

材料与化工(085600)全日制博士培养方案

Materials and Chemical Engineering

一、基本信息 Basic Information

院 系 名 称 School	(160) 环境科学与工程学院 School of Environmental Science & Engineering			适 用 年 级 Grade	2025
适 用 专 业 Major	材料与化工(085600) Materials and Chemical Engineering				
项 目 类 型 Program Type	全日制博士				
最 低 学 分 Min Credit	35.5	最低GPA学分 Min GPA Credit	16	最低GPA Min GPA	2.7

二、学科简介 Introduction

1984年获准环境化学硕士点，开始培养环境领域硕士生，1998年调整为环境工程硕士点，同年又获准环境科学硕士点，2000年获准环境工程二级学科博士点，2003年获准环境科学与工程一级学科博士点，同年设立环境科学与工程博士后流动站。

在流域水污染控制、区域大气污染控制、废弃物资源化、环境功能材料、土壤-地下水污染修复、环境化学与毒理学、环境管理、海洋环境等方向，具有鲜明的特色与厚重的积累。学院拥有完善的教学与科研体系和先进分析测试平台，承担着大量的国家级、省部级、国际合作以及企业委托的科研项目。

As early as the 1984 we began to cultivate the master's students in environmental field. It was adjusted to the master degree of environmental engineering in 1998. The environmental science master station was established at the same year. In 2000, a second-rate discipline of environmental engineering for doctor-degree program was established. The first-rate discipline of environmental science and engineering for doctor-degree program was established in 2003. The school was approved to have post-doctoral mobile center of first class discipline of Environmental Science and Engineering in 2003.

The major research fields are regional water pollution control, regional air pollution control, solid waste treatment and disposal, environment function materials, soil and groundwater remediation, environmental chemistry and toxicology, environmental management, marine environment, etc. The school has advanced teaching and research system, and the public service platform, the center laboratory, guarantees the advanced analysis and test. The school also undertakes many national, international and industrial scientific research projects.

三、培养目标 Program Objective

总体目标：培养具有坚定的科学信念、坚忍不拔的科学意志、敏锐的科学触角、广阔国际视野并且具有较高学术水平的一流人才。培养德、智、体、美、劳全面发展，热爱祖国、遵纪守法、品行端正，具有艰苦奋斗、为人民服务 and 为社会主义建设事业献身的精神，热爱环境保护事业，具有扎实的基础理论与系统的专门知识，熟悉环境学科在国内外发展的历史、现状及趋势，在某一具体研究方向上取得突破性进展，熟练掌握英语，能够撰写高水平研究论文，具备批判思维、创新能力、实践能力与全球视野，具有较强的解决和探索环境污染控制、生态文明建设等问题的能力，具有从事科学研究工作或担负专门技术工作能力的环境科学与工程领域的卓越人才。

We will cultivate all-round development of morality, intelligence, body and beauty, love the motherland, abide by the law, and behave in a proper manner. We will have the spirit of hard work, serving the people and dedicating ourselves to the cause of socialist construction. We love the environmental cause and master the solid and broad environmental engineering of this discipline. The theoretical foundation and systematic in-depth expertise, familiar with the history, current situation and trend of environmental discipline development at home and abroad, with good critical thinking, innovation ability and practical ability, have strong ability to solve and explore environmental pollution control problems, The ability to independently engage in scientific research, management, and practical work, to create creative results in environmental science or expertise, and to have high-level talents with a global environmental perspective.

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

本项目标准学制为5年，采用全日制学习、导师制培养模式；博士生最长可延长2学年。

This program requires a full-time study for 5 years under a supervisor. For those unable to

graduate on time, upon approval of the application, the maximum period of study can be extended by two years.

