课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	PHY5003/高等统计物理 Advanced Statistical Mechanics
2.	**课程性质** **Compulsory/Elective**	专业必修课 Degree Required Course
3.	**课程学分/学时** **Course Credit/Hours**	3/48
4.	**授课语言** **Teaching Language**	中文 Chinese
5.	**授课教师** **Instructor(s)**	许志芳 Zhifang Xu
6.	**是否面向本科生开放** **Open to undergraduates or not**	否 NO
7.	**先修要求** **Pre-requisites**	（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.） 无 N/A

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.）

本课程是针对研究生开设的统计物理课程，内容主要包括系综理论，量子统计，费米和玻色气体，集团展开理论，超流和相变理论。目的是让学生掌握对经典及量子多体体系运用统计物理进行理论分析与处理的方法，并初步具备有效运用统计物理理论解决科学研究中遇到的实际问题的能力。

This is a course of statistical physics for graduate students. It mainly includes ensemble theory, quantum statistics, Fermi and Bose gases, cluster expansion theory, superfluidity and phase transition theory. The goal is to enable students to master the methods of theoretical analysis and processing of classical and quantum many body systems by using statistical physics and have the preliminary ability to use statistical physics to solve practical problems in scientific research.

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.）

采用黑板板书和多媒体教学结合的方式。主要的公式推导使用板书，一些特殊专题的图片和动画展示用投影仪放映。

Blackboard writing and multimedia teaching are both used. The formula derivation mainly shown by blackboard writing, and the pictures and animations of some special topics will be shown by projectors.

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	热力学基本定律（4 学时） Laws of thermodynamics

	Section 2	系综理论（6 学时） Equilibrium Ensemble
	Section 3	量子统计理论（8 学时） Quantum statistics
	Section 4	理想费米子系统（6 学时） Ideal Fermi system
	Section 5	理想玻色子系统（6 学时） Idea Bose system
	Section 6	集团展开理论（4 学时） The method of cluster expansion
	Section 7	超流理论（8 学时） Theory of superfluidity
	Section 8	相变理论（6 学时） Theory of phase transition

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 homework 30%，期末考试 exam 70%

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

Kerson Huang, *Statistical Mechanics*
Mehran Kardar, *Statistical Physics of Particles*
R. K. Pathria and Paul D. Beale, *Statistical Mechanics*