水利机械（0828Z2）
Hydraulic Engineering Machinery

学科门类：工学（08）　一级学科：农业工程（0828）

Discipline Category: Engineering (08)

First-Class Discipline: Agricultural Engineering (0828)

一、学科简介

河海大学农业工程 2011 年被教育部批准为一级学科博士学位授予点。水利机械学科是一级学科农业工程下的二级学科，2013 年获批招收硕士研究生和博士研究生。现有博士生导师 12 名、教授 19 名。

本学科紧密跟踪与引领学科发展动态，积极服务水利事业，在疏浚技术与装备、水利机械设计理论、计算机辅助设计与制造及水下机器人技术等方面形成了特色研究方向。目前，本学科水利机械领域的研究处于国内外领先地位，毕业的博士研究生主要工作于高校、科研院所。

本学科牵头成立和建设中国水利学会金属结构专委会，拥有“水利部水工金属结构安全监测中心”、“疏浚技术教育部工程研究中心”、“江苏省高校特种机器人重点实验室”、“机电控制及自动化水利部重点实验室”四个部级科研基地，“常州市数字化制造技术重点实验室”、“常州市光伏系统集成与生产装备技术重点实验室”、“常州市特种机器人及智能技术重点实验室”及“常州市高空作业装备及智能技术重点实验室”四个常州市重点实验室。目前，水利机械领域处于国内外领先地位，毕业。近 5 年以来，本学科主持与承担了 413 项科研项目，发表论文 860 篇，获国家、省部级科技进步奖 19 项。

I. Discipline Overview

Agricultural Engineering in our university was approved as a doctoral-level discipline by the Ministry of Education in 2011. The discipline of Hydraulic Engineering Machinery is a secondary discipline under the first-class discipline of Agricultural Engineering. In 2013, Hohai University was authorized to issue master

degrees and doctoral degree in the discipline of Hydraulic Engineering Machinery. Now, there are 19 professors and 12 PhD supervisors in this discipline.

This discipline pays close attention to the development of its field and actively serves the water conservancy industry. This discipline also has formed its own research advantages in the theory of dredging technology and equipment, hydraulic machinery design, computer aided design and manufacturing, and underwater robot technology. At present, the research in the field of hydraulic engineering machinery is in a top position at home and abroad, and PhD graduates usually serve for universities and scientific research institutes.

This discipline takes the lead in the establishment and construction of the Professional Committee for Hydraulic Steel Structure of China Hydraulic Engineering Society, and has four provincial and ministerial laboratories, i.e. Hydraulic Metal Structure Safety Monitoring Center of the Ministry of Water Resources, the Engineering Research Center of Dredging Technology of the Ministry of Education, the Key Laboratory of Electromechanical Control and Automation of the Ministry of Water Resources, and the Key Laboratory of Special Robots of Jiangsu Province. It also has four municipal key laboratories of Changzhou, i.e. the laboratory of Digital Manufacturing Technology, the laboratory of Photovoltaic System Integration and Production Equipment Technology, the laboratory of Special Robot and Intelligent Technology, and the laboratory of Aerial Work Equipment and Intelligent Technology. In the past five years, researchers of this discipline have hosted and undertaken 413 research projects, published 860 papers and won 19 national, provincial and ministerial science and technology awards.

二、培养目标

1. 河海大学博士层次外国留学生应当在机械工程领域中具有宽阔的国际视野，能够在世界范围内创新运用和发展机械工程的理论、技能和方法，在国际事务中具有竞争优势。

2. 以英语为专业教学语言的学科中，外国留学生毕业时，博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. 本学科博士留学研究生旨在培养本学科领域的高层次人才。培养在本学科上掌握扎实的基础理论知识和系统的专门知识；具有独立从事科学研究工作的能力；在科学和专门技术上做出创造性的成果；熟练阅读本专业外文文献，具有较强的英文写作和国际学术交流能力；了解中国文化并具备汉语日常交流能力的高层次学术型人才。

II. Training Objectives

1. International PhD graduates of Hohai University are expected to have broad international view in the relevant academic fields; to creatively apply and develop the theories, skills, and methodologies of the relevant disciplines in the world, and to obtain competitive advantage in the international academic affairs.

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

3. The doctorate program in the discipline of Hydraulic Engineering Machinery aims at cultivating high-level academic PhD graduates with comprehensive fundamental knowledge and theory of Hydraulic Engineering Machinery. They are also required to get deep insight into the status and the development trend of this discipline, and to obtain broad international vision, strict scientific thinking, and honest and teamwork sprits. They should also have the ability of working independently in the scientific research, and making creative achievements and using computers and English to carry out scientific research and academic exchange. The PhD graduates should know about the Chinese culture, and have the ability to use Chinese for daily and academic communication.