五、课程学习要求 Course Requirement

课程类别 Course Type	学分要求 Min Credits	GPA 学分要求 Min GPA Credit	备注 Note
公共基础课 General Fundamental Courses	13.5	6	
专业基础课 Program Core Courses	10	10	
专业前沿课 Program Frontier Courses	8		
专业选修课 Program Elective Courses	4		

六、培养过程要求 Training Requirement

一、课程学习

完成时间：普博生原则上第2学期结束前完成，不能晚于第4学期；直博生原则上第3学期结束前完成，不能晚于第5学期。

二、资格考试

完成时间：普博生原则上第3学期结束前完成，不能晚于第5学期；直博生原则上第4学期结束前完成，不能晚于第6学期。

前提要求：参加资格考试时，学生应已按培养计划进度完成专业基础课的学习。未完成专业基础课学习者、因故休学者或有其它特殊原因者，可申请推迟参加资格考试。参加国际联培的博士生原则上应在访学前通过资格考试。

评审组织：资格考试分为笔试和面试部分，由学院集中组织。

归档要求：学生在交我办(my.sjtu.edu.cn)发起申请并完成在线归档，附件须完备。

三、开题报告

完成时间：资格考试通过后一年内完成，一般在10月底前完成（因故休学者或有其它特殊原因者，可申请推迟博士论文开题；参加国际联培的博士生若出访前未进行开题报告，可在合作高校举行论文开题工作）。

评审组织：论文开题报告会由课题组或导师具体组织实施，专家组应由 3-5 名具有博士生指导资格的教师组成。

归档要求：学生在交我办(my.sjtu.edu.cn)发起申请并完成在线归档，附件须完备。

四、年度考核

完成时间：每年10月底前完成，论文开题通过满六个月以上者应参加。

评审组织：年度报告会由课题组或导师具体组织实施，专家组应由 3-5 名具有博士生指导资格的教师组成。

1. Course Learning

Time of completion: In principle, for normal doctoral candidates, it should be completed before the end of the second semester, and not later than the fourth semester; as for doctoral candidates after bachelor's degree, it should be completed before the end of the third semester, and not later than the fifth semester.

2. Qualification Examination

Time of completion: In principle, for normal doctoral candidates, it should be completed before the end of the third semester, not later than the fifth semester; as for doctoral candidates after bachelor's degree, it should be completed before the end of the fourth semester, and not later than the sixth semester.

Prerequisites: When taking the qualification exam, students should have completed courses learning. Doctoral students of international joint cultivation program should, in principle, pass the qualification test before attending the foreign university.

Review Organizing: Organized by the school collectively.

Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing procedure.

3. Thesis Proposals

Time of completion: In principle, it should be completed within one year after passing the qualification exam, usually held in October (doctoral students of international joint cultivation program can hold it in the foreign university).

Exception: The thesis proposals representation is held simultaneously with qualification examination for Class of 2019 and before.

Review Organizing: Held by the supervisor, and the review committee consists of 3 or 5 professors with the qualification of doctoral tutor.

Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing procedure.

Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing

procedure.

5. Academic Exchange

Time of completion: During the study period (before the formal thesis defense), students must participate at least once at a high-level international academic conference with the following forms of achievements.

Manners of achievements: The forms of achievements include oral reports, poster presentations, or the abstracts of the submitted papers are accepted by the conference, etc. The content of the communication should be closely related to the research work of the doctoral dissertation.

七、学术成果要求 Requirement on Academic Achievements

博士学位申请者应满足以下条件之一：

1. 以第一作者（共同第一作者须排序第一）发表至少2篇高水平学术论文。论文内容应与学位论文研究工作密切相关，导师应为作者之一，第一作者单位和第一通讯单位应为上海交通大学。高水平学术论文认定参照《上海交通大学环境科学与工程学院代表性期刊分类目录》。
2. 以第一发明人获得国际专利授权，或国内专利授权且转化产生较大规模的经济效益。导师应为发明人之一，第一权利人单位应为上海交通大学。
3. 经学院学位评定委员会认定的其他形式创新性成果。
4. 对于在科学前沿、颠覆性技术或领域潜心从事基础性、创新性或尖端性研究，力争经过长期攻关取得突破性、颠覆性科研成果的博士生，若答辩前暂无成果发表的，须通过学院规定的审核认定程序。

Doctoral degree applicants should meet one of the following conditions:

