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**	原子物理学 Atomic Physics
2.	**授课院系 Originating Department**	物理系 Department of Physics
3.	**课程编号 Course Code**	PHY210
4.	**课程学分 Credit Value**	3
5.	**课程类别 Course Type**	专业基础 Major Foundation
6.	**授课学期 Semester**	春季 Spring
7.	**授课语言 Teaching Language**	中文授课，英文讲义 Chinese
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）**	王干，助理教授 第二科研楼 229 室，物理系 Dr. WANG Gan, Assistant Professor, RM229, Department of Physics, No.2 Faculty Research Building. Email: wangg@sustech.edu.cn Tel.: 0755-88018216
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	待定，助教 To be assigned
10.	**选课人数限额(可不填) Maximum Enrolment （Optional）**	60

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			考试周不算入总学时	48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	大学物理 B 下（PHY105B） General Physics B (II) (PHY105B)
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	高等量子力学 Advanced Quantum Mechanics，核物理 Nuclear and Particle Physics, 固体物理 Solid State Physics,
14. 其它要求修读本课程的学系 Cross-listing Dept.	大学物理 A 下（PHY105A）或大学物理 B 下（PHY105B） General Physics A (II) (PHY105A) or General Physics B (II) (PHY105B)

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

原子物理是由物理系开设的专业必修课程。它重点介绍原子模型，自旋，泡利不相容原理等与量子物理密切相关的基础知识。修完本课程，学生将获得微观世界的基本物理图像，为量子力学，固体物理，研究型物理实验等课程的学习奠定基础。

As a mandatory course of physics department, “Atomic Physics” mainly covers the knowledge of atoms, one of the basic units in our nature connecting the macro- and micro-world, which includes the knowledge of atomic model, spin and Pauli exclusion principle and so on. Upon finishing the study of this course, students will form a clear physical scenario on the microscopic world and quantum mechanics, therefore, it will pave the way for learning deeper knowledge related to condense matter physics or nuclear physics.

16. 预达学习成果 Learning Outcomes

通过对本课程的学习，学生将了解氢原子模型的理论发展历程，重点了解玻尔的原子量子化理论内容，以及此理论对量子理论发展的重要意义，进而对量子力学的产生以及基本原理产生较为清晰的物理认识。掌握由薛定谔方程解出的氢原子模型。掌握自旋轨道相互作用机理，以及如何使用原子角动量量子化理论解释塞曼效应等经典近代物理实验。掌握 X 光特性以及产生机理。初步了解原子核物理基本知识。

Students are expected to get a comprehensive knowledge on the development of modern physics. Students should understand the quantum nature of Bohr’s atomic model, as well as its impact for the quantum mechanics development. Students should understand the atomic structure given by the solution of Schrödinger Equation. Students should also master the spin-orbital coupling mechanism; furthermore, understand how to explain the Zeeman effect as well as others classical modern physics experiments using spin-orbital theory. The knowledge on X ray’s emission mechanism and applications should be understood. The basic knowledge on the nuclei physics will be introduced in this course.

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.)

Main Contents:

Week 1-Week 2 Rutherford's atomic model.

Week 3-Week 4 Bohr's atomic model.

Week 5-Week 7 Quantum mechanics considerations.

Week 8-Week 9 The fine structure of atomic spectrum: spin.

Week 10 Midterm examination

Week 11-Week 12 Multiple-electron atoms and Pauli Exclusion Principle.

Week 13-Week 14 X ray.

Week 15-Week 16 An Introduction on the nuclei physics.

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

Textbook:

Atomic Physics (4th edition), YANG Fujia

Supplementary Readings:

Modern Physics (2nd edition), XU Kezun, Chen Xiangjun, Chen Hongfang,

Atomic Physics, ZHU Shenglin

Atomic Physics, C. J. FOOT

课程评估 ASSESSMENT

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		35%		
期末考试 Final Exam		45%		

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

物理系教学指导委员会

Education Instruction Committee of Physics department