

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	增材制造技术 Additive Manufacturing Technology
2.	<b>授课院系 Originating Department</b>	系统设计与智能制造学院 School of System Design and Intelligent Manufacturing (SDIM)
3.	<b>课程编号 Course Code</b>	SDM472
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业选修课 Major Elective Course
6.	<b>授课学期 Semester</b>	春季 Spring
7.	<b>授课语言 Teaching Language</b>	中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (For team teaching, please list all instructors)</b> <b>Instructor(s), Affiliation &amp; Contact</b>	Ke Wang 教授 系统设计与智能制造学院 (SDIM) Ke Wang Professor School of System Design and Intelligent Manufacturing Email: @sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式</b> <b>Tutor/TA(s), Contact</b>	待公布 To be announced
10.	<b>选课人数限额(可不填) (Optional)</b> <b>Maximum Enrolment</b>	待公布 To be announced

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数* Credit Hours	32		32		64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	SDM 262 材料工程基础 Fundamentals of Materials Engineering				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NIL				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 NIL				

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

本课程的主要任务是帮助学生：

- 熟悉增材制造 (AM) 技术
- 掌握与 AM 技术相关的基本理论、知识和技能，培养跨学科的创新思维能力
- 深入了解各种增材制造方法和相关材料
- 培养设计和制作复杂设备/工具的能力
- 了解增材制造部件的测试，特性表征和质量控制 方法
- 探索 AM 技术的未来应用和机遇

The main task of current course is to enable the students:

- Familiarize with additive manufacturing (AM) technology
- Acquire the fundamental theory, knowledge and skill of AM, thus to bring up interdisciplinary innovative thinking ability;
- Acquire deep understanding of various AM methods and corresponding materials
- Develop ability to design and manufacture complex devices/tools
- Learn the methods for the testing, characterization, and quality control for AM parts
- Explore future applications and opportunities of AM technology

#### 16. 预达学习成果 Learning Outcomes

完成本课程的学习后，学生将能够：

- 了解关键的增材制造技术
- 针对每种 AM 技术，确定与加工工艺相关的关键材料属性
- 根据具体应用情况，对增材制造方法和可用于增材制造的材料进行比较和区分
- 考虑到加工和应用的现实设计约束，设计组件或功能性装置以满足预期需求
- 使用 AM 技术制造组件和设备
- 评估当前和未来的 AM 技术

Upon completion of this course, students will be able to:

- Understand the key AM technologies
- Identify key material properties for processibility for each AM technique
- Compare and differentiate AM methods and processible materials based on specific application
- Design a component or a functional device to meet desired needs with realistic design constrains considering the processing and the application

- e. Manufacture components and devices using AM technology
- f. Assess current and future applications of AM technology

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

Lectures		Bite size lab/practical		
Week	Lecture Title	Hours	Demo/Lab/Practical title	Hours
1	<b>1 Introduction to additive manufacturing technologies</b> 增材制造技术概述	2	<b>Site visit</b> 现场参观	4
2	<b>2 Fundamental additive manufacturing procedures</b> 增材制造基本工艺过程	2	<b>Homework</b> Visit Report 作业：参观报告	
3-4	<b>3 Pre-processing and modelling of additive manufacturing</b> 增材制造的前处理	4	<b>Project 1</b> Design and 3D print a master part 项目 1 设计、3D 打印关键零部件  <b>Homework</b> Project report 作业：项目报告	4
5	<b>4 Material Extrusion</b> 材料挤出	2	<b>Project 2</b> Design and 3D print a non-demountable assembly 项目 2 设计、3D 打印不可拆卸组装件	4
6	<b>5 Sheet lamination</b> 薄材叠层	2	<b>Homework</b> Project report 作业：项目报告	
7	<b>6 Powder Bed Fusion</b> 粉末床熔融	2	<b>Project 3</b> Design and 3D print a functional gear assembly 项目 3 设计、3D 打印功能性齿轮传动装置	4
8	<b>7 Directed Energy Deposition</b> 定向能量沉积	2	<b>Homework</b> Project report 作业：项目报告	
9	<b>8 Vat photopolymerization</b> 立体光固化	2	<b>Project 4</b> Design and 3D print different joint types 项目 4 设计、3D 打印不同连接件	4
10	<b>9 Material Jetting</b> 材料喷射	2	<b>Homework</b> Project report 作业：项目报告	

11	<b>10 Binder Jetting</b> 粘结剂喷射	2	<b>Project 5</b> Testing of 3D printed parts 项目 5 检测、3D 打印部件	4
12	<b>11 Testing, Characterization and Quality Control</b> 测试表征与质量控制	2		
13	<b>12 Advantages and Challenges</b> 增材制造技术的优势与挑战	2	<b>Project 6</b> Design and 3D print complex assembly with moving parts 项目 6 设计、3D 打印带有活动部件的复杂装置	8
14-15	<b>13 Applications of additive manufacturing</b> 增材制造技术的应用	4		
16	<b>14 Future Trends in Additive Manufacturing</b> 增材制造技术的发展趋势	2		

**18. 教材及其它参考资料 Textbook and Supplementary Readings**
**Textbook and supplementary readings:**

- Gibson I., Rosen D., Stucker B., Khorasani, M., (2021), Additive Manufacturing Technologies, Springer
- 增材制造与 3D 打印技术及应用, 清华大学出版社, 杨占尧、赵敬云, 2017

**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz	Weekly	20%	NIL	To assess students' basic understanding of coursework, self-learning 检查学生基础知识的学习、自主学习
课程项目 Projects	Weeks 4, 6, 8, 10, 12, 16 第 4、6、8、10、12、16 项目	40%	NIL	To assess students' achievement in team working, hands-on and application of learned knowledge 检查学生团队合作、动手能力和知识应用能力
平时作业 Assignments	Fortnightly until Week 16 每两周项目报告	40%	NIL	To assess students' basic understanding of coursework, self-learning and reporting skills 检查学生基础知识学习、自主学习和报告技巧
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation				

其它（可根据需要  
改写以上评估方  
式）

Others (The  
above may be  
modified as  
necessary)

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20. 记分方式 **GRADING SYSTEM**

A. 十三级等级制 **Letter Grading**

B. 二级记分制（通过/不通过） **Pass/Fail Grading**

课程审批 **REVIEW AND APPROVAL**

21. 本课程设置已经过以下责任人/委员会审议通过

**This Course has been approved by the following person or committee of authority**

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