

(082700)核科学与技术学科 2021 级全日制直博研究生培养方案

2021 Full-time Doctoral after Bachelor's Program for Nuclear Science and Engineering

一、基本信息 Basic Information

院系名称 School	机械与动力工程学院 School of Mechanical Engineering	适用年级 Grade	2021 级 2021 Class		
适用专业 Major	核科学与技术 Nuclear Science and Engineering	标准学制 Duration	5 年 5 Years		
学习形式 Study Mode	全日制 Full time				
项目类型 Program Type	学术型 Academic				
培养层次 Program Level	直博生 Doctoral after Bachelor's				
最低学分 Min Credit	40	最低 GPA 学分 Min GPA Credit	19	最低 GPA Min GPA	2.7

二、学科简介 Introduction

上海交通大学核反应堆工程专业始建于 1958 年，是国内首批创建并开展研究生培养工作的专业。1998 年获得“核能科学与工程”联合博士学位授权点，2001 年获批“核科学与技术”一级学科博士后流动站。2006 年增加学科设置、拓宽专业方向，成立了核科学与工程学院。2010 年获批核科学与技术一级学科点。

The discipline of Nuclear Science and Engineering at SJTU originated from the major of Nuclear Reactor Engineering which was established in 1958, and it is among the earliest ones in related field in China. In 1998, the joint doctoral program of "Nuclear Science and Engineering" was set up. In 2001, the first-level post-doctoral research station of "Nuclear Science and Technology" was approved. In 2006, the School of Nuclear Science and Engineering (SNSE) was established by increasing subjects and broadening the scope of specialties. In 2010, it was approved to be the first-level discipline in the field of Nuclear Science and Technology.

核科学与技术学科下设 6 个研究方向：核安全与系统仿真、反应堆热工水力、核燃料循环与材料、核辐射防护与环境保护、核反应堆物理、先进核能系统。本专业具有一支国际化、高水平的师资队伍，共有 25 名专职教师，教授 6 名，其中曙光学者 1 名、优青 1 名，副教授 16 名，所有专业教师均有博士学位，且具有海外经历。

The research fields in SNSE include six research directions: nuclear safety and system simulation, reactor thermo-hydraulics, nuclear fuel cycle and materials, nuclear radiation protection, reactor physics and advanced nuclear reactor systems. SNSE consists of 25 faculty members, and all have doctoral degree and overseas' experience. Among them, it includes 6 Professors (1 Shuguang Scholar, 1 faculty member awarded the National Science Fund for Excellent Young Scholars) and 16 associate professors.

核科学与技术学科重实践、宽基础、严要求，培养学科交叉复合的创新人才。本专业注重对接国家核能发展重大需求，主持了国家“973”项目、国家自然科学基金重点项目、国家重点研发专项和国家科技重大专项课题等十余项，建成“上海市核电工程技术研究中心”和“先进

核能系统热工水力基础研究国际合作基地”等实践平台，形成了研究生培养和科研工作的基础。同时，本学科与美国密西根大学、德国 KIT、日本东京大学、韩国科技大学等世界知名大学建成了国际交流合作平台。

SNSE emphasizes on academic practice, broad foundation and strict requirements to cultivate students to be interdisciplinary, innovative as well as with global vision. In order to satisfy the fast development of nuclear energy application in China, SNSE hosted over 10 national key research projects, including National ‘973’ Project, Key Projects of NSFC, National Basic Research Programs, National Science and Technology Major Projects. Academic practice platforms aiming to graduate education and research work have been established, such as “Shanghai Nuclear Power Engineering Technology Research Center” and “International Cooperation Base for Basic Research on Thermal-Hydraulic of Advanced Nuclear Reactor System”. Meanwhile, SNSE has close international cooperation and develops exchange programs with University of Michigan, Karlsruhe Institute of Technology, University of Tokyo, Korea Advanced Institute of Science and Technology, etc.

三、培养目标 Program Objective

围绕学校研究生人才培养的总体目标，培养数理基础坚实、知识结构宽广，专业领域知识精通，创新能力强、具备社会责任感、具有国际视野和国际竞争力的核工程前沿领域专业人才，能胜任高等教育专业教学、科学研究、技术研发和科技管理等工作。

The postgraduate education objective is focused on nurturing the talents with solid mathematical foundation, broad knowledge structure, high proficiency in a professional field, strong innovation ability, good sense of social responsibility, and global vision and competitiveness in the frontier of nuclear science and engineering. The postgraduates will be qualified for conducting teaching, research and management in universities, research institutions and industries.

