控制科学与工程(0811)
Control Science and Engineering

学科门类：工学（08）　一级学科：控制科学与工程（0811）

Discipline: Engineering (08)

First-Class Discipline: Control Science and Engineering (0811)

一、学科简介

控制科学与工程（0811）是工学（08）学科门类中的一级学科，涵盖控制理论与控制工程（081101）、检测技术与自动化装置（081102）、系统工程（081103）、模式识别与智能系统（081104）、导航、制导与控制（081105）等二级学科，主要研究控制的理论、方法、技术及其工程应用。目前，控制科学与工程学科的应用已遍及工业、农业、交通、环境、军事、生物、医学、经济和社会等各个领域。

我校控制科学与工程学科源于 1977 年的工业自动化专业。1995 年以来先后获得控制理论与控制工程、检测技术与自动化装置、模式识别与智能系统二级学科硕士学位授予权，2005 年获一级学科硕士学位授予权。学科科研和人才培养力量雄厚，建有一支知识、年龄、学历、专业技术职务结构合理的专任教师队伍。近年来，承担省部级以上科研项目 50 余项，各类科研经费累计近 4000 万元，发表学术论文 400 余篇，其中 SCI 检索 110 余篇。学科拥有可再生能源发电技术教育部工程研究中心、江苏省输配电装备技术重点实验室等省部级教学、科研实验平台；具有先进的教学、实验、研究设施条件和仪器设备。本学科在水利水电自动化、电气传动自动化、交通综合自动化系统、自适应控制、智能控制、最优控制、系统辩识与建模、计算机测控系统、过程控制、模式识别、电能质量监控及电力电子系统控制等研究领域取得了显著的成果。

I. Discipline Overview

Control Science and Engineering (0811) is a master-degree postgraduate education course in the discipline of control theory and systems, covering 5 secondary disciplines including Control Theory and

Control Engineering (081101), Measurement Technique and Automation Equipment (081102), Systems Engineering (081103), Pattern Recognition and Intelligent Systems (081104), Navigation, Guidance and Control (081105). The control theory and their methodology, techniques and applications are mainly researched. Nowadays, the disciplinary knowledge and skills around control science and engineering are being required in all fields of the society and economy, such as industry, agriculture, national defense, transportation and communication networks, energy and electricity systems, etc.

The discipline of control science and engineering in Hohai University originated from the major of Industrial Automation in 1977. Since 1995, it has been granted the right to confer master's degrees in Control Theory and Control Engineering, Measurement Technique and Automation Equipment, and Pattern Recognition and Intelligent Systems, and in 2005, it was granted the right to confer master's degrees in the first-level disciplines. The discipline has a strong force in academic research and talent training, and has a team of full-time teachers with reasonable knowledge, age, educational background and professional and technical post structure. In recent years, it has undertaken more than 50 scientific research projects above the provincial and ministerial level, accumulated nearly 40 million yuan of various scientific research funds, and published more than 400 academic papers, including more than 110 SCI papers. The discipline has provincial and ministerial teaching, scientific research and experimental platforms including the Engineering Research Center of Renewable Power Generation Technologies (Ministry of Education), Jiangsu Key Laboratory of Power Transmission and Distribution Equipment Technology，and other advanced teaching, experimental and research facilities and equipment. This discipline is academically famed and technically featured for the devotion and contributions to automatic control and systems about hydropower and hydroelectricity, motor drive, traffic integration, adaptive/optimal/robust/intelligent control, system identification and modelling, computer measurement and control systems. The professors and researchers are also active and ambitious in developing other advanced control projects such as process control, pattern recognition, power quality control and power electronics.

二、培养目标

1. 河海大学硕士层次外国留学生应当在控制科学与工程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控制科学与工程的知识、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. 本学科硕士留学研究生旨在培养掌握控制科学与工程领域坚实的基础理论和系统的专门知识；具有从事控制科学研究工作或独立担负控制工程专门技术工作的能力；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控制科学与工程的知识、技能和方法，并具备参与国际事务和国际竞争的能力；了解中国文化并具备汉语日常交流能力的专门人才。

II. Training 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 training objective of this discipline is to cultivate advanced professional personnel to master the solid fundamental theory and systematic expertise in the field of Control Science and Engineering; to be familiar with methodologies and procedures of research projects planning and independent implementing; to have a good international perspective, be able to apply and develop the knowledge, skills and methods of Control Science and Engineering in the actual multinational environment, and have the ability to participate in international affairs and international competition; to understand Chinese culture and have the ability to communicate in Chinese.

