

Training Program for Full-Time Professional Master of **Software Engineering**

(Discipline Code: 085405 Conferred a Master's Degree in Engineering)

I. Major and Specialization

Software Engineering is a major that studies systematic and standardized methods and technologies for software development, operation, and maintenance, based on modern technologies such as computer science and engineering management principles. Focused on software systems, it emphasizes both theoretical foundations and methodological foundations for developing, operating, and maintaining complex software systems.

This major takes intelligent software engineering as its core training orientation, deeply integrating software engineering with cutting-edge artificial intelligence technologies. It has formed a distinctive and competitive postgraduate training system for professional master's students. The training model highlights the integration of theoretical learning and engineering practice, and enhances students' practical and international competitiveness through school-enterprise cooperation and internationalized approaches. The goal is to cultivate elite software engineers who master the theoretical foundations of software engineering and can engage in software development, project management and technical services in scientific research institutions, government agencies, enterprises, etc.

II. Training Objectives

Aiming at industry development needs, the program cultivates practical and innovative professional master's students with sound personality, healthy body and mind, strong social responsibility, good political and engineering literacy, adherence to professional ethics and engineering standards. Students should master in-depth basic knowledge of mathematics and natural sciences, specialized knowledge in software engineering, possess software design and development capabilities, as well as interpersonal communication, team cooperation and management abilities.

1. Aiming to cultivate high-level students who are "knowledgeable about China, friendly

to China, solid in foundation, proficient in profession, excellent in ability, innovative in thinking, and international in vision". Students should respect China's national interests and the feelings of the Chinese people, understand contemporary Chinese national conditions, identify with Chinese culture, have good moral character, international vision, knowledge of international practices and rules, strong dedication and innovation awareness, and a certain level of Chinese proficiency;

2. Have excellent engineering competence and innovative thinking; abide by laws and academic norms, maintain a rigorous scientific attitude, and adhere to academic ethics;

3. Possess knowledge acquisition, engineering practice and innovation capabilities in the field of software engineering, keep up with the cutting-edge technologies in the software engineering field, and independently discover, analyze, and solve complex software engineering problems;

4. Lead multidisciplinary teams to work in cross-cultural environments, and serve as senior software development engineers, software architects, product managers, and project managers, etc., in software engineering field.

III. Training Mode and Study Duration

1. Training mode

The training of professional master's students is under the tutor responsibility system. Tutors are responsible for formulating training plans, guiding thesis proposal, professional practice, and degree thesis. Equal emphasis is placed on course study and practical projects, combining theoretical learning with professional practice. School-enterprise cooperation is adopted to improve students' engineering practice capabilities. Advanced foreign teaching concepts and training methods are borrowed to enhance students' international competitiveness.

(1) Course learning: The curriculum is set up in a progressive manner of "quality enhancement, ability improvement, and professional advancement" to ensure the in-depth development of professional master's students in software engineering field.

(2) Joint training bases: Deep integration of schools and enterprises, introducing high-quality educational resources from enterprises to build a joint graduate education system,

and encouraging students to carry out practical training and engineering practice in enterprises.

(3) Internationalization: Invite professors from foreign universities to teach professional courses, introduce advanced teaching concepts and educational resources. Foreign and Chinese students study together to create an international learning environment and enhance students' communication and international competition abilities.

2. Study duration

The basic study duration for full-time professional master's students is 2 years. Those who fail to complete their studies within the basic study duration can apply for an extension of the study period by filling out the application form for delayed graduation, with the consent of the supervisor and the school where the degree program is located. The extension duration (including suspension of schooling and retaining student status) shall not exceed 2 years beyond the basic study duration. For students who take an additional suspension of study for entrepreneurship and whose cumulative suspension exceeds 2 years, 1 year can be added to the maximum study duration.

IV. Scientific Research and Practice

During their studies, full-time professional master's students should not only actively participate in course learning and complete course designs but also engage in the planning, analysis, design, implementation, testing, and operation and maintenance of actual software engineering projects. Participating in tutors' research projects or actual software engineering projects is the main way to train students' practical abilities and cultivate their ability to analyze and solve engineering problems, and it is a necessary condition for graduation.

1. Specific requirements for professional practice

(1) Professional master's students carry out professional practice in industry enterprises through graduate joint training bases, customized training projects, or arrangements by enterprise tutors. They should complete no less than 6 months of professional practice during their studies, and enter the professional practice link no later than the end of the second semester.

(2) The practice content can involve one or more links of actual software engineering

projects, such as planning, analysis, design, implementation, testing, and operation and maintenance.

