课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	PHY5034/现代物理实验 Experiments in Modern Physics A
2.	**课程性质** **Compulsory/Elective**	专业核心课 Degree Compulsory Course
3.	**课程学分/学时** **Course Credit/Hours**	3/64
4.	**授课语言** **Teaching Language**	中文 Chinese
5.	**授课教师** **Instructor(s)**	赵悦 Zhao Yue
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.）

随着实验技术的高速发展，温度、磁场、压力等热力学维度不断拓宽，大科学装置和仪器设备使实验的精度和弱信号的探测为现代实验物理提供了强有力的支撑。本课程旨在给研究生介绍现代物理实验设备的物理原理和实验应用，并在此基础上开拓他们的批判思维和定量推理能力，加强对物理问题的创新和批判能力。实验技能的介绍和培训能直接培养研究生在物理学方向的研究兴趣，有助于其未来在物理领域的发展。

With the rapid development of experimental technology, the boundaries of the thermodynamic parameters such as temperature, magnetic field, and pressure are continuously expanding. The latest generation of large scientific facilities offer robust support for the detection of extremely weak signals and experiments with enhanced accuracy, opening up new opportunities for modern physics. The aim of this course is to provide graduate students with a comprehensive and fundamental understanding of the principles of modern physics experiments and the scientific instrumentation. This will facilitate the development of their creative thinking and quantitative reasoning capabilities, enhancing their ability to analyze physics problems and experiments. Additionally, the course will provide experimental training for graduate students planning careers in physics and related physical sciences.

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.）

本课程以课堂教学为主，开设具体实验为辅。

This course is mainly lecture-based, including corresponding lab visits.

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	本课程将会涉及以下内容：实验仪器 (SEM, TEM, AFM, STM, Raman, ARPES, NMR 等) 的原理和表征方法；大型同步辐射及中子散射技术；高压技术；低温强磁场下材料的物理性质与测试技术；薄膜材料制备与性能测试；激光技术及光与物质相互作用等等（具体讲解内容根据不同授课老师涵盖内容不同）。 The course will encompass the principles of various instruments in condensed matter physics, including SEM, TEM, AFM, STM, Raman, ARPES, NMR, etc. The course will also cover topics such as synchrotron and neutron-based diffraction and scattering, high pressure techniques, physical properties and experimental methods at low temperatures and high magnetic fields, the fabrication and characterization of thin films, laser techniques, and the optical properties of condensed matter. Please note that the specific course content may vary based on the selected professor.
Section 2	在每次授课内容之后：会有相应的实验仪器参观，或视频原理讲解，简单实验技术应用等方式进一步促进对所学技术和原理的应用。 For each specific topic, there will be a lecture followed by a lab tutorial, a video demonstration, or hands-on experiments to enhance understanding of the techniques and their applications.

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.）

平时出席加作业占 60%; 期末考试占 40%。

Attendance and homework assignments: 60%; Final exam: 40%.

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

无。
N/A