

# 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) <b>模具数字化制造技术</b> (英文 English) Digital Manufacturing Theory and Technology and its Application in Die and Mold			
<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 个学期 Semesters (含夏季学期)。
<b>*课程类型</b> Course Type	专业前沿课 Program Frontier 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	050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
	周雄辉 Zhou Xionghui		材料科学与工程学院	xhzhou@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。) 在现代制造业中，以制造工程科学为理论基础，将传统制造过程与数字化技术相结合形成的数字化制造技术，已成为先进制造技术发展的基础和核心。当前，随着“互联网 + 智造”技术的飞速发展，推动了模具制造由传统的试错型工匠手工艺，发展成为一门以塑性成形理论科学为基础，以数字化、敏捷化、智能化制造技术为支撑的综合性科学技术，并在现代装备制造业中发挥着越来越广泛、越来越越重要的作用，已成为衡量一个国家制造业水平的重要标志。 本课程主要讲述数字化制造的概念、基础理论、技术体系和基本方法及其在模具工业中的应用，具体内容包括模具行业的发展与数字化制造技术概述、现代制造模式的演变与理念、数字化制造技术体系与关键技术、集成产品信息建模/系统集成与流程自动化、基于知识的模具智能设计与多学科优化、计算机辅助工艺计划与生产调度、数控编程/加工过程仿真与智能制造、模具制造成本评估、数字化设备/车间/工厂信息采集/分析/监控与三维可视化管理等数字化智能制造技术及其在模具工业中的实施。			
<b>*课程简介</b> (English) Course Description	In modern manufacturing industry, digital manufacturing technology, based on manufacturing engineering science and combining traditional manufacturing process with digital technology, has become the basis and core of the development of advanced manufacturing technology. At present, with the rapid development of "Internet + smart" technology, it promotes the development of die and mold manufacturing technology from the traditional trial-and-error handicraft into a comprehensive science and technology with plastic forming theory as the foundation and digital, agile, intelligent manufacturing technology as supports, which plays a more and more widely, more and more important role and in the modern equipment manufacturing industry, and has			

	<p>become an important symbol of measure of a country manufacturing technology level.</p> <p>This course mainly addresses the basic concept, theory, technical system, key technology and system method of digital manufacturing and its application in the die and mold industry. The concrete content includes overview about the development of die and mold industry and digital manufacturing technology, the evolution of modern manufacturing mode and concept, the digital manufacturing technology system and the key technology, integrated product information model/system integration and process automation, based on knowledge of the mold of intelligent design and multidisciplinary optimization, the computer aided process planning and production scheduling, NC programming/machining process simulation and intelligent manufacturing, mold manufacturing cost estimation, digital equipment/workshop/factory information collection, analysis, monitor and 3D visualization management and other intelligent digital manufacturing technology and its implementation in the die and mold industry</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> <p>第 1 章 概述 (4 学时)</p> <ul style="list-style-type: none"> <li>✓ 模具工业的地位、现状和面临的形势与发展趋势</li> <li>✓ “互联网+智造”模式下模具数字化智能制造的主要研究内容、系统与案例</li> <li>✓ 课程的目标、任务与要求</li> </ul> <p>第 2 章 生产模式的演变与现代制造理念和模式 (4 学时)</p> <ul style="list-style-type: none"> <li>✓ 生产模式的演变与制造业的发展策略</li> <li>✓ 计算机集成制造</li> <li>✓ 并行工程</li> <li>✓ 精益生产</li> <li>✓ 敏捷制造</li> <li>✓ 大批量定制</li> <li>✓ 工业 4.0 与智能制造/数字孪生</li> </ul> <p>第 3 章 数字化制造技术体系与关键技术 (6 学时)</p> <ul style="list-style-type: none"> <li>✓ 数字化制造的概念与内涵</li> <li>✓ 企业实施数字化制造的方法论</li> <li>✓ 数字化制造技术体系</li> <li>✓ 关键技术 <ul style="list-style-type: none"> <li>◆ 集成产品信息建模与系统集成</li> <li>◆ 仿真技术</li> <li>◆ 优化技术</li> <li>◆ 智能技术</li> </ul> </li> </ul> <p>第 4 章 模具数字化智能设计技术与系统开发 (6 学时)</p> <ul style="list-style-type: none"> <li>✓ 现代设计方法学与智能 CAD</li> <li>✓ 软件工程与系统开发方法</li> <li>✓ 注塑模智能设计技术与系统</li> <li>✓ 覆盖模智能设计技术与系统</li> <li>✓ 锻模智能设计技术与系统</li> <li>✓ 云平台标准件库 CAD 系统</li> <li>✓ 关键共性问题与讨论</li> </ul> <p>第 5 章 计算机辅助工艺规划与生产调度 (4 学时)</p> <ul style="list-style-type: none"> <li>✓ 从设计到制造的产品信息描述与传递</li> <li>✓ 工艺规划决策理论与方法</li> <li>✓ 计算机辅助工艺规划的原理与系统方法</li> <li>✓ 基于知识的工艺决策与柔性生产调度方法</li> </ul> <p>第 7 章 课程实践、总结与讨论 (2 学时)</p>

