

课程大纲

COURSE SYLLABUS

1. 课程代码/名称 Course Code/Title	PHY5050/高等宇宙学 Advanced Cosmology
2. 课程性质 Compulsory/Elective	专业选课修 Elective Course
3. 课程学分/学时 Course Credit/Hours	3/48
4. 授课语言 Teaching Language	英文 English
5. 授课教师 Instructor(s)	Sebastian Garcia-Saenz
6. 是否面向本科生开放 Open to undergraduates or not	是 Yes
	(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.)
7. 先修要求 Pre-requisites	统计物理 II PHY303 Statistical Mechanics II 量子力学 II PHY305 Quantum Mechanics II 广义相对论: 从黑洞到宇宙学 PHY439 General Relativity: from Black Holes to Cosmology

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.)

本课程旨在培养对现代宇宙学物理原理的透彻理解。学生将学习宇宙热大爆炸历史的基本物理原理, 包括核合成、重组、结构形成和宇宙微波背景。除了标准宇宙学模型外, 本课程还将让学生了解与宇宙暴涨和暗能量有关的最新发展。

The course aims at developing a thorough understanding of the physical principles of modern cosmology. Students will learn the fundamental physics underlying the hot Big Bang history of the universe, including nucleosynthesis, recombination, structure formation and the cosmic microwave background. In addition to the standard cosmological model, the course will also expose students to more recent developments related to cosmic inflation and dark energy.

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.)

课堂讲座

Lectures

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	广义相对论中的均匀和各向同性时空 Homogeneous and isotropic spacetimes in general relativity
Section 2	宇宙的热历史 Thermal history of the universe
Section 3	宇宙学微扰理论 Cosmological perturbation theory
Section 4	宇宙微波背景 Cosmic microwave background
Section 5	结构形成 Structure formation
Section 6	暴涨 Inflation

11. 课程考核

Course Assessment

(○1 考核形式 Form of examination; ○2.分数构成 grading policy; ○3 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.)

作业 Problem sets: 30%

两次测试 Two midterm exams: 40%

期末考试 Final exam: 30%

12. 教材及其它参考资料

Textbook and Supplementary Readings

Textbook:

Mukhanov, V., "Physical Foundations of Cosmology", Cambridge University Press (2005)

Supplementary reading:

Weinberg, S., "Cosmology", Oxford University Press (2008)

Dodelson, S., "Modern Cosmology", Academic Press (2003)

Peter, P., Uzan, J.-P., "Primordial Cosmology", Oxford University Press (2013)