

智能海洋装备（本硕、本博连读创新班）

Intelligent Ocean Equipment（Innovation Class）

专业代码：081906T

学 制： 4 年

Program Code: 081906T

Duration: 4 years

培养目标（Educational Objectives）：

为积极响应国家向海洋进军、建设海洋强国的战略需求，服务粤港澳大湾区海洋经济发展，华南理工大学在广州国际校区海洋科学与工程学院设立智能海洋装备新工科专业。该专业秉承教育部新工科专业建设理念，遵循“横向联系、纵向贯通、实践驱动、国际协同、个性发展”的原则，加强海洋工程、机械工程、智能技术、大数据处理、软件设计等学科交叉知识的深度融合，构建“通识+专业+双创+跨文化”四大课程体系，努力培养一批具有海洋工程专业基础、掌握人工智能、大数据、机电控制一体化等多学科知识体系并具有家国情怀、创新精神、国际视野、实践能力、团队协作能力的高素质本科人才，为国家从“海洋大国”发展为“海洋强国”以及新兴海洋产业迅速崛起、传统海洋产业转型升级贡献力量。

经过本科阶段培养及毕业之后约 5 年的工作或学习深造，本专业学生能够达到以下目标：

（1）培养目标 1：具有优良的职业道德及社会责任感，成为在智能海洋装备相关领域从事科学研究、教育、技术开发与创新、以及管理的拔尖人才。

（2）培养目标 2：能运用海洋工程和人工智能、大数据等相关交叉学科前沿理论、专业知识和创新思维创造性地解决复杂的智能海洋装备领域的工程问题。

（3）培养目标 3：具有全球化视野和跨文化交流与合作的能力，能准确把握所从事行业的特点和趋势，推动行业发展。

Educational Objectives:

As a proactive response to China's strategy to build the country into a maritime power, and also to support the development of maritime economy in the Greater Bay Area spanning Guangdong, Hong Kong, and Macao, the emerging engineering major of Intelligent Marine Equipment has been established in the School of Marine Science and Engineering on the International Campus of the South China University of Technology in Guangzhou. This program is based on the idea of developing emerging engineering majors as proposed by the Ministry of Education. It follows the principle of

offering learning opportunities that are “horizontally connected, vertically integrated, practice-driven, and further enhanced with international collaborations and possibilities for personalized development”, and features deep integration across multiple disciplines, including marine engineering, mechanical engineering, intelligent technology, big data processing, and software design. Its curriculum consists of four systematic sets of courses that cover "general education + specialized education + innovation and entrepreneurship + cross-cultural contents", and aims to cultivate teams of excellent undergraduates that are well versed in fundamentals of marine engineering, and in possession of comprehensive knowledge across multiple disciplines such as artificial intelligence, big data, and mechatronics integration, among others, who are also patriotic, innovative, internationally minded, capable of hands-on practices, and good at teamwork. The purpose is to help China develop from a "major maritime power" to a "strong maritime power", and contribute to the rapid rise of emerging marine industries and the transformation and upgrading of traditional ones.

It is expected that, 5 years after graduation from the undergraduate program, with further learning or involvement in hands-on work, graduates shall possess:

Overview of educational objectives

1. Good professional ethics and a sense of social responsibility, and an excellent potential for a career in the field of intelligent marine equipment, specializing in scientific research, education, technological development and innovation, or management.
2. The ability to creatively solve complex engineering problems in the field of intelligent marine equipment by applying professional knowledge, innovative thinking, as well as cutting-edge theories across multiple interdisciplinary fields, such as marine engineering, artificial intelligence, big data, etc.
3. A global perspective and the ability to engage in cross-cultural communication and cooperation, to accurately grasp the characteristics and trends of the industry, and to promote its development.

毕业要求（Student Outcomes）：

№1. 品德修养：理解并掌握科学的世界观和方法论，具有良好的思想品德和社会公德，具有家国情怀和社会责任感，能够践行社会主义核心价值观。

№1.1 理解并掌握科学的世界观和方法论，具有良好的思想品德和社会公德。

№1.2 具有家国情怀和社会责任感，能够践行社会主义核心价值观。

№2. 工程与理学知识：能够将数学、物理、计算机等学科知识与工程原理有机结合，解决海洋科学与工程专业相关领域复杂工程问题。

№2.1 能将数学、自然科学、计算和工程基础知识用于海洋科学与工程相关领域复杂工程问题的表述。

№2.2 能将数学、自然科学、计算和工程基础的相关知识用于推演、分析海洋科学与工程相

关领域的复杂问题，能够为具体的对象建立数学模型并求解。

№2.3 能够利用专业知识对相关领域中科学与工程问题的解决方案进行比较与综合分析。

№3. 问题分析：利用数学、自然科学和工程科学的第一原理，识别、制定、研究并分析复杂的海洋工程问题，得出有根据的结论，对可持续发展进行整体考虑。

№3.1 能运用数学、自然科学及工程科学的相关原理，识别和判断复杂工程问题的关键环节。

№3.2 能基于数学、自然科学及海洋工程的相关原理和数学模型方法正确表达海洋科学与工程领域复杂工程问题。

№3.3 能认识到海洋科学与工程相关复杂工程问题解决方案的多样性，并结合基本原理与文献调研进行全局分析，获得有效结论。

№4. 设计、开发解决方案：为复杂的海洋工程问题设计创造性的解决方案，并设计系统、部件或流程，以满足确定的需求，同时适当考虑公共健康和安全、整个生命周期的成本、净零碳以及资源、文化、社会和环境因素。

№4.1 掌握海洋工程设计和产品开发全周期、全流程的基本设计/开发方法和技术，了解影响设计目标和技术方案的各种因素。

№4.2 能够针对复杂工程问题和特定需求，完成和优化配方的设计。

№4.3 能够进行海工装备、智能装置相关系统或功能结构设计，在设计中体现创新意识，并考虑安全、健康、法律、文化及环境等制约因素。

№5. 研究：使用研究方法对复杂的海洋工程问题和系统进行研究，包括基于研究的知识、设计实验、分析和解释数据，以及综合信息以提供有效结论。

№5.1 能够基于科学原理，通过文献研究或相关方法，调研和分析复杂工程问题的解决方案。

№5.2 能够根据对象特征，选择研究路线，设计实验方案。

№5.3 能够根据实验方案构建实验系统，安全地开展实验，正确地采集实验数据，有效分析和解释实验结果，并通过信息综合得到合理有效的结论。

№6. 使用现代技术：能够针对海洋工程相关领域复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，并能够理解其局限性。

