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清华大学工程物理系

时间 - 周一至周五 (国际法定节假日除外)

上午 8:00 - 12:00 下午 13:00 - 17:00

网址 - <http://www.ep.tsinghua.edu.cn>

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Time - Monday - Friday, holidays excepted

8:00AM - 12:00AM 13:00PM - 17:00PM

Web - <http://www.ep.tsinghua.edu.cn/publish/open>

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Tsinghua University, Beijing 100084 P. R. China

INTERNATIONAL MASTER PROGRAM IN NUCLEAR ENGINEERING AND MANAGEMENT

核工程与管理国际硕士项目

International students are welcomed to join this amazing program
In 2017 with full scholarship supported
By the Chinese government.

该项目由中国国家能源局和中国教育部支持
并提供全额奖学金
欢迎国际学生参加此项目

2016年制



OVERVIEW OF THE PROGRAM

OVERVIEW OF THE PROGRAM

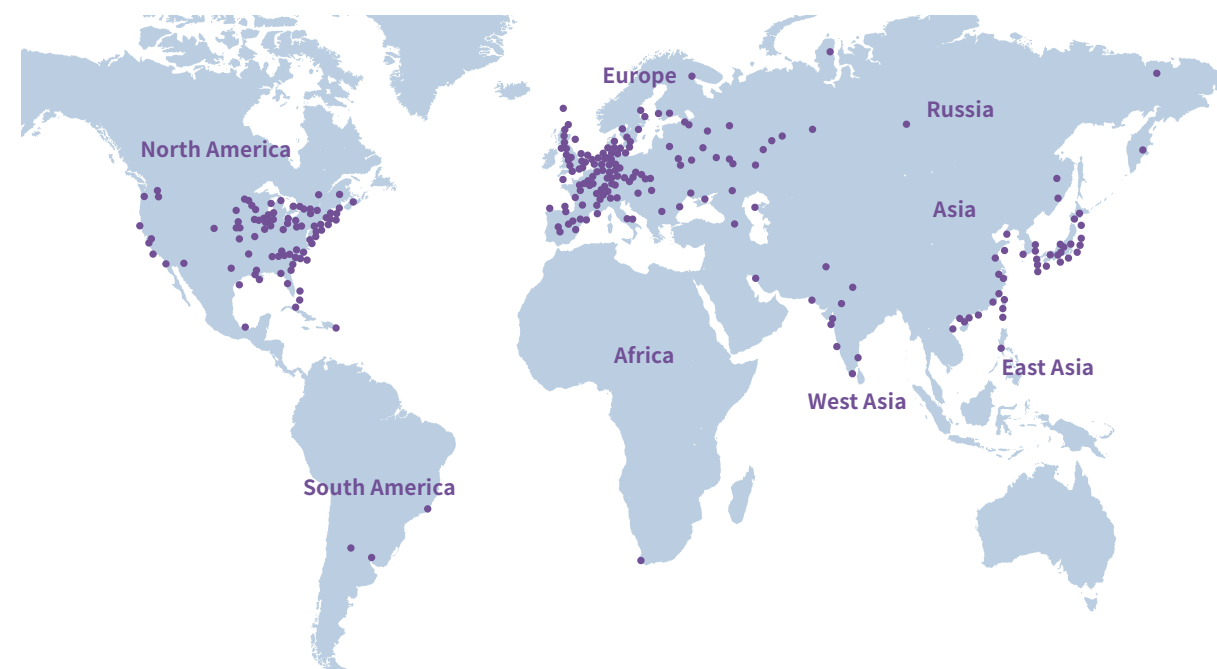
项目概述

Nuclear power is a low-carbon power generation method of producing electricity. China has always been sticking to the peaceful use of nuclear energy. Through dozens of years of development, China's nuclear power technology has been significantly developed.

The implementation of going global strategy is willing to share new technology and achievements of nuclear engineering with other countries, to support the development of nuclear power in all countries.

