

## (085800) 能源动力 (氢能与储能) 专业 2023 级全日制硕士研究生培养方案

### 2023 Full-time Master Program for Energy and Power (Hydrogen Energy and Energy Storage)

#### 一、基本信息 Basic Information

院系名称 School	中英国际低碳学院 China-UK Low Carbon College	适用年级 Grade	2023 级 Class		
适用专业 Major	能源动力 (氢能与储能方向) Energy and Power (Hydrogen Energy and Energy Storage)	标准学制 Duration	2.5 年 Years		
学习形式 Study Mode	全日制 Full time				
项目类型 Program Type	专业型 Professional				
培养层次 Program Level	硕士生 Master Student				
最低学分 Min Credit	30	最低 GPA 学分 Min GPA Credit	19	最低 GPA Min GPA	2.7

#### 二、专业领域简介 Introduction

为了积极应对气候变化、能源更新以及未来以绿色低碳为主的产业变革所带来的挑战，学院面向国家重大战略需求，着眼未来，开设了以推动低碳能源与可持续发展为目标的能源动力（氢能与储能方向）专业。该专业融合了上海交通大学在新工科、新能源、新材料、新系统等领域的优势，旨在培养氢能与储能领域的高端人才，开展并推进高水平的学术研究。

In order to cope with the challenges brought by climate change, energy reform, and the industrial transformation towards a low-carbon future, the China-UK Low Carbon College (LCC) has launched a master program in Hydrogen Energy and Energy Storage focusing on energy and sustainability. This program integrates the advantages of Shanghai Jiao Tong University in engineering, energy, materials, systems and other fields, aiming to cultivate high-level talents and promote cutting-edge academic research.

学院师资力量雄厚，围绕新能源与储能、智慧能源与大数据、碳捕集利用与贮存等主要方向开展科学研究和人才培养，拥有一流的科研平台和优秀的教学科研队伍。能源动力（氢能与储能方向）专业在全英文授课、国际化办学和产学研合作培养上独具特色，注重学生知识、能力和素质的全面协调发展。

LCC has rich academic staff resources, first-class research teams and research platforms. The college carries out scientific research and graduate education in the fields of renewables and energy storage,,

smart energy and big data, carbon capture, utilization and storage. This program is conducted in English and features in international educational cooperation and industrial cooperation and pays attention to the all-round development of students.

学院一直致力于培养富有社会责任感、创新精神、实践能力和国际视野，并且具备氢能与储能开发与利用、能量系统优化以及环境保护等能力的复合型工程技术人才。经过研究生阶段的培养，毕业生将能继续在能源与环保等相关领域的研究所、高校以及企事业单位从事科学研究、人才培养、技术开发、工程设计和管理工作。学院紧密结合国家的绿色发展战略，为低碳和可持续发展提供人才、技术和产业支撑。

The Low Carbon College has been committed to cultivating talents in the fields of hydrogen energy and energy storage development and utilization, energy system optimization and environmental protection. LCC provides graduates with a range of professional skills that enable them to pursue careers related to energy and environment in research institutes, universities, enterprises, governments and NGOs. The college follows the national green development strategy and provides talents, technology and industrial support for low carbon and sustainable development.

### 三、培养目标 Program Objective

学生应在掌握动力工程及工程热物理学专业基础知识的基础上，进一步系统学习氢能与储能先进技术，了解相关领域的国内外发展动态和学术研究前沿，掌握各种氢能和储能技术的基本原理，具备建模仿真和分析设计能力，能够运用所学技术和方法解决工程实际问题。

On the basis of mastering the professional knowledge of Power Engineering and Engineering Thermophysics, students should further learn advanced technologies of hydrogen energy and energy storage, understand domestic and international development trends and academic research frontiers in relevant fields, have the ability of modeling, simulation, analysis and design, and be able to apply the technologies and methods to solve practical engineering problems.

毕业生应具备良好的科研素养、创新思维、前瞻意识和国际化视野，能够主动适应氢能与储能产业的发展需求，力争成为面向世界、面向未来的高端工程复合型人才。

The graduates should have sound scientific attainments, creative thinking, forward-looking and international vision, actively adapt to the developing needs of hydrogen energy and energy storage industries, and strive to become first-class, international and interdisciplinary talents for the world and the future.

### 四、培养方式及学习年限 Training Mode and Study Duration

本项目采用全日制学习、导师制培养模式；新生入学后两周内经师生互选确定导师。

学制为二年半。其中，所有学生第一年在上海交通大学按规定修读课程。第二年经选拔被英国爱丁堡大学录取的学生，将前往爱丁堡大学进行为期一年的课程修读；未通过的学生，则在交大完成第二年规定的相应课程和论文工作。最后半年，所有学生在交大继续完成论文工作。

This program will adopt Full-time cultivation mode and the Tutorial System. The tutors of LCC students will be determined within two weeks from the entrance through mutual selections between tutors and students.