	<ul style="list-style-type: none"> <li>✓ 课程总结与讨论</li> <li>✓ 参观中国国际模具技术与设备博览会</li> </ul>
<p>*教学大纲 (English) Syllabus</p>	<p>(须与中文一致, 翻译请力求信达雅。)</p> <p>Chapter 1 Overview (4 credit hours)</p> <ul style="list-style-type: none"> <li>✓ The status, current situation and development trend of die and mold industry</li> <li>✓ The main research contents, systems and cases of die and mold digital intelligent manufacturing under the mode of "Internet + intelligent manufacturing"</li> <li>✓ Objectives, tasks and requirements of the course</li> </ul> <p>Chapter 2 Evolution of production mode and modern manufacturing concept and mode (4 credit hours)</p> <ul style="list-style-type: none"> <li>✓ Evolution of production mode and development strategy of manufacturing industry</li> <li>✓ Evolution of production mode and development strategy of manufacturing industry</li> <li>✓ Computer integrated manufacturing</li> <li>✓ Concurrent Engineering</li> <li>✓ Lean production</li> <li>✓ Agile manufacturing</li> <li>✓ Mass Customization</li> <li>✓ Industry 4.0, intelligent manufacturing, digital twin</li> </ul> <p>Chapter 3 Digital manufacturing technology system and key technologies (6 credit hours)</p> <ul style="list-style-type: none"> <li>✓ The concept and connotation of digital manufacturing</li> <li>✓ The methodology for enterprises to implement digital manufacturing</li> <li>✓ Technology system of the digital manufacturing</li> <li>✓ Key technologies <ul style="list-style-type: none"> <li>◆ Integrated product information modeling and system integration</li> <li>◆ System simulation</li> <li>◆ Optimization technology</li> <li>◆ AI</li> </ul> </li> </ul> <p>Chapter 4 The die and mold intelligent design technology and system development (6 credit hours)</p> <ul style="list-style-type: none"> <li>✓ Modern design methodology and intelligent CAD</li> <li>✓ Software engineering and system development methods</li> <li>✓ Intelligent design technology and system of injection mold</li> <li>✓ Cover die intelligent design technology and system</li> <li>✓ Forging die intelligent design technology and system</li> <li>✓ Cloud platform standard parts library CAD system</li> <li>✓ Key common questions and discussion</li> </ul> <p>Chapter 5 Computer-aided process planning and production scheduling (4 credit hours)</p> <ul style="list-style-type: none"> <li>✓ Description and transfer of product information from design to manufacturing</li> <li>✓ Theory and method of process planning decision making</li> <li>✓ Principle and systematic method of computer aided process planning</li> <li>✓ Knowledge - based flexible production scheduling method</li> </ul> <p>Chapter 6 Numerical control machining and intelligent manufacturing (6 credit hours)</p> <ul style="list-style-type: none"> <li>✓ CNC machining technology and the concept of digital manufacturing workshop</li> <li>✓ Mold NC machining automatic programming and CAPP/NC/CMM process integration</li> <li>✓ Geometric and physical simulation and optimization of machining process</li> <li>✓ Mold manufacturing cost assessment and resource management</li> <li>✓ Machine tool/workshop/factory information collection, analysis and 3d visualization management</li> </ul> <p>Chapter 7 Curriculum practice, summary and discussion (2 credit hours)</p> <ul style="list-style-type: none"> <li>✓ Curriculum papers presentation, discussion and summary</li> <li>✓ Visit China international die and mold technology and equipment expo</li> </ul>

<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) 要求通过本课程的学习、讨论与相关科研实践, 掌握模具数字化智能制造的基本概念、基础理论、技术体系和系统实现方法, 为从事相关课题研究和系统开发打下坚实的基础。 成绩: 出勤 + 课堂讨论 + 专题论文</p>
<p>*课程要求 (English) Requirements</p>	<p>(须与中文一致, 翻译请力求信达雅。) It is required to master the basic concept, theory, technical system and system realization method of die and mold digital intelligent manufacturing through the study, discussion and related scientific research practice of this course, so as to lay a solid foundation for the related science and technology research and system development. Grades: class attendance, discussion and dissertation</p>
<p>*课程资源 (中文) Resources</p>	<p>(教材、教参、网站资料等。) 《模具数字化制造技术》 化学工业出版社 《现代模具设计制造理论与技术》 上海交通大学出版社 Computer Aided Design Advanced Manufacturing Technology Intelligent Manufacturing Technology Computer Integrated Manufacturing...</p>
<p>*课程资源 (English) Resources</p>	<p>(须与中文一致, 请力求信达雅。) Die digital manufacturing technology, Chemical Industry Press Modern die and mold design and manufacturing theory and technology. Shanghai Jiao Tong University Press Computer Aided Design Advanced Manufacturing Technology Intelligent Manufacturing Technology Computer Integrated Manufacturing...</p>
<p>备注 Note</p>	