1. Publishing at least two high-level academic papers as the first author (or ranked first in co-author). The content of the thesis should be related to the research work of the dissertation. The first author unit and the first communication unit should be the School of Environmental Science and Engineering of Shanghai Jiao Tong University, the supervisor is one of the authors, academic journals can refer to the "Classified Catalogue of Representative Journals of School of Environmental Science and Engineering of Shanghai Jiao Tong University (2021-2023)" listed in (School of Environment [2021] No. 6).
2. Obtaining an international patent authorization as the first inventor, or a domestic patent authorization and transforming to produce large-scale economic benefits. The first right hold should be Shanghai Jiao Tong University, and the tutor is one of the inventors.
3. Other innovative achievements comparable to the above achievements approved by the school's Degree Evaluation Committee.
4. Doctoral students who are devoted to basic, original or cutting-edge research and strive to achieve breakthrough and subversive scientific research results after long-term research, if their results have been published before the thesis defense, they can apply for review by the school's degree evaluation committee after being recommended by their supervisor. The breakthrough and creativity of their dissertation results are recognized, and PhD defense and application can be conducted after the recognition is passed.

八、学位论文 Thesis/dissertation work

学位论文是进行学位评定的主要依据（专业学位博士也可通过规定的实践成果进行学位评定，实践成果评定方式视具体情况另行规定），应能反映出作者在本学科上已掌握坚实宽广的基础理论、系统深入的专门知识和规范科学的研究方法。

1. 选题与综述

博士学位论文的选题应在本学科及相关领域具有开拓性、前沿性和创新性，应对经济建设和社会发展具有较大的理论意义或应用价值。文献综述应在全面搜集、阅读大量有关研究文献的基础上，经过归纳整理、分析鉴别，对所研究的问题在一定时期内已经取得的研究成果、存在问题以及新的发展趋势等进行系统、全面、客观的叙述和评论，为论文课题的确立提供支持 and 论证。

2. 规范性要求

博士学位论文必须是一篇系统、完整的学术论文，是学位申请者在导师指导下独立完成的研究成果，不得抄袭和剽窃他人成果，能够表明作者具有独立从事科学研究工作的能力，且在

本门学科上掌握了坚实宽广的基础理论和系统深入的专业知识。

博士学位论文的学术观点必须明确，立论正确，推理严谨，数据真实，图表规范，层次分明，语言准确，且文字通畅。

博士学位论文字数一般为8~10万，论文中使用的术语、符号、代号必须全文统一并符合规范化要求。计量单位一律采用国务院发布的《中华人民共和国法定计量单位》。根据国家标准《学位论文编写规则》(GB/T 7713.1)，学位论文应使用中文撰写。国际留学生或申请国际评审与答辩的论文可以用英文撰写论文,但必须列出详细的中文摘要。学位论文撰写格式应符合《上海交通大学博士、硕士

The dissertation is the main basis for degree evaluation, and it should reflect that the author has mastered a solid and broad basic theory, systematic and in-depth expertise and standardized scientific research methods in the subject.

1. Topic selection and summary

The topic selection of a doctoral dissertation should be pioneering, cutting-edge and innovative in this discipline and related fields, and have greater theoretical significance or application value in response to economic construction and social development. The literature review should be based on a comprehensive collection and reading of a large number of relevant research literature, through induction, sorting, analysis and identification, and a systematic and comprehensive analysis of the research results, existing problems, and new development trends that have been achieved within a certain period of time. , Objective narratives and comments provide support and demonstration for the establishment of the thesis topic.

2. Normative requirements

The doctoral dissertation must be a systematic and complete academic thesis. It is the research result independently completed by the applicant under the guidance of the supervisor. It is not allowed to plagiarize or plagiarize the results of others. It can show that the author has the ability to independently engage in scientific research and is in this He has mastered solid and broad basic theories and systematic and in-depth professional knowledge in the subject.

The academic point of view of the doctoral dissertation must be clear, correct, rigorous in reasoning, truthful in data, standardized in diagrams, clear in layers, accurate in language, and unobstructed in text.

