

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	粘性流体 Viscous Flow				
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	MAE306				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Courses				
6.	授课学期 Semester	春季 Spring				
7.	授课语言 Teaching Language	英文 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)	待定				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	无 NA				
10.	选课人数限额(可不填) Maximum Enrolment (Optional)					
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	48				48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	高等数学（下）A 或者 数学分析 II 或者 高等数学（下） Calculus II A or Mathematical Analysis II or Calculus III
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

1. 课堂教学主要讲解基本原理，并将粘性流体力学常见现象融入基本原理的讲解，使学生初步了解粘性流体力学的理论体系、思维方式和研究方法
 2. 通过课堂互动式的教学模式，使学生能更好的融入课堂教学。
 3. 作业以理论分析和基本概念为主，培养学生熟练运用所学知识的能力及表达能力等。
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1. This course aims to provide students with basic principles of viscous flows by linking the phenomena in everyday life with these principles so that the student can understand the theoretical frame, thinking skills, and research methods about viscous fluid dynamics.
 2. Students can better integrate into classroom teaching by applying interactive teaching methods.
- Students can develop the ability to use what they have learned and the capability of expression by homework that mainly includes theoretical analysis and basic concept.

16. **预达学习成果 Learning Outcomes**

本课程的主要内容为粘性流体运动的基本方程、运动方程的精确解、不可压缩层流边界层、湍流的产生和流动稳定性理论、湍流基本理论、湍流边界层、剪切流动等。本课程的主要目的和任务是使学生掌握流体的运动性质和基本规律以及解决分离流、涡旋流、湍流等空气动力学问题的基本方法和分析手段。

The course covers the following topics: basic equations for viscous fluid dynamics, exact solution for fluid dynamic equation, boundary layer for incompressible fluid, onset of turbulence and instability theory, basic theory of turbulence, turbulent boundary layer, shear flow, etc. The main objective is to enable the students to master the basic principles and mechanism of fluid flow, and to provide the basic methods and analytical skills to solve the aerodynamic problems such as separating flow, vortex flow, and turbulent flow.

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.)

1. 粘性流体基本概念, 4 学时 (basic concepts for viscous fluid dynamics, 4 credits)
2. 粘性流体运动的基本方程, 4 学时 (basic equations for viscous fluid dynamics, 4 credits)
3. 运动方程的精确解, 8 学时 (exact solution for fluid dynamic equation, 8 credits)
4. 不可压缩层流边界层 6 学时 (boundary layer for incompressible fluid, 6 credits)
5. 湍流的产生和流动稳定性理, 8 学时 (onset of turbulence and instability theory, 8 credits)
6. 湍流基本理论, 8 学时 (basic theory of turbulence, 8 credits)
7. 湍流边界层, 6 学时 (turbulent boundary layer, 4 credits)
8. 剪切流动, 4 学时 (shear flow, 4 credits)

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

1. 粘性流体动力学基础, 陈懋章, 高等教育出版社, 2002
2. Viscous Fluid Flow, Frank M White, McGraw-Hill Education, 2005
3. 粘性流体力学, 邹高万, 贺征, 顾璇, 国防工业出版社, 2013

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		5		
课堂表现 Class Performance				
小测验 Quiz		5		
课程项目 Projects		15		
平时作业 Assignments		5		
期中考试 Mid-Term Test		20		
期末考试 Final Exam		50		
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

<input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading <input type="checkbox"/> 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
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