

力学 (0801)

Mechanics

学科门类：工学 (08) 一级学科：力学 (0801)

Discipline Category: Engineering (08)

First-Class Discipline: Mechanics (0801)

一、学科简介

河海大学力学学科，最早可追溯到 1922 年河海工程专门学校设立的“力学部”。1960 年，著名力学家、教育家徐芝纶院士领衔创办工程力学专业。固体力学学科于 1981 年成为我国首批硕士点，结构力学（后改为工程力学）学科于 1984 年获批硕士点，流体力学学科于 2000 年获批硕士点，工程力学学科于 1998 年获批博士点。工程力学二级学科为国家重点学科，力学一级学科为江苏省重点学科，拥有力学一级学科博士点和博士后流动站。牵头建设水利部结构力学与水工结构重点实验室、江苏省重大基础设施安全保障协同创新中心和江苏省风电机组结构工程研究中心。解决水利、土木、能源、环境等领域中力学问题为研究特色，获包括国家科技进步特等奖、一等奖在内的省部级以上奖励 40 余项；1 人获光华工程科技奖，6 人次担任国际期刊主编、副主编，9 人担任国际计算力学协会等国际学术组织理事和常务理事。拥有国家一流本科专业、国家级教学团队、国家工科基础课程（力学）教学基地、国家级实验教学示范中心、国家级虚拟仿真实验教学中心等教学平台，国家级教学名师 3 人、全国优秀教师 1 人、宝钢优秀教师奖 7 人、国家级规划教材 5 部、国家级课程 13 门次，获国家级教学成果奖 4 项。学科还是江苏省力学学会、南方计算力学联络委员会等学术组织的挂靠单位。力学学科现有博士生导师 25 人、硕士生导师 56 人。

I. Discipline Overview

The discipline of Mechanics in Hohai University can be traced back to the “Mechanics Department” established by Hohai Engineering School in 1922. In 1960, Prof. Zhilun Xu, who is an academician of the

China Academy of Sciences and a famous mechanics and educator, led the establishment of engineering mechanics. Hohai University was authorized in China to start the master's degree program of solid mechanics in 1981 among the first batch, and successively was authorized to start the master's programs of structural mechanics (later changed to Engineering Mechanics) in 1984 and fluid mechanics in 2000. Hohai University started the doctoral program of engineering mechanics in 1998. The engineering mechanics is one of the national second-level key disciplines, and the mechanics is one of the first-level key disciplines in Jiangsu Province. The discipline of mechanics can confer a doctoral degree and has a post-doctorate research station.

The discipline of mechanics takes a lead role in the construction of the Key Laboratory of structural mechanics and hydraulic structure of the Ministry of water resources, the Jiangsu Collaborative Innovation Center for major infrastructure security and the Jiangsu research center of wind turbine structure engineering. For decades, targeting to solving the mechanics problems in water conservancy, civil engineering, energy, environment and other fields, we have formed several distinctive research directions and have won more than 40 provincial or national awards, including the special prize of National Science and Technology Awards. The discipline of mechanics has one national first-class undergraduate major, a national teaching team, a national teaching base of engineering courses (Mechanics), a national experimental teaching center, a national virtual simulation experiment teaching center and other teaching platforms.

Many professors of mechanics discipline won various awards, e.g., the Guanghua Engineering Science and technology award, served as chief editor or deputy chief editor in famous international journals, and served as the director and executive director of international academic organizations such as the International Association of Computational Mechanics. Besides, we have 3 national famous teachers, 1 national excellent teacher, 7 Baogang excellent teachers, 5 national planning textbooks, 13 national courses, and 4 national teaching achievement awards. The department of engineering mechanics is also an affiliated enterprise of the Jiangsu society of mechanics and Southern Computational Mechanics Committee. There are 25 doctoral supervisors and 56 master supervisors in the department of engineering mechanics.

二、培养目标

1. 河海大学博士层次外国留学生应当在力学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力学的理论、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. 留学博士毕业生应具有坚实宽广的数学力学理论基础，掌握系统深入的力学学科专门知识。能熟练阅读外文文献、撰写科技论文和进行国际学术交流。能够熟练运用现代基础理论、先进计算方法和实验技术开展科学研究，解决重大工程技术问题。独立从事科学研究工作的能力强，在科学或专门技术上做出创造性的成果。

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 overseas doctoral program aims at cultivating individuals with solid and broad knowledge in mathematics, mechanics, and specific engineering applications, who are proficient in reading literature, writing scientific papers and conducting international academic communications, can carry out scientific research and hand complex technical problems in large projects by skillfully using fundamental theory, advanced numerical method and experimental technology. The doctoral candidates are required to have the strong ability to undertake scientific research independently and make creative achievements in science or special technology.