学生毕业时应达到：

- 1、具有坚实的数理基础理论知识，宽广的核工程及相关专业基础知识，深入了解学科的进展、动向和最新发展前沿；
- 2、具有敏锐的洞察力，具备对工程科学及技术问题的深入理解和综合分析能力；
- 3、具有独立从事科学研究的能力，并在本学科领域的某一方面理论或实践上取得创造性研究成果；
- 4、至少精通一门外国语，能熟练地阅读本专业外文资料，具有较强的写作能力和国际学术交流的能力；
- 5、具备优秀的学术素养、职业道德和社会责任感。

After graduation, you will:

1. Have the solid mathematical foundation and broad knowledge in nuclear engineering and related areas with deep understanding of the progress, trends and latest development of the discipline;
2. Have the keen insight, and be equipped with the comprehensive analytical skills for solving the engineering scientific and technical problems;
3. Be able to engage in scientific research independently and get creative achievements in a specific aspect of theory or practice in the discipline;
4. Show proficiency in at least one foreign language, read foreign language literature of your major fluently, and have good skills in writing and international academic communicating;

5. Have excellent academic accomplishment, professional ethics and social responsibility.

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

全日制直博生采用全日制学习、导师负责制培养模式。

学制为五年。未能按时完成学业者，经申请批准后其学习年限可适当延长，最长可以延期至七年。

Full-time Doctoral after Bachelor's Program students are tutored full-time by supervisors.

The length of Full-time Doctoral after Bachelor's Program is 5 years. Students who fail to complete the program within 5 years could apply for extension, with a maximum length of 7 years upon approval.

五、课程学习要求 Course Requirement

全日制直博生，课程总学分≥40 学分，总学分上限为 60 学分。其中 GPA 统计源的课程≥19 学分，必须选择一门全英文课程。

Full-time Doctoral after Bachelor's Program. Minimum credits: 40 credits, including at least 19 credits from GPA courses. One English-teaching course required.

1. 公共基础课程 12 学分

General Courses, 12 credits.

a) MARX7001 中国马克思主义与当代，2 学分，必修

MARX7001 Marxism in China, 2 credits, compulsory.

b) MARX6003 自然辩证法概论，1 学分，必修

MARX6003 Dialectic of Nature, 1 credit, compulsory.

c) FL6001 学术英语，2 学分，必修

FL6001 English for Academic Purposes, 2 credits, compulsory

d) GE6001 学术写作、规范与伦理，1 学分，必修，院系开课

GE6001 Academic Writing, Norms and Ethics, 1 credit, compulsory, offered by ME.

e) 数学课，6 学分，必修

Mathematics, 6 credits, compulsory.

2. 专业前沿课：GE6011 学术报告会，1 学分，必修

Frontier Course.

GE6011, Academic Seminar, 1 credit, compulsory.

3. 专业选修课：公共前沿选修课，至少 1 学分

Elective Courses: Public frontier elective course, Minimum credits 1 credits.

4. 统计如下：

Summarized as below.

课程类别 Course Type	学分要求 Required Credits	门数要求 Required Courses	GPA 学分要求 Min GPA	备注 Note
公共基础课 General Courses	12	6	≥19	
专业选修课 Elective Courses	≥1	NA		跨学科选课不超过 2

专业前沿课 Frontier Courses	1	1		门,且仅作为非 GPA 统计源课程。 No more than 2 interdisciplinary courses can be selected, which are counted as non-GPA course.
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六、培养过程要求 Training Requirement

(一) 培养过程环节要求:

Requirements for Training Process:

资格考试: 第 3 学期完成,不能晚于第 5 学期(含补考)。资格考试通过后方可申请开题。补考仍不通过者,经学院审议后进入分流淘汰程序。

PhD Qualification Examination: The examination will be held in the 3rd semester and no later than the 5th Semester (including make-up exams). Students can apply for a proposal only after passing the qualification examination. Those who still do not pass the make-up examination will enter the diversion and elimination procedure after the examination by the college.

直博生的资格考试由学院组织,考试形式为:闭卷、笔试,与硕博连读生一起进行。

The qualification examination for Full-time Doctoral after Bachelor's Program students shall be organized by school (close-book written examination). The examination is conducted with the combined master and doctor degree students.

考试内容: 选取 3 门专业基础课进行考试

Examination content: Choose three major fundamental courses for the examination.

开题报告: 不晚于第 6 学期前进行。开题报告要求就学位论文选题的科学根据、目的意义、研究内容、预期目标、研究方法和课题条件等做出论证。开题报告的文献阅读量应不少于 50~100 篇。

Dissertation proposal: Dissertation proposal will start no later than the 6th semester, which requires an argument on the scientific basis, purpose and significance, research content, expected goals, research methods, and project conditions of the intended dissertation topic. Students should read no less than 50 to 100 journal papers of the related topic during preparation.

直博生的论文开题由学院按学科统一组织。首次开题不通过者,可申请二次开题;两次开题均不通过者,经学院审议后进入分流淘汰程序。

Dissertation proposal is organized by school. Anyone who fail the defense twice will enter the shunt elimination program after school's deliberation.

