

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) 先进制造技术			
	(英文 English) Advanced Manufacturing Technology			
*学分 Credits	2	*学时 Teaching Hours	32 学时 (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 个学期 Semesters (含夏季学期)。
*课程类型 Course Type	专业选修课 Program Elective 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	博士课程 Doctoral Level	
*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	050 材料科学与工程学院 School of Material Science and Engineering			
所属学科 Subject	材料科学与工程 Material 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
	谢叻		材料科学与工程	Lexie@sjtu.edu.cn
课程扩展信息 Extended Information				
*课程简介 (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>课程介绍：</p> <p>随着科学和技术的发展，制造技术已成为当代各国在经济上获得成功的关键技术，并逐渐发展形成制造科学体系。制造技术即是制造业赖以生存的主体技术，又是国民经济发展的主要支柱技术。先进制造技术是将机械、材料、信息以及现代管理技术等最新成果综合应用于产品开发与设计、制造以及管理等制造全过程，实现优质、高效、低耗、敏捷生产的前沿制造技术的总和。先进制造技术已成为提高制造业竞争力的主要手段，是增加综合国立和促进国民经济发展的基础。</p> <p>材料成形技术是以金属成形为重要标志出现在人类社会中的最古老的生产技术之一。模具设计制造理论与技术的发展从最早原始的经验制造到今天的以计算机技术、信息技术为支撑的成形理论，走过了漫长的道路。随着计算机辅助技术渗透到模具技术的方方面面，计算机技术已经成为现代模具设计制造理论和技术的支撑技术，并形成了计算机辅助设计 (CAD)，辅助制造 (CAM)，辅助工程 (CAE)，反求工程 (RE) 和快速原型制造 (RP/RT) 虚拟设计与虚拟制造 (VM) 等一批分支技术。</p> <p>本课程将以模具设计制造为切入点，全面、系统地讲解组成先进制造技术的 CAD/CAM/CAE, RE, RP/RT, VM 等分支技术的国内外发展现状，介绍所涉及的基础知识，讲述各分支技术的主要研究内容。</p> <p>教学目标：</p> <p>(1) 具备运用所学知识来分析解决实际问题的能力</p>			

	<p>(2) 掌握从事工程师工作的基本技能知识和工程实践技能</p> <p>(3) 具备基于工程问题的过程设计能力</p> <p>(4) 对工程领域涉及的问题能有全面的认识</p> <p>(5) 能够通过书面和口头表达自己的想法和与人交流沟通的能力</p> <p>(6) 具有创新意识, 掌握综合运用理论和技术手段进行创新设计的方法</p>
<p>*课程简介 (English) Course Description</p>	<p>(须与中文一致, 翻译请力求信达雅。)</p> <p>Course introduction:</p> <p>With the development of science and technology, manufacturing technology has become the key technology for the economic success of contemporary countries, and gradually developed into the manufacturing science system. The manufacturing technology is not only the main technology of manufacturing industry, but also the main support technology of national economic development. The advanced manufacturing technology is the integration of the latest achievements of machinery, materials, information and modern management technology into the whole manufacturing process of product development and design, manufacturing and management, so as to realize the combination of advanced manufacturing technologies of high quality, high efficiency, low consumption and agile production. The advanced manufacturing technology has been the main means to improve the competitiveness of manufacturing industry, and it is the important foundation to increase the comprehensive national strength and promote the development of national economy.</p> <p>The material forming technology is one of the oldest manufacturing technologies in human society with metal forming as an important symbol. The theory and technology development of die design and manufacturing has gone a long way from the earliest experience manufacturing to current forming theory supported by computer technology and information technology. With the penetration of computer-aided technology into aspects of mold technology, the computer technology has become an important supporting technology of modern mold design and manufacturing theory and technology, and a series of divisions like computer-aided design (CAD), computer-aided manufacturing (CAM), computer-aided engineering (CAE), reverse engineering (RE) and Rapid prototyping (RP/RT), virtual design and manufacturing (VM) have been formed.</p> <p>This course will take the mold design and manufacturing as the starting point, comprehensively and systematically explain the domestic and international development status of CAD/CAM/CAE, RE, RP/RT, VM, etc., which constitute the advanced manufacturing technology, and introduce the involved basic knowledge, main research content of each branch technology.</p> <p>Teaching objectives:</p> <p>(1) To achieve the ability to use learned knowledge to analyze and solve practical problems;</p> <p>(2) To master the basic skill knowledge and engineering practice skills of the engineer;</p> <p>(3) To achieve the process design ability based on engineering problems;</p> <p>(4) Have a comprehensive understanding of the problems involved in the engineering field;</p> <p>(5) Have the ability to express ideas and communicate with others in written and oral form;</p> <p>(6) Have the innovative consciousness and master the method of innovative design by comprehensive use of theory and technology.</p>