(3) Internship/practice can be carried out in a concentrated or segmented manner, with clear task requirements and assessment requirements. Students need to submit a professional practice plan and write a professional practice summary report.

2. Assessment and evaluation methods for professional practice

(1) The school implements a professional practice assessment system for professional master's students, and the assessment is scheduled at the end of the third semester.

(2) The assessment is conducted in the form of defense, organized by the school and implemented by the degree program.

(3) The assessment team consists of 3-5 teachers with master's tutor qualifications or enterprise teachers, adopting a tutor scoring avoidance system, and graduate supervisors can attend as observers.

(4) The assessment team evaluates the practice content, difficulty, duration, and completion quality, and determines the practice assessment result based on the average score of the defense. The school will publicly announce the assessment results and enters them into the educational administration system of Beijing Jiaotong University after no objections.

(5) For those who fail the professional practice assessment, they are allowed to revise the practice report within 2 months, and apply for re-assessment after being reviewed and approved by the school.

V. Degree Thesis and Practical Achievements for Degree Application

Completing a degree thesis or obtaining practical achievements is an important part of professional master's training, the main way to train students' scientific research capabilities, innovation and practical abilities, and also one of the important bases for measuring whether students can obtain a degree. Students are required to complete the corresponding thesis links. The main links of the degree thesis and practical achievements for degree application are implemented in accordance with the Regulations on the Management of the Training Process for Professional Master's Students of Beijing Jiaotong University. The links of the degree thesis stage include thesis proposal defense, professional practice assessment and degree

thesis defense, establishing a comprehensive quality monitoring and guarantee system for master's theses.

1. Thesis proposal

After determining the thesis topic, a proposal should be formed, generally including:

(1) Project source and type, and application value of the project: Describe the source, significance, and application value of the project.

(2) Problems to be solved and objectives to be achieved in the thesis: Describe the actual problems to be solved and the overall objectives of the project.

(3) Research and development status of similar products at home and abroad: Read, analyze, and summarize relevant literature in recent years. At least 30 academic papers or dissertations related to the topic should be consulted and carefully read.

(4) Problem solution: Elaborate on research objectives, content, key issues, research methods, technical routes, experimental plans, etc.

(5) Project work foundation: Explain the existing research conditions, possible difficulties and problems in the research process, and possible solutions, as well as the preparatory work done for the thesis.

(6) Time arrangement for thesis research and writing.

The proposal is defended publicly, generally organized by the school at the end of the course study stage, that is, in the second semester after the admission of professional master's students. The proposal defense team consists of 3-5 teachers with master's tutor qualifications or enterprise teachers, adopting a tutor scoring avoidance system, and graduate supervisors can attend as observers. After the on-site report, the defense team reviews the proposal content.

The assessment result of the proposal defense for degree thesis or practical achievements is "pass" or "fail". Those who do not participate in proposal defense assessment within the specified time (except for special circumstances) are considered "fail". Those who pass continue the thesis research or professional practical work; those who fail can apply for a second proposal defense after two months. If they fail the second proposal defense assessment, their training will be terminated and they will be dismissed. The school degree evaluation committee reviews the proposal defense assessment results and reports them to the Graduate

School.

The school will publicly announce the defense results determined by the assessment team. After the public announcement receives no objections, the results will be promptly entered into the educational administration system of Beijing Jiaotong University.

2. Mid-term inspection of degree thesis (practical achievements) and professional practice assessment

The mid-term assessment of the degree thesis is generally scheduled at the end of the third semester, organized by the school and implemented by the degree program. The assessment team generally consists of 3-5 teachers with master's tutor qualifications or enterprise teachers, adopting a tutor scoring avoidance system, and supervisors can attend as observers.

The assessment team evaluates the practice content, difficulty, duration, and completion quality of professional master's students, checks whether the thesis work is consistent with the proposal content and progresses as planned in the proposal (explaining reasons for major differences), assesses the completed content and phased achievements of the degree thesis, as well as existing problems, proposed solutions, and next work plans, and gives a mid-term assessment score.

The mid-term assessment results are "pass" or "fail". Those who do not participate in the mid-term assessment within the specified time (except for special circumstances) are considered "fail". Those who pass continue the thesis research; those who fail can apply for a second mid-term assessment after two months. If they fail the second assessment, their training will be terminated and they will be dismissed. The school degree evaluation committee reviews the mid-term assessment results and reports them to the Graduate School.

The school will publicly announce the assessment results determined by the assessment team. After the public announcement receives no objections, the results will be promptly entered into the educational administration system of Beijing Jiaotong University.