年度考核: 开题报告通过后,每自然年进行一次。申请预答辩之前须至少参加一次学院统一组织的年度考核并且考核结果为通过。最晚在第 8 学期结束前完成首次年度考核。开题报告通过不满半年者可不参加当年年度考核。未按期在第 8 学期结束前完成首次年度考核者,第 9 学期起不予以注册,且导师记录博士生培养负面清单 1 次。参加学院统一组织的年度考核次数不做限制。具体办法参照《机械与动力工程学院博士生年度考核管理办法》执行。

Annual progress report: After completion of the dissertation proposal, annual progress reports evaluation will be held every year. Before applying for the dissertation pre-defense, the student must attend at least once organized by the school and pass. The first annual progress report must be completed by the end of 8th semester at the latest. Those who pass the dissertation proposal for less than half a year may not participate in the annual progress report. Those who fail to complete the first annual progress report before the end of the 8th semester will not be registered from the 9th semester, and the supervisor will record the negative list for the cultivation of Ph.D. students once. There is no limit to the number of annual progress report organized by the school. Please refer to Administrative Measures for Annual Progress Report of Ph.D Students of School of Mechanical Engineering for specific measures.

论文预答辩：参加学院统一组织的年度考核且结果为“优秀”或“良好”者，可申请预答辩。申请者最早可于年度考核通过后的下一学期、正式答辩前的三个月提出预答辩申请。预答辩不通过者不能进入后续博士学位申请流程。

Dissertation pre-defense: Those who have participated in the annual progress report organized by the school and the result is "excellent" or "good" can apply for the pre-defense. The applicant may, at the earliest, submit an application for pre-defense in the next semester after passing the annual progress report and three months before the formal defense. Those who do not pass the pre-defense cannot enter the subsequent doctoral degree application process.

论文答辩：在第 10 学期前完成（鼓励条件成熟情况下尽早完成，但不早于第 8 学期），未完成者最多可延期至 14 学期。答辩由学科组织，答辩前将由学院督导进行形式审查，对发表小论文不合格、盲审成绩过低等情况将不予审核通过。

Dissertation Defense: Students are required to pass the dissertation defense before the end of the 10th semester (Students are encouraged to complete as early as possible, but no earlier than the 8th semester.). Students could apply for extension and should complete the dissertation defense before the end of the 14th semester. The dissertation defense is organized by discipline. Before the defense, a routine review will be conducted by the school. Anyone who does not meet the graduation requirements or fails the blind review shall not be approved for dissertation defense.

（二）学术写作与交流要求

Requirements for Academic Writing and Communication

1、至少精通一门外国语，能熟练地阅读本专业外文资料，具有较强的写作能力，须有以排序第一作者在国际重要学术期刊发表与博士学位论文研究工作密切相关的研究性学术论文的经历。国际重要学术期刊的具体认定办法详见七“学术成果要求”。

Students should be proficient in at least one foreign language and be able to read foreign language materials in their major fluently. With strong writing ability, the student should have the experience of publishing research academic papers that are closely related to the research work of their doctoral dissertation in important international academic journals as the first author. For specific identification methods of important international academic journals, please refer to seventh part "Requirements for Academic Achievements".

2、应具备国际学术交流的能力，在读期间必须在高水平国际学术会议上以口头报告形式开展学术交流至少 1 次，且学术交流的内容须与博士学位论文研究工作密切相关。交流形式等具体要求详见《上海交通大学关于博士研究生参加学术交流的规定》。高水平国际学术会议的具体认定办法详见七“学术成果要求”。

Students should have the ability to international academic communication. During the study period, students must have at least one academic communication in the form of oral presentation in high-level international academic conferences, and the content of academic communication must be closely related to the research work of doctoral dissertation. Please refer to the *Regulations of Shanghai Jiao Tong University on the Participation of Ph.D. Students in Academic Exchange* for the detailed requirements on the form of exchange. The specific identification methods of high-level international academic conferences are detailed in the seventh part "Requirements for Academic Achievements".

七、学术成果要求 Requirements for Academic Achievements

博士学位论文的创新成果是评价学位论文水平的重要参考，必须是以学位申请人为主在攻读博士学位期间取得，且与学位论文内容密切相关。

The innovative achievements of the doctoral dissertation are an important reference to evaluate the level of the dissertation, which must be obtained by the degree applicants during their doctoral study and closely related to the content of the dissertation.

用于申请博士学位的学位论文中必须包含不少于三项以申请人为主要完成人并以上海交通大学为第一完成单位的创新性成果。创新性成果的主要完成人一般应为成果第一完成人，如果第一完成人是申请人的博士生导师且申请人排序第二，则申请人也认定为主要完成人。

The dissertation used for the Ph.D degree application must include at least three innovative works with the applicant as the principal composer and Shanghai Jiao Tong University as the first institution. The principal composer of the innovative achievement shall generally be the first author of the achievement. If the first composer is the Ph.D supervisor of the applicant and the applicant ranks second, the applicant shall also be identified as the principal composer.

