计算机科学与技术国际硕士研究生培养方案

授予学位类别： 工学硕士学位

一级学科（专业类别）代码名称： 0812 计算机科学与技术

二级学科（专业领域）代码名称：

> 081201 计算机系统结构
> 081202 计算机软件与理论
> 081203 计算机应用技术
> 0812Z1通信系统与信息安全
> 0812Z2软件工程理论与方法

制订单位： 计算机学院（牵头）、（参与）

培养方案版本号： 2020版

一、学科概况

The history of the discipline of Computer Science and Technology in Central South University can be traced back to the establishment of the Electronic Technology discipline in 1958. The department began to enroll undergraduate students in Computer Technology in 1972, began to recruit master students in 1982, and began to train doctoral students in 2000. The discipline is an authorized first-level discipline to confer a doctoral degree in Computer Science and to train postdoctoral researchers. The discipline is a key discipline in Hunan Province and was rated as excellent in all the past discipline evaluation. In the 4th round of national subject evaluation in 2017, the Computer Science and Technology discipline of Central South University was rated A-.

The department has strong faculty and has a high-level faculty including engineering academicians. There are currently 86 full-time teachers, including 26 professors, 39 associate professors, and 21 lecturers. Among them, there are 1 academician of the Chinese Academy of Engineering, 3 members of the Thousand Talents Program, 1 Cheung Kong Scholars Distinguished Professor, 1 Cheung Kong Scholars Lecture Professor. One professor receives the National Natural Science Fund for Distinguished Young Scholars. It has 3 winners of the Hunan Natural Science Fund for Distinguished Young Scholars, 1 winner of the Hunan hundred talents program, 3 outstanding talents of the Ministry of Education in the new century, and 5 University distinguished professors.

The department has the Cheung Kong scholars and innovative research team in university supported by the Ministry of Education of China, one National Engineering Laboratory of Medical Big Data Application Technologies, one Innovation and Intelligence Introduction Base of Medical Big Data Analysis Theory and Application Discipline, the Mobile Medical Key Laboratory of the Ministry of Education, the Medicine Big Data Collaborative Innovation Center supported by Hunan Province and several other provincial research platforms, including the Hunan Province Key

Laboratory of Medical Big Data Collaborative Innovation Center, the Hunan Province Key Laboratory of Network Resource Management and Credible Evaluation Service, the Hunan Engineering Technology Research Center of Financial Currency Identification and Independent Service Platform, the Hunan National Defence Science and Technology Key Laboratory of Sound Detection and Information Confrontation, The Hunan Province Key Laboratory of Bioinformatics, the International Scientific and Technological Innovation Cooperation Base of Artificial Intelligence and Medical Big Data in Hunan Province, and the International Scientific and Technological Innovation Cooperation Base of Biological Data Processing in Hunan Province.

The discipline adheres to the tenet of "innovation leading, serving the society", and has achieved a series of theoretical and application fruits. It has received a large number of funding grants from National Natural Science Foundation, Hunan Province, the Ministry of Science and Technology, and industrial communities. It has won the National Natural Science Award and provincial and ministerial natural science and technology progress award many times. It was ranked as a top 1% institute among all institutes that has the computer science discipline in the world according to the essential science index (ESI).

二、研究方向

1) Network Computing and Intelligent System

This program focus on theoretical research and application practice of new network computing models represented by transparent computing, mobile cloud computing, fog computing and edge computing, aiming to solve the problems that traditional computing models face in the era of the Internet of Things and big data. It mainly focuses on the research of new network computing platform architecture for lightweight IoT terminals, distributed machine learning and artificial intelligence algorithm design for lightweight terminals, IoT communication protocols design and network performance optimization based on new network computing mode, and actively promotes the demonstration application and industrialization of next-generation network computing platform.

2) Computational Theories and Algorithm

This program focuses on theories and methods for solving hard complex optimization problems in engineering applications. It focuses researches on building multidimensional mathematical models for a series of combinatorial optimization problems and analyzing the impact of different parameters on the computational complexity of the problem. The program aims to build new mathematical models for some combinatorial problems, and tries to effective solutions from the perspective of parameterized algorithms, approximate algorithms and random algorithms, aiming to establish a set of systematic theories and methods for solving difficult combinatorial optimization problems.

3) Bioinformatics

Facing the massive biological data generated in the post genomic era, this program

conducts research on new methods and algorithms to process huge volume of biological data. The program carries out systematic analysis on different types of omics data, such as genome data, transcriptome data and proteome data, aiming to address advance the research in hot issues such as genome assembly, structural mutation detection, protein complex mining, gene regulation network and dynamic protein network construction. The researches in this program aim at a set of data analysis methods for various types of biological data with different biological features, in order to extract intrinsic features hidden in the biological data features.

