishing Ltd., 2009 10) Nasir Ahmed, New development in advanced welding, Woodhead Publishing Ltd. 2005
<p style="text-align: center;">Note</p>	<p style="text-align: center;">MT26020 MSE8322</p>