Students are supposed to finish their study within 2.5 years. In the first year, students study at LCC of SJTU and can apply to study at the University of Edinburgh (UoE) during the second year if they meet its entry requirements. In the final half year, students are required to finish their thesis in SJTU.

## 五、课程学习要求 Course Requirement

1. 须修读完成不少于 30 学分，其中 GPA 学分不少于 19，GPA 不低于 2.7 方能进入论文开题阶段等后续过程，课程原则上要求在第一学年完成。

Students are required to acquire at least 30 credits, including 19 credits in GPA courses. If final GPA points are no less than 2.7, students are allowed to start writing their research proposal. In principle, students are required to finish all the courses in the first year.

2. 赴爱丁堡大学学习的学生须完成爱丁堡大学相应专业规定的学分课程。

Students who are admitted to the double degree program of UoE should finish relevant courses of UoE as required.

3. 各类课程具体要求如下：

The specific requirements are as follows:

课程类别 Course Type	学分要求 Min Credits	门数要求 Min Courses	GPA 学分要求 Min GPA Credit	备注 Note
公共基础课 General Courses	6.5	/	/	/
专业基础课 Program Core Courses	12	/	/	/
专业前沿课 Program Frontier Courses	7	/	/	/
专业选修课 Program Elective Courses	4	/	/	/

## 六、培养过程要求 Training Requirement

	普博生 Doctoral Student after Master's	直博生 Doctoral Student after Bachelor's	硕博连读生 Combined Master- Doctoral Student	学术型硕士 Academic Master	全日制专业型硕士 Full-time Professional Degree Master
资格(综合) 考试 Qualifying (comprehensive ) Examination	有 Yes	有 Yes	有 Yes	无 No	无 No
开题报告 Thesis Proposal	有 Yes	有 Yes	有 Yes	有 Yes	有 Yes
年度报告(论 文中期考核) Annual Report (Thesis Mid- term Examination)	有 Yes	有 Yes	有 Yes	无 No	无 No
预答辩 Pre-Defense	有 Yes	有 Yes	有 Yes	无 No	无 No
答辩 Thesis Defense	有 Yes	有 Yes	有 Yes	有 Yes	有 Yes
实践实习环节 Practice / Internship	无 No	无 No	无 No	无 No	有 Yes

## 七、学术成果要求 Requirement on Academic Achievements

须以第一作者发表至少 1 篇 SCI 或 1 篇中文核心期刊论文，第二年前往爱丁堡大学的学生须另交 1 篇英文项目报告。

It is required to publish at least 1 SCI paper or 1 Chinese Core Journals paper as the first author. Students that study in the University of Edinburgh during the second academic year should submit 1 piece of English Project Report in addition.

\* 关于学术成果的规定，以相应学科学位委员会当年的具体要求为准。

\* The regulations on academic achievements are subject to the specific requirements of corresponding Academic Degree Committee in that year.

## 八、学位论文 Thesis/dissertation work

1. 硕士学位论文，要求对所研究的课题有新见解或新成果，并对本学科发展或经济建设、

社会进步有一定意义，表明作者掌握坚实的基础理论和系统的学科知识，具有从事学术研究或担负专门技术工作的能力。

学位论文必须是一篇系统的、完整的学术论文，是学位申请者本人在导师的指导下独立完成的研究成果，论文不得抄袭和剽窃他人成果。学位论文的学术观点必须明确，且立论正确，推理严谨，数据可靠，层次分明，文字通畅。

1. The master's degree thesis requires new insights or achievements in the research topic, and has certain significance for the development of the discipline or economic construction and social progress, indicating that the author has a solid basic theory and systematic discipline knowledge, and has the ability to engage in academic research or undertake specialized technical work.

The dissertation must be a systematic and complete academic thesis, which is the research achievement independently completed by the student under the guidance of the supervisor. The dissertation shall not be copied or plagiarized from others. The academic viewpoint of the dissertation must be clear and correct, with rigorous reasoning, reliable data, clear hierarchy and smooth writing.

2. 爱丁堡大学按照碳金融、碳管理、地理能源、可持续能源系统、能源-社会与可持续发展等专业要求。论文通过答辩获爱丁堡大学理学学位。

2. Students who study in the UoE in the second year should meet the requirements of their UoE program to get the UoE master's degree.

## 九、课程设置 Courses

详见下页 Please refer to the next page.