核能发电是一种低碳发电方式，中国一直坚持和平安全利用核能。经过几十年的发展，中国核电技术取得了长足进步。

中国实施核电“走出去”战略的初衷是希望与其他国家分享核工程取得的科技新成果，为全球核电事业的发展贡献出一份力量。



World map of all nuclear power Plants 世界各国核电站分布图 (2016)

Nuclear power is a technology intensive industry. Personal training is the basis of the development of nuclear power. Tsinghua University is one of the world's leading universities. The Department of Engineering Physics (DEP) and the Institute of Nuclear and New Energy Technology (INET) are in the forefront of the world in the field of nuclear engineering and technology and enjoy a high reputation at home and abroad. They have cultivated a large number of talents for the development of China's nuclear industry.

This project is strongly supported by the National Energy Administration of China and the Ministry of Education of China with a full scholarship. At the same time, various nuclear power groups such as the China National Nuclear Corporation (CNNC), the China General Nuclear Power Group (CGN) and the State Nuclear Power Technology Corporation (SNPTC) give strong support; all students have a wealth of opportunities to practice.

核电是一种技术密集型产业，人才培养对核电“走出去”具有重要的战略意义。清华大学工程物理系、核能与新能源技术研究院在核能与核科技领域一直走在世界的前沿，在国内外享有很高的声誉，为中国核电的发展培养了一大批人才。

该项目由中国国家能源局和中国教育部支持，并提供全额奖学金。同时，各核电集团如中国核工业集团公司（CNNC），中广核集团公司（CGN）和国家核电技术公司（SNPTC）给予大力支持，因此所有的学生都有丰富的实践机会。



TSINGHUA UNIVERSITY

TSINGHUA UNIVERSITY

清华大学

Tsinghua University was founded in 1911 with an international program to help Chinese students to study abroad. Based on the favorable academic atmosphere and leaning environment, it has become one of the world leading universities.

Today, it is one of the most attractive universities in the world, rooted in the rich cultural background. It has become a bridge of international science and technology, education and cultural exchanges, the cradle of training elite leaders, the trustworthy partner of numerous research experts and scholars.

清华大学始建于1911年，自成立以来，有一大批国际项目支持学生去国外学习，得益于其良好的学术氛围和学术环境，已发展成世界著名高等学府之一。

清华大学作为当今世界最具吸引力的大学之一，根植于其丰富的文化底蕴，它已成为国际科技、教育和文化交流的桥梁，是培养精英领袖的摇篮，更是无数科研专家、学者值得信赖的合作伙伴。



The reemergence of China as an economic, scientific and cultural powerhouse has shifted the dynamics of global learning, presenting the world's best and brightest with unprecedented opportunities for advancing human knowledge in partnership with Chinese thinkers and researchers. In this world, institutions of higher education are engines of collaborative teaching and learning. That is why Tsinghua University is evolving, advancing and expanding.

The 21st century requires problem solvers with broad perspectives and international outlook. Success is no longer just about being the smartest, honing your expertise in a single area and looking at problems within your field of vision. Interconnectedness is a new reality.

中国经济、科学、文化的崛起为世界树立典范，也为我国的高端人才提供前所未有的机遇。当今世界，高等学府作为合作办学的载体，也推动了清华大学的演变、发展和进步。

21 世纪迫切需要具备广阔视角和国际视野的人才，以解决人类面对的各种问题。成功不再只是在某个领域成为专家，互通互联是当今的新形势。

“

The global challenges we face require strategic cooperation, mutual understanding, and leadership built upon hands-on experience.

全球化挑战下需要我们加强战略合作、共同认知以及实践领导力。





The campus, set in former imperial gardens of the Qing Dynasty, is home to over 40,000 students drawn from 120 countries. Tsinghua offers a friendly and welcoming community where students can get involved in their favorite activities and try new ones. Students can choose from associations of the university and activities, such as sports competition, community service, New Year's party, tourist visits to Chinese cultural and historic sites, concerts etc..

Students are encouraged to participate in various extracurricular activities, so that they can achieve a well-rounded development.

For details about Tsinghua University, please visit <http://www.tsinghua.edu.cn/>.

