力学（0801）

Mechanics

学科门类：工学（08） 一级学科：力学（0801）

Discipline: 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。本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 at 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. 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. 河海大学硕士层次外国留学生应当在力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力学知识、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. 留学硕士毕业生应具有坚实的数学力学理论基础，掌握系统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，解决工程技术问题。具有从事科学研究工作的能力，在科学或专门技术上做出有价值的工作。

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 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 overseas master's program aims at cultivating individuals with solid 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 by skillfully using fundamental theory, advanced numerical method and experimental technology. The master candidates are required to have the ability to undertake scientific research independently and make valuable 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. International academic master students will complete 28 credits, 20 of which are from degree courses, and 8 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 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:

力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 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 20 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 4 学分 Optional 4 credits at least
		2022LM880003	数值分析 Numerical Analysis	3	48	秋 Autumn	
		2022LM880004	数学物理方程 Partial Differential Equations	2	32	春 Spring	
		2022LM770001	流体力学 Fluid Mechanics	2	32	秋 Autumn	选修 2 学分 Optional 2 credits at least
		2022LM770003	弹性力学 Theory of Elasticity	2	32	秋 Autumn	
		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 2 学分 Optional 2 credits at least
		2022LM990302	河口海岸动力学 Estuarine and Coastal Dynamics	2	32	春 Spring	
		2022LM990601	综合能源系统 Integrated Energy System	2	32	春 Spring	
		2022LM990701	数字通信 Digital Communications	2	32	春 Spring	
		2022LM991001	环境大地测量学 Environmental Geodesy	2	32	秋 Autumn	
		2022LM991101	节水灌溉理论 Water Saving Irrigation	2	32	秋 Autumn	
	专业课程 Major Course	2022LM770002	塑性力学 Engineering Plasticity	2	32	春 Spring	选修 4 学分 Optional 4 credits at least
		2022LM090101	结构动力学 Structural Dynamics	2	32	春 Spring	
		2022LM090202	材料结构与性能 Structures and Properties of Material	2	32	秋 Autumn	
非学位课程 Non-degree Course 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
		2022LM090103	现代计算力学 Modern Computational Mechanics	2	32	春 Spring	
		2022LM090104	结构优化设计 Structural Optimization	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 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 Mechanics and Materials. 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. 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. 振动力学——研究性教程. 北京: 科学出版社，2020.

7. 殷宗泽，钱家欢. 土工原理与计算. 北京: 水利水电出版社，2003.

8. Zienkiewwicz O. C., Taylor R. L., Zhu J. Z., The Finite Element Method, Six Edition,Oxford:

Butterworth - Heinemann, 2005.

9. Holzapfel GA. Nonlinear Solid Mechanics: A Continuum Approach for Engineering 1st Edition. John Wiley & Sons, Chichester, 2000.

10. Oden JT, Reddy JN. Variational methods in theoretical mechanics. Springer Science & Business Media; 2012.

11. Gurtin ME. An introduction to continuum mechanics. Academic press; 1982.

12. Spencer AJ. Continuum mechanics. Courier Corporation; 2004.

13. Bonet J, Wood RD. Nonlinear continuum mechanics for finite element analysis. Cambridge university press; 1997.

14. Simo J. C., Hughes T., Computational Inelasticity, New York: Springer - Verlag, 1998.

15. Eduardo A. de Souza Neto, Djordje Peric, David R. J. Owen. Computational Methods for Plasticity: Theory and Applications. Wiley, 2008.

16. Basar Y, Weichert D. Nonlinear continuum mechanics of solids: fundamental mathematical and physical concepts. Springer Science & Business Media; 2000.

17. McConnell AJ. Applications of tensor analysis. Courier Corporation; 2014.

18. Ugural AC, Fenster SK. Advanced mechanics of materials and applied elasticity. Pearson Education; 2011.

19. Lubliner J. Plasticity theory. Courier Corporation; 2008.

20. Krajcinovic D. Damage mechanics. Elsevier; 1996 Apr 22.

21. Allix O, Hild F, editors. Continuum damage mechanics of materials and structures. Elsevier; 2002.

22. Murakami S. Continuum damage mechanics: a continuum mechanics approach to the analysis of damage and fracture. Springer Science & Business Media; 2012 Feb 24.

23. Knott JF. Fundamentals of fracture mechanics. Gruppo Italiano Frattura; 1973.

24. Gdoutos EE. Fracture mechanics: an introduction. Springer Nature; 2020.

25. Broek D. The practical use of fracture mechanics. Springer Science & Business Media; 2012.

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.

31. Brennen CE, Brennen CE. Fundamentals of multiphase flow.

32. Stephen B. P., Turbulent Flow, Cambridge University, 2000.

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.