*教学大纲 (中文) Syllabus	(建议列表形式, 各列内容: 章节、主要内容、课时数、教学方式等)		
	教学内容 Content	授课学时 Hours	教学方式 Format
	介绍国际国内 CAD 技术的发展现状, 讲解几何造型的发展。介绍线框、表面、实体、参数化造型的发展。讲解曲面造型技术, 包括曲面求交、曲面偏置, 曲面延伸, 曲面扫掠, 曲面拼接等。讲解特征造型技术。	4	课堂
	介绍国际国内 CAM 技术的发展现状, 讲解数控机床工作原理和分类。讲解数控自动编程技术, 讲解 2 坐标、3 坐标、5 坐标刀轨生成技术。	4	课堂
	介绍敏捷制造技术、绿色制造技术、产品数据管理技术、计算机辅助工艺技术	2	课堂
	介绍有限元网格划分技术、有限元分析数据可视化技术	2	课堂
	介绍反向工程技术, 反向工程中数据采集, 数据预处理、曲面重构技术。反向工程学科交叉的应用。	2	课堂
	讲解激光快速成形技术, 立体激光造型、选择性激光烧结、熔融沉积造型, 金属 3D 打印等。3D 打印学科交叉的应用。	4	课堂
	讲解虚拟现实技术, 虚拟现实的显示、交互技术。讲解虚拟制造技术, 虚拟制造建模, 分析技术。虚拟现实学科交叉的应用。	4	课堂
	介绍机器人技术, 讲解学科交叉的机器人技术	2	课堂
	介绍人工智能技术, 讲解学科交叉的人工智能技术	2	课堂
	计算机辅助技术、虚拟制造技术, 机器人技术学习展示	2	课堂
	介绍微成形技术的进展, 技术特点, 国内外研究现状	2	课堂
	微成形技术相关研究领域进展, 相关理论、技术研究进展, 微成形数值模拟、测试技术研究进展。	2	课堂
	*教学大纲 (English) Syllabus	(须与中文一致, 翻译请力求信达雅。)	
Content		Hours	Format
Introduce the development of CAD technology at home and abroad, and explain the development of geometric modeling. Introduce the development of wireframe, surface, solid and parametric modeling. Explain surface modeling technology, including surface intersection, surface offset, surface extension, surface sweep, surface splicing, etc. Explain feature modeling techniques.		4	Classroom
Introduce the development of CAM technology at home and abroad, and explain the working principle and classification of CNC machine tools. Explain NC automatic programming		4	Classroom

	technology, explain 2-coordinate, 3-coordinate, 5-coordinate tool path generation technology.		
	Introduce agile manufacturing technology, green manufacturing technology, product data management technology and computer-aided process technology.	2	Classroom
	Introduce the finite element mesh generation technology and the visualization technology of finite element analysis data.	2	Classroom
	Introduce reverse engineering technology, data acquisition, data preprocessing and surface reconstruction in reverse engineering. The application of reverse engineering interdisciplinary.	2	Classroom
	Explain laser rapid prototyping technology, three-dimensional laser modeling, selective laser sintering, melting deposition modeling, metal 3D printing, etc. Interdisciplinary application of 3D printing.	4	Classroom
	Explain virtual reality technology, display and interaction technology of virtual reality. Explain virtual manufacturing technology, virtual manufacturing modeling, analysis technology. The application of virtual reality interdisciplinary.	4	Classroom
	Introduce robotics, explain interdisciplinary Robotics.	2	Classroom
	Introduce artificial intelligence technology and explain the interdisciplinary artificial intelligence technology.	2	Classroom
	Learning display of computer aided technology, virtual manufacturing technology and robotic technology.	2	Classroom
	Introduce the development, technical characteristics and research status at home and abroad of microforming technology.	2	Classroom
	The research progress of microforming technology, related theory and technology, numerical simulation and testing technology.	2	Classroom
*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>平时布置作业, 学生查阅文献, 找到先进制造技术CAD/CAM/CAE, RE, 3D打印, 虚拟制造, 机器人等分支等技术的最新研究进展。</p> <p>考试以课程报告与平时成绩来衡量。平时成绩以作业和课堂表现评价, 课程报告以报告材料的先进性, 报告的逻辑性, 以及汇报表达的清晰度, 回答问题的正确性来考察。</p>		
*课程要求 (English) Requirements	<p>(须与中文一致, 翻译请力求信达雅。)</p> <p>Usually arrange the homework, consult literature, and find the latest research progress of advanced manufacturing technologies such as CAD / CAM / CAE, re, 3D printing, virtual manufacturing, robot and so on.</p> <p>The test is measured by the course report and usual results. The results of daily performance are evaluated by homework and classroom performance. The curriculum report examines the advanced nature of the report material, the logic of the report, and the clarity of the presentation, and answers the correctness of the questions.</p>		
*课程资源 (中文) Resources	<p>(教材、教参、网站资料等。)</p> <p>周雄辉: 现代模具设计制造理论与技术, 上海交通大学出版社</p>		
*课程资源 (English) Resources	<p>(须与中文一致, 请力求信达雅。)</p> <p>Zhou Xionghui: modern mold design and manufacturing theory and technology, Shanghai Jiaotong University Press</p>		
备注 Note			

