

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	航空结构强度实验 Experiments in Aircraft Structural Mechanics
2.	授课院系 Originating Department	力学与航空航天工程系 Department of Mechanics and Aerospace Engineering
3.	课程编号 Course Code	MAE316
4.	课程学分 Credit Value	2
5.	课程类别 Course Type	专业核心课 Major Core Courses
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)	刘轶军 力学与航空航天工程系 0755-88018180, liuyj3@sustech.edu.cn Liu Yijun Department of Mechanics and Aerospace Engineering 0755-88018180, liuyj3@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	刘晓宇 力学与航空航天工程系 075588018183, liuxy7@sustech.edu.cn Liu Xiaoyu Department of Mechanics and Aerospace Engineering 075588018183, liuxy7@sustech.edu.cn
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	48	0	64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	材料力学(MAE202) & 航空结构强度(MAE307) Mechanics of Materials (MAE202) & Aircraft Structural Strength (MAE307).				
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

航空结构强度实验是航空结构强度基础课程的延伸。通过结构强度基础试验确定结构参数，测定材料的机械性能，分析复杂结构的受力情况等；通过实验操作和对标准的学习，使学生掌握常用仪器的原理和方法，并逐步培养其工程测试和实验设计验证的能力。

This course is an extension of the lecture of Aircraft Structural Strength. Through conducting structural strength basic tests and understanding the mechanical properties of materials, students will determine the structural parameters and analyze the stresses of complex structures under different loading. The course will help gradually develop students' ability in testing engineering structures and validate experimental design by conducting experimental tests besides standard classroom learning.

16. 预达学习成果 Learning Outcomes

测定材料的机械性能，观察材料在受力全过程中的变形现象和破坏特征，加深对材料破坏规律的认识。验证理论公式和定律，加深对理论知识的理解。

Determine the mechanical properties of the material, observe the deformation and failure characteristics of the material in the whole process of stress, and deepen the understanding of the law of material destruction. Verify theoretical formulas and laws to deepen understanding of theoretical knowledge.

熟悉常用仪器设备的工作原理和使用方法，掌握力学测试技术。

Familiar with the working principle and usage of common instruments and equipment, master the mechanical testing technology.

在生产、设计和科学研究中，各种实验都要按照国家有关标准进行。如 GB/T6397-1986《金属拉伸实验试件》，GB/T228-1987《金属拉伸试验方法》等。让学生初步了解和认识国家标准，增强执行标准意识。

In production, design and scientific research, all experiments must be carried out in accordance with relevant national standards. Such as GB/T6397-1986 "metal tensile test specimens", GB/T228-1987 "metal tensile test methods" and so on. Let students initially understand and understand national standards and enhance their awareness of executive standards.

通过实验技能的训练，逐步提高学生解决工程测试技术的能力和独立设计实验的能力。

Through the training of experimental skills, gradually improve students' ability to solve engineering test techniques and independently design experiments.

通过创新型试验，拓宽学生的知识面，培养学生的综合素质和能力。

Through innovative experiments, broaden students' knowledge and develop students' comprehensive qualities and abilities.

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.)

序号 No.	实验项目 Experimental project	学时 credit hours	实验内容 Experimental content	类型 Types
1	演示实验 Demonstration experiment	4	课程介绍; Course Introduction; 光测法演示实验; Photometric demonstration experiment; 冲击演示实验; 疲劳演示实验; Impact demonstration experiment; fatigue demonstration experiment; 生活中的力学; Mechanics in life;	基础型 Basic type
2	电测法 Electrical measurement	4	电测法基本原理; Basic principle of electrical measurement; 电桥设计及应用; Bridge design and application; 应变片贴片; Strain gauge patch; 灵敏度系数测定; Determination of sensitivity coefficient;	基础型 Basic type
3	力学性能测试实验 Mechanical performance test	4	低碳钢拉伸、压缩; Low carbon steel tensile and compression; 铸铁拉伸、压缩; Cast iron tensile and compression; 低碳钢扭转实验; Low carbon steel torsion test;	基础型 Basic type
4	复合材料性能测试实验 Composite material performance test	4	偏心拉伸实验; Eccentric tensile test; 复合材料 0 度, 45 度和 90 度的弹性常数; The elastic constant of the composite material at 0 degrees, 45 degrees and 90 degrees;	综合型 Improved type
5	基本梁类 弯曲实验 Basic beam bending test	4	矩形梁纯弯曲; The purely curved rectangular beam experiment; 等强度梁实验; Equal strength beam experiment;	基础型 Basic type

