

## 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>	输运现象原理 <b>General Principles of Transport Phenomena</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>	MAE309				
4.	课程学分 <b>Credit Value</b>	3				
5.	课程类别 <b>Course Type</b>	专业选修课 Major Elective 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)	余鹏 副教授 力学与航空航天工程系 yup6@sustech.edu.cn  Yu Peng Associate Professor Department of Mechanics and Aerospace Engineering yup6@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>	48				48

12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b>	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 II
13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b>	无 NA
14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b>	材料科学与工程系、环境学院

### 教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

The first objective of this course is to provide students with basic principles of the three transfers encountered in engineering, momentum, heat and mass transfers. A second objective is for students to develop critical thinking skills by solving transport phenomena problems taken from the fields of engineering, using analytical methods.

本课程的教学目标为：1) 给学生讲解工程中的三种输运现象，即动量传输、传热、传质的基本原理；2) 培养学生利用分析方法，解决工程领域输运现象问题的创新思维能力。

16. **预达学习成果 Learning Outcomes**

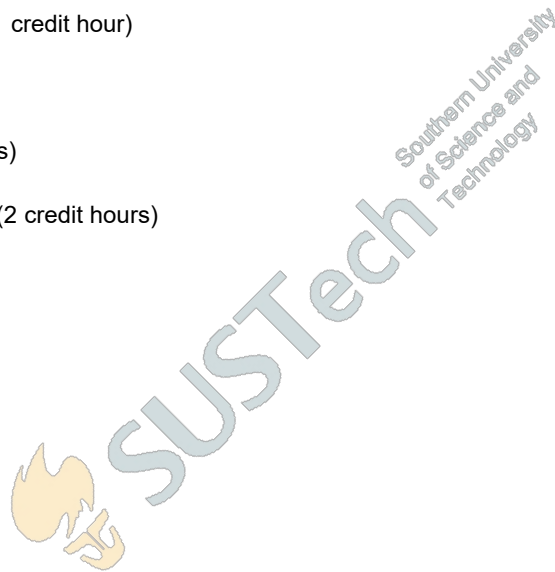
Students can understand the basic concepts on transport phenomena  
 Students can identify the mechanism of an engineering transport phenomenon and construct the proper model for it.  
 Students can apply the knowledge from pre-requisite as a tool to solve the model in 2.

学生能够掌握输运现象的基本物理概论。  
 学生能够正确辨别出工程中遇到的输运现象的机理，并为它构建出正确的数学模型。  
 学生能够利用已学过的数学知识求解出上述数学模型。

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. Introduction (1 credit hour)
2. Introduction on Fluid Mechanics (1 credit hour)
3. Fluid Statics (5 credit hours)
4. Conservation Law (3 credit hours)
5. Bernoulli Equation (3 credit hours)
6. Dimensional Analysis and Similarity (4 credit hours)
7. Laminar and Turbulent Flow (5 credit hours)
8. Midterm Exam (2 credit hours)
9. Introduction on Heat Transfer (1 credit hours)
10. Heat Conduction Part 1: Steady-State Problem (4 credit hours)
11. Heat Conduction Part 2: Unsteady-State Problem (3 credit hours)
12. Convection (5 credit hours)
13. Radiation (4 credit hours)
14. Introduction to Mass Transfer (1 credit hour)
15. Diffusion (2 credit hours)
16. Mass Convection (2 credit hours)
17. Final Review and Presentation (2 credit hours)

1. 课程概述 (1 学时)
2. 动量传输概述 (1 学时)
3. 流体静力学 (5 学时)
4. 守恒定律 (4 学时)
5. 伯努利方程 (3 学时)
6. 量纲分析和相似定律 (4 学时)
7. 层流和湍流 (5 学时)
8. 期中考试 (2 学时)
9. 传热简介 (1 学时)



- 10. 稳态热传导 (4 学时)
- 11. 非稳态热传导 (3 学时)
- 12. 对流换热 (5 学时)
- 13. 热辐射 (4 学时)
- 14. 传质简介 (1 学时)
- 15. 物质扩散 (2 学时)
- 16. 物质对流 (2 学时)
- 17. 课程终结及学生项目汇报 (2 学时)

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

Reference Book:

1. R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot, Daniel J. Klingenberg, Introductory Transport Phenomena, 1st Edition, Wiley, 2014.
2. Pijush K. Kundu, Ira M. Cohen, David R Dowling, Fluid Mechanics, 5th Edition, Elsevier, 2012
3. Adrian Bejan, Heat Transfer, Wiley, 1993
4. Hans Dieter Baehr, Karl Stephan, Heat and Mass Transfer, Springer 2006

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				
课程项目 Projects		20	抄袭本项记 0 分 Cheating:0	
平时作业 Assignments		10	抄袭平时作业记 0 分 Cheating:0	
期中考试 Mid-Term Test		20	考试作弊本门课程记 0 分 Cheating:0	
期末考试 Final Exam		45	考试作弊本门课程	

		程记 0 分 Cheating:0	
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)			

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
--