The number of words in a doctoral dissertation is generally 80,000 to 100,000. The terms, symbols, and codes used in the dissertation must be unified in the full text and meet the standardization requirements. All units of measurement shall be the "Statutory Units of Measurement of the People's Republic of China" issued by the State Council. According to the national standard "Rules for Writing Dissertations" (GB/T 7713.1), dissertations should be written in Chinese. International students or essays applying for international review and defense can write essays in English, but a detailed Chinese abstract must be listed. The format of dissertation writing should meet the requirements of "Guidelines for Writing Doctoral and Master's Thesis of Shanghai Jiaotong University".

3. Innovative requirements for results

The innovative achievements related to the doctoral dissertation should reflect the first-class level and creativity in the subject field; the achievements should be completed independently by the degree applicant during the period of studying for the doctoral degree, and be fully presented in the form of a dissertation. The innovation of the results is an important reference for evaluating the level of the dissertation, which can be presented in various forms such as high-level academic journal papers, academic conference papers, monographs, patents, works, and research reports.

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:

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	是否必修 Compusory	可以计算 GPA	必须计算GPA	备注 Note	多选组 Course Group
		中文Chinese	English 英文								
任意选修课 Elective Courses	GE6007	大学生心理健康	Mental Health for College Students	2	中文	春秋季	是	否	否	“好大学在线”慕课学习	
公共基础课 General Fundamental Courses	GE9003	工程实践I	Engineering Practice I	1	中文	春秋季	是	否	否		最少2门、最低2分
	GE9004	工程实践II	Engineering Practice II	1	中文	春秋季	是	否	否		最少2门、最低2分
	MATH6004	计算方法	Numerical Analysis	3	中英并行开班	春秋季	是	是	是		最少1门、最低3分
	MATH6005	矩阵理论	Matrix Theory	3	中英并行开班	春秋季	是	是	是		最少1门、最低3分
	MATH6015	最优化方法	Optimization Method	3	中英并行开班	春秋季	是	是	是		最少1门、最低3分
	STAT6001	基础数理统计	Fundamental Mathematical Statistics	3	中英并行开班	春秋季	是	是	是		最少1门、最低3分
	BI08007	生命科学前沿：合成生物学	Frontier of Life Science: Synthetic Biology	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9102	化学前沿专题：化学生物学	Frontier Topics in Chemistry: Chemical Biology	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9104	化学前沿专题：新能源化学	Frontier Topics in Chemistry: New Energy Chemistry	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9105	化学前沿专题：材料化学	Frontier Topics in Chemistry: Materials Chemistry	1	中文	春季	是	否	否		最少1门、最低1分
	MATH8004	现代数学专题-计算类：最优化	Special Topics in Modern Mathematics-Computational Mathematics: Optimization	0.5	中文	春季	是	否	否		最少1门、最低1分
	STAT8003	现代数学专题-随机类：现代统计	Special Topics in Modern Mathematics-Stochastic: Modern Statistics	0.5	中文	春季	是	否	否		最少1门、最低1分
	FL6001	学术英语	English for Academic Purposes	2	英文	秋季	是	是	是		
	GE6001	学术写作、规范与伦理	Scientific Writing, Integrity and Ethics	1	中英并行开班	春秋季	是	否	否	秋季学期中文；春季学期英文	
	GE6003	实验室安全教育	Laboratory Safety Education	0.5	中文	春秋季	是	否	否	“好大学在线”慕课学习	
	GE6011	学术报告会	Academic Lectures	1	中文	春秋季	是	否	否		
	MARX6003	自然辩证法概论	Introduction to Dialectics of Nature	1	中文	春秋季	是	是	是		
	MARX7001	中国马克思主义与当代	Marxism in China	2	中文	春秋季	是	否	否		
专业基础课 Program Core Courses	ENVR7001	分子生物学与环境生物工程	Molecular Biology and Environmental Bioengineering	2	中文	秋季	否	是	否		
	ENVR7005	大气污染控制理论与技术	Theories and Technology of Air Pollution Control	2	中文	秋季	否	是	否		
	ENVR7101H	高等环境化学	Advanced Environmental Chemistry	3	英文	秋季	否	是	否		
	ENVR7110	环境能源技术	Environmental Energy Technology	2	英文	秋季	否	是	否		
	ENVR7002	环境生态工程	Environmental Ecological Engineering	2	中文	春季	否	是	否		
	ENVR7003	现代环境分析技术	Modern Environmental Analytical Technology	2	中文	春季	否	是	否		
	ENVR7004H	水污染控制理论与技术	Theory and Technology for Water Pollution Control	3	中文	春季	否	是	否		
	ENVR7006	废弃物的处理与资源化	Solid Waste Disposal And Recvcling	2	中文	春季	否	是	否		
	ENVR7020	环境学科人工智能应用实践	Artificial Intelligence in Environmental Science	2	中文	春季	否	是	否	AI+	