3. Defense links and requirements for the thesis

(1) The degree thesis defense is generally held at the end of the fourth semester after admission. Professional master's students must complete all links specified in the training program and pass the grades before applying for thesis defense. After the degree thesis is

anonymously sent for review and approved, the applicant modifies and improves the thesis according to the experts' opinions under the guidance of the tutor, and can defend only after the tutor approves the final draft.

(2) The thesis defense is generally organized by the school and implemented by the degree program.

(3) The defense committee consists of 3 or 5 members, who must be teachers with graduate tutor qualifications in the degree program or off-campus peer experts with deputy senior professional titles. The defense committee has 1 secretary, who should be a formal employee of our university with an intermediate or above title. Graduate supervisors attend the defense but cannot serve as members or secretaries of the defense committee.

(4) The defense committee focuses on reviewing the students' mastery of professional basic theories, the ability to comprehensively use scientific theories, methods, and technical means to solve engineering problems, the technical difficulty and workload of the thesis, the theoretical level of the research results, new ideas, methods, and progress in solving engineering problems, the advancement and practicality of the adopted new technologies and designs, and the economic and social benefits created. The defense committee gives the thesis defense score based on the defense process, and the school will publicly announce the defense score and ranking results.

(5) Professional master's students who have passed the dissertation defense will be approved by the School and the University Degree Evaluation Committee to be awarded the master's degree. For students who fail the dissertation defense, if the time three months after the dissertation defense date does not exceed the maximum study period stipulated by the University, they may revise the dissertation according to the modification suggestions put forward by experts and restart the anonymous review process of the dissertation at least 3 months after the dissertation defense date. If the maximum study period is reached, they will be treated as completing their studies without a degree.

VI. Curriculum and Credit Requirements

The curriculum learning of this major implements a credit system, requiring students to complete the required credits before applying for defense.

The curriculum is divided into four parts: Quality Enhancement Platform, Ability Enhancement Platform, Professional Advancement Platform, and Academic and Practical Innovation Platform. Master's students should complete at least 32 credits during their studies.

1. Credit requirements:

6 credits for the Quality Enhancement Platform, 5 credits for the Ability Enhancement Platform, 14 credits for the Professional Advancement Platform, and 7 credits for the Academic and Practical Innovation Platform.

2. Make-up course requirements:

Master's students who lack the necessary basic knowledge of this discipline are required to take make-up courses, which are only graded and do not count towards credits.

3. Teaching arrangement:

Course learning shall generally be completed within 1 academic year.

The specific curriculum is shown in Schedule 1.

VII. Other Requirements

Other relevant requirements shall be implemented in accordance with the regulations of the university and the school.

**Schedule 1: Curriculum and Credit Requirements for Engineering Master's Professional Degree
(International) (Total Credits Not Less Than 32)**

Course Category	Course Module	Course Number	Course Name	Credits	Semester		Assessment Method	Mini-Credit Requirement
					fall	spring		
Quality Enhancement Platform	National Conditions Education	A212004B	Introduction to China	2	√		Exam	3
		A212005B	Chinese Culture	1		√	Exam	
	Comprehensive Quality Courses	A210001B	Engineering Ethics	1		√	Check	1
		A210003B	Career Planning and New Technology Topics	1	√	√	Check	1
	Comprehensive Quality Practice	H200501B	Comprehensive Quality Practice Module for International Students (Schedule 2)	1				1
Ability Enhancement Platform	Language Ability Module	C328020B	Elementary Chinese Comprehensive I	3	√		Exam	3
	Mathematical Ability Module	C308104B	Optimization Methods I	2	√		Exam	≥2
		C308103B	Matrix Analysis I	2	√		Exam	
Professional Advancement Platform	Core Discipline Courses	M510017B	Principles and Applications of Deep Learning	2	√		Exam	≥14
		M510025B	Complex Software System Architecture Design and Practice	2		√	Exam	
		M510026B	Intelligent Software Engineering Technology and Practice	2		√	Exam	
		M510027B	Principles and Practice of Large Models and Agents	2		√	Exam	
		M510028B	Data Science and Knowledge Engineering	2	√		Exam	
		M510029B	Network Computing and Edge Intelligence	2	√		Exam	
	Professional Expansion Courses	M510003B	Kernel Analysis of openEuler Operating System	2	√		Exam	

Academic and Practical Innovation Platform	Regular Academic Meetings	H200101B		1				1
	Thesis Proposal	H200301B		1				1
	Mid-term Inspection of Degree Thesis (Practical Achievements)	H200408B		1				1
	Professional Practice	H200722B		4				4

Schedule 2: Comprehensive Quality Practice Module for International Master's Students

The credits of the comprehensive quality practice module for international master's students are implemented and recognized by the International Education College.