三、主要研究方向

1．先进控制理论及应用

2．智能控制与智能系统

3．运动控制系统

4．现代检测技术与系统

5．水利水电自动化

6．智能化仪器与自动化装置

7．模式识别理论与应用

III. Research Directions

1. Advanced Control Theory and Applications

2. Intelligence Control and Systems

3. Motion Control and Systems

4. Modern Detection Techniques and Systems

5. Automation of Hydropower and Hydroelectricity

6. Intelligent Instruments and Automation Devices

7. Theory and Applications of Pattern Recognition

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 21 学分，非学位课程为 7 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 Provision

1. International academic master students will complete 28 credits generally, 21 of which are from degree courses, and 7 of which are from non-degree courses. Students will also complete academic activities. Coursework will be completed in 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 requires 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 provision is as follows:

控制科学与工程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 Majoring in Control Science and Engineering

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 Course 21 学分	公共课程 General Course	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 Course	2022LM880001	矩阵论 Matrix Theory	2	32	春 Spring	选修 7 学分 Optional 7 credits at least
		2022LM880002	最优化方法 Optimization Methods	2	32	秋 Autumn	
		2022LM880003	数值分析 Numerical Analysis	3	48	秋 Autumn	
		2022LM330001	程序设计方法 Methods of Programming	2	32	秋 Autumn	
		2022LM990601	综合能源系统 Integrated Energy System	2	32	春 Spring	必修 Compulsory
	专业课程 Major Course	2022LM060201	系统控制理论基础 Systems Control Theory	1	16	春 Spring	选修 4 学分 Optional 4 credits at least
		2022LM060202	鲁棒最优控制 Robust Optimal Control	1	16	春 Spring	
		2022LM060203	系统辨识与自适应控制 System Identification and Adaptive Control	1	16	春 Spring	
		2022LM060204	智能控制 Intelligent Control	1	16	春 Spring	
		2022LM060102	新能源发电与输电技术 New Energy Generation and Power Transmission Technology	2	32	春 Spring	
非学位课程 Non-degree Course 7 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
		2022LM990201	多目标决策理论及方法 Theory and Method of Multi-Objective Decision-making	2	32	春 Spring	选修 6 学分 Optional 6 credits at least
		2022LM880004	数学物理方程 Partial Differential Equations	2	32	春 Spring	
		2022LM991502	运筹学 Operations Research	2	32	春 Spring	
		选修硕士课程 Optional courses for master					
教学环节 Academic Activity		学术活动（含博导讲座） Seminar and Conferences (including lecturers 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

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 Energy and Electrical Engineering. 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. 钱学森，宋健. 工程控制论（第三版）[M]. 北京：科学出版社. 2011.

2. N. 维纳，郝季仁. 控制论（第二版）[M]. 北京：科学出版社. 2010.

3. 郑大钟. 线性系统理论（第二版）[M]. 北京：清华大学出版社. 2019.

4. 冯纯伯，张侃健. 非线性系统的鲁棒控制[M]. 北京：科学出版社. 2004.

5. 洪奕光，程代展. 非线性系统的分析与控制[M]. 北京：科学出版社. 2005.

6. 卢强，梅生伟，孙元章.电力系统非线性控制[M]. 北京：清华大学出版社. 2008.

7. 薛禹胜. 运动稳定性量化理论—非自治非线性多刚体系统的稳定性分析[M]. 南京：江苏科学技术出版社. 1999.

8. 段广仁. 线性系统理论（上、下册）（第三版）[M]. 北京：科学出版社. 2016.

9. 高黛陵，吴麒. 多变量频率控制理论[M]. 北京：清华大学出版社. 1998.

10. 萧德云. 系统辨识理论及应用[M]. 北京：清华大学出版社. 2014.

11. 梅生伟，申铁龙，刘康志. 现代鲁棒控制理论与应用[M]. 北京：清华大学出版社. 2008.

12. 胡寿松，王执铨，胡维礼. 最优控制理论与系统（第二版）[M]. 北京：科学出版社. 2005.

13. 韩崇昭，朱洪艳，段战胜，等. 多源信息融合[M]. 北京：清华大学出版社. 2006.

14. 王宏华. 线性系统理论与设计[M]. 北京：电子工业出版社. 2020.