清华大学坐落于北京西北郊风景秀丽的清华园—清朝的皇室花园，吸引了来自全世界近 120 个国家超过 4 万名学生学习。清华校园生活丰富多彩，社团蓬勃发展，百花齐放，每年组织各种活动如运动会、社区服务、新年晚会、历史文化遗址参观、音乐会等，学生可以根据自己的喜好参加。

学校鼓励学生参加各种课外活动，促进学生全面发展，详情请参阅链接：<http://www.tsinghua.edu.cn/>



2.1

DEPARTMENT OF ENGINEERING PHYSICS

工程物理系

The Department of Engineering Physics was established in 1956 aiming to provide higher education for talented young people in the area of nuclear science and technology. The research of the department has achieved accomplishments, and a healthy sustainable research environment has been formed.

The goal of the department is to provide high quality teaching in order that our outstanding students would be the "top performers" in the fast paced modern society. For this purpose, our teaching program is designed such that the students can have a solid background in both physics and mathematics and can acquire practical engineering skills as well and encourages students to develop their career in the area of the nuclear energy engineering and technology and to become professionals in the energy sector after graduation.

We are fortunate to have many fine faculty members who are dedicated in both teaching and research. Their research activities are not only on the cutting edge of modern sciences and technology, but they also undertake some key-development projects that meet the specific demands of country. Currently, the main research areas in the department are: nuclear science and technology, including nuclear technology and application, nuclear energy science and engineering, nuclear fuel cycle and material, radiation protection and environmental protection, nuclear instrument science and technology, medical physics and engineering, particle physics and nuclear physics, safety science and technology, etc..

<http://www.ep.tsinghua.edu.cn/publish/epcn/index.html>

工程物理系成立于 1956 年，是为了培养理工结合的新型人才，开创和发展我国的原子能科学技术而成立的。工程物理系坚持自主创新，取得了一系列科研成果，形成了良好的科研环境。

为了确保学生将来成为优秀人才，工程物理系提供了优质的教育，强调学生既要拥有扎实的数理知识，又要掌握熟练的工程技能，并鼓励学生毕业后投身于核工程与核科技领域。

工程物理系拥有一支高水平的师资队伍，投身于教学、科研，并始终以国家需求为己任，承担和完成了一大批学科前沿和国家迫切需求的重大项目。目前主要科研方向包括核技术及应用、核能科学与工程、核燃料循环与材料、辐射防护与环境保护、仪器科学与技术、医学物理与工程、粒子物理与原子核物理、安全科学与技术等。



2.2

INSTITUTE OF NUCLEAR AND
NEW ENERGY TECHNOLOGY

核能与新能源技术研究院

Established in 1960, the Institute of Nuclear and New Energy Technology (INET) has developed into one of the largest research and design institution in the world.

In 1986, the research done by INET on High Temperature Gas-cooled Reactor (HTGR) was included in the National High Technology Research and Development Program ("863" Program) of China. In March 1992, the State Council of China approved the construction of the first 10MW High Temperature Gas-cooled Reactor (HTR-10). In June 1995, the construction of HTR-10 was commenced and in December 2000 the criticality was reached. In January 2003, HTR-10 reached its full power operation and began to supply power to the grid.

In addition to the achievements in scientific and technology development, INET has made great accomplishments in post-graduate education, continuing education, international cooperation and exchange, etc..

核能与新能源技术研究院始建于1960年，是中国高等教育系统规模最大的科研与设计单位。

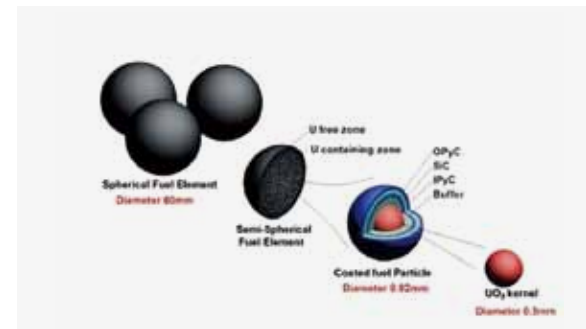
1986年，由核研院建设的高温气冷堆研究被列入国家高技术发展计划项目(863计划)。1992年3月，国务院批准立项，在核研院建成一座热功率为1万千瓦(10兆瓦)的高温气冷堆。1995年6月开始动工兴建，2000年12月建成达到临界，2003年1月实现满功率并网发电。

核研院不仅是科研基地，也是人才培养基地，在研究生培养、继续教育、国际交流与合作等方面都取得了骄人的成绩。



Nowadays, INET has been making efforts to meet the needs of national economy to develop itself into a world-class R&D base.