Classification	Sub-module	Project	Objective	Main Form	Participant Group	Semester	Time	Assessment
Core Quality Enhancement Practice: Sub-modules ≥5, Each sub-module completes ≥1 project, And Total projects ≥8.	Perceiving China	Entrance Education	Understand China's laws and regulations, school rules and regulations, campus facilities and environment, safety regulations	Lectures, activities	All freshmen	All	Irregular	Pass/No Pass
		"Perceiving China" Social Practice and Cultural Experience Activities	Understand China's social development and historical culture	Lectures, activities, experiential education	All international graduate students	All	Irregular	Pass/No Pass
	Academic Innovation	3 Famous Teacher Lectures	Strengthen scientific spirit and improve practical ability	Lectures	All international graduate students	All	Monthly	Pass/No Pass
		"Huiguang Cup" Academic and Cultural Festival		Thesis, forum	All international graduate students	Spring	March-April	Pass/No Pass

		Ministry of Education Innovation Practice Competition		Lectures, competitions	All international graduate students	All	March-December (as notified)	Pass/No Pass
	Scientific Morality	Academic Morality Commitment and Test	Strengthen academic self-discipline and adhere to academic integrity	Examination	All freshmen	Autumn	September	Pass/No Pass
		Scientific Spirit and Academic Morality Lectures		Lectures	All international graduate students	Autumn	September-October	Pass/No Pass
	Mental Health	Cross-Cultural Communication and Communication	Improve psychological quality, interpersonal communication, and cross-cultural communication abilities	Lectures, activities	All international graduate students	Autumn	November	Pass/No Pass
	Safety and Discipline	Anti-Drug Education, Anti-Smoking Education, Traffic Safety Knowledge Education	Enhance safety awareness and discipline awareness	Lectures, visits	All international graduate students	Autumn	Irregular	Pass/No Pass
		Fire Drill		Field drill	All international graduate students	Autumn	Irregular	Pass/No Pass
Personalized Expansion Practice: Sub-modules ≥2, and ≥1 project completed within the selected sub-modules.	International Competitiveness	Future Leaders Cultivation Project	Expand international vision and enhance leadership	Experiential teaching, forums	All international graduate students	All	Irregular	Pass/No Pass
	Innovation and Entrepreneurship Activities	Innovation and Entrepreneurship Workshop	Enhance innovation and entrepreneurship awareness and capabilities	Lectures, experiential teaching, etc.	All international graduate students	Autumn	September-December	Pass/No Pass
	Career Planning and	Career Ability Enhancement Lectures	Enhance career planning and development	Lectures, experiential teaching, etc.	All international graduate students	All	Irregular	Pass/No Pass

		Career Ability Enhancement Salon						Pass/No Pass
		Career Ability Enhancement Training						Pass/No Pass
		Career Ability Enhancement Practice						Pass/No Pass
		Career Ability Enhancement Competition						Pass/No Pass
	Social Service	Backbone International Graduate Students	Enhance social responsibility and improve emotional intelligence	Various forms according to positions	Backbone international graduate students	All	Long-term	Pass/No Pass
		Volunteer Service Activities			All international graduate students			Pass/No Pass
	Social Practice	Summer Social Practice	Enhance social responsibility and improve practical ability	Field practice	All international graduate students	Summer	June-August	Pass/No Pass
	Physical Fitness	University Sports Meeting	Strengthen physical fitness and enhance team cooperation	Competition	All international graduate students	Spring	May	Pass/No Pass
		Freshmen Campus Quality Development		Competition	All freshmen	Autumn	September-October	Pass/No Pass
		Internal and Intercollegiate Sports Activities		Competition	All international graduate students	All	Irregular	Pass/No Pass
	Humanities and Arts	Activities of Literature, History and Philosophy	Enhance humanistic heritage, artistic	Lectures, activities, competitions	All international graduate students	All	Irregular	Pass/No Pass

		International Cultural Festival, Campus Art Evening Party, Art Competition				All	Irregular	Pass/No Pass
According to the disciplinary positioning and the personalized development needs of postgraduates, the school may add self-determined projects under each module of core literacy improvement and personalized expansion practice								

- Notes:**
1. According to training requirements, international students in China are required to complete 1 credit.
 2. Implemented and recognized by the International Education College.