№6.1 熟悉海洋科学与工程专业常用的现代仪器、信息技术工具、工程工具和模拟软件的使用原理和方法，并理解其局限性。

№6.2 能够选择和使用恰当的仪器设备、信息资源、工程工具和专业模拟软件相关领域复杂工程问题进行分析、计算与设计。

№6.3 能够针对多学科交叉的复杂问题的对象，开发或选用满足特定需求的现代工具，模拟和预测智能海洋装备专业问题，并能够分析其局限性。

№7. 工程与社会：能够基于工程相关背景知识进行合理分析，评价智能海洋装备相关领域的工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.1 了解海洋科学与工程专业相关领域的技术标准体系、知识产权、金融手段和法律法规，

理解不同社会文化对工程活动的影响。

№7.2 能分析和评价海洋科学与工程专业工程实践对社会、健康、安全、法律、文化的影响，以及这些制约因素对项目的影响，并理解应承担的责任。

№8. 环境和可持续发展：能够理解和评价针对海洋工程相关领域复杂工程问题的工程实践对环境、社会可持续发展的影响。

№8.1 理解环境保护和可持续发展的理念和内涵，了解碳中和、碳达峰政策。

№8.2 能够站在环境保护和可持续发展的角度思考专业相关工程实践的可持续性，评价产品周期中可能对人类和环境造成的损害和隐患。

№9. 职业规范：具有人文社会科学素养、社会责任感，能够在实践中理解并遵守相关职业道德和规范，履行责任。

№9.1 有正确价值观，理解个人与社会的关系，了解中国国情。

№9.2 理解诚实公正、诚信守则的工程职业道德和规范，并能在工程实践中自觉遵守。

№9.3 理解工程技术人员对公众的安全、健康和福祉以及环境保护的社会责任，能够在工程实践中自觉履行责任。

№10. 沟通能力与项目管理：能够适应社会发展潮流，在多学科背景下的团队中承担个体、团队成员以及负责人的角色，能够就海洋工程相关领域复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。具备一定的国际视野，能够在跨文化背景下进行沟通和交流，理解并掌握海洋工程相关领域工程管理原理与经济决策方法，并能在多学科环境中应用。

№10.1 能够在团队中独立或合作开展工作，能够组织、协调和指挥团队开展工作。

№10.2 能就专业问题，选择口头、文稿、图表等方式，准确有效表达自己的观点，理解与业界同行和社会公众交流的差异性。了解专业领域的国际发展趋势、研究热点，具备跨文化交流的语言和书面表达能力，在跨文化背景下进行专业问题的基本沟通和交流。

№10.3 了解工程及产品全周期、全流程的成本构成，理解其中涉及的工程管理与经济决策。能在多学科环境下，在设计解决方案和开发产品的过程中，运用工程管理与经济决策方法。

№11. 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

№11.1 能在社会发展的背景下，认识到自主学习和终身学习的必要性。

№11.2 具有自主学习的能力，包括对技术问题的主动理解能力、归纳总结的能力、提出问题的能力等。

№1. Ethics: An understanding and mastery of the scientific worldview and methodology, possessing good moral characters and social ethics, and being patriotic with a sense of social responsibility, and able to put into practice the core socialist values.

№1.1 An understanding and mastery of the scientific worldview and methodology, possessing good moral characters and social ethics.

№1.2 Being patriotic with a sense of social responsibility, and able to put into practice the core

socialist values.

№2. Engineering and Scientific Knowledge: Being able to organically integrate knowledge from such disciplines as mathematics, physics, and computer science with engineering principles to solve complex engineering problems in fields related to marine science and engineering.

№2.1 Being able to describe complex engineering problems in fields related to marine science and engineering using knowledge from mathematics, natural science, computation, and engineering fundamentals.

№2.2 Being able to deduce and analyze complex problems in fields related to marine science and engineering using relevant knowledge from mathematics, natural science, computation, and engineering fundamentals, and to establish mathematical models and solve them for specific objects under study.

№2.3 Being able to compare and analyze potential solutions to scientific and engineering problems in relevant fields using the professional knowledge acquired.

№3. Problem Analysis: Being able to use basic principles of mathematics, natural science, and engineering to identify, formulate, study, and analyze complex marine engineering problems, and reach valid conclusions, while also taking into account the general need for sustainable development.

№3.1 Being able to identify and determine key factors in complex engineering problems using relevant principles of mathematics, natural science, and engineering.

№3.2 Being able to correctly describe complex engineering problems in the field of marine science and engineering based on mathematical models and relevant principles of mathematics, natural science, and marine engineering.

№3.3 Being able to see the possibility of using different approaches to solve complex engineering problems in the field of marine science and engineering, and to draw valid conclusions after conducting comprehensive analyses combining basic principles with literature studies.

№4. Design and Development of Solutions: Proposing creative solutions for complex marine engineering problems, and designing systems, components, or processes to meet identified needs, while also taking into account such matters as public health and safety, the cost across the entire life cycle, the aspiration for carbon net zero, and resource, cultural, social, and environmental factors.

№4.1 Mastery of basic design/development methods and technologies for marine engineering solutions and products across the entire life cycle and process, and an understanding of various factors influencing design objectives and technical solutions.

№4.2 Being able to complete and optimize the design of formulations for complex engineering problems against specific requirements.

№4.3 Being able to conduct system or functional structure design related to marine engineering equipment and intelligent devices, and demonstrate innovativeness in the design, while also taking into account such constraining factors as safety, health, law, culture, and environment.

№5. Research: Using appropriate research methods to study complex marine engineering problems and systems, which also includes setting up experiments based on knowledge acquired from said studies for additional data, analyzing and interpreting such data, and synthesizing information so acquired to reach valid conclusions.

№5.1 Being able to, based on scientific principles, and through literature studies or other relevant methods, research and analyze complex engineering problems for solutions.

