

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	Dynamical Systems				
2.	授课院系 Originating Department	Department of Mathematics				
3.	课程编号 Course Code	MA401				
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 / 夏季 Summer / 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)	Jana Hertz Department of Mathematics, Block 3, Wisdom Valley Jana Hertz, Room 427, rhertz@sustech.edu.cn , 0755-8801-8121				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced				
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	MA203a 数学分析 III 或者 MA213 数学分析精讲 Mathematical Analysis III (MA103a) (or Real Analysis (MA213)).
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、了解和掌握动力系统理论的基础理论，基本方法，重要模型以及主要结果

To learn and understand the basics of Dynamical Systems

2、培养学生在动力系统及常微分方程领域初步的科研能力

Get prepared for research work in the fields of Dynamical Systems and ODEs

16. 预达学习成果 **Learning Outcomes**

Dynamical Systems is a major branch of theoretical mathematics. It is a comprehensive application of ODE, Analysis and Measure theories. This course will provide for the interested students a general view of dynamical systems: beginning with the basics, it will go through the main models and methods from one-dimensional dynamics to higher dimensional cases, with an emphasize on hyperbolic dynamics, and then finally it will end with an introduction to continued fractions.

After taking the course, students should all have a good grasp of the fundamental theories of dynamical systems, and more importantly, they should be able to take part in research works especially in the fields of Dynamical Systems and ODEs.

动力系统是基础数学理论的一个重要分支，它是包括常微分方程、分析学及测度论等学科理论在内的综合应用与延伸。本课程将为对动力系统感兴趣的学生较为全面系统地介绍其基本理论与方法：从最基本的概念引入，从一维动力系统到高维动力系统逐渐推进，重点讲解双曲动力系统理论，并以遍历理论作为结束。

通过本课程的学习，学生们将不仅能对动力系统理论的基本方法、重要模型、主要结果有所了解，也可以初步培养起学生在动力系统及常微分方程领域初步的科研能力。

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. Basic notions of dynamical systems (2h)

Section 2: One dimensional dynamical systems

2.1 Lifts and degree. Rotation number (2h)

2.2 Classification via conjugacy maps. Orientation preserving homeomorphisms with periodic points (4h)

2.3. Classification. Orientation preserving homeomorphisms without periodic points (2h)

2.4. Denjoy example (2h)

2.5. Hartman-Grobman Theorem in the circle (2h)

2.6. Expanding maps on the circle (2h)

2.7. Expanding maps on the circle. Coding. Symbolic dynamics (2h)

2.8. Expanding maps on the circle. Classification. (4h)

Section 3. Hyperbolicity

3.1 Smale's horseshoe. Coding (4h)

3.2. Hyperbolicity. Hyperbolic sets. Stable and unstable manifolds (8h)

3.3 Arnold's cat map (4h)

3.4. Subshifts of finite type (2h)

3.5. Anosov diffeomorphisms. Surfaces admitting Anosov diffeomorphisms (4h)

Section 4. Gauss map and Continued fractions

4.1 Gauss map and continued fractions (4h)

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

1. Introduction to the Modern Theory of *Dynamical Systems*, by A. Katok and B. Hasselblatt.

2. Ergodic Theory. M. Einsiedler, T. Ward

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		20%		
期中考试 Mid-Term Test	2 hours	30%		
期末考试 Final Exam	2 hours	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)				

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