

物理学 (0702)

Physics

学科门类：理学 (07) 一级学科：物理学 (0702)

Discipline: Science (07)

First-Class Discipline: Physics (0702)

一、学科简介

河海大学物理学学科始于 2001 年开设的应用物理学本科专业，2007 年获批凝聚态物理二级学科硕士点，2018 年在海洋科学一级博士学科下自主设置海洋应用物理学二级博士学科点。学科结合学校水利背景，注重物理学基础理论在水利工程、水文分析、海洋过程理论模式和海洋信息处理等领域的应用，在凝聚态物理、光学、理论物理、等离子体物理等方向开展研究。

本学科现有专职教师 33 人，其中教授 7 人，副教授 18 人，博士生导师 4 人，硕士生导师 20 人，具有海外经历 12 人。本学科将坚持物理基础理论和应用研究并行并重，学生毕业后主要从事物理、电子、信息等领域的科研、管理与教学工作。

I. Discipline Overview

The discipline of physics in Hohai University dates back to an undergraduate major in Applied Physics established in 2001. It was authorized to grant master's degree in the sub-discipline of Condensed Matter Physics in 2007. In 2018, a second-class doctoral program in Marine Applied Physics was set up under the first-class doctoral degree program of marine science. Combined with the water conservancy background of Hohai University, the discipline pays attention to the application of basic theories of physics in the fields of water conservancy engineering, hydrological analysis, theoretical model of ocean process and ocean information processing, and forms three research fields, i.e. condensed matter physics, optics, theoretical physics and plasma physics.

Currently the discipline of Physics has 33 members in its academic staff, among whom 7 are professors and 18 are associate professors, including 4 PhD supervisors, 20 Master supervisors, and 12 with overseas experience. This program is intended to attach equal importance to fundamental theories of physics and applied research, allowing students to be engaged in scientific research, management and teaching where physics, electronics, information are involved after graduation.

二、培养目标

1. 河海大学硕士层次外国留学生应当在物理学领域中具有较好的国际视野，能够在多个国家的实际环境中运用和发展物理学的知识、技能和方法，并具备参与国际事务和国际竞争的能力。

2. 以英语为专业教学语言的学科、专业中，外国留学生毕业时，硕士研究生的中文能力应当至少达到《国际汉语能力标准》三级水平。

3. 本学科旨在通过此硕士学位项目来培养满足下列条件的优秀人才：在物理学及相关学科等方面掌握坚实的基础理论和系统的专门知识；具备诚信的学术作风、积极的团队合作精神，具有从事科学研究工作或独立担负专门技术工作的能力；能够较为熟练地运用英语阅读本专业的有关文献资料、撰写论文、参与学术交流的能力。应当在物理学科领域中具有较好的国际视野，能够在多个国家的实际环境中运用和发展物理学科的知识、技能和方法，并具备参与国际事务和国际竞争的能力。

II. Discipline Objectives

1. International master graduates of Hohai University are expected to have good international view, to apply and develop the theories, skills, and methodologies in the actual environment of several countries, and to participate in the international academic affairs.

2. International master graduates must meet the requirement of Level 3 in Chinese Language Proficiency Scales upon graduation if they conduct their coursework in English.

3. The program aims at cultivating students to master fundamental theories and systematic professional knowledge in physics and related disciplines, to have academic integrity, positive team spirit, and the ability

to engage in scientific research or to independently undertake specialized technical work. Students train to become high-level researchers who are capable of using English to carry out scientific research and academic exchange, to have a good international perspective in the field of physics, and to be able to apply and develop the knowledge, skills and methods of physics in the real-life situations in different countries, and to have the ability to participate in international affairs and international competition.

三、主要研究方向

1. 凝聚态物理
2. 光学
3. 理论物理
4. 等离子体物理

III. Three main tracks

1. Condensed matter physics
2. Optics
3. Theoretical physics
4. Plasma physics

四、学制和学习年限

学术学位全英文硕士留学研究生的标准学制为 3 年。实行弹性学制，学习年限最短不少于 2 年，最长不超过 5 年。

IV. Number of Years Requirement

The master program typically requires 3 years to complete. However, the completing time may vary to 2 years as the minimum and 5 years as the maximum.

五、学分要求和课程设置

1. 学术学位全英文硕士留学研究生课程总学分为 28 学分，其中学位课程为 20 学分，非学位课程为 8 学分。另设教学环节。所有课程学习一般应在入学后 1 年内完成。

2. 汉语课每学分为 24 学时，中国概况课每学分为 18 学时，其他课程每学分为 16 学时。

3. 中国国情教育（水韵课堂）为系列专题讲座，要求学生按照要求完成规定的学习任务。

4. 对于汉语水平已达到毕业要求的学生，可申请免修汉语，具体要求详见留学生课程免修有关规定。

具体课程设置如下：

V. Credit Requirements and Curriculum

1. Each international graduate student shall complete 28 credits in all, 20 of which are from degree courses, and 8 from non-degree ones. Each shall attend academic activities as well. All coursework shall be completed within one year after registration.