№5.2 Being able to select a research route and design an experiment plan based on characteristics of the object under study.

№5.3 Being able to construct an experiment system according to the experiment plan, safely conduct experiments, correctly collect resultant data, effectively analyze and interpret the results, and draw reasonable and valid conclusions through information synthesis.

№6. Use of Modern Technology: Being able to develop, select, and use appropriate technologies, resources, modern engineering tools, and IT tools to address complex engineering problems in the field of marine engineering, with an understanding of their respective limitations.

№6.1 Being familiar with the principles and usage of modern instruments, IT tools, engineering tools, and simulation software commonly used in the field of marine science and engineering, with an understanding of their limitations.

№6.2 Being able to select and use appropriate instruments, information resources, engineering tools, and specialized simulation software to analyze, calculate, and design for complex engineering problems in related fields.

№6.3 Being able to develop or select modern tools that meet specific needs for tackling complex interdisciplinary problems, use them to simulate and predict problems related to intelligent marine equipment, and analyze their limitations.

№7. Engineering and Society: Being able to, based on engineering principles and related background knowledge, analyze and evaluate the impact that engineering practices and solution for complex engineering issues in fields related to intelligent marine equipment can have on society, health, safety, law, and culture, with an understanding of the responsibilities to be taken.

№7.1 An understanding of the system of technical standards, intellectual property rights, financial means, and laws and regulations related to marine science and engineering and connected fields, and also an understanding of the influence of different social cultures on engineering activities.

№7.2 Being able to analyze and evaluate the impact of engineering practices in the field of marine science and engineering on society, health, safety, law, and culture, as well as the impact of these constraints on project implementation, with an understanding of the responsibilities to be undertaken.

№8. Environment and Sustainable Development: Being able to understand and evaluate the impact of engineering practices in fields related to marine science and engineering on environment and

sustainable development.

№8.1 An understanding of the concepts and implications of environmental protection and sustainable development, and familiarity with policies on carbon neutrality and peak carbon emission.

№8.2 Being able to consider the sustainability of related engineering practices from the perspective of environmental protection and sustainable development, and assess potential harms and risks to humans and the environment during product life cycle.

№9. Professional Ethics: Possessing literacy in humanities and social sciences with a sense of social responsibility, and able to understand and adhere to relevant professional ethics and norms in practice with ownership.

№9.1 Possessing correct values, and an understanding of the relationship between individuals and society as well as the national conditions of China.

№9.2 An understanding of the engineering professional ethics and the norms of honesty, fairness, and integrity, and voluntary adherence to them in engineering practices.

№9.3 An understanding of engineering technicians' social responsibility for safety, health, and welfare of the general public, as well as for protection of environment, and the ability to conscientiously fulfill such responsibility in engineering practices.

№10. Communication Skills and Project Management: Being able to adapt to social development trends, assume roles as individuals, team members, and leaders in multidisciplinary teams, and effectively communicate and interact with industry peers and the general public on complex engineering problems in fields related to marine engineering, including writing reports and designing documents, making presentations, and clearly expressing or responding to instructions. Also possessing, to a certain extent, an international vision, and being able to communicate and interact with others in cross-cultural settings. An understanding and mastery of the principles of engineering management and methods of financial decision-making in the field of marine engineering, and the ability to apply them in multidisciplinary environments.

№10.1 Being able to work independently or collaboratively within a team, and able to organize, coordinate, and direct team efforts.

№10.2 Being able to express one's own views on professional issues accurately and effectively through oral, written, graphical, and other means, with an understanding of the difference between the exchange with peers in the industry and that with the general public. An understanding of international development trends and research hotspots in the professional field, with the language proficiency and writing skill needed for cross-cultural communication, and the ability to conduct basic communication and exchange on professional issues in a cross-cultural setting.

№10.3 An understanding of the cost composition of engineering undertakings and products across the entire life cycle and process, and also an understanding of the engineering management and financial

decision-making involved. Being able to use methods related to engineering management and financial decision-making in multidisciplinary environments during the process of designing solutions and developing products.

№11. Lifelong Learning: Having the motivation to learn on one's own for life, and possessing the ability to continuously learn about and adapt to new developments.

№11.1 A recognition of the necessity for independent and lifelong learning as society continues to move forward.

№11.2 Having the capacity for independent learning, including the ability to proactively probe into technical issues, to summarize and generalize, and to ask valid questions.

培养目标与毕业要求关系矩阵：

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3
毕业要求 1.1	●	●	
毕业要求 1.2	●	●	
毕业要求 2.1	●		
毕业要求 2.2	●		
毕业要求 2.3	●		
毕业要求 3.1	●	●	
毕业要求 3.2	●	●	
毕业要求 3.3	●		●
毕业要求 4.1	●	●	
毕业要求 4.2	●	●	
毕业要求 4.3	●	●	
毕业要求 5.1	●		
毕业要求 5.2	●		
毕业要求 5.3	●		
毕业要求 6.1			●
毕业要求 6.2	●		●
毕业要求 6.3		●	
毕业要求 7.1			●
毕业要求 7.2	●		●
毕业要求 8.1		●	
毕业要求 8.2		●	
毕业要求 9.1		●	●

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3
毕业要求 9.2		●	
毕业要求 9.3	●		
毕业要求 10.1	●		●
毕业要求 10.2		●	
毕业要求 10.3		●	●
毕业要求 11.1	●		
毕业要求 11.2	●	●	

Relationship Matrix between Educational Objectives and Student Outcomes:

Educational Objectives Student Outcomes	Educational Objective 1	Educational Objective 2	Educational Objective 3
Student Outcome 1.1	●	●	
Student Outcome 1.2	●	●	
Student Outcome 2.1	●		
Student Outcome 2.2	●		
Student Outcome 2.3	●		
Student Outcome 3.1	●	●	
Student Outcome 3.2	●	●	
Student Outcome 3.3	●		●
Student Outcome 4.1	●	●	
Student Outcome 4.2	●	●	
Student Outcome 4.3	●	●	
Student Outcome 5.1	●		
Student Outcome 5.2	●		
Student Outcome 5.3	●		
Student Outcome 6.1			●
Student Outcome 6.2	●		●
Student Outcome 6.3		●	
Student Outcome 7.1			●
Student Outcome 7.2	●		●
Student Outcome 8.1		●	
Student Outcome 8.2		●	
Student Outcome 9.1		●	●

