

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	机械设计与制造综合 I Mechanical Design and Manufacturing I
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
3.	课程编号 Course Code	SDM232 (co-listed in MEE as ME303B)
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	中文和英文 Chinese-English bilingual
8.	授课教师、所属学系、联系方式 Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	吴元庆 系统设计与智能制造学院 Yuanqing WU School of System Design and Intelligent Manufacturing (SDIM) Email: wuyq@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	32	0	32	0	64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	ME102CAD 与工程制图 CAD and Engineering Drawing				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	机械设计制造 2 Mechanical Design and Manufacturing 2				
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

This course, SDM232 'Mechanical Design and Manufacturing I', is the mechanical engineering (ME) stream module of SDIM Integrative course. It offers the students basic knowledge in machine design essential to developing engineering thinking and basic mechanical engineering skills in machine design and manufacturing.

The course first presents methods of analysis and design of machines, including study of displacements, velocities, accelerations, and static and dynamic forces required for the proper design of mechanical linkages, cams, and geared systems. Then it presents concepts and procedures for designing and manufacturing machine elements commonly found in mechanical devices and systems, including cams, gears, and belt drives for mechanical power transmission, shafts and bearings, etc. The course is complemented with extensive Computer-aided design (CAD) / Computer-aided engineering (CAE) software practice and bite-sized lab sessions.

The course may serve either as a core course for year-two students majoring ME stream at SDIM, or as the 'B Version' of ME303 'Fundamentals of Machine Design', a core course offered by the department of mechanical and energy engineering.

External reference:

- SUSTech ME303: Fundamentals of Machine Design
- Michigan University ME250: Design and Manufacturing I
- MIT 2.007: Design and Manufacturing I

16. 预达学习成果 Learning Outcomes

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

- Be able to conduct structure analysis of mechanisms and calculate their degree of freedom.
- Be able to conduct kinematic and kinetic analysis of planar mechanisms.
- Be familiar with linkage mechanism, cam mechanism, gear mechanism and gear trains. Be able to conduct fundamental design of these mechanisms.
- Be familiar with machine system and be able to conduct the efficiency, balance and fluctuation analysis.
- Be familiar with generally used machine elements and mechanical drives.

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	In-class		Out of class	
	Lecture Title	Hour	Tutorial / Lab Practice	Hour
1	ME orientation	2	Research report	2
2	Introduction to theory of machines	2	Bite-sized lab: Kinematic pairs	2
3	Linkage mechanism	2	Bite-sized lab: linkages in practice 1	2
4	Kinematics analysis	2	Bite-sized lab: linkages in practice 2	2
5	Static analysis	2	Bite-sized lab: linkages in practice 3	2
6	Cam mechanism	2	Bite-sized lab: cam indexer disassembly	2
7	Gear mechanism	2	Bite-sized lab: comb paper binder and paper shredder disassembly	2
8	Gear train	2	Bite-sized lab: bicycle speedhub disassembly	2
9	Introduction to machine components	2	Bite-sized lab: components of cam indexer and speedhub	2
10	Gear drive	2	Bite-sized lab: motorcycle gearbox disassembly	2
11	Belt drive	2	Bite-sized lab: mini conveyor belt drive disassembly	2
12	Chain drive	2	Bite-sized lab: motorcycle chain drive disassembly	2
13	Shaft	2	Bite-sized lab: shaft design of bicycle speedhub and motorcycle gearbox	2
14	Bearing	2	Bite-sized lab: bearing classification	2
15	Motor	2	Bite-sized lab: motor classification	2
16	Machine fabrication, assembly and testing	2	Final report	2

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

Textbook:
Lecture notes only.

Supplementary readings:
Norton, Robert L. *Machine design: an integrated Approach, 4ed.* Prentice hall, 2011.
Uicker, John Joseph, Gordon R. Pennock, and Joseph Edward Shigley. *Theory of machines and mechanisms, 5ed.* New York, NY: Oxford University Press, 2017.
Mott, Robert L., and John Tang. *Machine elements in mechanical design, 6ed.* Upper Saddle River, NJ: Prentice Hall, 2014.
Shigley, Joseph Edward. *Shigley's mechanical engineering design.* McGraw-Hill Education, 2011.

课程评估 **ASSESSMENT**

19.

Type of Assessment	Assessment Time	% of final score	Penalty	Notes
Quizzes, labs and technical reports	Week 1-16	30	NIL	To assess students' grasp of coursework knowledge.
Designs, simulations and assemblies	Week 1-16	30	NIL	To assess students' hands-on skills.
Semester-long project prototype	Week 1-16	40	NIL	Test students' knowledge and skills through semester-long project of a prototype making and functionality.

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