三、主要研究方向

1. 疏浚技术与疏浚装备

2. 水工金属结构设计与制造

3. 机械工程及自动化

4. 先进材料与加工技术

5. 能源工程与装备

6. 机电控制与机器人技术

III. Research Directions

1. Dredging Technology and Equipment

2. Design and Manufacturing of Hydraulic Metal Structure

3. Mechanical Engineering and Automation

4. Advanced Materials and Processing Technology

5. Energy Engineering and Equipment

6. Electromechanical Control and Robotics

四、学制和学习年限

学术学位全英文博士留学研究生的标准学制为 4 年。实行弹性学制，学习年限最短不少于 3 年，最长不超过 6 年。

IV. Number of Years Requirement

The PhD program typically requires 4 years to complete. However, the completing time may vary to 3 years as the minimum and 6 years as the maximum.

五、学分要求和课程设置

1. 学术学位全英文博士留学研究生课程总学分为 15 学分，其中学位课程为 10 学分，非学位课程为 5 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. International academic PhD students will complete 15 credits, 10 of which are from degree courses, and 5 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 require students to complete the specified learning tasks.

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

The specific curriculum is as follows:

水利机械全英文学术型留学博士研究生课程设置

Curriculum for English Taught International Academic PhD Students in Hydraulic Engineering Machinery

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 10 学分	公共课程 General Course	2022LD000001	汉语 I Chinese Language I	2	48	秋 Autumn	必修 Compulsory
		2022LD000003	中国概况 Introduction to China	2	36	秋 Autumn	
		2022LD110001	论文写作指导 Guide of Thesis Writing	2	32	秋、春 Autumn/ Spring	
	基础课程 Basic Course	2022LD880001	应用数学 Applied Mathematics	4	64	秋 Autumn	选修 2 学分 Optional 2 credits at least
		2022LD880003	随机微分方程 Stochastic Differential Equations	2	32	春 Spring	
		2022LD990401	岩石水力学 Rock hydraulics	2	32	春 Spring	
	专业课程 Major Course	2022LD120101	机械系统动力学 Mechanical System Dynamics	2	32	秋 Autumn	选修 2 学分 Optional 2 credits at least
		2022LD120102	现代机械设计理论与工程 Modern Mechanical Design theory and Engineering	2	32	春 Spring	
非学位课程 Non-degree Course 5 学分		2022LD110002	中国国情教育（水韵课堂） Water Harmony Lectures	1	16	秋、春 Autumn/ Spring	必修 Compulsory
		2022LD000002	汉语 II Chinese Language II	2	48	春 Spring	
		2022LD120103	非线性问题及有限元方法 Nonlinear Problems and Finite Element Methods	2	32	春 Spring	选修 2 学分 Optional 2 credits at least
		2022LD120104	机器人与智能控制 Robotics and Intelligent Control	2	32	秋 Autumn	
		选修博士课程 Optional courses for PhD					选修 Optional
教学环节 Academic Activity		学术活动（含博导讲座） Seminar and Conferences (including seminars 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

学术学位博士研究生入学后，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

学术学位博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、博士生导师讲座，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 20 次以上的学术交流活动，其中博士生导师讲座至少 8 次，由本人做的公开的学术报告 1 次（开题报告、中期检查、预答辩、答辩不计入）。本人做的学术报告由指导教师负责对其学术报告效果进行考核。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，学术学位博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。

4. 科学研究

学术学位博士研究生应积极参加科学研究课题，并应具有在导师指导下独立负责某专题或子课题的研究工作经历。课题完成后由导师提出综合评审意见。

VI. Academic Activities

1. Study Proposal

The PhD students must prepare a study proposal on how they will complete the PhD 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

PhD students must participate in academic conferences, seminars by experts and PhD advisors, and discussion panels. Before their dissertation defense, PhD students must participate in seminars and

conferences over 20 times, including at least 8 seminars by PhD advisors, and deliver at least 1 academic presentation (the activities concerning with their dissertation are not counted). The presentations delivered by the PhD students will be evaluated by their own research advisors. All the seminars and presentations should be recorded in relevant record book.

3. Practice Activities

PhD 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.

4. Scientific Research

International academic PhD students should vigorously participate in scientific research projects, and shall be capable of conducting independent research on a particular topic or sub-topic under the guidance of their advisors. Their performance will be evaluated by their research advisors.

七、论文工作

学术学位博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《河海大学博士学位论文工作管理办法》和学院相关文件执行。留学博士研究生可使用英文撰写论文。

VII. Dissertation

The dissertations of academic PhD 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 PhD. Dissertation Management Measures” and relevant documents in College of Mechanical and Electrical Engineering. Dissertations 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. 邹慧君，王晶，宋友贵. 高等机械动力学，北京:高等教育出版社，2013

2. 黄真，赵永生，赵铁石. 高等空间机构学，北京:高等教育出版社，2006

3. 宋天霞. 非线性结构有限元计算，华中理工大学出版社，1996

4. 钟毅芳，陈柏鸿，王周宏. 多学科综合优化设计原理与方法，武汉：华中科技大学出版社，2006

5. 孔珑. 工程流体力学（第三版），北京：中国电力出版社，2007

6. 殷宗泽. 土工原理，北京:中国水利水电出版社，2007

7. 钱宁、万兆惠. 泥沙运动力学，北京：科学出版社，2003

8. Cottrell J. Austin, Hughes Thomas J. R., Bazilevs Yuri. Isogeometric analysis: toward integration of CAD and FEA. Wiley: John Wiley & Sons, Ltd, 2009.