当前，核研院致力于满足国家经济发展的需要，争取成为世界级研发机构。



INET has three test reactors in the nuclear field. It originally focused only on nuclear science and engineering. INET believes nuclear energy and nuclear technology application will continue to play an important role in the world. In addition, INET will also improve its capability in the fields of energy policy and technology evaluation, and new energy technology like hydrogen, fresh water supply, environment technology, and advanced materials.

Through its continual progress, INET intends to become an internationally recognized R&D center based on its contribution and impact. INET has established partnerships with many international institutions and has relationships with colleagues worldwide.

核研院在核能领域拥有三座试验用核反应堆，主要研究核科学与工程，核研院认为核能与核技术应用将在众多方面发挥不可替代的作用。此外，核研院也将在能源政策、技术评估、新能源技术领域比如氢、淡水供给、环境技术、高等材料等方面提升整体实力。

经过多年努力，核研院已发展成具有国际影响力的研发基地，与很多科研机构、一流大学建立了合作关系。

能源政策
fields of energy
policy

技术评估
technology
evaluation

新能源
new energy
technology

SUPPORTERS

3.1

CHINA NATIONAL NUCLEAR CORPORATION

中国核工业集团公司

The China National Nuclear Corporation (CNNC) is a large State-owned enterprise under direct management by the central government. It successfully built the first nuclear power plant in the Chinese mainland. CNNC has established a complete industrial system of nuclear science and technology, is the core force of national nuclear strategy and the main body for nuclear development and nuclear power construction in China, shouldering the dual historical mission of national security and national economic and social development.

CNNC is constantly upgrading nuclear safety facilities, techniques and management specifications. Strict management systems for storage, transportation and security of nuclear materials as well as a complete nuclear safety and support framework have been established. A sense for nuclear safety has been intensified so that everyone feels him or herself to be the last barrier. A sound nuclear emergency system has been established to ensure the safety of nuclear power plant.

中国核工业集团公司是经国务院批准组建的特大型国有独资企业，成功建成我国大陆第一座核电站。作为国家核科技工业的主体，中核集团拥有完整的核科技工业体系，是国家战略核力量的核心和国家核能发展与核电建设的主力军，肩负着国家安全和国民经济与社会发展的双重历史使命。

中核集团不断地优化核安全相关技术、设备及管理制度，目前已建立一套严格的核材料存储、运输及安全保障的管理体系，以及一套完整的核安全及支持框架。核安全的理念已深入人心，同时核应急系统也已建立，以确保核电安全。

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The China National Nuclear Corporation (CNNC) is a large State-owned enterprise under direct management by the central government. It successfully built the first nuclear power plant in the Chinese mainland.

中国核工业集团公司是经国务院批准组建的特大型国有独资企业，成功建成我国大陆第一座核电站。



<http://en.cnncc.com.cn/>

CNNC has established a complete and professional associated nuclear technology innovation system that incorporates 23 well-founded nuclear technology research institutes as well as advanced facilities for experimental work. A complete scientific technology innovation management system has been established.

The technology innovation program “Dragon Rising 2020”, which includes eight demonstration projects for technical innovations and 12 significant technology improvement projects, has been implemented.

CNNC has been exploring some business opportunities of the whole industry chain in nuclear power markets along the Belt and Road areas and, as China’s only exporter of nuclear power plants, has already sold seven power units and eight reactors abroad and established cooperation with more than 40 countries.

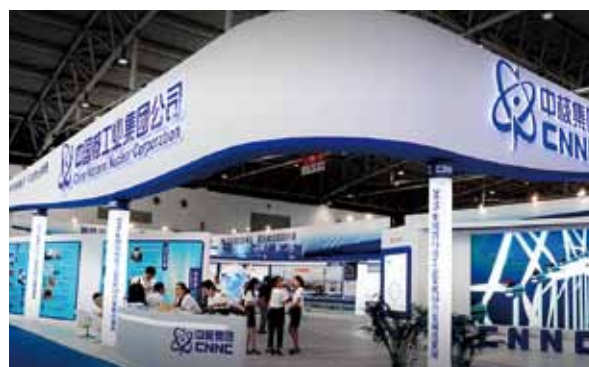
CNNC has signed contract with Argentina on heavy water reactor and pressurized water reactor, signed contract with France on nuclear energy comprehensive cooperation, signed contract with Britain on cooperation for the construction of nuclear energy research and innovation center, signed framework agreement with Sudan, pushing their nuclear energy cooperation to a new phase, has been deepening nuclear energy cooperation with Saudi Arabia, Egypt, Iran and Algeria.

