

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	系统设计与管理 System Design and Management
2.	授课院系 Originating Department	系统与智能制造学院 School of System Design and Intelligent Manufacturing
3.	课程编号 Course Code	SDM223
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业核心课 Core Course
6.	授课学期 Semester	春季 Spring
7.	授课语言 Teaching Language	中英双语 English & Chinese
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)	王振坤 系统与智能制造学院 Zhenkun Wang School of System Design and Intelligent Manufacturing Email: wangzk3@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

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	16	0	32	0	48
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 NIL				
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

SDM223 “系统设计与管理”课程涉及系统组织建立和运行管理中的主要概念和技术，旨在培养学生的分析评价和创新思维能力，以及运用系统思想与方法来处理复杂综合性问题的能力。学生将首先了解系统工程的分类与发展史，掌握系统工程的一般原则与方法论，并熟悉系统工程的作用及应用领域。在系统的开发和维护过程中，都离不开系统的设计。而系统设计是在系统分析的基础上进行的。因此本课程还将介绍系统分析与设计的基本程序与步骤，并讲授一些常用的系统评价方法。系统维护与改进是系统运行中必不可少的要素，因此本课程还将介绍系统管理的基本步骤，系统实施技巧和风险预防措施。同时学生还将学习系统建模与仿真中常用技术，如数学仿真和计算机仿真等。除此之外，学生还将学习到系统决策与优化相关的知识。在当代，随着系统逐渐地复杂化、大规模化和多目标化，传统的优化技术越来越不堪重负。因此本课程还将介绍一些先进的智能优化技术与多目标优化决策技术。

This course, **SDM223 “System Design and Management”**, introduces the main concepts and techniques in the establishment and operation of a system. It aims to develop students' analytical and innovative skills, and the ability to use system thoughts and methods to address complex problems. Students will first learn the classification and development of the system engineering, study its main principles and methodology of the system engineering, and understand the application value of the system engineering. System design exists in each stage of the development and maintenance of a system, while the system analysis is the basis of system design. Therefore, this course will also introduce the basic procedures of system analysis and design and presents some commonly used system evaluation methods. System maintenance and modification are key elements of the system operation. The basic steps, system implementation skills and risk precautions in the system management will be introduced in this course. Meanwhile, students will also learn the widely-used techniques in system modeling and simulation, such as the mathematical simulation and the computer simulation. In addition, students will also learn the knowledge about the system decision-making and optimization. Currently, as the system is gradually becoming more complex, large-scale, and multiobjective, traditional optimization techniques are becoming increasingly overwhelmed. Therefore, this course will also introduce some advanced intelligent optimization techniques and multiobjective optimization decision-making techniques.

16. 预达学习成果 Learning Outcomes

通过这门课程的学习，学生预期掌握以下能力：

- 熟悉系统工作的一般原理和方法
- 熟悉系统设计基本的基本步骤
- 熟悉系统管理的技巧
- 掌握系统建模和仿真
- 熟悉一般的优化与决策技巧
- 掌握多目标优化
- 能够实现常用的智能优化算法

By the end of this course, students should have mastered the following abilities:

- Be familiar with the general principles and methodology of the system engineering.
- Be familiar with the basic procedures of the system design.
- Be familiar with system management skills.
- Be able to conduct the system modelling and simulation.
- Be familiar with the common decision-making and optimization skills
- Be familiar with multiobjective optimization
- Be able to use generally used intelligent optimization algorithms

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.)

课程安排 Course Schedule				
教学周 Week	课程标题 Lecture Title	课时 Hour	实验 Lab	课时 Hour
1	系统简介 1, 系统的概念 2, 系统的发展历史 3, 系统的分类 4, 系统的生命周期 Introduction to System: 1, the concept of system 2, the history of system 3, the classification of system 4, the lifecycle of system	2		
2			编译环境讲解 Tutorial on programming tools	4
3	系统设计 1, 系统设计的准则与步骤 2, 系统的构造与部署 3, 案例分析 System Design: 1, the principles and steps of system design 2, construction and production of system 3, case study	2		
4			系统思维训练 System thinking	4
5	系统评估与修改 1, 系统验证 2, 配置与风险管理 3, 案例分析 System Evaluation and Modification: 1, system validation 2, configuration and risk management 3, case study	2		

6			系统设计与管理技巧练习 Practice of system design and management skills	4
7	系统建模 1.理论、方法, 仿真与实验 System Modeling: theories and methods, simulation and experiments	2		
8			建模仿真一个特定功能的系统 Implementation of a system for a specific purpose	4
9	优化与决策 1.系统优化的综述 2.线性规划 3.系统觉得主要步骤 Optimization and Decision-making 1.the overview of system optimization 2.linear programming 3. the main steps of system decision making	2		
10			数学规划方法练习 Practice of mathematical programming methods	4
11	多目标优化 1.多目标优化的基本概念 2.多目标线性规划 3.多目标决策原理 Multiobjective optimization 1, the concepts of multiobjective optimization 2, multiobjective linear programming 3, multiobjective decision-making theories	2		
12			多目标优化方法练习 Practice of multiobjective optimization methods	4
13	多目标优化 1.多目标优化的基本概念 2.多目标线性规划 3.多目标决策原理 Intelligent optimization algorithms 1.heuristic algorithms 2.neural networks 3.Bayesian optimization	2		
14			实现一个算法来解决一个给定的优化问题 Implementation of an algorithm for a given optimization problem.	4
15	回顾总结 Review and summary	2		

16			项目说明与分析 Project analysis and explanation	4
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18. 教材及其它参考资料 Textbook and Supplementary Readings

Textbook:

Lecture notes only.

Supplementary readings:

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	1-16 周 Week 1-16	10	NIL	学生知识点掌握 To assess students' grasp of coursework knowledge.
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments	1-16 周 Week 1-16	70	NIL	作业及报告 Lab assignments and report
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation	1-16 周 Week 1-16	20	NIL	系统设计与管理的项目展示 Presentation about the design and management of a system
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				

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