化学学科（070300）博士研究生
培养方案（留学生）
Academic Doctoral Candidates in Chemistry (070300)
[Chemistry]

一、领域简介 Introduction

化学学科源于 1959 年由中科院上海分院协助创办的上海科技大学化学系，先后由汪猷、黄耀曾、林国强、蒋锡夔等院士担任系主任或化学化工学院院长，培养了包括林国强、孙晋良和吴明红院士在内的一大批优秀人才，具有深厚的历史底蕴，并在国内外化学界具有重要的影响力。化学学科以秉承学术渊源、瞄准学科前沿、以战略性新兴产业需求和地方经济建设为目标；学科全体教师励精图治、发奋图强、攻坚克难、自强不息，学科各项建设取得快速发展。目前，化学学科最新 ESI 全球排名进入前 1.255‰行列（2022 年 3 月）；最新英国 QS 专业排名位居全球并列 150-200 名（列大陆高校并列第 14 名）；US News 排名第 172 位（大陆高校第 27 位）。

The chemistry discipline of Shanghai University (SHU) originates from the Department of Chemistry of Shanghai University of Science and Technology founded in 1959 and owns deep historical heritages. Several distinguished academicians had served as the dean of the Department of Chemistry or the College of Chemistry and Chemical Engineering, including Prof. You Wang, Prof. Yaozeng Huang, Prof. Guoqiang Lin, and Prof. Xikui Jiang. Many outstanding talents are from the chemistry discipline of SHU, such as academician Guoqiang Lin, academician Jinliang Sun, academician Minghong Wu and so on, which makes SHU’s chemistry discipline has more and more influences on the chemistry field in China and abroad. Based on the academic origin and scientific frontiers, the researches in the Chemistry Discipline aims to meet the need of strategic emerging industries and promote the development of local economy. To accelerate the development of the discipline, all the staff has made great efforts and worked hard to overcame difficulties with unremitting

self-improvements. The SHU's chemistry discipline is competitive worldwide, as can be seen from the following well-known rankings. The SHU's chemistry was ranked in the top of 1.255‰ in the latest ESI (Essential Science Indicators) ranking (March 2022), and was ranked between 150-200 in the latest QS World University Rankings in Chemistry and was ranked 172nd in best chemistry program in US News all over the world (tied for 14th in Mainland, China).

化学学科 2006 年获批化学一级学科硕士学位授权点，2021 年获批化学一级学科博士学位授权点，相关科研平台包括：材料复合及先进分散技术教育部工程研究中心、科技部国家国际科技合作基地、上海市资源环境新材料工程技术研究中心、可持续能源研究院、超分子化学与催化研究中心、量子与分子结构国际中心和创新药物研究中心等，其中“纳米材料化学”为上海市教委第五期重点学科。目前，化学学科已经形成了环境化学、有机化学、无机化学、物理化学四个优势学科方向，在大气污染化学、有机合成化学、纳米材料化学、超分子化学、理论与计算化学和能源化学等领域取得一系列重要研究成果，并在相关交叉学科领域发挥着越来越重要的作用。

In 2006, the chemistry discipline was approved to authorize master degree in chemistry, and in 2021, it was approved to authorize doctoral degree in chemistry. The chemistry discipline includes many research platforms, such as Materials Composites and Advanced Dispersion Technology Engineering Research Center of the Ministry of Education, National International Science and Technology Cooperation base of Ministry of Science and Technology, Engineering Technology Research Center of New Materials for Resources and Environment of Shanghai, Institute for Sustainable Energy, Center for Supramolecular Materials and Catalysis, International Centre for Quantum and Molecular Structures, and Innovative Drug Research Center, among which "Nanomaterial Chemistry" is selected as the fifth phase of key disciplines of the Education Commission of Shanghai. At present, the chemistry discipline has formed four predominant disciplines, including environmental chemistry, organic chemistry, inorganic chemistry, and physical chemistry. A series of important research results have been achieved in various research areas, such as the chemistry of atmospheric pollution, synthetic organic chemistry, nanomaterials chemistry, supramolecular chemistry, theoretical and computational chemistry, energy chemistry

and so on. These results are also playing more and more significant in in related interdisciplinary fields.

