

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				
*课程名称 Course Name	(中文 Chinese) 材料加工智能制造基础			
	(英文 English) Fundamental of Intelligent Manufacturing in Materials Processing			
*学分 Credits	3	*学时 Teaching Hours	48 (1 学分=16 课时)	
*开课学期 Semester	秋季学期 Fall	*是否跨学期 Cross-semester?	否 No	
*课程类型 Course Type	专业基础课 Program Core Course	*课程分类 Course Type	全日制课程 For full-time students	
*课程性质 Course Category	专业课 Specialized Course	课程层次 Targeting Students	硕博共用 All graduates	
*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			
所属学科 Subject	材料科学与工程			
负责教师 Person in charge	姓名 Name	工号 ID	单位 School	联系方式 E-mail
	蔡艳		材料学院	ycai@sjtu.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、主要教学内容、先修课程等；不少于 200 字。)</p> <p>以信息技术为牵引的材料加工智能制造是融合人的感官信息（视觉、听觉、触觉）、经验知识（控形、控性）、推理判断（知识学习、推理与决策）、过程控制以及工艺优化等各方面专门知识的交叉课程。课程围绕智能制造的基本环节和前沿发展，系统性地介绍信息物理系统、人工智能技术、工业大数据和云计算等核心技术，解析工业 4.0 及智能工厂的组成架构和技术特征，选取柔性化汽车制造车间和混合（增材+减材）智能制造技术等案例，介绍智能制造在材料热加工领域的应用现状和前景，培养学生掌握智能制造理念、基本方法和初步技能，具备在材料加工领域继续探索智能制造技术的基本素质和能力。</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>The intelligent manufacturing of material processing based on information technology is an Interdisciplinary course. It integrates human sensory information (visual, auditory, tactile), experience knowledge (control of shape and performance), reasoning judgment (knowledge learning, reasoning and decision making), and process control and optimization. The course focuses on the elementary segments and nowadays frontiers of intelligent manufacturing. The core technologies, including cyber-physical system, artificial intelligence technology, industrial large data and cloud computing are systematically introduced. The structure and technical features</p>			

of industrial 4.0 and intelligent factories are analyzed. Some application cases, such as the flexible manufacturing workshop and mixed (material adding + material reduction) intelligent system are studied as examples. The application status and prospect of intelligent manufacturing in the field of material hot processing are introduced.

(建议列表形式, 各列内容: 章节、主要内容、课时数、教学方式等)

*教学大纲
(中文)
Syllabus

教学内容	授课学时	教学方式	授课教师
[1] 智能制造概述 <ul style="list-style-type: none"> ◆ 什么是智能制造? ◆ 智能制造技术特征和发展方向 ◆ 智能制造在材料热加工中的应用现状与前景 ◆ 中国智能制造之路 	3	授课	华学明
[2] 智能制造技术和系统 <ul style="list-style-type: none"> ◆ 智能制造系统架构 ◆ 产品全生命周期管理系统 ◆ 生产执行系统 ◆ 信息物理系统 	6	授课	华学明
[3] 信息物理系统 <ul style="list-style-type: none"> ◆ 3C(Computer, Communication, Control)技术的有机融合与深度合作 ◆ 大型工程系统的实时感知、动态控制和信息挖掘 	6	授课	华学明
[4] 工业 4.0 和智能工厂 <ul style="list-style-type: none"> ◆ 工业机器人 ◆ 柔性化生产线 ◆ 物联网和数字车间 ◆ 工业 4.0 与智能工厂 	9	授课 参观	华学明
[5] 人工智能技术 <ul style="list-style-type: none"> ◆ 人工智能的基本原理 ◆ 知识表示和推理方法 ◆ 机器视觉技术 ◆ 深度学习技术 ◆ 人工智能在材料加工中的应用 	9	授课 课堂 研讨	蔡艳
[6] 工业大数据和云计算 <ul style="list-style-type: none"> ◆ 工业大数据 ◆ 云计算技术 ◆ 数据挖掘技术 ◆ 虚拟制造技术 	9	授课	蔡艳
[7] 智能制造应用案例 <ul style="list-style-type: none"> ◆ 基于大数据挖掘的制造过程优化 ◆ 柔性化智能制造车间 ◆ 混合(增材+减材)智能制造技术 	6	授课 参观 研讨	蔡艳