博士学位论文的创新性成果应该具有重要的理论或工程应用价值，具体展现形式包括：

The innovative achievements of the Ph.D dissertation should have important theoretical or engineering application value, and the specific manifestation forms include:

(1) 发表在国际重要学术期刊或高水平国内学术期刊上的研究性学术论文。其中，国际重要学术期刊是指 SCI 刊源期刊，但不包含按《机械与动力工程学院不推荐 SCI 期刊认定办法》认定的不推荐期刊；高水平国内期刊是指《高质量科技期刊分级目录》相关领域 T1/T2 档核心期刊。国际重要学术期刊与高水平国内期刊认定以论文发表或录用当年为准认定。

Research academic papers published in important international academic journals or high-level domestic academic journals. The important international academic journals refer to the SCI Journals, but do not include the non-recommended journals identified according to the *Measures for the Recognition of Non-recommended SCI Journals by the School of Mechanical Engineering*. High-level domestic academic journals refer to the related fields of T1/T2 core periodicals in the *Classification Catalogue of High-quality Sci-Tech Journals*. The accreditation of important international academic journals and high-level domestic journals shall be subject to the year when the paper was published or accepted.

(2) 发表在高水平学术会议的会议论文或者口头报告且能提供相应证明材料。高水平学术会议包括本学科公认的国际性学术组织主办的系列专业性学术会议或《上海交通大学资助研究生参加国际会议项目-重要国际会议目录》中的会议。口头报告需提供会议录用摘要证明。如果学术会议论文或口头报告学术贡献与发表期刊论文相同，则认定为一项成果。

Conference papers or oral presentations presented at high-level academic conferences with supporting materials. High-level academic conferences include a series of professional academic conferences hosted by recognized international academic organizations within the discipline or conferences listed in the *International Conference Program Sponsored by Shanghai Jiao Tong University - List of Important International Conferences*. Oral presentation should provide proof of acceptance summary. If the academic conference paper or oral presentation has the same academic contribution as the published journal paper, they will be considered as the same achievement.

(3) 获得授权的重要发明专利且能提供相关实施应用证明材料。

The important invention patent that has been authorized and can provide relevant application proof materials.

(4) 由中国国家标准管理委员会正式发布国家标准，或由 ISO、IEEE、ASME 等国际组织发布的国际标准，及相关行业归口部门统一管理发布的行业标准。

National standards officially issued by the Standardization Administration Committee of China, or international standards issued by ISO, IEEE, ASME and other international organizations, as well as industrial standards uniformly managed and issued by relevant industry departments.

(5) 由学院学位评定委员会委员和同行专家组成的专家组，或有关权威组织机构认定的其他重大成果。

Other major achievements recognized by the expert group composed of members of the Academic Degree Assessment Committee and peer experts or by relevant authoritative organizations.

具体详见《上海交大机械与动力工程学院博士学位（学术型）授予标准》，对达不到创新性成果要求的博士生，将无法进入正式答辩。

See details in *Awarding Criteria for Ph.D Degree from School of Mechanical Engineering, Shanghai Jiao Tong University*. Anyone who cannot meet the innovative requirements is not allowed to apply for the dissertation defense.

八、学位论文 Dissertation work

学位论文是进行学位评定的主要依据,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。

Dissertation is the main basis for degree evaluation, which should reflect the author's grasp of solid and broad basic theory, systematic and in-depth expertise and standardized scientific research methods in the subject.

1、选题与综述 Topic Selection and Review

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。

The topic of the Ph.D dissertation should be pioneering, cutting-edge and innovative in the discipline and related fields, and should have great theoretical significance or application value in economic construction and social development.

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和论证。

Literature review is based on the comprehensive collection and reading of a large number of relevant research literature. After summarizing, analyzing and discriminating, the literature review systematically, comprehensively and objectively narrates and comments the research achievements, existing problems and new development trends of the issues studied in a certain period of time, providing support and demonstration for the establishment of the topic of the dissertation.

2、规范性要求

Normative requirements

博士学位论文必须是一篇系统、完整的学术论文,是学位申请者在攻读博士学位期间在导师指导下独立完成的研究成果,应严格遵守《上海交通大学研究生学术规范》和《机械与动力工程学院研究生学术道德规范》进行学位论文工作。

Ph.D dissertation must be a systematic and complete academic paper. Dissertation is the achievement of research completed independently by the applicant under the supervision of supervisor during doctoral study. Students should strictly abide by the *Academic Code for Graduate Students of Shanghai Jiao Tong University* and the *Academic Code of Ethics for Graduate Students of School of Mechanical Engineering* in their dissertation work.