化学学科现有专任教师 100 余名，教授 40 余名，拥有包括中国工程院院士、美国科学院院士、加拿大三院院士、国家杰出青年基金获得者、国家海外高层次人才、国家百千万人才计划、优秀青年基金获得者、东方学者、曙光学者等在内的高层次人才队伍，并有四位教师连续入选全球高被引科学家。近年来，先后承担了包括国家重点研发计划和国家自然科学基金重点基金项目在内的国家级课题 100 多项，获得包括上海市自然科学一等奖在内的部省级成果 8 项；在 Nature、Nat Chem、PNAS、Chem Rev、Chem Soc Rev、J Am Chem Soc、Angew Chem Int Ed、Adv Mater, Environ. Sci. Technol.等 SCI 期刊上发表论文 600 篇以上；被 ESI 收录的 TOP1%文章 25 篇，热点文章 5 篇；发明专利授权 150 多项；其中 20 多项研究成果实现产业化，取得了良好的社会效益和经济效益。

There are currently more than 40 full professors in 100 full-time faculty members in the chemistry discipline, with the title of member of Academician of Chinese Academy of Engineering, member of the United States National Academy of Sciences, member of the Academy of Science of the Royal Society of Canada, member of the Engineering Institute of Canada, member of the Canadian Academy of Engineering, winner of the National Science Fund for Distinguished Young Scholars, winner of National High Talents Oversea, winner of National Millions of Talents Project, winner of the Excellent Young Scientists Fund, winner of Shanghai Dongfang Scholar, Shanghai Shuguang Scholar, etc. Four scholars were selected as Highly Cited Researchers in succession. Recently, the chemistry discipline has undertaken more than 100 national-level projects including the National Key R&D Program and the National Natural Science Foundation of China, and won 8 ministerial and provincial achievements including the first prize of Shanghai Natural Science Award. More than 600 papers were published in SCI journals, such as Nature, Nat Chem, PNAS, Chem Rev, Chem Soc Rev, J Am Chem Soc, Angew Chem Int Ed, Adv Mater, Environ. Sci. Technol etc. Among them, 25 papers selected as the TOP1% and 5 papers selected as hot paper were included in ESI. More than 150 invention patents are authorized, including 20 research results have been industrialized and achieved good social and economic benefits.

化学学科重视国际间的交流和合作，并与美国德克萨斯大学奥斯汀分校、英国拉夫堡大学、英国女王大学建立了紧密的合作关系。毕业研究生除直接就业外，有大量研究生赴美国、德国、法国、英国、荷兰等地著名大学深造，或在中科院、上海交大、清华大学和复旦大学等院校攻读博士学位。目前，除了国家奖学金、校长奖学金、蔡冠深奖学金、宝钢奖学金等，本学科还设立了一系列针对优秀研究生的资助项目。

The chemistry discipline attaches great importance to international communication and cooperation, and has established close cooperative relationships with the University of Texas at Austin, Loughborough University, and Queen's University. In addition to direct getting a job from industry, a large number of graduate students got admitted to famous universities in the United States, Germany, France, the United Kingdom, the Netherlands and other places abroad for further study, or did their Ph.D. programs in domestic institutions or universities, such as the Chinese Academy of Sciences, Shanghai Jiaotong University, Tsinghua University, Fudan University and so on. At present, in addition to the National Scholarship, President's Scholarship, Cai Guanshen Scholarship, Baogang Scholarship, etc., the discipline has also established a series of funding programs for outstanding graduate students.

