课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	固体的磁性概论 Introduction to Magnetic Properties in Solids
2.	**课程性质** **Compulsory/Elective**	专业选修课 Subject-Elective
3.	**课程学分/学时** **Course Credit/Hours**	3 学分 Credits /48 学时 Hours
4.	**授课语言** **Teaching Language**	英语 English
5.	**授课教师** **Instructor(s)**	邬家臻助理教授 Assistant Prof. Jiazhen Wu
6.	**是否面向本科生开放** **Open to undergraduates or not**	是 Yes
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.） 建议本科生先修 《材料物理》MSE328

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.）

磁性是固体的基本性质之一，通过本课程的学习，学生应 Magnetic property is one of the fundamental physical properties in solids. By taking this course, the students should:

1. 理解固体的磁性在材料科学研究中的重要性,掌握固体中磁性的基本概念 understand the basic concept of magnetic properties in solids and its importance to materials science;
2. 掌握材料的顺磁性、抗磁性、铁磁性、反铁磁性等基本性质、代表性材料及实验表征方法 master the basic properties, representative materials and experimental characterization methods of paramagnetism, diamagnetism, ferromagnetism, andtiferromagnetism, etc.;
3. 了解磁相互作用、磁序及相关模型 understand magnetic interactions, magnetic orders and related theoretical models;
4. 了解磁场下固体的基本电子输运性质 understand electrical transport properties in solids under uniform magnetic field;
5. 了解磁性材料在前沿科学中的研究状况 understand the research status of magnetic materials in frontier science.

注：本科生没有区分 no difference for undergraduates

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.）

1. 课堂授课上坚持由浅入深，由简单模型到复杂体系，由书本知识到实际应用 The lecture will be given from the easy to the difficult, from simple models to complicated systems, and from text books to actual applications;
2. 在数学推理的基础上，强调实验方法和数据分析，加深学生对不同物理性质的理解 On basis of mathematical derivation and physical theorem, experimental approach and data analysis will be emphasized for helping students to understand each physical concept;
3. 课后延伸阅读和文献调研，激发学生更广泛深入地学习课堂上不能传授的知识 Books and literatures will be recommended to students for helping them to learn more than what is given in the lecture;
4. 课后作业，检验学生对课程的掌握程度 Assignment will be given for testing how the lecture is

understood.

注：本科生没有区分 no difference for undergraduates

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	第一讲：固体磁性简介 Chapter 1: Introduction
Section 2	第二讲： 孤立原子和离子的磁性 Chapter 2: Magnetic Properties of Isolated Atoms or Ions
Section 3	第三讲： 晶体环境的影响 Chapter 3: The influence of Crystal Environment
Section 4	第四讲： 磁相互作用 Chapter 4: Magnetic Interactions
Section 5	第五讲：磁序与磁结构 Chapter 5: Magnetic order and structure
Section 6	第六讲： 金属中的磁性 Chapter 6: Magnetic Properties in Metals
Section 7	第七讲： 低维磁体 Chapter 7: Low-dimensional magnets
Section 8	第八讲： 磁场下的固体性质 Chapter 8: Physical properties under magnetic field
Section 9	第九讲： 常见磁性测量方法和数据分析 Chapter 9: Measurement Methods of Magnetic Properties and Data Analysis

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.）

成绩评估方法 (Course assessment methods)：

针对研究生 For graduate students：
1. 出席情况（10%） Attendance (10%) 2. 平时作业和表现（含文献调研与相关报告）（30%） Assignment and performance (30%) 3. 期中考试（20%） Mid-term examination (20%) 4. 期末考试（40%） Final examination (40%)

针对本科生 For undergraduates：
1. 出席情况（20%） Attendance (20%) 2. 平时作业和表现（含文献调研与相关报告）（40%） Assignment and performance (40%) 3. 期中考试（15%） Mid-term examination (15%) 4. 期末考试（25%） Final examination (25%)

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

1. 《Introduction to Solid State Physics》 by C. Kittel
2. 《Magnetism and Magnetic Resonance in Solids》by A. P. Guimaraes
3. 《Magnetism in Condensed Matter》by S. Blundell
4. 《Magnetism in the Solid State: An Introduction》by P. Mohn