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,文字通畅。

The academic point of view of a Ph.D dissertation must be clear, correct in argument, rigorous in reasoning, true in data, standardized in chart, clear in hierarchy, accurate in language and smooth in text.

学位论文撰写必须遵循和符合《机械与动力工程学院学位论文撰写指南》的具体要求。

Dissertation writing must follow and conform to the specific requirements of *Dissertation Writing Guide of School of Mechanical Engineering*.

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	课程代码	课程名称 Course Name		学分	授课语言	开课学期	可以计算 GPA	必须计算 GPA	备注 Note
Category	Course Code	中文 Chinese	English 英文	Credit	Language*	Semester			
公共基础课 General Courses	FL6001	学术英语	English for Academic Purposes	2	英文 in English	秋季 Fall	是 Yes	是 Yes	必修 Compulsory
	MARX7001	中国马克思主义与当代	Marxism in China	2	中文 in Chinese	春季 Spring	是 Yes	是 Yes	必修 Compulsory
	MARX6003	自然辩证法概论	Dialectic of Nature	1	中文 in Chinese	秋季 Fall	是 Yes	是 Yes	必修 Compulsory
	GE6001	学术写作、规范与伦理	Scientific Writing, Integrity and Ethics	1	中文 in Chinese	春秋季 Spring/Fall	否 No	否 No	必修 Compulsory
	MATH6009	数学物理方程	Mathematical-Physical Equation	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	必修, 5 选 2, 至少 6 学分数学类课程 Compulsory, Must take two of them.
	MATH6015	最优化方法	Optimization Methods	3	中文 in Chinese、英文 in English	春秋季 Spring/Fall	是 Yes	否 No	
	MATH6004	计算方法	Numerical Analysis	3	中文 in Chinese、英文 in English	春秋季 Spring/Fall	是 Yes	否 No	
	MA26073	矩阵理论	Matrix Theory	3	中文 in Chinese、英文 in English	春秋季 Spring/Fall	是 Yes	否 No	
	STAT6001	基础数理统计	Basic Mathematical Statistics	3	中文 in Chinese、英文 in English	春秋季 Spring/Fall	是 Yes	否 No	
								否 No	
专业基础课 Program Core Courses	ME6100H	高等机构学	Advanced Mechanism and Machine Science	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
	ME6120	高等机械动力学	Mechanical System Dynamics	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	二选一
	ME6120H	高等机械动力学	Mechanical System Dynamics	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
	ME6520	数字信号处理	Digital Signal Processing	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	二选一
	ME6521H	数字信号处理与应用	Digital Signal Processing and Application	3	英文 in English	秋季 Fall	是 Yes	否 No	

ME6540	现代控制理论	Modern Control Theory	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	二选一
ME6540H	现代控制理论	Modern Control Theory	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
PE6100	高等燃烧学	Advanced Combustion Theory	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	二选一
PE6101H	高等燃烧理论	Advanced Combustion Theory	3	英文 in English	春季 Spring	是 Yes	否 No	
PE6200	高等传热传质学	Advanced Heat and Mass Transfer	3	中文 in Chinese	春季 Spring	是 Yes	否 No	三选一
PE6201	高等传热学	Advanced Heat Transfer	3	英文 in English	秋季 Fall	是 Yes	否 No	
PE6201H	高等传热学	Advanced Heat Transfer	3	英文 in English	秋季 Fall	是 Yes	否 No	
PE6220	高等工程热力学	Advance Engineering Thermodynamics	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	三选一
PE6221	高等热力学	Advanced Thermodynamics	3	英文 in English	秋季 Fall	是 Yes	否 No	
PE6221H	高等热力学	Advanced Thermodynamics	3	英文 in English	春季 Spring	是 Yes	否 No	
ME6104	摩擦学与润滑理论	Tribology & Lubrication Theory	3	中文 in Chinese	春季 Spring	是 Yes	否 No	二选一
ME6105	工程摩擦学导论	Introduction to Engineering Tribology	3	英文 in English	春季 Spring	是 Yes	否 No	
ME6122	应用固体力学	Applied Mechanics of Solids	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	二选一
ME6123	固体力学	Mechanics of Solids	3	英文 in English	春季 Spring	是 Yes	否 No	
ME6124	弹塑性力学	Elastic & Plastic Mechanics	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	二选一
ME6125	金属塑性加工力学	Plastic Mechanics in Metal Processing	3	英文 in English	秋季 Fall	是 Yes	否 No	
ME6180	计算机图形学	Computer Graphics	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	

