



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.	课程名称 Course Title	设计思维与工程 Design Thinking and Engineering
2.	授课院系 Originating Department	系统设计与智能制造学院 School of System Design and Intelligent Manufacturing (SDIM)
3.	课程编号 Course Code	SDM212 (co-list in MEE as ME111B)
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业核心课 Core Course
6.	授课学期 Semester	春季学期 / 秋季学期 Spring semester / Fall semester
7.	授课语言 Teaching Language	英语 English
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	Fred HAN 系统设计与智能制造学院 School of System Design and Intelligent Manufacturing (SDIM) Email: fred@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	tbc
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	30



11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 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	无 NA				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NA				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 NA				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

This course aims to apply and practice the core principles of Design Thinking in a real-world engineering project-based learning. The course is redesigned the traditional Design Thinking course in design university and is tailored for engineering students to practice engineering and science, engineering ethics and manufacturing process. Focus on Design Thinking process-based learning, understanding and using methods for defining uncovered engineering problems, market research, engineering ideation, conceptualisation, manufacturing, and performance evaluation. It guides students design and innovation principle through the multidisciplinary collaboration project implementation, where the steps of the design and engineering applications are embedded.

Students will be brought to and practice:

- Design Thinking application in engineering and product development process
- Understanding of relationship between design, engineering and science
- Methods of market research and emphatical user research
- Defining product function and features with engineering solutions
- Product design with suggested manufacturing and production techniques and materials.

16. 预达学习成果 Learning Outcomes

Upon completing the subject, students will gain:

- 1. Understanding of design as a thinking tool**
 - Design thinking: Divergent > Convergent thinking processes
 - Integration of Design/Engineering/Technology in a pathway to product innovation
 - Humanistic design, user- centered/orientated design and empathy
- 2. Understanding of New Product Development Process**
 - From quantitative market research and qualitative user research, to product concept, to realization of product concept with manufacturing requirements.
 - Integration of design and engineering practices
 - Collaboration of different engineering disciplines including product design



3. Knowledge of Product Definition and Requirement Document

- Product Definition Document structure
- Writing skill of Product Definition document
- Understanding of Function and Features

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.)

Course Schedule					
Week	Hour	Lecture		Practice	Hours
		Lecture Title	Language	Practice in Makerspace	
1	2	Design Thinking & Introduction of design in product development process	• English	Preliminary study 1: Assigned research topic (Design focused)	4
2-3	4	Market & User Research & Problem Statement	• English	- Quantitative Research - Market Research - Qualitative Research - User research - Analysis of the product objectives (product definition) and translate to a product definition document	4
4	2	Identifying Problems and user needs	• English	Finalization of market and user research	2
5	4	Research Presentation	• English	Constructing Product Definition (Writing a Project Brief)	4
6-8	4	Product Design Method_: Function, Feature and forms	• English	Exploring product concepts : Practice of visualization of product concepts : Understanding of product concept and its development Understanding of defining product function and features	4
9	4	Concept presentation	• English		
10	2	Project Management skills	• English	Project management methods and planning of new product development	2
11-15	6	- Realization of product concept - Manufacturing and product performance / feasibility evaluation	• English	- Understanding of manufacturing methods and production of functional prototypes - Components layout and assembly - Product Testing and evaluation	8
16	4	Final Presentation	• English	Final Presentation	4

All teaching is conducted in English, including teaching materials and oral communications. Students assignment submission should be in English as well. Final Presentation for open audiences can be presented in Chinese or preferred language.



18. 教材及其它参考资料 Textbook and Supplementary Readings

Supplementary readings:

Kelly, Tom. *Creative Confidence*. 2013

Dreyfuss, Henry. *Designing for People*. Allworth, 2003

Lidwell, William. *Universal Principles of Design*. Rockport, 2010

Madsen, David A., and David P. Madsen. *Engineering drawing and design*. Nelson Education, 2016.

课程评估 ASSESSMENT

19.

Type of Assessment	Assessment Time	% of final score	Penalty	Notes
Research Presentation	End of the 6 th week	25	NA	To assess students' understanding of the product's pain-points in relation with user and & its context
Concept Presentation	End of the 9 th week	25	NA	To assess students' design solutions that respond to the defined problem through the research
Final Presentation and Report	End of the 16 th week	40	NA	To assess a student's individual work ethics and collaborative team works
Attendance and Participation	End of the 16 th week	10	NA	To assess a student's individual work ethics and collaborative team works

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