15. 王宏华. 开关磁阻电动机调速控制技术（第二版）[M]. 北京：机械工业出版社. 2014.

16. 孙文瑜等. 最优化方法[M]. 北京：高等教育出版社. 2004.

17. 褚健等. 鲁棒控制理论及应用[M]. 杭州：浙江大学出版社. 2000.

18. 孙元章，焦晓红，申铁龙. 电力系统非线性鲁棒控制[M]. 北京：清华大学出版社. 2007.

19. 王玉振. 广义 Hamilton 控制系统理论-实现、控制与应用[M]. 北京：科学出版社. 2007.

20. 王久和. 无源控制理论及其应用[M]. 北京：电子工业出版社. 2010.

21. 李继彬，赵晓华，刘正荣. 广义哈密顿控制系统理论及其应用[M]. 北京：科学出版社. 2007.

22. 王冰，袁越. 非线性无源控制理论及其在风力发电机组中的应用[M]. 北京：科学出版社. 2016.

23. 卢新彪. Synchronization in complex networks[M]. Nova Science Publishers. 2011.

24. 倪建军. 复杂系统多 Agent 建模与控制的理论及应用[M].北京：电子工业出版社. 2011.

25. 费峻涛. Advanced Control Design of MEMS Vibratory Gyroscope[M]. Nova Science Publishers. 2012.

26. 卢志刚. 非线性自适应逆控制及其应用[M]. 北京：国防工业出版社. 2004.

27. 周志华. 机器学习[M]. 北京：清华大学出版社. 2016.

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29. 韩京清，何关钰，许可康. 线性系统理论代数基础[M]. 沈阳：辽宁科学技术出版社. 1985.

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32. 马宏忠. 电机学[M]. 北京：高等教育出版社. 2009.

33. 吴文传，张伯明，孙宏斌. 电力系统调度自动化[M]. 北京：清华大学出版社. 2011.

34. 倪以信，陈寿孙，张宝霖. 动态电力系统的理论与分析[M]. 北京：清华大学出版社. 2002.

35. 刘取. 电力系统稳定性及发电机励磁控制[M]. 北京：中国电力出版社. 2007.

36. 余贻鑫，王成山. 电力系统稳定性理论与方法[M]. 北京：科学出版社. 1999.

37. 康重庆，夏清，徐玮. 电力系统不确定性分析[M]. 北京：科学出版社. 2011.

38. 胡克定，郑卫新. 线性多变量系统理论与设计[M]. 南京：东南大学出版社. 1991.

39. 叶杭冶. 风力发电机组的控制技术（第 2 版）[M]. 北京：机械工业出版社. 2006.

40. Khalil H K. Nonlinear Systems[M]. Prentice-Hall. New Jersey. 2002.

41. Vidyasagar M. Nonlinear Systems Analysis[M]. Prentice-Hall, New Jersey. 1998.

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51. Dalvi J. Brain Theory and Neural Networks[M]. Foster Academics. 2018.

52. 参考期刊：IEEE Transactions on Automatic Control

53. 参考期刊：Automatica

54. 参考期刊：IEEE Transactions on Cybernetics

55. 参考期刊：IEEE Transactions on Mechatronics

56. 参考期刊：IEEE Transactions on Industrial Electronics

57. 参考期刊：IEEE Transactions on Industrial Informatics

58. 参考期刊：IEEE Transactions on Pattern Analysis and Machine Intelligence

59. 参考期刊：IEEE Transactions on Neural Networks and Learning Systems

60. 参考期刊：IEEE Transactions on Smart Grid

61. 参考期刊：IEEE Transactions on Power Systems

62. 参考期刊：IEEE Transactions on Renewable Energy

63. 参考期刊：SIAM Journal on Control and Optimization

64. 参考期刊：System & Control Letters

65. 参考期刊：International Journal of Control

66. 参考期刊：IET Transaction on Control Theory and Applications

67. 参考期刊：自动化学报

68. 参考期刊：控制理论与应用

69. 参考期刊：控制与决策

70. 参考期刊：中国电机工程学报

71. 参考期刊：电工技术学报

72. 参考期刊：电机与控制学报

73. 参考期刊：太阳能学报

74. 参考期刊：水利学报

75. 参考期刊：电力系统自动化

76. 参考期刊：电网技术

77. 参考期刊：电力系统保护与控制