中核集团已建立一套完成的核技术创新体系，包括 23 家完整的核科技研究机构，建立了多个装备先进具有现代化水平的试验室，配备了一批高精度仪器和设备，并建立了一个完整的科技创新管理体系。

2012 年，中核集团发布了“龙腾 2020 科技创新计划”（简称龙腾计划），龙腾计划是中核集团全面实施创新驱动发展战略的重大举措，龙腾计划的实施将为我由核大国变成核强国奠定坚实的技术基础，首批入选的项目包括 8 个科技创新示范工程和 12 个核心技术提升项目。

中核集团实施“一带一路”战略，在核能市场不断探索新的商业契机，当前，中核集团在“一带一路”沿线开展核能全产业链，市场开拓已具备一定基础，是中国唯一出口过核电站并实现批量出口的企业，已成功出口过 7 台核电机组及 8 台反应堆或核动力装置，与 40 多个国家和地区建立了交流合作关系。

中核集团与阿根廷核电公司签署阿根廷重水堆核电站商务合同及压水堆核电站框架合同，与法国签署核能全面合作合同，与英国签署核能研究及创新中心建设的合作合同，与苏丹签署合作框架协议，以推动他们的核能发展到一个新的阶段，并与沙特阿拉伯、埃及、伊朗和阿尔及利亚等国家开展了核能领域的深度合作。



3.2

CHINA GENERAL NUCLEAR POWER CORPORATION

中国广核集团简介

Established in September 1994, China General Nuclear Power Corporation (CGN), formerly known as China Guangdong Nuclear Power Group is a state-owned large clean energy group with over 40 subsidiaries.

中国广核集团（简称中广核），原中国广东核电集团，成立于 1994 年 9 月，是伴随我国改革开放和核电事业发展逐步成长壮大起来的中央企业，由核心企业中国广核集团有限公司及 40 多家主要成员公司组成的国家特大型清洁能源企业集团。





Since its inception, CGN has been making unrelenting efforts to fulfill its mission of “developing clean energy to benefit mankind”, and to realize its vision of “building one of the world’s top clean energy enterprises”. By the end of October 2016, the installed capacity of CGN’s operating nuclear generating units has reached 20,370 MWe (19 units), and 9 other nuclear generating units are currently under construction involving a total installed capacity of 11,356 MWe. In addition, CGN owns an installed capacity of 9,400 MWe for wind power generators in operation, a total capacity of 1,730 MWe for solar photovoltaic power, and a controlling equity capacity of 1,580 MWe for hydro power. Furthermore, CGN has made great strides in distributed energy, nuclear technology application and energy conservation technical services.

Moreover, CGN has set up 8 state-level nuclear power R&D centers and a national key laboratory to further add to its capabilities to simultaneously build, operate and manage multiple nuclear and other clean energy projects scattered across different regions.

中国广核集团以“发展清洁能源，造福人类社会”为使命，以“成为国际一流的清洁能源企业”为愿景。截至 2016 年 10 月底，中国广核集团拥有在运核电机组 19 台，装机容量 2037 万千瓦，在建核电机组 9 台，装机 1135.6 万千瓦；拥有风电控股装机达 940 万千瓦，太阳能光伏发电项目控股装机容量 173 万千瓦，水电权益装机 340 万千瓦、控股装机 158 万千瓦。另外，在分布式能源、核技术应用、节能技术服务等领域也取得了良好发展。

此外，中广核还拥有八个国家级研发中心和一个国家重点实验室，具备了在确保安全的基础上面向全国、跨地区、多基地同时建设和运营管理多个核电、风电、水电、太阳能及其他清洁能源项目的的能力。

“

The mission of CGN is “developing clean energy to benefit mankind”, and the vision is “building one of the world’s top clean energy enterprises”.

