

化学工程与技术 学科硕士研究生培养方案

Master's degree program in Chemical Engineering & Technology

一级学科代码：0817

Discipline code:0817

一、学科概况与研究方向

Discipline overview and research direction

化学工程与技术学科为江苏大学重点建设学科之一，本学科坚持以学科建设为龙头，学科队伍建设为根本，以服务于材料化工、石油化工、精细化工等支柱产业发展为目标，坚持人才培养与科学研究并重的原则，不断提升学科的水平 and 地位。学科拥有江苏省化学化工实验教学示范中心和中央财政部与地方共建特色应用化学专业实验室；学科拥有先进的仪器设备等硬件条件，建设了“绿色化学与化工技术研究院”和“应用化学研究所”等研究机构，与企业合作共建江苏省工程技术研究中心 3 个。本学科 2004 年获批应用化学硕士授权点，2006 年增设工业催化硕士点，2010 年获批一级学科硕士授权点，有一支具有多年培养研究生经验的教师团队，在 2021 年泰晤士高等教育首届中国学科评级为 A- 等级，2022 年“软科世界一流学科排名”中位列全球第 34 位(全国 17 位)。2010 年本学科与环境科学与工程学科联合申请获得环境科学与工程一级博士点。本学科在石油化工、材料化工、精细化学品工业等领域形成了鲜明的研究特色，在国内有一定的地位，本学科参与建设的相关学科如工程学、化学入选 ESI 全球前 1%。本学科主要研究方向为：绿色化学工艺与过程；先进分离技术及其工程；新材料化工和清洁能源化工。

Chemical Engineering & Technology is the key construction disciplines of Jiangsu University for serving the material chemical industry, petrochemical industry, fine chemical industry and pillar industry development as the goal, adhere to the principle of paying equal attention to personnel training and scientific research, continuously upgrade the level and the status of the subject. The discipline adheres to discipline construction as the leading and discipline team construction as the foundation. The discipline has the Chemistry and Chemical Experiment Teaching Center of Jiangsu Province and the applied chemistry specialized laboratory co-built by the Central Ministry of Finance and local government. The discipline has advanced instruments and equipment and other hardware conditions, which has built "Institute of Green Chemistry and Chemical Technology", "Applied Chemistry Research Institute" and other research institutions. The Chemical Engineering & Technology cooperated

with enterprises to build three engineering technology research centers of Jiangsu Province. This discipline was approved the master's program in Applied Chemistry in 2004 and Industrial Catalysis was added in 2006. The first-level discipline for master's program was approved in 2010. Chemical Engineering & Technology is A- in Higher Education China Discipline Rating in the first time at 2021 and it ranked 34th in the world (17th in China) in the "Soft Science World First-class Discipline Ranking" at 2022. In 2010, this discipline and Environmental Science and Engineering jointly applied for the first-level doctoral program of Environmental Science and Engineering. This discipline has formed distinct research characteristics in petrochemical industry, material chemical industry, fine chemical industry and other fields, and has a certain status in China. Related disciplines such as engineering and chemistry involved in the construction of this discipline are listed in the top 1% of ESI in the world. The main research directions of this discipline are: green chemical technology and process; advanced separation technology and engineering; new material chemicals and clean energy chemicals.

化学工程与技术包含研究方向:

The Master Degree Program in Chemical Engineering & Technology focuses on:

1 化学工程 Chemical Engineering (081701)

- (1) 绿色化工过程 Green Chemical Process
- (2) 生物材料制备和药物释放 Biological material preparation and drug release process
- (3) 化工纳米催化 Nanocatalytic in chemical technology
- (4) 环境保护与固体废物资源利用 Environmental protection technology and solid waste resource process

2 化工工艺 Chemical Processes (081702)

- (1) 精细化学品合成 Fine chemicals synthesis process
- (2) 自然资源开发利用 Natural resource development process
- (3) 新能源与化工工艺 New energy and chemical process
- (4) 新型功能材料制备 Preparation of new functional materials

3 生物化工 Biological Chemical Engineering (081703)

- (1) 生物催化 Biocatalysis
- (2) 生物分离工程 Bioseparation engineering
- (3) 生物医药工程 Biomedical engineering
- (4) 环境生物工程 Environmental bio-engineering
- (5) 蛋白质工程 Protein engineering

4 应用化学 Applied Chemistry (081704)

- (1) 环境污染物控制技术 Environmental pollution and control technology
- (2) 化工工艺和分离技术 Chemical processes and analytical techniques

(3) 高分子和天然产物化学 Polymers and natural products chemistry

(4) 化学合成功能性材料和应用 Chemical synthesis and application of functional materials

5 工业催化 Industrial Catalysis (081705)