二、学位标准 Degree Standards and Requirements

化学专业培养的科学学位博士研究生应掌握本学科领域坚实宽广的基础理论和专业知识，对所研究领域的前沿和发展有较深入的了解，具备生物-材料-能源-环境等多学科交叉和渗透的能力，具有较强的外语与计算机运用的能力，并能独立开展科学研究和撰写科学研究论文；能熟练地阅读本专业的外文文献资料，有较高的外语写作水平和国际学术交流的能力，能够胜任事教学、科研或相关科学实践工作。

Doctoral candidates trained in chemistry major should master basic theoretical knowledge. They should also have an in-depth understanding of the frontiers and developments in the research field. They must possess the ability to cross and penetrate multiple disciplines such as biology-materials-energy-environment, good computer skills, and be able to carry out scientific research and write scientific

research papers independently. Strong English reading, writing and communication skills. Be competent in teaching, research or related scientific practice.

三、培养目标 Objectives

（1）遵纪守法，品德良好，学风严谨，身心健康，具有较强的探索精神，具有较强的事业心和责任感。

Doctoral students should abide by laws and disciplines. They also should have good morals, rigorous study style, physical and mental health, strong spirit of exploration, strong sense of professionalism and responsibility.

（2）具有良好的科学精神和严谨的科学态度，对化学研究有浓厚的兴趣，愿意献身化学研究事业。

Doctoral students should have good scientific spirit and rigorous scientific attitude with strong interest in chemical research, and is willing to devote themselves to chemical research.

（3）掌握坚实的基础理论和系统的专业知识，具有良好创新精神和创新能力、能够胜任化学学科及相关领域教学和科学研究工作，德智体美劳全面发展。

Doctoral students should master the basic theory and professional knowledge with the spirit and ability of innovation, and be competent in teaching and scientific research in chemistry and related fields, and have all-around development of moral, intellectual, physical, aesthetics and labor education.

（4）严格遵守学术规范和学术道德，自觉抵制研究工作中急功近利、粗制滥造、损人利己等不良风气，自觉维护学术事业的纯洁性和严肃性。

Doctoral students have to strictly abide by academic norms and academic ethics, and consciously resist the bad habits of quick success, shoddy production, selfish in research work, and consciously maintain the purity and seriousness of academic careers.

（5）学习创新创业理论，培养创新创业能力，增强创新创业的基本技能。

Doctoral students are required to learn the theory of innovation and

entrepreneurship, and accept the training to enhance the basic skills of innovation and entrepreneurship.

（6）能熟练运用计算机及化学软件，具有独立进行科学研究的能力，或运用专业知识合作解决实际问题的能力。

Doctoral students are required to operate computers and chemical softwares skillfully, and have the ability to conduct scientific research dependently, or the ability to use professional knowledge to cooperate and to solve practical problems.

（7）较为熟练地使用一门外语，有良好的外语表达能力，能阅读本专业的外文文献，并具有撰写外文科研论文的能力。

Doctoral students are required to be proficient in at least one foreign language, and they are expected to use the language to read literature and write scientific research papers for the major.

四、学习方式及学习年限 Length of Study

本专业攻读博士学位的学制 4 年，博士研究生最长学习年限不超过 8 年。

The length of degree for Doctoral candidates usually takes in 4 years, the maximum length of schooling for Doctoral candidates should not exceed 8 years.

五、培养方向 Training Direction

（1）环境化学

（2）有机化学

（3）无机化学

（4）物理化学

（1）Environmental Chemistry

（2）Organic Chemistry

（3）Inorganic Chemistry

（4）Physical Chemistry

六、语言要求 Language Requirements

留学生需要具有中文学习交流的能力，能听懂中文课程，在听说读写方面满足毕

业要求。

International students need to have the ability to learn and communicate in Chinese, understand Chinese courses, and meet the graduation requirements in listening, speaking, reading and writing.

七、培养方式及导师要求 Training methods and Mentor requirements

培养方式为导师个人指导或导师团队指导相结合。导师需要有海外学术交流访问经历。

The training method is a combination of individual mentoring or advisor team guidance. Advisors need to have overseas academic exchange visit experience.