中国广核集团的使命是“发展清洁能源，造福人类社会”为，愿景是“成为国际一流的清洁能源企业”。

<http://en.cgnpc.com.cn/>

3.3

STATE NUCLEAR POWER TECHNOLOGY CORPORATION

国家核电技术公司

State Nuclear Power Technology Corporation (SNPTC), which is one of three NPP developer & operators in China, is the main carrier and developer of AP1000 GEN III nuclear power technology, is an NPP EPC contractor and lifetime services supplier, as well as technology service provider and EPC contractor of high parameter & large capacity thermal power station, high voltage, extra high voltage, and smart grid.

Inheriting China's 40 years of experience in nuclear power research and design, and 20 years of experience in nuclear power operation, as well as based on the introduction of AP1000 technology, SNPTC has developed CAP1400 with independent intellectual property rights, which is the world's largest active nuclear power technology. As one of the 16 major programs listed in China's plan for scientific and technological development, the safety, economy and environmental protection of CAP1400 is Gen III nuclear.

SNPTC has established covers 12 key technologies in the field of complete scientific system, has four state-level, 7 provincial scientific research institutions, has 8 members of the enterprise through the national high and new technology enterprise certification, with about 9000 R&D and design personnel, complete nuclear power research, development and design ability, and provide technical support for China's nuclear safety supervision.

国家核电技术公司（国家核电）是中国三大核电投资运营商之一，是实现第三代核电技术自主化的主要载体和研发平台，是核电站 EPC 总承包商和核电寿期服务供应商，同时也是电源、电网、新能源工程的技术服务供应商和总承包商。

在中国 40 多年核电研发、设计、建设、运行经验基础上，结合 AP1000 技术引进，国家核电已成功开发具有自主知识产权、功率更大的 CAP1400 非能动压水堆核电技术。作为中国 16 个国家科技重大专项之一，CAP1400 技术的安全性、经济性和环境相容性均居于全球三代核电领先地位。

国家核电已经建立了涵盖 12 个关键技术领域的完整学科体系，拥有 4 个国家级、7 个省部级科研机构，已有 8 家成员企业通过国家高新技术企业认证，拥有约 9000 余名研发设计人员，具备完整的核电研发设计能力，同时为核安全监管工作提供技术支持。





SNPTC has organized the domestic equipment manufacturing enterprises on the basis of the introduction of technology, to strengthen the localization of key equipment and independent research. The nationalization of AP1000/CAP1400's key equipment and materials was realized. The formation of a number of nuclear and conventional islands of key equipment manufacturing base, to achieve the leap from the second generation to hit three in China equipment manufacturing level.

SNPTC is responsible for construction management of 4 units of AP1000 Self-reliance Program Supporting Projects (build 2 units each at Sanmen, Zhejiang province and Haiyang, Shandong province) and the CAP1400 Demonstration NPP. Unit 1 of Zhejiang Sanmen NPP, which is the first unit of AP1000 Self-reliance Program Supporting Projects will be connected to the grid in early 2017. The CAP1400 Demonstration NPP seated in the Shidao Bay Shandong, which is expected to see the construction of 2 CAP1400 units. At present, the project construction drawings completed by more than 92%, long cycle equipment manufacturing goes as planned, the review licensing has been completed prior to commencement, CAP1400 site construction conditions are ready.

国家核电组织国内装备制造企业在技术引进的基础上,加强关键设备国产化和自主化攻关,实现了AP1000、CAP1400的关键设备和材料的研发、设计和制造技术的国产化,形成了一批核岛、常规岛关键设备制造基地,实现了中国装备制造水平从二代到三代的跨越。

国家核电承担着三代核电 AP1000 依托项目 4 台机组(浙江三门和山东海阳各建设 2 台)及 CAP1400 示范工程的建设管理。AP1000 依托项目首台机组——浙江三门核电项目 1 号机组将于 2017 年初并网发电。CAP1400 示范电站位于山东威海市荣成石岛湾厂址,项目规划建设 2 台 CAP1400 压水堆核电机组。目前,CAP1400 示范工程核电厂施工图纸已完成 92% 以上,长周期设备制造按计划进行,开工前的各项审评许可已经完成,CAP1400 现场开工条件已准备就绪。

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The site construction conditions of CAP1400 project which located in Rongcheng, Shandong province, are ready.