2. Each credit of Chinese language course is 24 credit hours. Each credit of Introduction to China is 18 credit hours. For other courses, each credit is 16 credit hours.

3. “Water Harmony Lectures” is a series of seminars, which require students to complete the specified learning tasks.

4. For students who have met the Chinese language requirement for the master degree, Chinese language courses can be exempted, of which the details can be referred to in relevant regulations.

The specific curriculum is as follows:

物理学全英文学术型留学硕士研究生课程设置

Curriculum for English Taught International Academic Master Students in Physics

课程类别 Category	课程代码 Course Code	课程名称 Course Name	学分 Credit	学时 Hours	开课学期 Term	备注 Remarks	
学位课程 Degree Courses 20 学分	公共课程 General Courses	2022LM000001	汉语 I Chinese Language I	2	48	秋 Autumn	必修 Compulsory
		2022LM000002	汉语 II Chinese Language II	2	48	春 Spring	
		2022LM000003	中国概况 Introduction to China	2	36	秋 Autumn	
		2022LM110001	论文写作指导 Guide of Thesis Writing	2	32	秋、春 Autumn/ Spring	
	基础课程 Basic Courses	2022LM880001	矩阵论 Matrix Theory	2	32	春 Spring	选修 8 学分 Optional 8 credits at least
		2022LM880002	最优化方法 Optimization Methods	2	32	秋 Autumn	
		2022LM880004	数学物理方程 Equations of Mathematical Physics	2	32	春 Spring	
		2022LM140001	凝聚态物理学导论 Introduction to Condensed Matter Physics	2	32	秋 Autumn	
		2022LM140002	非线性光学 Nonlinear Optics	2	32	秋 Autumn	
		2022LM140003	高等量子力学 Advanced Quantum Mechanics	2	32	春 Spring	
	专业课程 Major Courses	2022LM140004	微纳制造科学原理 Science of Micro-and nano-fabrication	2	32	春 Spring	选修 4 学分 Optional 4 credits at least
		2022LM140005	纳米材料设计与计算 Design and Calculation of Nano- materials	2	32	春 Spring	
		2022LM140006	材料物理 Materials Physics	2	32	春 Spring	
		2022LM140007	纤维光学与传感原理 Principles of Fiber Optics and Fiber- Sensing	2	32	秋 Autumn	
非学位课程 Non-degree Courses 8 学分	2022LM110002	中国国情教育（水韵课堂） Water Harmony Lectures	1	16	秋、春 Autumn/ Spring	必修 Compulsory	
	2022LM770004	有限元法 Finite Element Method	3	48	秋 Autumn	选修 7 学分 Optional 7 credits at least	
	2022LM330001	程序设计方法 Methods of Programming	2	32	秋 Autumn		
	2022LM140008	现代物理测试原理与技术 Measurement Principles and Techniques of Modern Physics	2	32	秋 Autumn		
	2022LM140009	激光工程原理与应用 Laser Techniques and Application	2	32	秋 Autumn		
	2022LM140010	光谱学与光谱分析技术 Spectroscopy and Spectral Analysis	2	32	春 Spring		
	选修硕士课程 Optional courses for master						选修 Optional
教学环节 Academic Activity	学术活动（含博导讲座） Seminar and Conferences (including lectures by PhD advisors)					必修 Compulsory	
	实践活动 Practice Activity						
	科学研究 Scientific Research						

六、教学环节

1. 个人培养计划

学术学位硕士研究生入学后，应在导师指导下，在规定时间内按照培养方案和学位论文工作有关规定，结合研究方向和本人实际情况制定个人培养计划，其中学习计划在入学 2 个月内提交。

2. 学术活动

学术学位硕士研究生学术活动包括参加国内外学术会议、专家学术讲座，以及研究生学术研讨活动等。申请学位论文答辩前必须参加 10 次以上的学术交流活动，其中博导讲座至少 2 次。研究生参加学术活动必须填写相关学术活动登记本。

3. 实践活动

为培养劳动实践能力和责任意识，学术学位硕士研究生必须参加实践活动，实践活动形式包括助教、助管、助研、生产实践、社会实践等。由导师对学生实践环节的时长和效果进行考核和评价。

VI. Academic Activities

1. Study Proposal

The master students must prepare a study proposal on how they will complete the master degree by considering their research interests, advice from their research advisors, and other requirements mentioned in this document. The proposal must be submitted in two months after official registration.