(1) 新型催化材料和技术 New catalytic materials and technology

(2) 光电催化技术和应用 Photoelectro-catalysis technology and application

(3) 分子识别技术和应用 Molecular recognition technology and application

二、培养目标

本专业的目标是培养具有正确世界观、人生观和价值观的化工专业技术人才。化学工程技术人员应具备以下思想品德素质要求。第一，要有实事求是的精神和严谨的学风，还需要有良好的职业道德。第二，具有扎实的化学基础理论知识和较强的实验能力，能够独立从事化学相关的学术研究和产品开发。最后，他们有良好的心理素质和健康的体质。获得本专业硕士学位，需要实现以下目标：

(1) 硕士研究生应具有正确的世界观、人生观、价值观，遵纪守法，品行端正，学风严谨，事业心强，具有开拓精神。

(2) 硕士研究生需要掌握化工生产工艺和设备的基本原理、专业技能和研究方法。具有化学合成、生产工艺与化工设备设计、工业催化过程研究、化学应用技术等方面的研究能力。可以独立从事化工领域的技术开发、新技术研究、新产品开发、工程设计和生产工艺管理等相关工作。熟练阅读专业文献，熟练撰写研究论文。

(3) 硕士研究生应具备良好的心理素质和健康的体质。

Training objectives

Goal of the major is to train specialized chemical engineering & technology talents who have the correct world outlook, the outlook on life and values. The specialized chemical engineering & technology talents should meet the following requirements in terms of ideology and moral character. Firstly, they should have the spirit of seeking truth from facts and the rigorous style of study. Good professional ethics is also required. Secondly, they should have solid basic chemistry theoretical knowledge and strong experiment ability. And, they are able to independently engage in chemical related academic research and product development. Last but not least, they have the good psychological quality and healthy physique. Masters of the major are required to achieve the following goals:

(1) Masters should have the correct world outlook, the outlook on life and values, law-abiding, good character, rigorous style of study, strong career-ambition and pioneering spirit.

(2) Masters should master the basic principle, professional skills and research methods of chemical production process and equipment. Masters should have research ability in terms of chemical synthesis, design of production technology and chemical equipment, industrial

catalysis process research and chemical application technology. They can be independently engaged in the field of chemical industry and other related work, such as technology development, new technology research, new product development, engineering design and production technology management. They should skillfully read the professional literature and proficiently write research papers.

(3) Masters should have the good psychological quality and healthy physique.

三、培养方式及学习年限

化学工程与技术硕士研究生的学习年限一般为 3 年，最长不超过 5 年。确属优秀的硕士研究生可申请提前半年毕业，详见“江苏大学研究生提前毕业具体要求”。化学工程与技术专业研究生应完成必修课程的总学分不低于 26 学分，学位课程的总学分不低于 14 学分。这些课程通常在 1-2 年内完成，额外的 2-3 年用于完成论文研究和论文答辩。此外，如果就你的知识背景和你将要参与的研究项目而言，有必要的话，可以在总学分之外加上必修课程的学分。

Training modes and the duration of study

The length of study for master's degree in Chemical Engineering & Technology is generally 3 years, with a maximum of 5 years. Outstanding graduate students can apply to graduate for 2.5 years, see "The specific requirements for students graduate in advance of Jiangsu University." The graduate students for Chemical Engineering & Technology major should finish the required course credits that must be at least a total of 26 credits, and the credits for degree courses should be more than 14. The completion of these courses is usually within 1 to 2 years, while the additional 2 to 3 years is used to complete the dissertation research and thesis oral defense. In addition, the required course credits can be added beyond the total required course credits if that is necessary in terms of your knowledge background and the research project in which you will involve.

四、课程学分

Course credits

1、学分要求

Credit requirements

课程总学分不低于 26 学分，其中学位课不少于 14 学分，选修课不少于 12 学分。

The total credits of the course shall be no less than 23 credits, including no less than 14 credits for degree courses and no less than 12 credits for elective courses.