ME6320	机器视觉与应用	Machine Vision and Its Applications	3	中文 in Chinese	春季 Spring	否 No	否 No	二选一
ME6321	计算视觉及其智能化应用	Computational Imaging and Intelligent Application	3	英文 in English	春季 Spring	否 No	否 No	
ME6522	测试原理、传感器与系统	Basic Principle of Sensors and Systems for Mechanical Measurement	3	中文 in Chinese	春秋季 Spring/Fall	是 Yes	否 No	二选一
ME6523	先进测试技术与仪器	Advanced Measurement and Instrumentation	3	英文 in English	春季 Spring	是 Yes	否 No	
PE6120	高等工程流体力学	Advanced Fluid Dynamics in Engineering	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	二选一
PE6121	高等流体力学	Advanced Fluid Mechanics	3	英文 in English	秋季 Fall	是 Yes	否 No	
PE6122	计算流体力学	Computational Fluid Dynamics	3	中文 in Chinese	春季 Spring	是 Yes	否 No	二选一
PE6123	计算流体力学与应用	Computational Fluid Dynamics & Applications	3	英文 in English	秋季 Fall	是 Yes	否 No	
ME6102	机械设计可靠性分析	Reliability Analysis of Mechanical Design	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
ME6140	高等振动理论	Theory of Advanced Vibrations	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
ME6142	声学原理及计算方法	Theories and Computation of Acoustics	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
ME6145	结构声学	Structural Acoustics	3	英文 in English	春季 Spring	否 No	否 No	
ME6146	转子动力学	Rotor Dynamics	3	中文 in Chinese	春季 Spring	否 No	否 No	
ME6160	机器人性能仿真与控制原理	Performance Simulation and Control of Robot	3	中文 in Chinese	春季 Spring	否 No	否 No	
ME6182	现代机械设计学	Modern Mechanical Design	3	中文 in Chinese	春季 Spring	否 No	否 No	
ME6220	软件工程 II	Software Engineering II for Manufacturing	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
ME6340	机械电子学	Mechatronics	3	中文 in Chinese	春季 Spring	否 No	否 No	

ME6500	塑性变形理论与数值模拟	Plastic Deformation Theory and Numerical Simulation	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
ME6524	误差分析与测试数据处理	Error Analysis and Data Processing in Measurement	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
ME6542	智能控制技术	Intelligent Control Technology	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
PE6103	燃烧化学动力学	Combustion Chemical Kinetics	3	英文 in English	春季 Spring	是 Yes	否 No	
PE7124	多相流理论与计算	Multiphase Flow Theory and Simulation	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
PE7126	湍流与传输理论	Turbulent Flow and Transportation Theory	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
PE6202	热辐射传热	Thermal Radiation Heat Transfer	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
PE6205	微尺度流动与传热	Microfluidic Flow and Heat Transfer	3	英文 in English	春季 Spring	是 Yes	否 No	
ME7184	多学科综合设计	Multidisciplinary Design	3	中文 in Chinese	春季 Spring	否 No	否 No	
ME6222	软件技术基础	Foundation of Software Technology	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6208	强化传热理论与技术	Theory and Technology on Enhanced Heat Transfer	3	中文 in Chinese	秋季 Fall	否 No	否 No	
ME6426	智能网联汽车技术	Intelligent and Connected Vehicle Technology	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6400	热泵系统及应用	Heat Pump Systems and Applications	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6502	内燃机燃烧与排放控制	Combustion and Emission Control in Internal Combustion Engine	3	中文 in Chinese	秋季 Fall	否 No	否 No	
ME6420	汽车多能源管理与优化	Vehicle Multi-energy Management and Optimization	3	中文 in Chinese	春季 Spring	否 No	否 No	
ME6560	研究实验技能	Experimental Skill for Research	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE7426	高等传输理论与化学反应工程	Advanced Transmission Theory and Chemical Reaction	3	中文 in Chinese	春季 Spring	否 No	否 No	

		Engineering							
	NU6100	高等反应堆工程	Advanced Reactor Engineering	3	中文 in Chinese	秋季 Fall	是 Yes	否 No	
	NU6102	核材料科学	Nuclear Material	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
	NU6104	核反应堆安全学	Advance Engineering Thermodynamics	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
	NU6106	核燃料循环	Nuclear Waste & Environment	3	中文 in Chinese	秋季 Fall	否 No	否 No	
	NU6108	现代辐射测量及应用	Modern Radiation Detection and Applications	3	中文 in Chinese	春季 Spring	是 Yes	否 No	
	NU6111	多相流与传热	Multiphase Flow and Heat Transfer	3	英文 in English	春季 Spring	是 Yes	否 No	
	NU6112	两相流与沸腾换热	Tow-phase Flow & Boiling Heat Transfer	3	中文 in Chinese	秋季 Fall	否 No	否 No	
	NU6114	流场测试基础	Flow Field Test Basis	3	中文 in Chinese	春季 Spring	否 No	否 No	
专业前沿课 Program Frontier Courses	GE6011	学术报告会	Academic Reports	1	中文 in Chinese	春秋季 Spring/Fall	否 No	否 No	必修 Compulsory
	NU8128	核能科学发展前沿	Nuclear Science Development Frontier	3	中文 in Chinese	秋季 Fall	否 No	否 No	