撰稿人签字： 日期：

校稿人签字： 日期：

审核人签字： 日期：

主管院长签字： 院系公章 日期：

说明：

1. 培养方案制定完成并经院系学位委员会审核通过后，全日制请将本表格电子版(word)发送至 SherryLi327@sjtu.edu.cn, 非全日制请将本表格电子版(word)发送至 jshen@sjtu.edu.cn;
2. 请在新研究生教育管理信息系统完成新培养方案的申请，并在审核通过后将本表格的纸质版（签字盖章）送交研究生院存档。

课程类别 Category	课程代码 Course Code	课程名称 Course Name		学分 Credit	授课语言 Language*	开课学期 Semester	可以 计算 GPA	必须 计算 GPA	备注 Note
		中文 Chinese	English 英文						
公共基础课 General Courses	FL6001	学术英语	English for Academic Purposes	2	英文 in English	春季 Spring	是 Yes	是 Yes	必修 Compulsory 6.5 学分 at least 6.5 credits
	MARX6001	新时代中国特色社会主义思想理论与实践	Theory and Practice of Socialism with Chinese Characteristics in the New Era	2	中文 in Chinese	秋季 Autumn	是 Yes	是 Yes	
	MARX6003	自然辩证法概论	Dialectic of Nature	1	中文 in Chinese	春季 Spring	是 Yes	是 Yes	
	GE6001	学术写作、规范与伦理	Academic Writing, Standards and Ethics	1	英文 in English	春季 Spring	是 Yes	是 Yes	
	GE6003	实验室安全教育	Laboratory Safety Education	0.5	中文 in Chinese	春季 Spring	否 No	否 No	
专业基础课 Program Core Courses	MATH6015	最优化方法	Fundamentals and Theory for Optimization Methods	3	英文 in English	春季 Spring	是 Yes	是 Yes	必修 Compulsory 数学类课程, 五选二, 学分 $\geq$ 6 Mathematics Courses, Select 2 out of 5, at least 6 credits
	MATH6004	计算方法	Numerical Analysis	3	英文 in English	秋季 Autumn	是 Yes	是 Yes	
	STAT6001	基础数理统计	Fundamental Mathematical Statistics	3	英文 in English	秋季 Autumn / 春季 Spring	是 Yes	是 Yes	
	MATH6014	最优估计及系统建模	Matrix Theory	3	英文 in English	秋季 Autumn / 春季 Spring	是 Yes	是 Yes	
	MATH6008	偏微分方程数值方法	Mathematical-Physical Equation	3	英文 in English	秋季 Autumn / 春季 Spring	是 Yes	是 Yes	
	新建课程	热工原理	Thermal Principle	3	英文 in English	秋季 Autumn	是 Yes	是 Yes	必修 Compulsory 学分 $\geq$ 6 at least 6 credits
	新建课程	储能原理	Energy Storage Principle	3	英文 in English	秋季 Autumn	是 Yes	是 Yes	
	新建课程	能源化学基础	Fundamentals of Energy Chemistry	3	英文 in English	春季 Spring	是 Yes	是 Yes	
	新建课程	能源材料	Energy Materials	3	英文 in English	春季 Spring	是 Yes	是 Yes	
	新建课程	先进制氢及储运技术	Advanced Hydrogen Production, Storage and Transportation Technology	2	英文 in English	秋季 Autumn	是 Yes	是 Yes	
新建课程	电化学原理与应用	Electrochemical Principle and Application	3	英文 in English	秋季 Autumn	是 Yes	是 Yes		

专业前沿课 Program Frontier Courses	GE6011	学术报告	Seminar	1	英文 in English	秋季 Autumn / 春季 Spring	否 No	否 No	必修 Compulsory	学分 $\geq$ 7 At least 7 credits.
	新建课程	氢能及可再生合成燃料	Hydrogen Energy and Renewable Synthetic Fuels	2	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
	新建课程	燃料电池技术	Fuel Cell Technology	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	
	新建课程	新型物理储能技术及应用	New Physical Energy Storage Technology and Application	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	
	新建课程	新型电池技术	New Battery Technology	2	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
	新建课程	电池系统建模与仿真	Battery System Modeling and Simulation	2	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
专业选修课 Program Elective Courses	GE8001	专业实践	Practice in Specialty	1	英文 in English	春季 Spring	否 No	否 No	必修 Compulsory	学分 $\geq$ 4 At least 4 credits
	PE6420	能源清洁与梯级利用	Energy Clean and Cascade Utilization	3	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
	PE8603	能源互联网与智慧能源	Energy Internet and Smart Energy	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	
	PE8605	新能源与储能技术	Renewable Energy and Energy Storage Technology	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	
	PE8619	零碳燃烧技术	Zero Carbon Fuel Combustion	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	
	新建课程	先进分析与表征技术	Advanced Techniques of Analysis and Characterization	3	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
	新建课程	电池管理系统	Battery Management System	2	英文 in English	秋季 Autumn	否 No	否 No	选修 Elective	
	新建课程	电池材料回收技术	Recycling Technology of Battery Materials	2	英文 in English	春季 Spring	否 No	否 No	选修 Elective	