			悬臂梁弯曲实验; Cantilever beam bending test;	
6	工程梁类 弯曲实验 Engineering beam Bending experiment	4	T 型梁弯曲实验; T-beam bending test; 工字梁弯曲实验; I-beam bending test; 叠梁 (复合梁) 弯曲实验; Stacked beam (composite beam) bending test; 拱型梁受力分析实验; Stress analysis experiment of arch beam;	综合型 Improved type
7	薄壁管类 弯扭实验 Thin wall tube Bending and twisting experiment	4	薄壁管纯扭实验; Thin-walled tube pure torsion test; 弯扭组合实验; Bending and twisting combination experiment; 薄壁槽型梁的弯扭组合; Bending and twisting combination of thin-walled grooved beams; 工字型弯扭梁组合; I-shaped bending and twisting beam combination;	综合型 Improved type
8	框类实验 Frame experiment	4	四种构型静定框架实验; Four configurations of static frame experiments; 超静定框类实验; Ultra static frame type experiment;	综合型 Improved type
9	结构组合 受力实验 Structural combination Stress test	4	斜弯曲梁实验; Oblique bending beam experiment; 拉伸杆和压缩杆组合变形实验 (变角度); Stretching rod and compression rod combined deformation experiment (variable angle);	综合型 Improved type
10	桁架类 基本实验 Truss Basic experiment	4	结构的几何组成规律实验; Experiment on the geometric composition of the structure; 桁架内力测量: 不同连接方式、零杆检测实验; Truss internal force measurement: different joint mode, zero rod detection experiment; 桁架静变形实验; Truss static deformation experiment;	综合型 Improved type
11	桁架类 综合实验 Truss	4	空间桁架结构模拟静力实验; Truss structure simulation static experiment	综合型 Improved type

	Comprehensive Experiment			
12	稳定性实验 Stability test	4	不同边界条件，压杆稳定性实验； Different boundary conditions, pressure bar stability test; 桁架稳定性实验； Truss stability test; 框架（钢架）稳定性实验； Frame (steel frame) stability test;	综合型 Improved type
13	团体创新 项目设计 Group innovation Project Design	4	限定载荷下，机翼方案团体设计； Under the limited load, the wing plan group design;	创新型 Improved type
14	团体创新 项目设计 Group innovation Project Design	4	单项实验测试； Single experimental test; 机翼制作； Wing production; 机翼载荷测试； Wing load test;	创新型 Improved type
15	团体创新 项目设计 Group innovation Project Design	4	机翼结构优化； Optimization of wing structure; 撰写方案报告； Write a plan report;	创新型 Improved type
16	团体创新 项目设计 Group innovation Project Design	4	项目方案口试； Project plan oral test; 项目答辩； Project defense;	创新型 Improved type
总计		64		

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

金宝森,卢智先.材料力学实验[M]. 机械工业出版社. 2005.10

Jin Baosen, Lu Zhixian. Material Mechanics Experiment [M]. Mechanical Industry Press. 2005.10

刘礼华,欧珠光.结构力学实验[M]. 武汉大学出版社, 2010.

Liu Lihua, Ou Zhuguang. Structural Mechanics Experiment [M]. Wuhan University Press, 2010.

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
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出勤 Attendance		0	如果迟到, 会在该次实验扣 1~2 分; 如果旷课, 则该次实验成绩为 0. If be late, 1~2 points will be deducted in the experiment; if miss class, that experiment will be zero.
课堂表现 Class Performance		40	12 个基础及综合实验操作完成情况 12 basic and comprehensive experimental operations completed
小测验 Quiz		0	
课程项目 Projects		20	
平时作业 Assignments		40	具体为 12 个实验报告 12 experimental reports
期中考试 Mid-Term Test		0	
期末考试 Final Exam		0	
期末报告 Final Presentation		0	
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

力学与航空航天工程系教学指导委员会
The commission of teaching instruction in department of mechanics and aerospace engineering