专业基础课	ENVR7102H	环境管理	Environmental Management	2	英文	春季	否	是	否		
专业前沿课 Program Frontier Courses	ENVR6101	土壤—地下水污染修复	Soil and Groundwater Pollution Remediation	2	中文	秋季	否	否	否		
	ENVR7016	铁环境化学与污染控制技术	Iron Environmental Chemistry and Pollution Control Technology	2	中文	秋季	否	否	否		
	ENVR7019	饮用水深度处理	Advanced Treatment of Drinking Water	2	中文	秋季	否	否	否		
	ENVR7103	产业生态学	Industrial Ecology	2	英文	秋季	否	否	否		
	ENVR9001	环境科学与工程学科前沿 进展	Frontiers of Priority of Environmental Engineering	3	中文	秋季	是	否	否		
	ENVR7105	可持续能源技术	Technologies for Sustainable Energy	2	英文	春季	否	否	否		
	ENVR9002	碳中和与气候变化研究前 沿	Research Frontiers of Carbon Neutrality and Climate Change	2	中文	春季	否	否	否		
	ENVR9003	工程经济学	Engineering Economics	2	中文	春季	否	否	否		
专业选修课 Program Elective Courses	ENVR6013	城市矿产资源循环技术与 实践	Technology and Practice of Urban Mines Recvcling	2	中文	秋季	否	否	否		
	ENVR6015	环境传感技术及原理	Environmental Sensing Technology and Principles	2	中文	秋季	否	否	否	AI+	
	ENVR6017	全球化学品管理	Global Chemical Management	2	中文	秋季	否	否	否		
	ENVR7007	环境污染与控制化学	Chemistry of Environmental Pollution and Control	2	中文	秋季	否	否	否		
	ENVR7008	环境催化与环境功能材料 专题	Environmental Catalysis and Functional Materials	2	中文	秋季	否	否	否		
	ENVR7009	高等环境毒理学	Advanced Enviromental Toxicity	2	中文	秋季	否	否	否		
	ENVR7010	高级氧化技术	Advanced Oxidation Process	2	中文	秋季	否	否	否		
	ENVR7013	水体富营养化	Water Eutrophication	2	中文	秋季	否	否	否		
	ENVR7014	环境电化学	Environmental Electrochemistry	2	中文	秋季	否	否	否		
	ENVR7015	大气化学	Atmospheric Chemistry	2	中文	秋季	否	否	否		
	ENVR7018	环境地球化学	Environmental Geochemistry	2	中文	秋季	否	否	否		
	ENVR7104	环境经济学	Environmental Economics	2	中英并行开班	秋季	否	否	否		
	ENVR7106	环境微生物技术与应用	Environmental microbiology: technology and application	2	中文	秋季	否	否	否		
	ENVR6012	气溶胶物理与化学	Aerosol Physics and Chemistry	2	中文	春季	否	否	否		
	ENVR7011	现代环境化工技术	Modern Technology of Environmental Chemical Engineering	2	中文	春季	否	否	否		
	ENVR7111	环境催化原理与应用	The Principles and Application of Environmental Catalysis	2	英文	春季	否	否	否		