Educational Objectives Student Outcomes	Educational Objective 1	Educational Objective 2	Educational Objective 3
Student Outcome 9.2		●	
Student Outcome 9.3	●		
Student Outcome 10.1	●		●
Student Outcome 10.2		●	
Student Outcome 10.3		●	●
Student Outcome 11.1	●		
Student Outcome 11.2	●	●	

专业简介（Program Profile）：

海洋科学与工程学院成立于 2021 年 9 月，位于华南理工大学广州国际校区，是学校按计划建设的若干个重点新工科学院之一。学院紧密结合国家发展海洋强国的战略需求，以粤港澳大湾区海洋经济发展为依托，聚焦海洋产业在信息化新时代产生的新问题、新要求、新挑战，注重学科交叉融合，设置智能海洋装备新工科专业。本专业授课教师都有海外科研或工作经历，包括澳大利亚技术科学与工程院院士 1 名、国家级人才 2 名、国家级青年人才 2 名。此外，该专业建立了良好的国际合作办学与学术交流平台，与美国、英国、澳大利亚、新加坡等国家的多所著名高校建立联合培养机制和渠道。

智能海洋装备可以广泛应用于海洋资源勘探和开采、可再生能源收集与存储、海洋环境监测、航道安全管理、海事救援等领域，具有智能化、自主化、多功能化、智能互联化、精准化、国际化的特点，在未来海洋科技发展和产业需求发展方面，都是重要方向之一。

智能海洋装备专业是面向未来海洋科技发展及其应用的专业性本科专业，同时也是海洋工程、机械工程、智能技术、大数据处理、软件设计等多学科知识与技术交叉融合的专业。该专业汇聚了国内外具有丰富海洋工程经验及相关学术背景的师资团队，注重学生实践能力、创新能力、综合协调能力的锻炼，为海洋工程领域输送科研领军人才和行业精英。

Established in September 2021, the School of Marine Science and Engineering under South China University of Technology is located in its International Campus in Guangzhou. It is one of several key emerging engineering schools created by the university as previously planned. The school closely aligns itself with the national strategy of building China into a maritime power, and rides on the developmental trend of a maritime economy in the Greater Bay Area spanning Guangdong, Hong Kong, and Macao. It focuses on new issues, new requirements, and new challenges emerging in the maritime industry in this new era of information ubiquity, and emphasizes interdisciplinary integration in its offering of the new specialized engineering program of Intelligent Marine Equipment. All the teachers in this program have had prior experiences of either researching or working overseas, including one Academician of the Australian Academy of Technological Sciences and Engineering, two national-level talents, and two

national-level young talents. The program has also been built as an excellent platform for international collaborations for both educational and academic purposes, as mechanisms and channels have been created for joint efforts with a number of renowned universities or colleges across multiple countries, such as America, UK, Australia, and Singapore.

Intelligent marine equipment can be used extensively in multiple areas, such as maritime resource exploration and exploitation, renewable energy collection and storage, maritime environment monitoring, navigation safety management, and maritime rescue. Such equipment is characterized by its intelligence, autonomy, multifunctionality, connectivity, and precision. As an area of international attention, it is considered a key direction for future development in both maritime technologies and industrial demands.

The Intelligent Marine Equipment major is a specialized undergraduate program geared towards the future development and application of marine science and technology. It is a program that features the interdisciplinary integration of knowledge and technology across multiple areas, such as marine engineering, mechanical engineering, intelligent technology, big data processing, and software design. The program brings together a faculty team with rich experience in marine engineering and other relevant academic backgrounds from both domestic and international sources. It emphasizes the development of students' practical skills, capacities for innovation, and comprehensive coordination abilities, with its aim being the cultivation of leading researchers and industry elites in the field of marine engineering.

专业特色（Program Features）：

实行本硕博贯通培养，提供系统的国际化的智能海洋装备专业教育；对接海洋、能源、航空航天、交通、建筑等行业需求，提供国内外大型工程企业实践平台；进行精英化培养，采用本科生全程导师制，引导学生开展创新研究；所有专业课程全英授课，并与国际顶尖大学进行联合培养，培养学生在全球科研、就业的能力。

This program offers integrated training from bachelor level all the way up to doctoral, providing a professional education that is both systematic and international in the field of Intelligent Marine Equipment. Its setup is in line with the needs of multiple industries, such as maritime, energy, aerospace, transportation, and construction, and provides opportunities for hands-on practices thanks to its collaboration with large engineering enterprises both within and without China. During the elite training process, full-time mentors are present to accompany undergraduate students in their journey, providing guidance in their research efforts for innovation. All specialized courses are delivered in English, and partnerships with top international universities facilitate the development of students' competency for research and chance for career success in a global setting.

授予学位 (Degree Conferred) : 工学学士学位 (Bachelor of Engineering)

核心课程 (Core Courses) :

理论力学、材料力学、流体力学、结构力学、土力学、海洋装备水动力学、海工结构与装备设计、海洋岩土工程、人工智能技术与应用、海工装备电工与电子技术基础、自动控制原理与现代控制理论、现代信号处理基础

Theoretical Mechanics, Mechanics of Materials, Fluid Mechanics, Structural Analysis, Soil Mechanics, Hydrodynamics of Offshore Equipment, Offshore Equipment Structures, Offshore Geotechnical Engineering, Artificial Intelligence and Applications, Fundamentals of Electrical Engineering and Electronic for Ocean Equipment, Principles of Automatic Control and Modern Control Theory, Fundamentals of Modern Signal Processing

大学分专业核心课: 海工结构与装备设计、海工装备电工与电子技术基础、自动控制原理与现代控制理论、现代信号处理基础

Core University Courses by Major: Offshore Equipment Structures, Fundamentals of Electrical Engineering and Electronic for Ocean Equipment, Principles of Automatic Control and Modern Control Theory, Fundamentals of Modern Signal Processing

特色课程 (Featured Courses) :