八、课程设置及学分要求 Courses and Credits Requirements

（1）已取得硕士学位继续攻读博士学位的学生需修满 22 学分，其中公共课 7 学分、本专业的专业课不低于 8 学分、创新创业课不低于 2 学分、学术规范与写作 2 学分、学术研讨课 3 学分。第一学年须修完除学术研讨课之外的所有其它课程。课程详细设置请查看附表。

（2）为提高博士生的学术水平，要求在攻读期间参加化学学科主办学术报告 30 次以上。

（3）免修条款：根据学校规定，本系留学生原则上应按照入学时培养方案规定的课程进行学习，但入学前三年内已修习过博士生培养方案中相同课程且成绩合格的研究生；或研究生因退学等学籍变动等原因中止学业后五年内重新入学时，培养方案中的课程在原单位已经修读合格并获得学分的，可以申请免修该门课程并认定学分。申请免修课程须填写《上海大学研究生课程学习免修单》并提供原考试成绩单，经导师签署意见，学院批准后报研究生院审核。研究生申请认定的课程学分不得超过培养计划课程总学分的 50％；培养方案中明确不允许校外修读的课程不予认定。

（1）Students who have obtained a master's degree and continue to study for a doctoral degree are required to have 22 credits, including 7 credits of public courses, no less than 8 credits of professional basic courses, no less than 8 credits of professional elective courses, no less than 2 credits of innovation and

entrepreneurship courses, 2 credits of Academic Criterion and Scientific Paper Writing，and 3 credits of academic seminar courses.

In first year, all courses are required to be completed (except academic seminars). Please refer to the attached table for the detailed course information.

（2）Besides broad and demanding curriculums for doctoral studies, we expect students to participate in academic seminars for more than 30 times during their study period and get actively involved in research work besides their primary learning period.

(3) Waiver clause: International students in this department should, in principle, study according to the course prescribed by the training program at the time of admission, but have completed the same course and qualified graduate students who have completed the same course in the doctoral training program within three years of admission；or if the graduate student re-enrolled within five years after the suspension of admission due to changes in academic status such as withdrawal, the course in the training program may apply for exemption from the course and be recognized. Application for exemption courses must fill out the "Shanghai University Graduate Course Study Waiver Form" and provide the original test transcript, after the tutor signed the opinion, the college approved and reported to the Graduate School for examination. The course credits for graduate students applying for recognition shall not exceed 50% of the total credit scored in the training program courses

九、培养计划制定 Make Training Plan

攻读博士学位的研究生入学后，应在导师指导下按照本学科当年度培养方案的要求制定培养计划，根据学位要求和培养目标，制订培养计划，并在入学后 1 个月内登录研究生管理系统，输入培养计划。同时，打印的纸质版培养计划报学院（学科）学位分委员会审核批准后，由学院统一备案留存。

After the enrollment, doctoral candidates are expected to make their own study plans under the guidance of their academic advisors while following the requirements of the degree program. Students are expected to log into the online graduate students system and input their study plans within one month of the enrollment. Meanwhile,

the printed version of their study plan will be submitted to the academic degree sub-committee of the school (discipline) for further approval, and then sent to the graduate school center.

十、必修环节 Compulsory

（1）课程考核。（考核时间、考核要求与结果使用）

（a）所有课程应在入学后的一年内修完（学术研讨课入学后八个学期内修完），要求每门成绩不得低于 60 分。所选专业课程应至少有一门为专业基础课，成绩低于 60 分为不及格，不及格的课程必须重修或经批准后改选同类课程。课程考试及格但低于 75 分也可申请重修。重修通过后方可进入学位论文开题报告和中期考核环节。

（1）Course assessment. (Time, requirements and results)

（a）All courses should be completed within one year of admission (within eight semesters of admission of academic seminar courses), and the scores of each course should not be lower than 60 points. If the grade is below 60, it is considered as a failure, and the failing course must be retaken or re-selected after approval. Students who pass the course but score less than 75 points can also apply to retake the course.