2、课程设置

Curriculum

Course Category 课程类别		Course Name 课程名称	Credit 学分	Term 学期 (Spring/ Autumn)	School by which Courses opened 开课学院	type of the course 课程性质	Remark 备注
Degree courses 学位课	Public degree course 公共学位课	Integrated Chinese I 综合汉语 I	1.5	Autumn 秋学期	Language & Culture Center 语言文化中心		Compulso ry 必修
		Integrated Chinese II 综合汉语 II	2.5	Spring 春 学期	Language & Culture Center 语言文化中心		
		Overview of China 中国文化概论	3	Autumn 秋学期	OEC 海外教育 学院		
	Basic Theory Course 基础理论课	Numerical Analysis 数值分析	2	Autumn 秋学期	School of Mathematical Sciences 数学科学 学院	bilingual course	At least 2 credits 至少 2 学 分
		Mathematic Statistics 数理统计	2	Autumn 秋学期	School of Finance & Economics 财经 学院	bilingual course	
		Advanced Organic Chemistry 高等有机化学	2	Autumn 秋学期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course	At least 2 credits 至少 2 学分
		Advanced physical Chemistry 高等物理化学	2	Autumn 秋学期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course	
	Core Specialized Degree Courses 核心专业学 位课	Modern Chemical Engineering Theory and Technology 现代化工理论	3	Autumn 秋学期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course	At least 3 credits 至少 3 学 分

		与技术					
Non-degree course 非学位课	Specialized Elective Courses 专业选修课	Advanced instrument analysis experiment 高等仪器分析 实验	3	Autumn 秋 学期	School of Chemistry and Chemical Engineering 化学 化工学院	experimental course 实验 平台	At least 5 credits 至少 5 学 分
		Chemical and Chemical Engineering Frontiers 化学化工前沿 讲座	2	Autumn 秋 学期/ Spring 春 学期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course cutting-ed ge lecture 前沿讲座	
		Modern Spectrometry 现代波谱解析	3	Autumn 秋 学期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course	
		Separation Science and Technology 分 离科学与技术	2	Spring 春学 期	School of Chemistry and Chemical Engineering 化学 化工学院	bilingual course	At least 7 credits 至少 7 学分
		Chemical Process Design and Optimization 化工过程设计 与优化	2	Spring 春学 期	School of Chemistry and Chemical Engineering 化学化 工学院	bilingual course	

		Chemical synthesis and application of material 材料化学合成与应用	2	Spring 春学期	School of Chemistry and Chemical Engineering 化学化工学院	bilingual course	
		Advanced Coordination Chemistry 高等配位化学	2	Spring 春学期	School of Chemistry and Chemical Engineering 化学化工学院	bilingual course	
		Chemical Reaction Engineering Reviews 化学反应工程概论	2	Spring 春学期	School of Chemistry and Chemical Engineering 化学化工学院	bilingual course	
	Public Elective Courses 公共选修课	All graduate programs in all disciplines throughout the school 全校所有学科的全部研究生课程					Optional

Note: Please specify the type of the course { English taught course, bilingual course, cutting-edge lecture or experimental course}
课程性质中请明确是全英文课程、双语课程、前沿讲座或实验平台课程等

五、拓展学分要求

Extended credit requirements

不做要求 No requirements

六、实践学分要求 (8 分)

相关规定参见《江苏大学学术型硕士研究生培养方案（总则）》和《江苏大学硕士研究生培养环节简介》要求。

此外安排学生参与本科生实验的指导工作，进行助教工作或进行生产实践，并且进行仪器技能培训，并获得大型仪器设备操作证书，有条件的学生到工厂参与导师的合作课题或进行见习，完成社会实践并上交社会实践报告(4 学分)。

研究生在校期间要参加学术报告 20 次以上，每次报告都应有相应的记录(4 学分)。

Practice credit requirements (8 credits)

Refer to the relevant provisions of <Training Program of Jiangsu University for Graduate Students (general)>, <Jiangsu University graduate training process Introduction>

Further arrangements undergraduate students to participate in experiments that work performed for the production assistants to work or practice, and for instrument skills training, and access to large equipment operating certificate, conditional students to participate in cooperation projects to the factory or trainee instructor, completed community practice and turn social practice reports (4 credits).

The graduate students are also required to attend related seminars and experts forum more than 20 times, each report should have the corresponding records (4 credits).

七、学位论文与学位授予

Dissertation and degree requirements

硕士论文质量的高低是衡量硕士研究生培养质量和学术水平的重要标志。论文可以是基础研究、应用基础研究和工程应用研究，特别是加强研究的前沿学科和交叉跨学科领域的渗透，参与重大问题解决高科技发展的前沿，提出一个新概念，新理论,新方法、新技术；参与解决国民经济建设中的重大理论和工程问题，并尽可能参与导师或管理人员承担的国家重大科研项目。本学科应体现作者在本学科中掌握了扎实广泛的基础理论和系统的专业知识。研究论文一般应包括理论分析和实验研究两个方面。还应注重内容的深度和广度，突出创新和原创的见解或开拓新的领域。论文应由硕士生本人在导师指导下自行完成，以表明作者具有独立从事科学研究或独立承担专业技术工作的能力。