36. Hale J. K., Theory of Functional Differential Equations, New York: Springer - Verlag, 1977.

37. Malvern L. E., Introduction to the Mechanics of a Continuum Medium, New Jersey: Prentice - Hall Inc., 1969.

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48. Mallat S., A Wavelet Tour of Signal Processing, Academic Press, 2008.

49. Dennis R. B., Introduction to N.C.M., A Non-contact Measurement Tool, Trafford Publishing, 2005.

50. Sciammarella CA, Sciammarella FM. Experimental mechanics of solids. John Wiley & Sons; 2012.

51. Kundu T., Nonlinear Ultrasonic and Vibro-acoustical Techniques for Nondestructive Evaluation, Springer, 2019.

52. 参考期刊：力学进展.

53. 参考期刊：力学学报.

54. 参考期刊：固体力学学报.

55. 参考期刊：计算力学学报.

56. 参考期刊：实验力学.

57. Reference Journal: Applied Mechanics Reviews, American Society of Mechanical Engineers.

58. Reference Journal: Journal of the Mechanics and Physics of Solids, Elsevier.

59. Reference Journal: Physical Review Letters, American Physics Society.

60. Reference Journal: AIAA Journal, American Institute of Aeronautics and Astronautics.

61. Reference Journal: Nano Letters, American Chemical Society.

62. Reference Journal: International Journal of Plasticity, Elsevier.

63. Reference Journal: International Journal of Solids and Structures, Elsevier.

64. Reference Journal: Science China Physics, Mechanics & Astronomy

65. Reference Journal: Mechanics of Advanced Materials and Structures

66. Reference Journal: International Journal of Fracture, Springer.

67. Reference Journal: Journal of Sound and Vibration, Elsevier.

68. Reference Journal: Journal of Fluid Mechanics, Springer Nature.

69. Reference Journal: European Journal of Mechanics A-Solids, Elsevier.

70. Reference Journal: Nonlinear Dynamics, Springer.

71. Reference Journal: Multibody System Dynamics, Springer.

72. Reference Journal: Computer Methods in Applied Mechanics and Engineering, Elsevier.

73. Reference Journal: Journal of Dynamic Systems, Measurement and Control, American Society of Mechanical Engineers.

74. Reference Journal: International Journal for Numerical Methods in Engineering, John Wiley and Sons Ltd.

75. Reference Journal: Computational Mechanics, Springer.

76. Reference Journal: Computational Materials Science, Elsevier.

77. Reference Journal: Experimental Mechanics, Springer.

78. Reference Journal: Mechanics of Materials, Elsevier.

79. Reference Journal: Annual Review of Fluid Mechanics, Annual Reviews Inc.

80. Reference Journal: International Journal of Mechanical Sciences, Elsevier.

81. Reference Journal: International Journal of Impact Engineering, Elsevier.

82. Reference Journal: International Journal for Numerical and Analytical Methods in Geomechanics, John Wiley and Sons Ltd.

83. Reference Journal: Engineering Fracture Mechanics, Elsevier.

84. Reference Journal: Measurement Science and Technology, Institute of Physics.

85. Reference Journal: Theoretical and Applied Fracture Mechanics, Elsevier.

86. Reference Journal: Advances in Applied Mechanics, Academic Press Inc.

87. Reference Journal: International Journal of Damage Mechanics, SAGE.

88. Reference Journal: International Journal of Heat and Mass Transfer, Elsevier.

89. Reference Journal: Extreme Mechanics Letters

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: Journal of Engineering Mechanics

94. Reference Journal: Journal of Fluids and Structures, Elsevier.

95. Reference Journal: Journal of Thermal Stresses, Taylor and Francis Ltd.

96. Reference Journal: Journal of Vibration and Control, SAGE.

97. Reference Journal: Mechanical Systems and Signal Processing, Elsevier.

98. Reference Journal: Applied Mathematical Modeling, Elsevier.

99. Reference Journal: International Journal of Multiphase Flow, Elsevier.

100. Reference Journal: Computers and Geotechnics, Elsevier.

101. Reference Journal: International Journal of Rock Mechanics and Mining Sciences, Elsevier.

102. Reference Journal: Journal of Rock Mechanics and Geotechnical Engineering

103. Reference Journal: Rock Mechanics and Rock Engineering, Springer.

104. Reference Journal: Physica A: Statistical Mechanics and its Applications

105. Reference Journal: Journal of Statistical Mechanics: Theory and Experiment

106. Reference Journal: Archive for Rational Mechanics and Analysis

107. Reference Journal: Structural Engineering and Mechanics

108. Reference Journal: Journal of Non-Newtonian Fluid Mechanics

109. Reference Journal: Engineering Applications of Computational Fluid Mechanics