（2）学位论文开题报告与中期考核。（考核时间、考核要求与结果使用）

(a) 选题：选题应根据专业特点，着重选择对于科学研究和经济建设有应用价值的课题。课题要具有先进性，课题份量和难易程度要适当，并尽量结合国家、部委和上海市的科研任务选题。

(b) 开题条件：应修满培养计划规定的学分和递交 5000 字以上文献阅读专题报告及 2－3 篇学术讨论会小结报告并经导师同意。至少有一篇 SCI 学术论文已系统完成，方可申请开题。`

(c) 开题要求：在入学一年半内（博士生）或三年内（硕博连读生）开题。内容包括文献综述、选题意义、研究目标与难点、预期成果和可能的创新点等部分。引用文献不少于 40 篇。

(d) 开题评审：组织集中开题并进行评议，评议通过后方可开题。对评议不通过者给予警告，三个月后可复审一次，仍不通过者，按学籍管理有关规定给

予处理。

(d.1) 实施学位论文学科集中开题制度。成立学科学位论文开题小组，负责组织本学科内研究生的学位论文集中开题工作。

(d.2) 实行导师回避制度。学科学位论文开题小组成员一般不少于 5 人，其中校外专家不少于 2 人。

(d.3) 严格分流淘汰。对参加学位论文集中开题研究生的考核结果进行排序，并严格按照考核要求对不合格的研究生进行处理。

（e）中期考核：在论文课题研究中期，在开题报告计划的范围内，对论文进展情况进行阶段性报告和中期考核，以保证论文按进度完成。中期考核需组织 7 名一级学科高级职称（至少 4 名教授）的教师听取进展报告并进行评议。对评议不通过者给予警告，半年后可复审一次，仍不通过者，按学籍管理有关规定给予处理。中期考核答辩 1 次不合格的学生进入观察名单，中期考核 2 次答辩不合格的学生进入分流淘汰名单。

（2）Thesis proposal report and mid-term assessment. (Time, requirements and results)

（a）Select topic: Select topics should be based on professional characteristics, focusing on the selection of scientific research and economic construction. The subject should be advanced, the weight and difficulty of the subject should be appropriate, and try to combine the national, ministerial and Shanghai scientific researches.

（b）Opening conditions: the credits stipulated in the training plan and the submission of 5000 words or more literature reading special reports and 2-3 colloquial summary reports and the consent of the tutor. At least one SCI academic paper has been systematically working before applying for an opening.

（c）Opening requirements: within one and half years of admission (phD) or three years (Master-PhD crossover students) open the question. The content includes literature review, the significance of selected topics, research objectives and difficulties, expected results and possible innovation points. No less than 40 citations. Graduate students who fail to complete the proposal within the normal length of study will be given warning, delay or triage and elimination.

（d）Opening review:　A committee will be organized before the opening of the

topic. A warning shall be given to those who fail the review, and may be reviewed once after three months, and those who fail to pass it shall be dealt with in accordance with the relevant provisions of the administration of academic registration.

(d.1) A subject thesis opening group should be set up.

(d.2) The group should have more than 5 members in the absence of the PhD's advisor. The member from outside SHU should be at least 2.

(d.3) The examination results of graduate students participating in the degree examination papers shall be sorted centrally, and the unqualified graduate students shall be dealt with in strict accordance with the examination requirements.

（e）For those who fail to pass the evaluation, the subject group shall uniformly organize the re-evaluation within three months. Students who fail to meet the requirements of each required part will be given academic warning, postponement, diverting elimination or elimination. The policy should be implemented according to the related rules of the Department of Physics.

(3) 国（境）外学术交流

博士生在预答辩之前至少有一次国（境）外学术交流的经历；或者参加本学科高水平国际会议（Workshop 主题研讨会）；或者前往国际知名学府作为期 3 个月以上的短期访学。

(3) Before the pre-defense, doctoral candidate students should have at least one academic experience abroad, or participate in a high-level international conference (Workshop Themes) in this discipline, or have a short-term visiting study for more than three months in a well-known international institution.

