

## 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 <b>Course Title</b>	流体力学 <b>Fluid Mechanics</b>				
2.	授课院系 <b>Originating Department</b>	力学与航空航天工程系 Department of Mechanics and Aerospace Engineering				
3.	课程编号 <b>Course Code</b>	MAE303				
4.	课程学分 <b>Credit Value</b>	4				
5.	课程类别 <b>Course Type</b>	专业核心课 Major Core Courses				
6.	授课学期 <b>Semester</b>	秋季 Fall				
7.	授课语言 <b>Teaching Language</b>	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) <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	万敏平 副教授 力学与航空航天工程系 wanmp@sustech.edu.cn Wan Minping Associate Professor Department of Mechanics and Aerospace Engineering wanmp@sustech.edu.cn				
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	待公布 To be announced				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	64	16			80

<p>12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b></p>	<p>MA102B 高等数学（下）A 或 MA102b 高等数学（下）或 MA102a 数学分析 II 且 PHY105A 大学物理 A(下) 或者 PHY105B 大学物理 B(下) MA102B Calculus II A / MA102b Calculus II / MA102a Mathematical Analysis II &amp; PHY105A General Physics A (II) / PHY105B General Physics B (II)</p>
<p>13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b></p>	
<p>14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b></p>	

**教学大纲及教学日历 SYLLABUS**

15. **教学目标 Course Objectives**

本课程将为学生教授流体静力学和动力学。在本课程中，我们将学习积分和差分形式的质量，动量和能量的基本守恒定律。学生将学习如何使用正确的方法来解决不同的流程问题。学生还将学习如何在不同参照系下简化不同的问题。我们还将介绍这些基本概念在现实生活中的应用，同时还将强调对实验结果的解释以及流体流动的数值模拟。

This course will provide the student with a fundamental background in the statics and dynamics of fluids. In this course, we will analyse basic conservation laws of mass, momentum and energy in control volume and differential form. The students will learn how to use the right formulation for different flow problems. The student will also learn how to simplify problems with different frames of reference. We will also introduce real life applications of these fundamental concepts with an emphasis on critical analysis of the limitations of the model used in solving the problem. Interpretation of results from experiments and numerical simulation of fluid flows will also be emphasized.

16. **预达学习成果 Learning Outcomes**

本课程的任务是系统介绍流体的力学性质、流体力学的基本概念和观点、基础理论和常用分析方法、有关的工程应用知识等；培养学生具有对流体力学问题的分析和求解能力，掌握一定的实验技能，为今后学习相关专业课程，从事相关的工程技术和科学研究工作打下坚实基础。

The task of this course is to systematically introduce the mechanical properties of fluid, the basic concepts and perspectives of fluid mechanics, the basic theory and commonly used analytical methods, the relevant engineering application knowledge, etc. ; cultivate students with fluid mechanics problem analysis and solving ability, as well as the experimental skills for the future study of professional courses, and lay a solid foundation for future engineering and scientific research work.

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.)**

Section 1: Introduction and fluid properties (3 credit hours)

Section 2: Fluid properties (3 credit hours)

Section 3: Fluid Statics (3 credit hours)

Section 4: Conservation laws: Integral Form (3 credit hours)

Section 5: Conservation laws: Integral Form (3 credit hours)

Section 6: Kinematics and Bernoulli's equation (3 credit hours)

Section 7: Differential analysis of the conservational laws (3 credit hours)

Section 8: Differential analysis of the conservational laws (3 credit hours)

Section 9: Dimensional analysis and principles of similarity (3 credit hours)

Section 10: Irrotational, incompressible flows (3 credit hours)

Section 11: Vorticity and incompressible flows (3 credit hours)

Section 12: Internal flows: Flow in Pipes (3 credit hours)

Section 13: External flows: boundary layer (3 credit hours)

Section 14: External flows (3 credit hours)

Section 15: Compressible Flow (3 credit hours)

Section 16: Basic turbulence (3 credit hours)

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

1. Alexander J. Smits, A Physical Introduction to Fluid Mechanics (PDF copy provided)
2. Frank M. White, Fluid Mechanics
3. G. K. Batchelor, An introduction to fluid dynamics
4. 林建忠等, 流体力学, 清华大学出版社

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				
小测验 Quiz		5		
课程项目 Projects		10	抄袭本项记 0 分 Cheating	
平时作业		15	抄袭本项记 0 分	

**Assignments**

期中考试  
**Mid-Term Test**

期末考试  
**Final Exam**

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)**

		Cheating:0	
	25	抄袭本项记 0 分 Cheating:0	
	45	抄袭本项记 0 分 Cheating:0	

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