在山东荣成石岛湾的先进压水堆核电站重大专项 CAP1400 示范工程,现场开工条件已经具备。



4.1

DEGREE OFFERED

本项目提供

MASTER OF ENGINEERING

工程硕士

4.2

PROFESSIONAL
COURSES OFFERED
IN ENGLISH

专业课程英文授课

Students are required to take Chinese courses, professional courses, internship and academic activity. The program provides a comprehensive professional education and research opportunity in the field of nuclear engineering including thermodynamics, heat transfer, fluid flow, electrical science, chemical engineering, material science, mechanical science, nuclear physics, reactor theory, fuel cycling, radiation protection, and so on. The courses are scheduled to permit either intensive study in a single field or interdisciplinary study between fields. Comprehensive introductory courses are given to provide a common basis of understanding for those students of dissimilar backgrounds. Professional courses are selected in consultation with the graduate coordinator or a faculty advisor to meet his/her academic and career goals. Some internship is designed for students to gain professional experiences in companies of nuclear industry in China.

学生需完成中国语言课、专业课、实习和各种学术活动。该项目计划在核工程研究领域提供全面的专业教育，包括热力学、传热学、流体力学、电气科学、化学工程、材料科学、机械科学、核物理、反应堆理论、核燃料循环和辐射防护。课程允许单一学科或跨学科领域之间的交叉选修。综合概论课程适合不同背景的学生对本专业有总体了解。专业课程的选择在教师指导下进行，以适合未来课题的研究和职业发展。为培养专业实践能力，学生将有在中国核电企业内实习的机会。

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The normal period of this program is 2 years.

该计划学习期限一般为 2 年。

4.3

INTERNSHIP

实习

Based on the plan, the two-year master program requires some internship or on-spot survey. During the on-spot survey, student will design and conduct scientific survey on China-specific issues with the help of supervisors. A diverse number of practice opportunities are available in nuclear industry companies of CNNC, CGN and SNPTC. During the on-spot survey, students will be exposed to methods and techniques used by natural and social scientists to identify, analyze and interpret nuclear engineering problems. The on-spot survey will be in Beijing or in other parts of China, and usually conduct in the summer after the first academic year.

在两年硕士期间，学生必须完成不少于半年的实习和实地调查等实践环节。学生将在导师的帮助下，设计并完成富有中国特色的项目调查研究。中核集团，中广核或国家核电提供了大量的实践机会。在现场调查过程中，学生有机会接触到科学家用先进的方法和技术来识别、分析和解释核工程问题。实习将安排在北京或其他省市，通常在第一学年后的暑假进行。



4.4

THESIS

论文

Students are required to conduct an independent research project which will be supervised by a faculty member of Tsinghua University and a senior researcher of CNNC, CGN or SNPTC. The research topic comes from the actual project. A thesis topic selection plan and a topic selection report are required in the second term. Students are required to submit a thesis in English with an executive summary in Chinese or a thesis in Chinese. The final thesis defense is required.

学生由清华大学教师和来自中核集团，中广核或国家核电的专家作为联合导师指导进行独立的项目研究。研究课题来自于实际项目，要求在第二学期完成书面的选题计划和正式的选题报告。学生在毕业前要求提交由英文撰写的论文并附上详细中文摘要，或提交中文论文，并完成最终论文答辩。



4.5

QUALIFICATION OF APPLICANTS

申请人资格

Applicants for Master programs should hold a Bachelor degree, or equivalent degree, or will receive a Bachelor degree before enrollment, majoring in Nuclear Engineering, Management, or other relevant fields.

Working experience in nuclear engineering field is preferred.

申请人应获得核能工程、管理学或其他相关专业学士学位或具有同等学力，或者为应届生。优先考虑具有核工程领域工作经验的申请人。

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For international master program in nuclear engineering and management, please apply through website: <http://gradadmission.tsinghua.edu.cn>

申请核工程与管理国际硕士项目，请访问 <http://gradadmission.tsinghua.edu.cn>