课程大纲
COURSE SYLLABUS

1.	课程代码/名称 **Course Code/Title**	**MAT8025 动力系统引论 Introduction to Dynamical Systems**
2.	课程性质 **Compulsory/Elective**	Compulsory
3.	课程学分/学时 **Course Credit/Hours**	Course credits 3 – 48 hours
4.	授课语言 **Teaching Language**	English
5.	授课教师 **Instructor(s)**	Jana Rodriguez Hertz – Raul Ures
6.	是否面向本科生开放 **Open to undergraduates or not**	Yes
7.	先修要求 **Pre-requisites**	常微分方程 A 或 B（MA201a 或 MA201b） Ordinary Differential Equations A or B (MA201a or MA201b). No differences between undergraduate and graduate students.
8.	教学目标 **Course Objectives**	

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

In the first part of the course a panorama of dynamical systems is given, with several paradigmatic examples.

We then introduce basic notions of topological dynamics, limit sets, recurrence, classification.

Symbolic dynamics is a necessary tool for classification, and it will be studied.

We will introduce basic topics and examples in Ergodic Theory.

No differences between undergraduate and graduate students.

9.	教学方法 **Teaching Methods**	

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

In presence class. No differences between undergraduate and graduate students.

10.	教学内容 **Course Contents** （如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）	

Section 1	Section 1. Examples and basic concepts.
	1.1 The notion of a dynamical system (2h)
	1.2 Circle rotations (2h)
	1.3 Expanding endomorphisms of the circle (4h)

	1.4 Shifts and subshifts (2h) 1.5 Quadratic maps (2h) 1.6 The Gauss transformation (2h) 1.7 Hyperbolic toral automorphisms (2h) 1.8 The horseshoe (2h) 1.9 The solenoid (2h) 1.10 Attractors (2h) 1.11 Chaos and Lyapunov exponents (2h)
Section 2	2. Topological dynamics 2.1. Limit sets and recurrence (2h) 2.2 Topological transitivity and topological mixing (1h) 2.3. Expansiveness (1h) 2.4. Topological entropy. Examples (4h)
Section 3	3. Symbolic dynamics 3.1. Subshifts and codes (1h) 3.2. Subshifts of finite type (1h) 3.3. Topics in symbolic dynamics (2h)
Section 4	4. Ergodic theory 4.1 Measure theory preliminaries (2h) 4.2. Recurrence (2h) 4.3. Ergodicity and mixing (2h) 4.4. Examples (2h) 4.5. Ergodic theorems (2h) 4.6 Invariant measures for continuous maps. (2h)
Section 5	
Section 6	
Section 7	
Section 8	
Section 9	
Section 10	

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11.	课程考核 **Course Assessment**	
	Homework 20%+ Mid-term Exam (closed-book) 30%+Final Exam (closed book) 50%	
12.	教材及其它参考资料 **Textbook and Supplementary Readings**	
	1. Introduction to Dynamical Systems, M. Brin and G. Stuck 2. A first course in Dynamics, B. Hasselblatt and A. Katok. 3. Introduction to the Modern Theory of *Dynamical Systems*，*by A. Katok* and B. Hasselblatt.	