专业选修课 Program Elective Courses	ME6106	计算几何学	Computational Geometry	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME6126	高等结构动力学	Advanced Structural Dynamics	3	中文 in Chinese	秋季 Fall	否 No	否 No	
	ME6149	气动声学	Aeroacoustics	3	英文 in English	秋季 Fall	否 No	否 No	
	ME6151	先进噪声控制技术	Advanced Noise Control Techniques	3	英文 in English	秋季 Fall	否 No	否 No	
	ME7162	步行机器人机构学	Walking Robotic Mechanisms	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME6200	弹塑性加工理论	Solid Mechanics in Machining	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME6202	微细制造	Micro Manufacturing	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME6204	薄板成形理论及技术	Sheet Metal Forming Theory and Technology	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME6207	超精密智能制造技术	Ultra-precision Smart Manufacturing	3	英文 in English	春季 Spring	否 No	否 No	
	ME6209	先进复合材料及其加工技术	Advanced Composites and Their Manufacturing Techniques	3	英文 in English	春季 Spring	否 No	否 No	
	ME6343	工业智能维护与预知诊断	Intelligent Maintenance and Prognostics for Industrial Systems	3	英文 in English	春季 Spring	否 No	否 No	
	ME6423	现代汽车动力总成技术	Advanced Powertrain Technologies	3	英文 in English	春季 Spring	否 No	否 No	
	ME6424	汽车电子控制软件工程	Software Engineering for Automotive Electronic Control System	3	中文 in Chinese	春季 Spring	否 No	否 No	
	ME7429	汽车控制工程	Modern Vehicle Control Engineering	3	英文 in English	秋季 Fall	否 No	否 No	
	ME6503	先进工程应用中的高温材料	High Temperature Materials for Advanced Engineering Applications	3	英文 in English	春季 Spring	否 No	否 No	
ME6527	先进激光诊断原理与技术	Advanced Laser Diagnostic Technology	3	英文 in English	春季 Spring	否 No	否 No		

ME7528	高等测试技术	Advanced Techniques in Measurement	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6105	先进排放控制技术	Advanced Emission Control Technologies	3	英文 in English	春季 Spring	否 No	否 No	
PE7106	计算燃烧学	Computational Combustion	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6140	叶轮机械气动力学	Turbomachinery Aerodynamics	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6143	叶轮机械试验方法与 设计	Turbomachinery Experimental Design	3	英文 in English	春季 Spring	否 No	否 No	
PE6207	计算材料热物理	Computational Materials Thermophysics	3	英文 in English	秋季 Fall	否 No	否 No	
PE6300	湍流两相流动的模化 与数值仿真	Modeling and Numerical Simulation of Turbulent Two-phase Flow	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6302	煤粉燃烧与气化理论	Theory of Coal Combustion and Gasification	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6304	微细颗粒动力学	Fine Particle Dynamics	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6307	循环流化床燃烧技术	Circulating Fluidized Bed Combustion	3	英文 in English	秋季 Fall	否 No	否 No	
PE6402	现代人工环境技术	Modern Artificial Environment Technology	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6404	制冷低温系统的设计 与实践	Design and Practice of Refrigeration and Cryogenic Systems	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6406	制冷空调系统的仿真 优化与控制	Simulation, Optimization and Control of Refrigeration and HVAC Systems	3	中文 in Chinese	秋季 Fall	否 No	否 No	
PE6420	能源清洁与梯级利用	Energy Clean and Cascade Utilization	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6422	热力系统建模与仿真	Analysis of Energy Utilization Systems	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6424	先进动力循环分析	Analysis of Advanced Thermal Power Cycles	3	中文 in Chinese	春季 Spring	否 No	否 No	

PE6441	新能源系统	New Energy Systems	3	英文 in English	秋季 Fall	是 Yes	否 No	
PE6442	建筑节能与太阳能利用	Building Energy Saving and Solar Energy Utilization	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6500	内燃机电控技术	Electronic Control Technology in Internal Combustion Engine	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6504	内燃机性能仿真与优化	Simulation and Optimization of Internal Combustion Engine Performance	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6523	先进空气动力学测量技术基础与实践	Analysis of Advanced Thermal Power Cycles	3	英文 in English	秋季 Fall	否 No	否 No	
PE7540	先进能源材料导论	Introduction on Advanced Energy Materials	3	中文 in Chinese	春季 Spring	否 No	否 No	
PE6542	能源电化学基础	Fundamentals of Electrochemistry for Energy Applications	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6116	传热流动的数值分析	Numerical Analysis of Heat Transfer and Flow	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6118	非动力核技术应用	Application of No-Power Nuclear Technology	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6121	核反应堆设计原理	Nuclear Reactor Theory and Design	3	英文 in English	秋季 Fall	否 No	否 No	
NU6122	先进反应堆数值模拟	Advanced Simulation of Nuclear Power	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6124	严重事故现象与管理	Severe Accident Phenomenology And Management	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6128	汽液两相流动与传热	Two Phase Flow and Heat Transfer	3	中文 in Chinese	秋季 Fall	否 No	否 No	
NU6130	高等反应堆物理	Advanced Reactor Physics	3	中文 in Chinese	秋季 Fall	否 No	否 No	
MATH8003	现代数学专题-计算类: 谱方法		0.5	中文 in Chinese	春季 Spring	否 No	否 No	公共前沿选修课, 至少 1 学分
MATH8001	现代数学专题-计算类: 差分方法		0.5	中文 in Chinese	春季 Spring	否 No	否 No	