The level of the quality of master's thesis is a comprehensive measure of master's training quality and academic standards as an important symbol. Dissertation can be basic research, applied basic research, and Engineering application research, particularly to strengthen the study of the frontier disciplines and the field of cross interdisciplinary penetration, participate in a major issue to solve the forefront of high-tech development, put forward a new concept, new theories, new methods, new technologies; Participate in solving the major theoretical and engineering problems of national economic construction, and, as far as possible, participate in an important national research project which is undertaken by the supervisor or School of Management. The thesis should reflect that the author has grasped solid and wide basic theory as well as systemic expertise in this discipline. The dissertation should normally include two aspects of theoretical analysis and experimental research. It also should focus on the depth and breadth of content, highlighting the innovative and original insights or open up new areas. Dissertation should be, under the guidance of an instructor, completed by the master students himself or herself to indicate that the author has the ability to undertake independent scientific

research or to be independently responsible for the specialized technical work.

包含:

(1) 论文主题

研究生入学后,应清楚自己的研究方向,在导师的指导下,参与科学研究。硕士生通常在第二学年通过资格考试后,通过文献收集和阅读,开展研究和实验工作,完成学位论文课题报告,并聘请相关学科专家对课题报告进行评估。完成报告主题的审议后,博士生在导师的指导下制定论文实施方案。关于工作计划的报告和论文题目有三份。一份由监考人员保管,另一份由学生保管,第三份由学院在通过后两周内保管。在论文工作过程中,可以对工作计划进行部分调整,但原则上不允许更改题目。如有特殊原因需要变更职称的,应自行撰写申请书,并由主要导师签署申请意见,由学院研究生办公室备案,并及时重做论文题目报告。

including:

(1) Topics of the report

After enrollment, the master student should know his research direction clearly, under the guidance of the instructor, and participate in scientific research. Usually after passing the qualification exam within the second school year, through the collection and read literature, the master student should carry out research and experimental work, complete the report about topics of dissertation, and employ experts of the relevant disciplines and evaluate the report of the topics. After the passage of the deliberations of the topics of the report, the master student prepares the implementation plan of thesis under the guidance of the instructor. Topics of reports and papers on the work plan are triplicate. One is saved by the supervisor, another by the student, and the third by College within 2 weeks after the passing. In the process of dissertation work, allowing for partial adjustment of the work plan, however, in principle, the titles are not allowed to change. If there are special reasons that support to change the title, candidate for master degree should write an application himself or herself, and signing an opinion on the application by your major supervisor, recorded by the College Graduate Office, and timely redo report about topics of dissertation.

(2) 新颖性

为了提高我校硕士生素质,确保硕士论文创新,进一步加强对硕士论文的管理,对硕士论文实施选题查新。主要主管的指导下,硕士生在学校应该检查主题上的新奇科技项目咨询部门或其他结果的新中心,检索主题的研究动态、水平,和国内外研究方法,填写并

提交新颖的报告。

(2) Novelty

In order to improve the quality of the master students in our school, ensure the innovation of master's thesis further strengthen the management of the master degree theses, topics of master's Dissertation implement check of Novelty. Under the guidance of the major supervisor, the master's candidate should check the Novelty on the topics in School science and technology project consulting department or the new center of other outcomes, retrieve topics of the research dynamics, horizontal, and research methods at home and abroad, and fill out and submit the novelty report.

(3) 论文阶段汇报

硕士研究生的导师对硕士论文工作进行定期检查。在硕士论文工作的中期，硕士生应提交研究报告。评估组(含导师)由学院 5 名以上副教授或同等专业技术职务的专家组成，明确负责人，召开公开报告会。通过对硕士生阶段论文工作的全面描述，评估组成员提出了问题，并指出了存在的问题和改进建议。汇报会需要做详细的记录，汇报会结束后，根据评审小组讨论后给出的评审结果，填写《研究生研究工作评估表》。然后硕士生将其交给评估小组签字。测试结果作为授予学位的参考材料之一。

(3) Thesis stage research report

The major supervisor of master student should carry out regular checks on the master dissertation work. In the medium-term of master's thesis work, master student should stage research report. Assessment team (including the supervisor) are organized by more than five associate professors of the colleges or experts of equivalent professional and technical positions, specify the person in charge, and hold Public report meetings. Through the full description of the work of stage thesis by master students, members of the assessment team question, and point out the problems and suggest improvements. The report meetings are needed to make a detailed record, and when the report meetings end, appraisal forms for postgraduate research work will be filled out, based on reviews and results given by the assessment team after discussion. Then the master student hands it over to assessment team for signature. Test results are served as one of the reference materials for degree-granting.