2. Seminars and Presentations

Master students must participate in academic conferences, seminars by experts and PhD advisors, and discussion panels. Before their dissertation defense, master students must participate in seminars and conferences over 10 times, including at least 2 seminars by PhD advisors. All the seminars and presentations should be recorded in relevant record book.

3. Practice Activities

Master students are required to participate in practice activities to prepare professional development. Practice activities include teaching assistantship, research assistantship, management assistantship, and

industry engagement etc., which are to be assessed by the advisors.

七、论文工作

学术学位硕士学位论文研究工作必须经过文献阅读、论文选题、论文计划及开题报告、论文中期检查、科研成果产出、学位论文预审、学位论文评阅、学位论文答辩等环节。具体按照《河海大学硕士学位论文工作管理办法》和学院相关文件执行。留学硕士研究生可使用英文撰写论文。

VII. Dissertation Writing

The dissertations of academic master students are required to complete the stages of literature review, topic selection, dissertation plan and dissertation proposal, mid-term examination, output of scientific research achievements, pre-examination, review and assessment, and dissertation defense. Detailed requirements can be referred to in “Hohai University Master's Dissertation Management Measures” and relevant documents in College of Science. Dissertation in English is acceptable.

八、本学科推荐阅读的重要书目、专著和学术期刊

VIII. Recommended Bibliographies, Monographs and Academic Journals of the Discipline

1. Michael A. Lieberman, Alan J. Lichtenberg, Principles of Plasma Discharges and Materials Processing [M]. Wiley-Interscience, 2005.
2. Philip Phillips, Advanced Solid State Physics [M]. Cambridge University Press, 2012.
3. Xing Hongwei, Fundamental of Functional Materials Science (in English) [M]. Wuhan University of Technology Press, 2019.
4. D. Feng, G. Jin, Introduction to Condensed Matter Physics (Vol.1) [M]. World Scientific Publishing Co, 2005.
5. Steven H. Strogatz, Nonlinear Dynamics and Chaos [M]. Westview Press, 2015.

6. Stephen A. Campbell, The Science and Engineering of Microelectronic Fabrication [M]. Oxford University Press, 2001.
7. Liu Tiegeng, Jiang Junfeng, Liu Kun, Wang Shuang, Optical Fiber Sensing Technologies: Principles, Techniques and Applications [M]. Wiley-VCH Verlag GmbH, 2021.
8. Robert W. Boyd, Nonlinear optics (third edition) [M]. Academic Press, 2007.
9. M. P. Marder, Condensed Matter Physics (2ed) [M], John Wiley & Sons, 2010.
10. C. Kittel, Introduction to Solid State Physics (8ed) [M], John Wiley & Sons, 2005.
11. Simon M. Sze, Semiconductor Device: Physics and Technology 2nd Edition [M], Soochow University Press, 2004.
12. Du Yanliang, Sun Baochen, Li Jianzhi, Zhang Wentao, Optical fiber sensing and structural health monitoring technology (in English) [M], Huazhong University of science and Technology Press, 2019.
13. Wei, Lei, Advanced Fiber Sensing Technologies [M], Springer Berlin Heidelberg, 2020.
14. Cai Xiaoqing, Selected research cases of modern instrumental analysis [M]. Science Press, 2018.
15. Wang Shiping, Modern instrumental analysis principles and techniques [M]. Science Press, 2015.
16. Yan Mi, Peng XiaoLing, Fundamentals of magnetism and magnetic materials [M]. Zhejiang University Press, 2006.
17. Wu Yong, Han Rushan, Fundamentals of superconducting physics [M]. Peking University Press, 1997.
18. Li Ling, Xiang Hang, Functional materials and Nanotechnology [M]. Chemical Industry Press, 2002.
19. Mi baoxiu, Gao Zhiqiang, Bilingual course of material physics [M]. Posts and Telecommunications Press, 2018.
20. Pethick C J, Smith H, Bose-Einstein Condensation in Dilute Gases [M]. Cambridge University Press, 2002.
21. 冯端,金国均. 凝聚态物理学(上卷)[M].北京:高等教育出版社,2002.
22. 赵冷柱,张希成. 高等半导体物理[M].上海:华东师范大学出版社,1992.
23. 喀兴林. 高等量子力学[M].北京:高等教育出版社,2001.

24. 朱林泉,朱苏磊. 激光应用技术基础[M].北京:航空工业出版社,2004.
25. 李言荣,恽正中. 材料物理学概论[M].北京:清华大学出版社,2001.