MATH8002	现代数学专题-计算类：有限元方法		0.5	中文 in Chinese	春季 Spring	否 No	否 No
MATH8004	现代数学专题-计算类：最优化		0.5	中文 in Chinese	春季 Spring	否 No	否 No
MATH8005	现代数学专题-分析类：动力系统		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8008	现代数学专题-分析类：摄动理论		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8006	现代数学专题-分析类：偏微分方程		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8007	现代数学专题-分析类：傅里叶分析、复分析、小波分析		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8010	现代数学专题-离散类：现代组合技术与算法		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8009	现代数学专题-离散类：网络科学		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8011	现代数学专题-离散类：组合设计与纠错码		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
MATH8012	现代数学专题-离散类：代数与密码		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
STAT8001	现代数学专题-随机类：高等随机过程		0.5	中文 in Chinese	春季 Spring	否 No	否 No
STAT8002	现代数学专题-随机类：随机矩阵		0.5	中文 in Chinese	春季 Spring	否 No	否 No
STAT8004	现代数学专题-随机类：随机优化		0.5	中文 in Chinese	春季 Spring	否 No	否 No
STAT8003	现代数学专题-随机类：现代统计		0.5	中文 in Chinese	春季 Spring	否 No	否 No
ASTR8103	现代物理与天文专题（天文类）：恒星和星系		0.5	中文 in Chinese	春季 Spring	否 No	否 No
ASTR8404	现代物理与天文专题（天文类）：天文观测		0.5	中文 in Chinese	春季 Spring	否 No	否 No

ASTR8203	现代物理与天文专题 (天文类): 宇宙学		0.5	中文 in Chinese	春季 Spring	否 No	否 No
ASTR8304	现代物理与天文专题 (天文类): 大规模数值模拟		0.5	中文 in Chinese	春季 Spring	否 No	否 No
PHY8312	现代物理与天文专题 (量子类): 量子计算与量子模拟		0.5	中文 in Chinese	春季 Spring	否 No	否 No
PHY8311	现代物理与天文专题 (量子类): 量子材料物理		0.5	中文 in Chinese	春季 Spring	否 No	否 No
PHY8210	现代物理与天文专题 (量子类): 微纳光学		0.5	中文 in Chinese	春季 Spring	否 No	否 No
PHY8211	现代物理与天文专题 (量子类): 量子信息		0.5	中文 in Chinese	春季 Spring	否 No	否 No
PHY8104	现代物理与天文专题 (交叉类): 统计物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8105	现代物理与天文专题 (交叉类): 软物质物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8106	现代物理与天文专题 (交叉类): 生物物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8107	现代物理与天文专题 (交叉类): 非线性物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8405	现代物理与天文专题 (粒子与核物理类): 强激光		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8509	现代物理与天文专题 (粒子与核物理类): 粒子物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8510	现代物理与天文专题 (粒子与核物理类): 新物理		0.5	中文 in Chinese	秋季 Fall	否 No	否 No
PHY8511	现代物理与天文专题 (粒子与核物理类):		0.5	中文 in Chinese	秋季 Fall	否 No	否 No

	核物理						
CHEM9102	化学前沿专题：化学生物学		1	中文 in Chinese	春季 Spring	否 No	否 No
CHEM9105	化学前沿专题：材料化学		1	中文 in Chinese	春季 Spring	否 No	否 No
CHEM9103	化学前沿专题：合成化学		1	中文 in Chinese	春季 Spring	否 No	否 No
CHEM9104	化学前沿专题：新能源化学		1	中文 in Chinese	春季 Spring	否 No	否 No
BIO8004	生命科学前沿：脑科学		1	中文 in Chinese	春季 Spring	否 No	否 No
BIO8005	生命科学前沿：基因编辑		1	中文 in Chinese	春季 Spring	否 No	否 No
BIO8006	生命科学前沿：表观遗传学		1	中文 in Chinese	春季 Spring	否 No	否 No
BIO8007	生命科学前沿：合成生物学		1	中文 in Chinese	春季 Spring	否 No	否 No