新生研讨课: 海洋装备导论

基于项目 (设计、案例) 的课程: 海洋水动力课程设计、海洋土壤实验课程设计

国际化特色课程: 土力学

专题研讨课: 海洋工程技术与应用研讨课

学科前沿课: 海洋工程技术与应用研讨课、智能海洋装备前沿

跨学科交叉课程: 人工智能技术与应用、现代信号处理基础、自动控制原理与现代控制理论

本研贯通课: 船舶与海洋工程结构力学、海洋可再生能源、波浪理论与波浪荷载

本研共享课: 土力学、海洋岩土工程

校企合作课: 海工结构与装备设计、人工智能应用实践、传感器技术与应用

创新实践课: 新能源装备与技术应用实践 (“三个一”)

创业教育课: 海洋装备导论 (“三个一”)

工作坊: 海洋工程软件实训、海洋装备导论实践

专题设计课: 海洋水动力课程设计、海洋土壤实验课程设计

竞教结合课: 海工结构与装备设计

劳动教育课：工程创新训练I

Freshmen Seminars: Introduction to Marine Equipment

Project-based Courses: Offshore Hydrodynamics Design Project, Geotechnical Experiment Project

Featured International Courses: Soil Mechanics

Special Seminars: Ocean Engineering Technology and Application Seminar

Subject Frontiers Courses: Ocean Engineering Technology and Application Seminar, The Frontier of Intelligent Offshore Equipment

Interdisciplinary Courses: Artificial Intelligence and Applications, Fundamentals of Modern Signal Processing, Principles of Automatic Control and Modern Control Theory

Under/Post-Graduate Integrated Courses: Structural Dynamics of Ships and Ocean Engineering, Marine Renewable Energy, Wave Theory and Wave Load

Under/Post-Graduate Shared Courses: Soil Mechanics, Offshore Geotechnical Engineering

Cooperative Courses with Enterprises: Offshore Equipment Structures, AI Technology Design Project, Ocean Sensor Technology and Applications

Innovation Practices: Practice of Renewable Energy Equipment and Technology Application (Three “Ones”)

Entrepreneurship Courses : Introduction to Marine Equipment (Three “Ones”)

Workshops: Ocean Engineering Software Practice, Practice for Introduction to Ocean Engineering

Special Designs: Offshore Hydrodynamics Design Project, Geotechnical Experiment Project

Contest-Teaching Integrated Courses: Offshore Equipment Structures

Education on the Hard-working Spirit: Engineering Innovation Training I

一、各类课程学分登记表（Registration Form of Curriculum Credits）

1. 学分统计表（Credits Registration Form）

课程类别 Course Category	课程要求 Requirement	学分 Credits	学时 Academic Hours	备注 Remarks				
公共基础课 General Basic Courses	必修 Compulsory	56.5	1092					
	通识 General Education	10	160					
专业基础课 Specialty Basic Courses	必修 Compulsory	34	576					
选修课 Elective Courses	选修 Elective	20	328					
合 计 Total		120.5	2148					
集中实践教学环节 Practice Training	必修 Compulsory	38	44 周 44 Weeks					
毕业学分要求 Credits Required for Graduation	120.5+38=158.5 合计学分+集中实践教学环节学分=毕业学分要求							
建议每学期修读学分 Suggested Credits for Each Semester	1	2	3	4	5	6	7	8
	24	26	29	27.5	17.5	17.5	5.5	11.5

备注：学生毕业时须修满专业教学计划规定学分，并取得第二课堂 5 个人文素质教育学分和 4 个创新能力培养学分。

2. 类别统计表（Category Registration Form）

学时 Academic Hours					学分 Credits						
总学时数 Total	其中 Include		其中 Include		总学分数 Total	其中 Include		其中 Include			其中 Include
	必修学时 Compulsory	选修学时 Elective	理论教学学时 Theory Course	实验教学学时 Lab		必修学分 Compulsory	选修学分 Elective	集中实践教学环节学分 Practice	理论教学学分 Theory Course	实验教学学分 Lab	Innovation and Entrepreneurship Education
2156	1668	488	1454	702	158.5	128.5	30	38	98.5	22	4

备注：

1. 通识课计入选修一项中；
2. 实验教学包括“专业教学计划表”中的实验、实习和其它；
3. 创新创业教育学分：培养计划中的课程，由各院系教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；
4. 必修学时+选修学时=总学时数；理论教学学时+实验教学学时=总学时数；必修学分+选修学分=总学分数；集中实践教学环节学分+理论教学学分+实验教学学分=总学分数。

二、课程设置表 (Courses Schedule)

类别 Course Category	课程 代码 Course No.	课程名称 Course Title	是否 必修 C/ E	学 时 数 Total Curriculum Hours					学分 数 Credits	开课 学期 Semester
				总学 时 Class Hours	理论 Theor etical class hours	实验 Lab Hours	实习 Practic e Hours	其它 Other Hours		
公共基础课 General Basic Courses	031101761	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必修 / C	48	36			12	3.0	1
	031101661	思想道德与法治 Ethics and Rule of Law		40	36			4	2.5	2
	031101371	中国近现代史纲要 Skeleton of Chinese Modern History		40	36			4	2.5	3
	031101424	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao Zedong and Theory of Socialism with Chinese Characteristics		40	36			4	2.5	4
	031101522	马克思主义基本原理 The Basic Tenets of Marxism		40	36			4	2.5	4
	031101331	形势与政策 Analysis of the Situation & Policy		64	64				2.0	1-8
	EMP040100011	工程数学：微积分 II (一) Engineering Math: Calculus (1)		80	80				5.0	1
	EMP040100021	工程数学：线性代数与解析几何 Engineering Math: Linear Algebra & Analytic Geometry		48	48				3.0	1
	EMP040100012	工程数学：微积分 II (二) Engineering Math: Calculus (2)		80	80				5.0	2
	EMP040100031	工程数学：概率论与数理统计 Engineering Math: Probability & Mathematical Statistics		48	48				3.0	2
	AIP045100011	人工智能 I：大学计算机基础 Artificial Intelligence I: Foundations of Compute		32				32	0	1
	AIP045100031	人工智能 II：Python 编程基础 Artificial Intelligence II: Fundamentals of Python Programming		48	32			16	2.5	1
	044104182	学术英语与科技交流 (一) EAP and Technical Communication (1)		32	32				2.0	1
	044104192	学术英语与科技交流 (二) EAP and Technical Communication (2)		32	32				2.0	2
	074102992	工程制图 Engineering Drawing		48	48				3.0	1
	041101155	大学物理 III (一) General Physics III (1)		64	64				4.0	2
	041100671	大学物理实验 (一) Physics Experiment (1)		32		32			1.0	2

