

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	MAT7061 Ergodic Theory 光滑遍历论
2.	课程性质 Compulsory/Elective	Elective
3.	课程学分/学时 Course Credit/Hours	3/48
4.	授课语言 Teaching Language	英语 English
5.	授课教师 Instructor(s)	Raul Ures, Professor; Jana Hertz, Professor
6.	是否面向本科生开放 Open to undergraduates or not	是 Yes
7.	先修要求 Pre-requisites	MA301 实变函数 MA301 Theory of Functions of a Real Variable, Real analysis, Topology
8.	教学目标 Course Objectives	
	This course introduces the basic concepts of ergodic theory mainly focused on differentiable ergodic theory. It focusses on the classical results that are important for the following development of the theory, preparing the students for the study of more advanced topics and research.	
9.	教学方法 Teaching Methods	
	The course will be taught in the standard way (“ chalk and board”, in-class discussion, homework, office hours, closed-book tests).	
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 (6 hours)	Measure preserving transformations. Existence of invariant measures. Poincaré recurrence theorem.
	Section 2 (8 hours)	Ergodicity. Ergodic theorems of Von Neumann and Birkhoff.
	Section 3 (6 hours)	Ergodic hierarchy. Mixing, K-automorphisms. Unique ergodicity
	Section 4 (8 hours)	Examples: shifts, subshifts of finite type, toral automorphisms, toral translations. Hopf argument.
	Section 5 (6 hours)	Entropy: metric and topological entropy. Variational principle.
	Section 6 (6 hours)	Ergodicity of Anosov diffeomorphisms. Hopf argument revisited.
	Section 7 (8 hours)	Introduction to additional topics of differentiable ergodic theory: SRB measures for hyperbolic attractors, Osedelec’s theorem, Pesin theory, Ruelle inequality, Pesin equality, etc.

11.	课程考核 Course Assessment
Homework 30%+ Mid-term Exam (closed-book) 30%+Final Exam (closed book) 40%	
12.	教材及其它参考资料 Textbook and Supplementary Readings
<ol style="list-style-type: none"> 1. Mañé, Ricardo - Ergodic Theory and Differentiable Dynamics. Springer-Verlag, New York-Berlin, 1987. 2. Brin, Michael, Stuck, Garret – Introduction to Dynamical Systems. Cambridge University Press, 2004. 3. Walters, Peter - An introduction to ergodic theory. Springer-Verlag, New York-Berlin, 1982. 4. Bowen, Rufus - Equilibrium States and the Ergodic Theory of Anosov Diffeomorphisms. Lecture Notes in Math., Springer-Verlag, 1975. 5. Viana, Marcelo; Oliveira, Krerley – Foundations of Ergodic Theory. Cambridge studies in advanced mathematics 151, Cambridge University Press, 2016. 	