（4）学位论文答辩。（考核时间、考核要求与结果使用）

（a）前提条件：每位博士生在规定的学习年限内修完教学培养计划规定的内容，完成课程学习和必修环节，成绩合格者，在完成学位论文并经导师认可，可进行预答辩。

(a.1) 实施集中预答辩制度。成立学科学位论文预答辩委员会，负责组织本学科内研究生的学位论文集中预答辩工作。

(a.2) 实行导师回避制度。学科学位论文预答辩委员会成员一般不少于 5 人，其中校外专家不少于 2 人。

(a.3) 严格分流淘汰。对参加学位论文集中预答辩研究生的考核结果进行排序，并严格按照考核要求对不合格的研究生进行处理。

（b）预答辩通过后论文送盲审，双盲通过后，可由校内外同行专家进行评审、答辩。 对不合格者可由学校或院学位委员会做出不授予学位或延期补充论文重新进行答辩的处理。

（c）通信评审和答辩：发送 3 名正高职称专家进行评议，其中必须有外单位专家。经同行专家评议后，若 2 名专家评阅人均不同意答辩，此次申请无效，申请人需修改论文后重新申请。若 1 名专家评阅人不同意答辩，经导师与学院同意后可以聘请 1 名专家评阅人，若再聘专家评阅人同意答辩后，则同行专家评议通过；如再聘评阅人不同意答辩，则此次申请无效；全部专家同意答辩后，按专家意见修改论文，组织答辩。

（d）研究生在学习期间，须达到学科规定的研究生科研成果量化指标，否则可由学校或院学位委员会做出延期授予学位的处理。

（e）答辩委员会由 5（或 7）名正高职称专家组成，其中校外专家须超过半数，论文评阅人要小于半数。

（4）Defense of dissertation. (Time, requirements and results)

（a）Prerequisites: each PhD candidate within the period of study who has completed the courses and compulsory parts, upon completion of the dissertation and approved by mentor, after defense and double blind can be conducted by face-to-face peer expert review. Graduation certificates will be issued to those who pass the defense. Those who meet the requirements of degree conferment stipulated in the detailed rules for the implementation of degree conferment of Shanghai University may apply for the corresponding doctoral degree.

(a.1) A pre-defense committee with at least 5 experts in the absence of the PhD’s advisor. The member from outside SHU should be at least 2.

(a.2) There must be two experts from institute other than Shanghai University.

(a.3) The pre-defense results of graduate students shall be sorted centrally, and the unqualified graduate students shall be dealt with in strict accordance with the pre-defense requirements.

（b）After the students pass the pre-defense reviewing, the dissertation shall be subject to "double-blind" evaluation in accordance with the regulations of the

academic degree office of the university. For those who fail to pass the examination, the university or school academic degree committee may decide not to grant the degree or postpone the defense of the supplementary dissertation.

（c）Review Communication and Defense: 3 experts with professional titles or above shall be sent for evaluation, among which there must be experts from institute other than Shanghai University. After the peer-review, if neither of the two reviewers agrees with the defense, the application shall be invalid, and the applicant shall revise the paper and apply again. If one expert reviewer does not agree with the defense, one expert reviewer can be hired upon the approval of the tutor and the college. If another reviewer agrees with the defense, peer expert review will be passed. If the reviewer does not agree with the defense, the application will be invalid. After all the experts agree to the defense, modify the paper according to the expert's opinions and organize the defense.

（d）During the study period, the graduate students shall meet the quantitative indexes of scientific research achievements stipulated by the discipline; otherwise, the university or the academic degree committee of the school may postpone the granting of degrees.

（e）Defense of dissertation: The committee should consist of 5 （or 7）experts with full professor titles, among which there must be 3 （or 4） experts from institute other than Shanghai University. The peer-review member should be less than half of the committee.