041100344	大学物理III (二) General Physics III (2)		64	64				4.0	3
041101051	大学物理实验(二) General Physics (2)		32		32			1.0	3
052100332	体育 (一) Physical Education (1)		36				36	1.0	1
052100012	体育 (二) Physical Education (2)		36				36	1.0	2
052100842	体育 (三) Physical Education (3)		36				36	1.0	3
052100062	体育 (四) Physical Education (4)		36				36	1.0	4
006100112	军事理论 Military Principle		36	18			18	2.0	2
	人文科学、社会科学领域 Humanities, Social Science	通识 / E	128	128				8.0	1-8
	科学技术领域 Science and Technology		32	32				2.0	1-8
合 计 Total			1252	950	64		238	66.5	

备注：学时中其它可以为上机和实践学时。

通识课要求：

- 1.开设党史、新中国史、改革开放史、社会主义发展史等“四史”通识课程，全校本科生从“四史”中选择一门必修；
- 2.学生不能修读本学院开设的通识课程（除在本学院跨学科修读外）；
- 3.除艺术类的学生外，每位学生须修满2学分的公共艺术通识课程，其中美学和艺术史论类、艺术鉴赏和评论类课程至少取得1个学分。

二、课程设置表（续）（Courses Schedule）

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学时数 Total Curriculum Hours					学分 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
专业基础课 Specialty Basic Courses	089100011	海洋装备导论 Introduction to Marine Equipment	必/C	16	16				1.0	1
	AISO89100011	人工智能 III: 人工智能导论 Artificial Intelligence III: Introduction to Artificial Intelligence		32	32				2.0	2
	089100021	海工装备电工与电子技术基础 Fundamentals of Electrical Engineering and Electronic for Ocean Equipment		48	48				3.0	3
	089100031	人工智能技术与应用 Artificial Intelligence and Applications		36	28	8			2.0	3
	089100041	理论力学 Theoretical Mechanics		36	28	8			2.0	3
	089100051	流体力学 Fluid Mechanics		40	24	16			2.0	3
	089100061	土力学 Soil Mechanics		32	32				2.0	3
	089100071	材料力学 Mechanics of Materials		36	28	8			2.0	4
	089100081	自动控制原理与现代控制理论 Principles of Automatic Control and Modern Control Theory		48	48				3.0	4

	089100091	现代信号处理基础 Fundamentals of Modern Signal Processing		48	48				3.0	4
	089100101	数据结构与算法 Data Structures and Algorithms		32	32				2.0	4
	089100111	海洋装备水动力学 Hydrodynamics of Offshore Equipment		34	30	4			2.0	4
	089100121	海洋岩土工程 Offshore Geotechnical Engineering		34	30	4			2.0	4
	089100131	结构力学 Structural Analysis		36	28	8			2.0	5
	089100141	海洋装备前沿 The Frontier of Offshore Equipment		16	16				1.0	5
	089100151	海工结构与装备设计 Offshore Equipment Structures		52	44	8			3.0	6
	合 计 Total		必 /C	576	512	64			34	
选修课 Elective Courses	海洋工程模块 Marine Engineering Module									
	089100161	船舶与海洋工程结构动力学 Structural Dynamics of Ships and Ocean Engineering	选 /E	32	32				2.0	5/7
	089100171	海洋可再生能源 Marine Renewable Energy	选 /E	32	32				2.0	5/7
	089100181	海洋工程技术与应用研讨课 Ocean Engineering Technology and Application Seminar	选 /E	32	32				2.0	6/8
	089100191	波浪理论与波浪荷载 Wave Theory and Wave Load	选 /E	32	32				2.0	6/8
	机器人技术模块 Robotic Technology Module									
	089100201	海洋动力系统建模、分析与控制 Modeling, Analysis and Control of Ocean Dynamic Systems	选 /E	32	32				2.0	5/7
	089100211	海洋机器人理论与技术 Principles and Technology of Ocean Robotics	选 /E	32	32				2.0	5/7
	089100221	海洋装备机电传动控制 Mechanical & Electrical Transmission Control of Marine Equipment	选 /E	32	32				2.0	6/8
	089100231	数控技术与智能制造 CNC Technology and Intelligent Manufacturing	选 /E	40	24	16			2.0	6/8
	海洋传感器模块 Ocean Sensor Module									
	089100241	海洋传感器技术与应用 Ocean Sensor Technology and Applications	选 /E	32	32				2.0	5/7

	089100251	空天海一体化信息网络 Space-Air-Sea Integrated Information Network	选/E	32	32				2.0	5/7
	089100261	海洋装备机电一体化 Marine Mechatronics	选/E	32	32				2.0	6/8
	海洋人工智能模块 Maritime AI Module									
	089100271	海洋软件工程 Maritime Software Engineering	选/E	32	32				2.0	5/7
	089100281	海洋云计算与大数据平台 Maritime Cloud Computing and Big Data Platform	选/E	32	32				2.0	5/7
	089100291	海洋大数据分析与应用 Maritime Big Data Analysis and Applications	选/E	32	32				2.0	6/8
	089100301	海洋数字孪生技术 Maritime Digital Twins Technology	选/E	32	32				2.0	6/8
	089100311	海洋人工智能系统综合设计 Integrated Design of Maritime AI System	选/E	32	32				2.0	6/8
	089100321	智能装备与工业互联网 Intelligent Equipment and Industrial Internet	选/E	32	32				2.0	6/8
	创新创业模块 Innovation and Entrepreneurship Module									
	089100331	IT 商业模式与创业 IT Business Model and Entrepreneurship	选/E	32	32				2.0	7
	020100051	创新研究训练 Innovation Research Training	选/E	48			48		3.0	7
	020100041	创新研究实践 I Innovation Research Practice I	选/E	48			48		3.0	7
	020100031	创新研究实践 II Innovation Research Practice II	选/E	48			48		3.0	7
	020100061	创业实践 Entrepreneurial Practice	选/E	48			48		3.0	7
	跨学院选修课 Interdisciplinary Elective Courses									
	089100341	跨学院选修课 I Interdisciplinary Elective Course I	选/E	32	32				2.0	1-8
	089100351	跨学院选修课 II Interdisciplinary Elective Course II	选/E	32	32				2.0	1-8
	合 计 Total		选/E	选修课修读最低要求 20 学分 Minimum elective course credits required:20						