4) Computer Vision and Medical Image Processing

This program focuses on research in the fields of computer vision, graphic image processing, digital medical visualization analysis, medical big data processing, smart medicine, machine learning, and interdisciplinary cooperation in the context of big data. The topics in this program include computer vision methods based on human vision mechanisms, face recognition technology, 3D digital medical and virtual simulation research, glaucoma, diabetic retina image analysis and disease screening, computer-aided diagnosis and radiotherapy of early liver cancer.

5) Network Optimization and Information Security

This program focuses research on optimization technologies of new network application performances and information security, such as network service optimization and security guarantee mechanisms under various constraints. The topics in this program include optimization of data transmission, task scheduling, distributed storage under resource and QoS constraints in novel network models including data center networks, Internet of Things, and mobile Internet. This program also researches the security guarantee mechanisms of different network application services, including user data privacy protection, network application vulnerability discover and security detection, user data isolation and protection in cloud computing environments, and network security visualization. It aims to provide a solid research foundation for the service quality and security guarantee of new network applications.

6) Data Science and Medical Big Data

This program focuses on the integration of computer science and medicine. Based on the research of data acquisition, data cleaning, granulation, data clustering, data fusion and comparison, this program takes the medical big data as the research object and aims to build a platform to process medical big data. It focuses on integrating all levels of medical data of relevant hospitals, performing in-depth research on key technologies such as mining, analyzing and effectively utilizing medical big data. It also conducts researches on key technologies in medical data security and privacy protection, medical data standards, etc.

三、培养目标

This discipline trains senior professionals with a comprehensive development of moral, intellectual, and physical computer science and technology, scientific

research, teaching, management, technological development, good innovative thinking and academic literacy:

(1) Has a good scientific research style, scientific ethics and cooperative spirit, good conduct, and physical and mental health.Have the konwlege of Chinise national congditions and culture.

(2) Has solid basic theory and system expertise in computer science and technology related disciplines, can engage in scientific research or independently hold specialized technical work, has innovative thinking, and be able to make creative results in the research direction being engaged in.

(3) Master at least one foreign language, can read foreign language materials and write scientific papers in the chosen subject; be proficient in academic communication in the chosen subject in foreign languages.

四、学制和学习年限

According to the registration administration of Central South University for international graduate students, the minimum length and the maximal length of study for master students are 3 years and 5 years, respectively, including 1-year course study. The management of students' roll whose study duration exceeds the longest duration should obey the rules listed in Regulations on school rolls for students exceeding normal period. The date to calculate study duration in each academic year is August 31.

Students with excellent comprehensive quality can apply for graduation six months in advance. To apply for early graduation, please refer to the Regulations for the Management of Postgraduates of Central South University and The Provisions of the School of Computer of Central South University on the Application for Early Graduation of Doctoral and Graduate Students.

五、培养方式

1) The student will conduct his study and research under the guidance of an advisory group, which compose of his supervisor and co-supervisors. The supervisor is the leader of the group and is responsible of training process,

2) The supervisor advises the student to make his personalized course plan, gives advice on how to perform literature retrieval, participate in academic communication and social practice, confirm the thesis topic, and give guidance in conducting scientific research.

3) The supervisor's research guidance and ideological education for graduate students should be organically combined to comprehensively cultivate and improve the comprehensive qualities of graduate student.

4) There should be an elimination mechanism. All the students should pass the elimination before they can conduct further steps in the training process. The ones that fail in the elimination should quit the program or re-apply to join the program.

六、课程设置与学分要求

课程类别	学分要求	课程类别	学分要求
公共学位课	5	学科基础课	10
专业课	4	选修课	4
培养环节	3	学术交流与研讨	2
补修课	4		
总学分		28	
学分说明	（1）实行学分制，学术型硕士生总学分不低于28学分，其中课程学习23学分，学术研讨与学术交流2学分，培养环节3学分。研究生在学位论文答辩前必须修满所规定的总学分和补修课学分。（2）全日制硕士生课程学习一般为2个学期。研究生根据个人培养计划按学期选修课程，每学期选修的总学分不超过17学分（不包括培养环节的学分）。（3）允许研究生跨学科选修课程，但跨学科选课学分数不超过6学分。本专业学位的选修课可以在学校（相关学院）所开设的所有研究生课程中选择。（4）补修课是指跨一级学科或以同等学力考取的研究生必须加修的课程，应按照所选研究方向要求加修所考取学科相关专业本科生阶段的专业基础课2门或以上，学分不低于4分。补修课计算学分，补修课不计入学分，学科基础课和专业课选修学分不低于14分		