三、主要研究方向

1. 工程结构破坏力学与安全
2. 计算力学与工程仿真
3. 工程材料力学特性与行为
4. 环境流体力学与应用
5. 结构动力学与灾变控制

III. Research Directions

1. Failure Mechanics and Safety of Engineering Structures
2. Computational Mechanics and Engineering Simulation
3. Mechanical Properties and Behaviors of Engineering Materials
4. Environmental Fluid Mechanics and Applications
5. Structural Dynamics and Catastrophe Control

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 17 学分，其中学位课程为 12 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 17 credits, 12 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:

力学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 Mechanics

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 12 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
		2022LD880002	动力系统、混沌与分形 Dynamic Systems, Chaos and Fractal	3	48	春 Spring	
		2022LD880003	随机微分方程 Stochastic Differential Equations	2	32	春 Spring	
		2022LD990101	水文学与水文模拟 Hydrology and Hydrological Modelling	2	32	秋 Autumn	选修 2 学分 Optional 2 credits at least
		2022LD990301	高等海岸动力学 Advanced Coastal dynamics	2	32	春 Spring	
		2022LD990401	岩石水力学 Rock hydraulics	2	32	春 Spring	
		2022LD991001	应用地球物理 Applied Geophysics	2	32	春 Spring	
	专业课程 Major Course	2022LD090101	工程材料本构理论 Constitutive Modelling of Engineering Materials	2	32	春 Spring	选修 2 学分 Optional 2 credits at least
2022LD090102		高等流体力学 Advanced Fluid Mechanics	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		
	2022LD090103	学科前沿专题 Modern Science of the Discipline	2	32	春 Spring	选修 2 学分 Optional 2 credits at least	
	2022LD090104	高等动力学 Advanced Dynamics	2	32	春 Spring		
	2022LD770001	高等计算力学 Advanced Computational Mechanics	2	32	春 Spring		
	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 Department of Engineering Mechanics and College of Mechanics and Materials. 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. 钟万勰. 应用力学的辛数学方法. 北京: 高等教育出版社, 2006.
2. 黄克智, 黄永刚. 固体本构关系. 北京: 清华大学出版社, 1999.
3. 石根华. 接触理论及非连续形体的形成约束和积分. 北京: 科学出版社, 2017.
4. 梅凤翔, 刘桂林. 分析力学基础. 西安: 西安交通大学出版社, 1987.
5. 刘延柱. 高等动力学. 北京: 高等教育出版社, 2001.
6. 胡海岩. 应用非线性动力学. 北京: 航空工业出版社, 2000.
7. 胡海岩. 振动力学——研究性教程. 北京: 科学出版社, 2020.
8. 程耿东. 工程优化设计基础. 北京: 水利电力出版社, 1983.
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10. 殷宗泽, 钱家欢. 土工原理与计算. 北京: 水利水电出版社, 2003.
11. Holzapfel GA. Nonlinear Solid Mechanics: A Continuum Approach for Engineering 1st Edition. John Wiley & Sons, Chichester, 2000.
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26. Zehnder AT. Fracture mechanics. Springer Science & Business Media; 2012.
27. Atkinson BK, editor. Fracture mechanics of rock. Elsevier; 2015.
28. Munson BR, Okiishi TH, Huebsch WW, Rothmayer AP. Fluid mechanics. Singapore: Wiley; 2013.
29. Goldstein R. Fluid mechanics measurements. 2017
30. Kundu PK, Cohen IM, Dowling DR. Fluid mechanics. Academic press; 2015.
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33. Robert D. B., Flow-induced Vibration, Krieger Publishing Company, 2001.
34. Chiang C. M., Bogdan V., Homogenization Methods for Multiscale Mechanics, World Scientific Publishing, 2010.
35. George J. D., Micromechanics of Composite Materials, Springer, 2013.
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58. 参考期刊：力学进展.
59. 参考期刊：力学学报.
60. 参考期刊：固体力学学报.
61. 参考期刊：计算力学学报.
62. 参考期刊：实验力学.
63. Reference Journal: AIAA Journal, American Institute of Aeronautics and Astronautics.
64. Reference Journal: Applied Mechanics Reviews, American Society of Mechanical Engineers.
65. Reference Journal: Journal of the Mechanics and Physics of Solids, Elsevier.
66. Reference Journal: Physical Review Letters, American Physics Society.
67. Reference Journal: Nano Letters, American Chemical Society.
68. Reference Journal: International Journal of Plasticity, Elsevier.
69. Reference Journal: International Journal of Solids and Structures, Elsevier.
70. Reference Journal: International Journal of Fracture, Springer.
71. Reference Journal: Journal of Sound and Vibration, Elsevier.
72. Reference Journal: Nonlinear Dynamics, Springer.
73. Reference Journal: Multibody System Dynamics, Springer.
74. Reference Journal: Journal of Fluid Mechanics, Springer Nature.
75. Reference Journal: Computational Mechanics, Springer.
76. Reference Journal: Computational Materials Science, Elsevier.