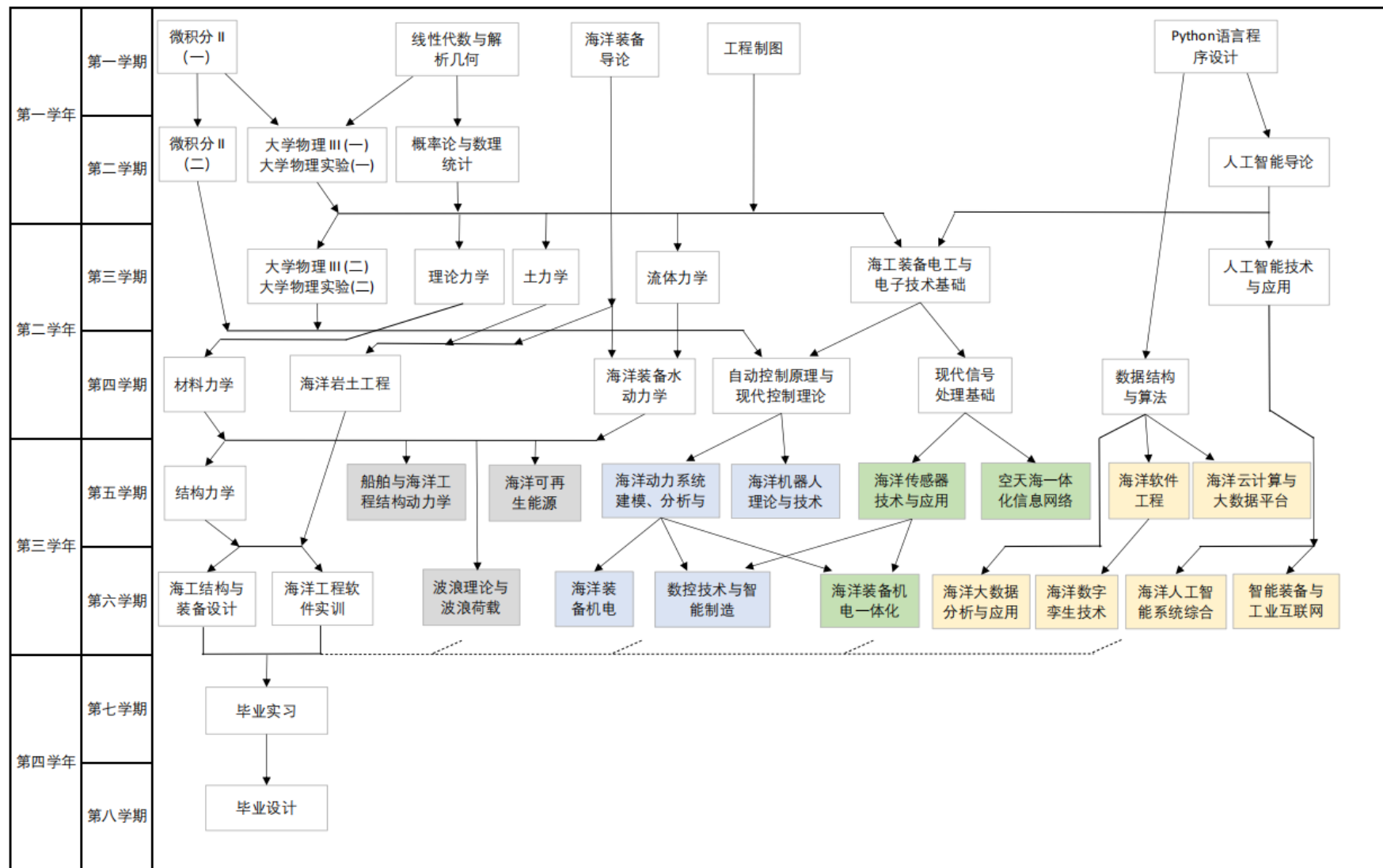
备注：

- 1.学时中其它可以为上机和实践学时。
- 2.学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践 I、创新研究实践 II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。
- 3.学生修读其他学院或本院跨专业开设的课程，已修读课程学分等于或高于 2 学分的，可以折算为一定的专业选修课学分。
- 4.学生可根据自身需要选修模块中的任意课程以达到最低的选修学分需求,从而在特定领域建立更完整的知识体系。

三、集中实践教学环节（Practice-concentrated Training）

课 程 代 码 Course No.	课 程 名 称 Course Title	是否必 修 C/E	学 时 数 Total Curriculum Hours		学分数 Credits	开课学期 Semester
			实践 Practice weeks	授课 Lecture Hours		
006100151	军事技能 Military Training	必/C	2 周 2 weeks		2.0	1
031101551	马克思主义理论与实践 Marxism Theory and Practice		2 周 2 weeks		2.0	3
089100361	海洋装备导论实践 Practice of Introduction to Marine Equipment		2 周 2 weeks		2.0	2
067101782	工程创新训练 I Engineering Innovation Training I		2 周 2 weeks		2.0	3
089100371	海洋工程软件实训 Ocean Engineering Software Practice		3 周 2 weeks		3.0	6
089100381	海洋水动力课程设计 Offshore Hydrodynamics Design Project		3 周 2 weeks		3.0	4
089100391	海床土壤实验课程设计 Geotechnical Experiment Project		3 周 2 weeks		3.0	5
089100401	新能源装备与技术应用实践 Practice Of Renewable Energy Equipment and Technology Application		3 周 3 weeks		3.0	4
089100411	人工智能应用实践 AI Technology Design Project		4 周 4 weeks		4.0	3
089100421	毕业实习 Practice on Diploma Project		4 周 4 weeks		4.0	7
089100431	毕业（设计）论文 Thesis Project		16 周 16 weeks		10.0	8
合 计 Total		必/C	44 周 44 weeks		38.0	

