

## 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 <b>Course Title</b>	量子力学 II Quantum Mechanics II				
2.	授课院系 <b>Originating Department</b>	物理系 Department of Physics				
3.	课程编号 <b>Course Code</b>	PHY305				
4.	课程学分 <b>Credit Value</b>	3				
5.	课程类别 <b>Course Type</b>	专业必修 major required				
6.	授课学期 <b>Semester</b>	秋季 Fall				
7.	授课语言 <b>Teaching Language</b>	中文授课，英文教材。				
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） <b>Instructor(s), Affiliation &amp; Contact</b> (For team teaching, please list all instructors)	卢海舟，副教授，物理系 第二科研楼 208 室 LU Haizhou, Associate Professor, Department of Physics Rm. 208, No.2 Research Bldg. luhz@sustc.edu.cn 0755-88018175				
9.	实验员/助教、所属学系、联系方式 <b>Tutor/TA(s), Contact</b>	待公布 To be announced				
10.	选课人数限额(可不填) <b>Maximum Enrolment (Optional)</b>					
11.	授课方式 <b>Delivery Method</b>	讲授 <b>Lectures</b>	习题/辅导/讨论 <b>Tutorials</b>	实验/实习 <b>Lab/Practical</b>	其它(请具体注明) <b>Other (Please specify)</b>	总学时 <b>Total</b>
	学时数 <b>Credit Hours</b>	48	16 (另外安排, 不占用上课时间)	0	考试周不算入总学时	48

12. 先修课程、其它学习要求 <b>Pre-requisites or Other Academic Requirements</b>	量子力学 I Introduction to Quantum Mechanics (PHY206-15)
13. 后续课程、其它学习规划 <b>Courses for which this course is a pre-requisite</b>	本课程为物理系必修专业核心课程。Required by B.Sc. degree with a major in Physics.
14. 其它要求修读本课程的学系 <b>Cross-listing Dept.</b>	其它需要相关量子力学知识的学科院系也可以学修本课程。Open for other related disciplines if required.

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

量子力学 II 是由物理系开设，面向物理专业的必修课程。它介绍描述量子力学原理在微观世界中的应用。修完本课程，要求了解定态微扰理论，变分法，WKB 近似，含时微扰，绝热近似，散射理论。

Quantum Mechanics II is a physics major core course. It introduces the principles of quantum mechanics and its applications, including the time-independent perturbation, variational principle, WKB approximation, time-dependent perturbation, adiabatic approximation, scattering theory, and other relative topics.

#### 16. 预达学习成果 Learning Outcomes

熟练掌握量子力学的基本原理以及各种近似方法，并能够运用量子力学的知识解释和处理相关的物理现象。

After learning this course, students should be familiar with the fundamental principles of quantum mechanics and several approximate methods, and utilize the knowledge to deal with microscopic quantum phenomena.

#### 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.)**

Week 01	Nondegenerate Perturbation Theory
Week 02	Degenerate Perturbation Theory
Week 02	Fine Structure of Hydrogen - Relativistic correction
Week 03	Fine Structure of Hydrogen - Spin-orbit coupling
Week 04	Zeeman Effect
Week 05	Hyperfine splitting and Review of Chapter 6
Week 06	Theory of Variational Principle
Week 06	Ground state of Helium
Week 07	Hydrogen Molecule Ion
Week 08	Classical Region of WKB Approximation
Week 08	Tunnelling
Week 09	Connection formulas
Week 10	Review of Chapters 6, 7, and 8
Week 10	Midterm test
Week 11	Two-Level Systems
Week 12	Emission and absorption of Radiation

Week 12	Spontaneous Emission
Week 13	Adiabatic Theorem
Week 14	Berry's Phase
Week 14	Scattering - Introduction
Week 15	Partial Wave Analysis
Week 16	Phase Shifts
Week 16	Born Approximation

# The last topic is adjustable according to the teaching process.

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

<p>(1) Introduction to quantum mechanics, D. J. Griffiths, 机械工业出版社</p> <p>(2) 量子力学卷1, 曾谨言, 科学出版社</p> <p>(3) Quantum Mechanics, Landau and Lifshitz, 世界图书出版社</p> <p>(4) Modern quantum mechanics, J.J.Sakurai and J. Napolitano, 世界图书出版社</p>
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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		10%		
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		35%		
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)**

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20. **记分方式 GRADING SYSTEM**

<input checked="" type="checkbox"/> A. 十三级等级制 <b>Letter Grading</b> <input type="checkbox"/> B. 二级记分制（通过/不通过） <b>Pass/Fail Grading</b>
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**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
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