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	偏微分方程（下） Partial Differential Equations II
2.	授课院系 **Originating Department**	数学系 Department of Mathematics
3.	课程编号 **Course Code**	MAT7024
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**	秋季 Fall
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**）	王学锋、数学系、wangxf@sustc.edu.cn Xuefeng Wang, Department of Mathematics, wangxf@sustc.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 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	MA302 泛函分析 MA302 Functional Analysis
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**

学生通过本课程的学习将掌握偏微分方程中的基本概念、基本理论以及基本方法。此课将为学生们以后阅读参考文献和开展相关的科研工作打好基础。

The students will learn fundamental concepts, theories, and methods in partial differential equation and be able to apply them to solve problems. Students will be well prepared to read more advanced literature and carry out related research in the future.

16. **预达学习成果 Learning Outcomes**

将采用传统方式教授此课(版书，课堂讨论，作业，课外答疑，闭卷考试)。本课讲授者长期从事偏微方程的科研，知道什么是科研中最需要的基础知识。教师将高效地利用有限的课时讲授最重要的内容，并在适当的时候以授课和作业的形式介绍科研前沿问题。

The course will be taught in the standard way ("chalk and board", in-class discussion, homework, office hours, close-book exams). The instructors are experienced researchers in the field of partial differential equations, hence know what are the most needed in real research. The instructors will be highly efficient in using the class hours to teach the most important material, and to expose the students to research problems via lectures and homework.

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 L^2 theory for second order parabolic and hyperbolic equations, existence via Galerkin method, uniqueness and regularity via energy method. （8H）

Section 2   Semigroup theory applied to second order parabolic and hyperbolic equations. （8H）

Section 3   A brief introduction to elliptic and parabolic regularity theories, the Lp and Schauder estimates. （8H）

Section 4   Nonlinear elliptic equations, variational method—the direct minimization method, method of upper and lower solutions, fixed point method. （8H）

Section 5   Nonlinear parabolic equations, global existence, stability of steady states, traveling wave solutions. （8H）

Section 6   Conservation laws, Rankine-Hugoniot jump condition, uniqueness issue, vanishing viscosity method, entropy condition, Riemann problem for Burger's equation, p-systems. （8H）

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

1. Partial Differential Equations, by Lawrence C. Evans, American Mathematical Society.

2. Elliptic and Parabolic Equations, by Wu Zhuoqun,Yin Jinxue and Wang Chunpeng, World Scientific Publishing Co.

3. Elliptic Partial Differential Equations of second Order, by David Gilbarg and Neil S.Trudinger, Springer.

4. Linear and Quasilinear Equations of Parabolic Type, by Q. A. Ladyzenskaja, V. A. Solonnikov and N. N. Uralceva, American Mathematical Society.

5. Partial Differential Equations, 2nd edition, by R. McOwen, Prentice-Hall

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				
	课程项目 Projects				
	平时作业 Assignments		40		
	期中考试 Mid-Term Test		20		
	期末考试 Final Exam		40		
	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

☑ 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