77. Reference Journal: International Journal for Numerical Methods in Engineering, John Wiley and Sons Ltd.
78. Reference Journal: Journal of Geotechnical and Geoenvironmental Engineering, American Society of Civil Engineers.
79. Reference Journal: Journal of Dynamic Systems, Measurement and Control, American Society of Mechanical Engineers.
80. Reference Journal: Mechanics of Materials, Elsevier.
81. Reference Journal: Nanotechnology, Institute of Physics.
82. Reference Journal: International Journal for Numerical and Analytical Methods in Geomechanics, John Wiley and Sons Ltd.
83. Reference Journal: Experimental Mechanics, Springer.
84. Reference Journal: Measurement Science and Technology, Institute of Physics.
85. Reference Journal: Annual Review of Fluid Mechanics, Annual Reviews Inc.
86. Reference Journal: Advances in Applied Mechanics, Academic Press Inc.
87. Reference Journal: Computer Methods in Applied Mechanics and Engineering, Elsevier.
88. Reference Journal: International Journal of Heat and Mass Transfer, Elsevier.
89. Reference Journal: International Journal of Mechanical Sciences, Elsevier.
90. Reference Journal: Applied Thermal Engineering, Elsevier.
91. Reference Journal: Communications in Nonlinear Science and Numerical Simulation, Elsevier.
92. Reference Journal: Structural and Multidisciplinary Optimization, Springer.
93. Reference Journal: International Journal of Impact Engineering, Elsevier.
94. Reference Journal: Journal of Fluids and Structures, Elsevier.
95. Reference Journal: Journal of Thermal Stresses, Taylor and Francis Ltd.
96. Reference Journal: European Journal of Mechanics A-Solids, Elsevier.

97. Reference Journal: Engineering Fracture Mechanics, Elsevier.
98. Reference Journal: Journal of Vibration and Control, SAGE.
99. Reference Journal: Theoretical and Applied Fracture Mechanics, Elsevier.
100. Reference Journal: Applied Mathematical Modeling, Elsevier.
101. Reference Journal: International Journal of Multiphase Flow, Elsevier.
102. Reference Journal: International Journal of Damage Mechanics, SAGE.
103. Reference Journal: Mechanical Systems and Signal Processing, Elsevier.
104. Reference Journal: Computers and Geotechnics, Elsevier.
105. Reference Journal: International Journal of Rock Mechanics and Mining Sciences, Elsevier.
106. Reference Journal: Rock Mechanics and Rock Engineering, Springer.
107. Reference Journal: Physica A: Statistical Mechanics and its Applications
108. Reference Journal: Journal of Statistical Mechanics: Theory and Experiment
109. Reference Journal: Extreme Mechanics Letters
110. Reference Journal: Archive for Rational Mechanics and Analysis
111. Reference Journal: Journal of Rock Mechanics and Geotechnical Engineering
112. Reference Journal: European Journal of Mechanics-A/Solids
113. Reference Journal: Structural Engineering and Mechanics
114. Reference Journal: Mechanics of Advanced Materials and Structures
115. Reference Journal: Science China Physics, Mechanics & Astronomy
116. Reference Journal: Journal of Engineering Mechanics
117. Reference Journal: Engineering Applications of Computational Fluid Mechanics
118. Reference Journal: Journal of Non-Newtonian Fluid Mechanics
119. Reference Journal: Archives of Civil and Mechanical Engineering
120. Reference Journal: Advances in Mechanical Engineering