



研究生专业基础课程教学大纲 (Syllabus)

课程代码 Course Code	ASTR6004H	*学时 Teaching Hours	64	*学分 Credits	4
*课程名称 Course Name	(中文) 星系动力学 (English) Galactic Dynamics				
*授课语言 Instruction Language	中文(Chinese)				
*开课院系 School	物理与天文学院 (School of Physics and Astronomy)				
*先修课程 Prerequisite	(若有, 请给出具体课程名称; 若无, 请写“无”) 无 No				
授课教师 Instructors	姓名 Name	职称 Title	单位 Department	联系方式 E-mail	
	沈俊太 Juntai Shen	教授 Professor	天文系 Department of Astronomy	jtshen@sjtu.edu.cn	
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*课程简介 (中文) Course Description	<p>星系是由恒星、暗物质粒子及星际介质被相互间引力束缚而成的集合体, 也是构成整个宇宙的基本组元。星系动力学是研究星系中物质分布和运动状态的动力学理论, 它是深入理解星系的结构、形成、和演化所必需的基础学科。课程的目标是让学生掌握星系动力学的基本理论, 并可将其应用以理解和解释现有的星系观测结果。课程内容涵盖势场理论, 恒星轨道理论, 无碰撞 Boltzmann 方程、分布函数、无碰撞系统的稳定性、盘星系的动力学等。本课程将设计若干次大作业以检验学生对概念的掌握情况和数学计算能力, 并帮助学生直接衔接科研中遇到的实际前沿问题。</p>				

<p>*课程简介 (English) Course Description</p>	<p>A galaxy is a collection of stars, dark matter particles, and inter-stellar medium bounded by their mutual gravity. Galaxies are the basic building blocks of the Universe. Galactic dynamics study the distribution and motion of matters in stellar systems like galaxies. Galactic dynamics is fundamental to understanding the formation of galaxies, their internal evolution and their current structure. It also governs interactions between galaxies in systems ranging in size from groups to large clusters of galaxies. The course will cover the potential theory, the orbits of stars, equilibria of systems governed by the collision-less Boltzmann Equation, distribution function, stability of collision-less systems, and disk dynamics. Homework will be assigned to assure that the students grasp the key physical concepts and help them to understand real problem in the research front of galaxy structure, formation, and evolution.</p>			
<p>*教学安排 Schedules</p>	<p>教学内容 Content</p>	<p>授课学时 Hours</p>	<p>教学方式 Format</p>	<p>授课教师 Instructor</p>
	<p>星系、银河系、星系结构概论、弛豫时间的概念（沈俊太） Galaxies, the Milky Way, Galaxy structure, relaxation in stellar systems (Juntai Shen).</p>	<p>6</p>	<p>课堂教学 (Classroom lectures)</p>	<p>沈俊太</p>
	<p>势场理论（沈俊太） Potential Theory (Juntai Shen)</p>	<p>10</p>	<p>课堂教学 (Classroom lectures)</p>	<p>沈俊太</p>
	<p>恒星轨道理论、本轮近似，相空间截面、混沌轨道、共振、作用量-角度变量（沈俊太） Orbits of stars, epicyclic approximation, surfaces of section, chaos, resonances, angle-action variables (Juntai Shen)</p>	<p>16</p>	<p>课堂教学 (Classroom lectures)</p>	<p>沈俊太</p>

	<p>恒星系统的平衡态模型、分布函数、金斯方程、维里定理、金斯定理，典型分布函数（沈俊太）</p> <p>Equilibrium models of stellar systems, distribution functions, Jeans Equation, Virial Theorem, Jeans Theorem, Typical Distribution Functions (Juntai Shen)</p>	16	<p>课堂教学 (Classroom lectures)</p>	沈俊太
	<p>恒星系统的稳定性分析，盘星系的动力学（沈俊太）</p> <p>Stability analysis of stellar systems, disk dynamics (Juntai Shen)</p>	10	<p>课堂教学 (Classroom lectures)</p>	沈俊太/李兆聿
	<p>碰撞与并合、潮汐相互作用、动力学摩擦、球状星团（沈俊太）</p> <p>Collisions and mergers, tidal interactions, dynamical frictions, globular clusters (Juntai Shen)</p>	6	<p>课堂教学 (Classroom lectures)</p>	沈俊太/李兆聿
<p>*考核方式 Grading Policy</p>	<p>作业（含编程 Projects），期末考试 Homework (including projects), final exam.</p>			

*教材/讲义或 参考资料 Textbooks & References	星系动力学“Galactic Dynamics” (Binney & Tremaine, Princeton University Press, Second Edition, 2008)、自编讲义 “Galactic Dynamics” (Binney & Tremaine, Princeton University Press, Second Edition, 2008)、Lecture notes by Juntai Shen
备注 Notes	

备注说明：

1. 带*内容为必填项；均为中英文填写。
2. 课程简介字数为 300-500 字；教学内容、进度安排等以表述清楚教学安排为宜，字数不限。