(4) 研讨会

硕士生研修班每学期1~2次, 合计不低于6次; 座谈由导师、咨询委员会成员(或相关学科的部分教师和研究生)及候选人参加; 座谈会公开举行, 候选人对其研究领域的文献或论文进行综述, 其他成员提出问题并给予指导; 学术报告会结束后, 硕士生填写学术报告会概况表, 与学术报告会报告一起上交审核。

(4) Workshop

Seminar would be held for doctoral students 1 ~ 2 times per semester, the total number should be at least six times; Symposiums are participated in by the supervisor, the member of the Advisory Committee (or some teacher and graduate students of related discipline) and the candidate; Symposiums are held in public, the candidate reviews literatures in his research field or report on his thesis in progress, and other members question and give guidance; After the symposium, doctoral student fills in the seminars profile table, together with the report of symposium, hands it over for auditing.

(5) 论文预答辩

为提高硕士学位论文质量水平, 本学科硕士学位论文应实行预答辩制度。硕士论文预答辩是有效审核硕士论文工作的重要环节, 是硕士论文质量的保证。

(5) Papers pre-defense

To improve the quality of the level of doctoral thesis, master dissertation of the discipline should implement the pre-defense system. Master's dissertation pre-defense is an important part of effectively checking the master's thesis work, ensuring the quality of master's thesis.

(6) 论文评审和答辩

申请硕士学位的申请人工作, 必须满足和严格按照“中华人民共和国学位条例暂行实施办法”中的要求, 以及采用的学位委员会授予学位工作规则和其他有关文件和法规。

(6) Paper reviewers and respondents

Work of Application for the respondent of the master's thesis, reviewing and defense should be strictly in accordance with the requirements of the "Interim Implementation Measures of the Regulations Concerning Academic Degrees of the People's Republic of China", as well as adopted by the Academic Degrees Committee of the degree-granting work rules and other related documents and regulations.

八、其他要求

Other Requirements

研究生必须在第二学期结束前开始他们的论文研究项目。论文研究的中期测验定于第四学期进行。以下与您的研究生学习相关的重要日程请到江苏大学海外教育学院(OEC)查询。一般而言,硕士生须于第二学期结束前提交一份研究计划,并由研究生谘询委员会接受。还应准备一份已完成的课程和拟满足学校要求的课程清单。学生应召开谘询委员会会议,讨论其建议及课程作业。

Graduate students are required to initiate their thesis study projects prior to the end of the second semester. The medium-term examination for thesis study is scheduled in the fourth semester. Other following important schedules relevant to your graduate study could be found from the Overseas Education College (OEC) at Jiangsu University. In general, a Master's student is required to have a research proposal and a plan of study accepted by his or her Graduate Advisory Committee by the end of the second semester of study. A list of completed courses and those proposed to meet school requirements should also be prepared. A meeting of the Advisory Committee should be convened by the student to discuss his/her proposal and course work.

每名研究生须在相关国际期刊上发表至少一篇研究论文,方可申请论文答辩。论文必须证明对研究技术的掌握,进行原创和独立研究的能力,以及形成结论的技能,扩大或修改公认的观点。

Every graduate student is required to publish at least one research paper in a relevant INTERNATIONAL JOURNAL prior to being eligible to apply a dissertation defense. The thesis must demonstrate a mastery of research techniques, ability to perform original and independent research, and skill in formulating conclusions that enlarge upon or modify accepted ideas.

以上成绩取得需以江苏大学为第一单位。

The above achievements are required to be with the first unit of Jiangsu University.

附、需阅读的主要经典著作和专业学术期刊目录

Appendix: Catalogue of professional journals to be read

一、主要经典著作

Main Classic works

1. Z. B. Szabo and D. Kallo, Contact Catalysis, Elsevier Amsterdam, 1976
2. G. C. Bood, Heterogeneous Catalysis, Principle and Applications, Oxford Uni. Press, 1974

3. The Structure of Materials. Allen S. M. and Thomas E. New York: John & Sons. Inc., 1998
4. The Physics and Chemistry of Solid. Elliot S.R. New York: John & Sons. Inc, 1998

二、主要外文专业学术期刊

Major foreign academic journals

1. AIChE J
2. Chem. Eng. Sci.
3. Ind. Eng. Chem. Res.
4. Chem. Eng. J.
5. Chem. Rev.
6. J. Am. Chem. Soc.
7. Angew. Chem. Int. Ed.
8. Chem. Soc. Rev.
9. Chem. Commun.
10. Dalton Trans.
11. Inorg. Chem.
12. Chem. Eur. J.
13. J. Catal.
14. Appl. Catal. A, B
15. J. Phys. Chem. A, B,