(须与中文一致，翻译请力求信达雅。)

*教学大纲
(English)
Syllabus

Content	Hours	Mode	Instructor
[1] overview of intelligent manufacturing <ul style="list-style-type: none"> ◆ What is intelligent manufacturing? ◆ Features and development direction of Intelligent Manufacturing Technology ◆ Application status and Prospect of Intelligent Manufacturing in material hot processing ◆ The road of Intelligent Manufacturing in China 	3	Lecture	Prof. Xueming Hua
[2] Intelligent manufacturing technology and system <ul style="list-style-type: none"> ◆ Architecture of intelligent manufacturing system ◆ Product life cycle management system ◆ Production execution system ◆ Information physical system 	6	Lecture	Prof. Xueming Hua
[3] Information physical system <ul style="list-style-type: none"> ◆ Organic integration and deep collaboration of 3C (computer, communication, control) technology ◆ Real time perception, dynamic control and information mining of large engineering systems 	6	Lecture	Prof. Xueming Hua
[4] Industry 4.0 and smart factories <ul style="list-style-type: none"> ◆ Industrial robot ◆ Flexible production line ◆ The Internet of things and digital workshop ◆ Industry 4.0 and intelligent factory 	9	Lecture Technical visit	Prof. Xueming Hua
[5] Artificial intelligence technology <ul style="list-style-type: none"> ◆ The basic principles of artificial intelligence ◆ Knowledge representation and reasoning method ◆ Machine vision technology ◆ In depth learning technology ◆ The application of artificial intelligence in material processing 	9	Lecture discussion	Prof. Yan Cai

	<p>[6] Industrial big data and cloud computing</p> <ul style="list-style-type: none"> ◆ Industrial big data ◆ Cloud computing technology ◆ Data mining technology ◆ The virtual manufacturing technology 	9	Lecture practice	Prof. Yan Cai
	<p>[7] Intelligent manufacturing application case</p> <ul style="list-style-type: none"> ◆ The optimization of manufacturing process based on big data mining ◆ Flexible intelligent manufacturing workshop ◆ Intelligent manufacturing technology of mixing (additive + subtraction) 	6	Lecture Discussion practice	Prof. Yan Cai
*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> <p>本课程采用综合评分方式考核, 具体比例为平时成绩 10%+作业 30%+课程设计 60%, 其中平时成绩包括出勤和课堂问答, 课程设计包括项目方案设计与实施, 汇报与交流, 以及完整的书面报告。</p>			
*课程要求 (English) Requirements	<p>(须与中文一致, 翻译请力求信达雅。)</p> <p>The course is assessed by comprehensive scoring method, with the specific proportion of 10% of usual performance + 30% of homework + 60% of course design. The usual performance includes attendance, classroom Q & A. The course design includes project scheme design and implementation, report and communication, and a complete written report.</p>			
*课程资源 (中文) Resources	<p>(教材、教参、网站资料等。)</p> <ul style="list-style-type: none"> ◆ 王芳, 赵中宁. 智能制造基础与应用, 2018, 机械工业出版社 ◆ 谭建荣. 智能制造: 关键技术与企业应用, 2017, 机械工业出版社 ◆ 陈明. 智能制造之路: 数字化工厂, 2016, 机械工业出版社 ◆ Ian Goodfellow, Yoshua Bengio 等. 深度学习, 2017, 人民邮电出版社 			
*课程资源 (English) Resources	<p>(须与中文一致, 请力求信达雅。)</p> <ul style="list-style-type: none"> ◆ Fang Wang, Zhongning Zhao. Intelligent manufacturing foundation and application, 2018, China Machine Press ◆ Jianrong Tan. Intelligent Manufacturing: key technologies and enterprise applications, 2017, China Machine Press ◆ Ming Chen. The way of Intelligent Manufacturing: digital chemical plant, 2016, China Machine Press ◆ Ian Goodfellow, Yoshua Bengio. Deep Learning, 2017, people's post and Telecommunications Press 			
备注 Note				