十一、学位论文 Paper Work

本专业的博士生的科学研究工作应在导师的指导下进行，指导老师有责任和义务为所指导的研究生提供必要的科学研究的条件、设施和经费。学位论文的基本要求：

The scientific research of doctoral students of this major should be conducted under the guidance of the supervisor, who has the responsibility and obligation to provide the necessary conditions, facilities and funds for the scientific research of the graduate students. The following are some of the basic requirements of the dissertation:

（1） 论文选题应有较高的理论意义或应用价值。

（2） 论文内容应体现出作者的知识水平及对系统的专门知识的掌握情况。

（3） 论文的结果应有创新性。

（4） 论文的研究方法应体现出科学性。

（5） 论文格式正确、语句通顺、图表清晰、引文准确规范。

（1）The topic reflects theoretical value or application value, and has certain prospects for development.

（2）The content fully demonstrates the author has a solid and broad theoretical foundation and systematic knowledge in physics.

（3）The research theme is clear, the structure is reasonable, the conclusion is distinct, and the logic of analysis and demonstration is rigorous. The results of the paper should contain some innovative findings.

（4）The research method should reflect the methodology of science.

（5）The format of dissertation must be standardized: titles should be concise and focused; Expression of the main body must be fluent, avoid using literary or emotional non-academic words, and typesetting should be neat and standardized; Charts and formulas are standardized; References are complete and standardized.

附表.课程与必修环节

化学学科攻读博士学位研究生课程与必修环节

Doctoral Courses and Compulsory Courses in Chemistry

类别 Course Category	课程编号	课程名称 Course Name	学时 Class hour	学分 Credits	开课学期 Term	备注 Remark
公共平台课	公共平台课作为学校面向全校开设的公共课程，学生可在导师指导下选择公共平台课程列入培养计划，课程学分计入总学分。					
公共课 Public Courses	0CS000027	公共体育 Public Physical Education	20	1	1	
	0LY000001	中国概况 General Situation of China	60	3	3	必修 Compulsory
	0LY000002	综合汉语 B Comprehensive Chinese B	60	3	2	
专业课 Professional Courses	2XBL01301	化学前沿 Frontier in Chemistry	20	2	1	必修 Compulsory
	2XBL01302	现代仪器分析方法 Means of Modern Instruments Analysis	20	2	2	
	2XBL01303	环境催化 Environmental Catalysis	40	4	1	四选一 At least 1
	2XBL01304	现代有机合成 Modern Organic Synthesis	40	4	2	
	2XBL01305	高等结构化学 Advanced Structural Chemistry	40	4	1	
	2XBL01306	缺陷化学 Defect Chemistry	40	4	2	
学术规范与写作课 Academic Standards and Writing Course	7XBL01301	学术规范与写作 Academic Standards and Writing	20	2	2	必修 Compulsory

创新创业课 Innovation and Entrepreneurship Course	4XBL01301	化学与可持续发展 Chemistry and Sustainable Development	20	2	2	必修 Compulsory
学术研讨课 Academic Seminar Course	6CB000001	学术研讨课 Academic Seminars		3		必修 Compulsory
跨专业、学院选修课 Cross-Disciplinary Optional Courses	学生可根据自身情况在导师指导下跨院系、专业选取非本专业课程列入培养计划，课程学分计入总学分。 Under the guidance of supervisors, students can select cross-disciplinary optional courses as part of their program. The course scores will be incorporated into the total academic score.					
补修课 Designated Complementary Courses	根据学生具体情况由导师指定选修硕士生/本科生主干课 2-3 门（不计入总学分） Students are required to select two to three undergraduate courses designated by the supervisors, which will not be incorporated into the total academic score.					
必修环节 Required Steps	课程考核 Course Scores			4		须通过考核后方可进入下一环节 Move to the next step only after confirming the previous step
	论文开题与中期考核 Thesis Proposal and Mid-Term Evaluation			6/7		
	论文预答辩 Thesis Pre-Defense			15		
	论文答辩 Thesis Final Defense			15		