四、课程地图（Curriculum Mapping）



五、课程体系与毕业要求关系矩阵（Relation Matrix between Curriculum System and Student Outcomes）

序号 No	课程名 Course Title	智能海洋装备专业毕业要求																												
		Intelligent Ocean Technology Major Student Outcomes																												
		1.1	1.2	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	5.3	6.1	6.2	6.3	7.1	7.2	8.1	8.2	9.1	9.2	9.3	10.1	10.2	10.3	11.1	11.2
1	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	•	•	•		•																							•	•
2	思想道德与法治 Ethics and Rule of Law	•	•																	•									•	•
3	中国近现代史纲要 Skeleton of Chinese Modern History	•	•																										•	•
4	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao Zedong and Theory of Socialism with Chinese Characteristics	•	•																										•	•
5	马克思主义基本原理 Analysis of the Situation & Policy	•	•																										•	•
6	形势与政策 Analysis of the Situation & Policy	•	•																										•	•
7	工程数学：微积分 II (一) Engineering Math: Calculus (1)			•	•	•		•	•				•																•	•

8	工程数学：线性代数与解析几何 Engineering Math: Linear Algebra & Analytic Geometry			•	•	•		•	•				•															•	•
9	工程数学：微积分 II (二) Engineering Math: Calculus (2)			•	•	•		•	•				•															•	•
10	工程数学：概率论与数理统计 Engineering Math: Probability & Mathematical Statistics			•	•	•	•	•	•					•														•	•
11	人工智能I：大学计算机基础 Artificial Intelligence I: Foundations of Compute														•	•												•	•
12	Python 语言程序设计 Introduction to Programming Using Python					•	•	•	•						•	•												•	•
13	人工智能III：人工智能导论 Artificial Intelligence III: Introduction to Artificial Intelligence																•	•	•	•								•	•
14	学术英语与科技交流（一） EAP and Technical Communication (1)												•		•	•												•	•
15	学术英语与科技交流（二） EAP and Technical Communication (2)												•		•	•												•	•
16	工程制图 Engineering Drawing			•	•	•									•	•	•											•	•
17	大学物理III（一） General physics III（1）			•	•	•	•	•	•																			•	•

18	大学物理实验（一） Physics Experiment（1）						•	•	•	•	•	•																			•	•	
19	大学物理Ⅲ（二） General physicsⅢ（2）			•	•	•	•	•	•																						•	•	
20	大学物理实验（二） Physics Experiment（2）						•	•	•	•	•	•																			•	•	
21	体育（一） Physical Education (1)																														•	•	
22	体育（二） Physical Education (2)																														•	•	
23	体育（三） Physical Education (3)																														•	•	
24	体育（四） Physical Education (4)																														•	•	
25	军事理论 Military Principle																														•	•	
26	海洋装备导论 Introduction to Marine Equipment									•	•								•	•												•	•
27	海工装备电工与电子技术基础 Fundamentals of Electrical Engineering and Electronic for Ocean Equipment			•	•	•	•	•	•	•	•	•	•	•	•		•		•	•	•	•			•	•	•					•	•
28	理论力学 Theoretical Mechanics			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•	•			•	•	•					•	•
29	流体力学 Fluid Mechanics			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•	•			•	•	•					•	•
30	材料力学 Mechanics of Materials			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•	•			•	•	•					•	•

31	土力学 Soil Mechanics			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
32	结构力学 Structural Analysis			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
33	自动控制原理与现代控制理论 Principles of Automatic Control and Modern Control Theory			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
34	现代信号处理基础 Fundamentals of Modern Signal Processing			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
35	数据结构与算法 Data Structures and Algorithms			•	•	•	•	•	•																	•	•	
36	海洋装备水动力学 Hydrodynamics of Offshore Equipment			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
37	人工智能技术与应用 Artificial Intelligence and Applications			•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•					•	•	
38	海洋岩土工程 Offshore Geotechnical Engineering			•	•	•	•	•	•	•	•	•	•	•			•		•	•	•					•	•	
39	海洋装备前沿 The Frontier of Offshore Equipment																					•	•	•	•	•	•	•
40	海工结构与装备设计 Offshore Equipment Structures			•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•					•	•	
41	海洋工程技术与应用研讨课 Ocean Engineering Technology and Application Seminar																	•	•	•	•				•	•	•	•

六、第二课堂 (“Second Classroom” Activities)

第二课堂由人文素质教育和创新能力培养两部分组成。

1.人文素质教育基本要求

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于 5 个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72 学时，1 学分，纳入第二课堂人文素质教育学分。大学生心理健康教育，2 学分，虚拟第三学期开设，纳入第二课堂人文素质教育学分。

2.创新能力培养基本要求

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或各类课外创新能力培养活动（如学科竞赛等）。学生参加上述活动及创新能力培养相关学术讲座所获学分累计不少于 4 个学分。

“Second Classroom” Activities are comprised of two parts, i.e. Humanities Quality Education and Innovation Ability Cultivation.

(1) Basic Requirements of Humanities Quality Education

Besides gaining credits by attending courses listed in the curriculum, students are also expected to participate in extracurricular activities under the framework of Humanities Quality Education based on personal interests or preferences and acquire no less than 5 credits. Among which is an extracurricular PE course, offered by the Physical Education faculty, that is compulsory for undergraduate students in their Junior and Senior years. This course consists of 72 class hours and awards 1 credit under the framework of Humanities Quality Education. There is also the Mental Health Education for College Students (2 credits), which is made available in the virtual third semester, and is similarly placed under the framework of Humanities Quality Education as part of “Second Classroom”.

(2) Basic Requirements of Innovation Ability Cultivation

Besides gaining credits by attending courses listed in the curriculum, students are also expected to participate in following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities geared towards cultivation of one’s capacity for innovation (e.g. academic contests or lectures). Students are expected to receive no less than 4 cumulative credits by participating in such activities.