9. Hughes T.J.R. The Finite Element Method, Linear Static and Dynamic Finite Element Analysis, Dover Publications Inc., 2000.

10. Martin Philip Bendsoe, Ole Sigmund. Topology optimization-theory methods and applications. Springer, 2003

11. Chris tensen P.W., Kla rbring A. An Introduction to Structural Optimization, Springer , 2009.

12. Piegl L., Tiller W. The NURBS Book, Springer-Verlag, New York, 1997.

13. Choi K.K., Kim Nam-Ho. Structural Sensitivity Analysis and Optimization 1: Linear Systems. Springer, 2005

14. Choi K.K., Kim Nam-Ho. Structural Sensitivity Analysis and Optimization 2: Nonlinear Systems and Applications, Springer, 2010

15. Mark S. Gockenbach. Understanding and Implementing The Finite Element Method. SIAM, 2006

16. Vuong A V. Adaptive hierarchical iso-geometric finite element method. Springer, 2012.

17. Karl Johan Astrom, Richard M. Murray. Feedback Systems: An Introduction for Scientists and Engineers, Princeton University Press, 2010

18. Hughes T.J.R., Cottrell J.A., Bazilevs Y. Isogeometric analysis: CAD, finite elements, NURBS, exact geometry and mesh refinement. Computer Methods in Applied Mechanics and Engineering. 2005, 194(39-41): 4135-4195.

19. Cottrell J.A., Hughes T.J.R., Reali A. Studies of refinement and continuity in isogeometric structural analysis. Computer Methods in Applied Mechanics and Engineering. 2007, 196(41-44): 4160-4183.

20. Seo Yu-Deok, Kim Hyun-Jung, Youn Sung-Kie. Shape optimization and its extension to topological design based on isogeometric analysis. International Journal of Solids and Structures. 2010, 47(11-12): 1618-1640

21. Wall Wolfgang A., Frenzel Moritz A., Cyron Christian. Isogeometric structural shape optimization. Computer Methods in Applied Mechanics and Engineering. 2008, 197(33-40): 2976-2988.

22. Qian Xiaoping. Full analytical sensitivities in NURBS based isogeometric shape optimization. Computer Methods in Applied Mechanics and Engineering. 2010, 199(29-32): 2059-2071.

23. Ha Seung-Hyun, Choi K.K., Cho Seonho. Numerical method for shape optimization using T-spline based isogeometric method. Structural and Multidisciplinary Optimization. 2010, 42(3): 417-428.

24. Uhm Tae-Kyoung, Youn Sung-Kie. T-spline finite element method for the analysis of shell structures. International Journal for Numerical Methods in Engineering. 2009, 80(4): 507-536.

25. 参考期刊：Structural Multidisciplinary Optimization, Springer

26. 参考期刊：Journal of Mechanical Design, ASME

27. 参考期刊：Journal of Vibration and Acoustics, ASME

28. 参考期刊：ASME Journal of Mechanical Engineering, ASME

29. 参考期刊：IEEE Control Systems Magazine, IEEE

30. 参考期刊：IEEE Robotics & Automation Magzine, IEEE

31. 参考期刊： IEEE Transactions on Automatic Control, IEEE

32. 参考期刊：IEEE Transactions on Automation Science and Engineering, IEEE

33. 参考期刊：IEEE Transactions on Control Systems Technology, IEEE

34. 参考期刊：IEEE Transactions on Fuzzy Systems, IEEE

35. 参考期刊：IEEE-Asme Transactions on Mechatronics, IEEE

36. 参考期刊：IEEE Transactions on Industrial Electronics, IEEE

37. 参考期刊：IET Control Theory and Applications, IET

38. 参考期刊：JOURNAL OF HYDRAULIC RESEARCH, International Association for Hydraulic Research

39. 参考期刊：JOURNAL OF HYDRAULIC ENGINEERING，American Society of Civil Engineers, (ASCE)

40. 参考期刊：机械工程学报(中英文版)，中国机械工程学会

41. 参考期刊：自动化学报，中国自动化学会

42. 参考期刊：力学学报，中国力学学会

43. 参考期刊：计算力学学报，中国力学学会

44. 参考期刊：振动工程学报，中国振动工程学会

45. 参考期刊：计算机集成制造系统，中国兵器工业集团

46. 参考期刊：系统仿真学报，中国系统仿真学会

47. 参考期刊：机器人，中国自动化学会

48. 参考期刊：船舶工程，中国造船工程学会

49. 参考期刊：水动力学研究与进展 A 辑、B 辑，中国船舶科学研究中心