类别	课程编号	课程（环节）名称	学时	学分	开课学期	说明
公共学位课	10000003A01	中国概况	32	2	春秋季	Compulsory
	11000003A01	汉语	64	3	秋季	
学科基础课	47081203B01	论文写作与学术道德（计算机院）	32	2	秋季	Compulsory
学科基础课	21070103A02	矩阵论	48	3	秋季	Select at least one course
	21070103A03	应用统计	48	3	秋季	
学科基础课	47081202B01	高级计算机网络	32	2	春季	Select at least three courses
	47081202B02	复杂算法设计与分析	32	2	秋季	
	47081202B03	机器学习与数据挖掘	32	2	春秋季	
	47081202B04	数据科学与工程	32	2	秋季	
	47081202B05	现代操作系统	32	2	春季	
	47081202B06	高级分布式系统	32	2	春秋季	
专业课	47081202B51	软件系统与工程	32	2	春秋季	Select at least 2 courses
	47081202C01	网络与信息安全	32	2	春季	
	47081202C02	云计算与大数据处理	32	2	春秋季	
	47081202C03	数字图像处理与应用	32	2	秋季	
	47081203B02	人工智能	32	2	春秋季	
选修课	47081002D02	自然语言处理	32	2	春秋季	Select at least 2 courses
	47081202D01	高性能计算	32	2	秋季	
	47081202D02	学科前沿与实践	32	2	秋季	
	47081202D03	数据可视化	32	2	春季	
	47081202D04	现代密码学原理与应用	32	2	春季	
	47081203C01	无线网络与移动计算	32	2	春秋季	
	47081203D01	生物信息学	32	2	秋季	
	47081203D02	网络科学基础与应用	32	2	春季	
	47081203D03	物联网技术与工程	32	2	秋季	

培养环节	99000003F06	学位论文选题报告		1	春秋季	Compulsory
	99000003F08	社会实践		1	春秋季	
	99000003F09	科研训练		1	春秋季	
学术交流与研讨	99000003F03	学术交流与研讨（学术学位硕士生）		2	春秋季	Compulsory

七、学术研讨与学术交流

Academic seminars and academic exchanges is a compulsory course for all academic master students and it requires 2 credits. By carrying out multi-channel, multi-form, and diversified academic seminars and academic exchange activities, this course aims at creating a strong academic and cultural atmosphere, leading the frontier, stimulate interest, and expanding knowledge span and academic horizons.

For detailed content and assessment methods, please refer to the Implementation Rules for Academic Discussion and Assessment of Academic Exchanges in the Training Program of School of Computer, Central South University.

八、学位论文开题报告

Under the guidance of supervisors, postgraduates should determine the research direction of their dissertations in the first semester, make a public topic selection report and determine research topics on the basis of consulting a large number of literature. More than 60 documents should be consulted by master students, and more than one-third of them should be high-level documents in Chinese.

The thesis proposal defence should be completed in the third semester. The thesis proposal should have a certain academic significance or application value or have some practical value for the country's economic, educational, cultural and social development. Those who do not pass the first proposal defence should apply for the second defence within 6 months. The thesis proposal defence of master students should be organized in the department (center).

Graduate students should fill in the online version of the Central South University Graduate Thesis Proposal in the graduate education management information system. After the proposal is reviewed and approved, it will be archived and registered in the graduate management office of the school.

九、中期考核

无。

十、科研训练、专业实践和社会实践

Scientific research training is a compulsory course arranges for scientific research, teaching, experiment, design, internship and other tasks, totaling 32 hours (1 credit).

Graduate students in this discipline must complete the practical teaching tasks arranged by the school or participate in social practice. According to the situation, the student can assist the instructor to guide the graduation design and teaching assistantship for undergraduates, with more than 32 hours; can also select to participate in the three ways to do practice in the countryside activities (longer than a half month), which counts 1 credit.

十一学年总结与考核

Before each school year ends, the school organizes a comprehensive summary to evaluate and assess the postgraduate's political and ideological performance, course learning performance, scientific research performance, etc., the results of the assessment serve as the basis for adjusting the level of scholarships and bursaries for graduate students and the elimination of graduate students. Those who fail the assessment will be processed according to the regulations for the management of graduate student status.

十二、学位论文工作

(1) Outcome requirements in the program

In strict accordance with the requirements listed in Central South University Computer Science and Technology First-level discipline doctoral and master's degree awarding standards and other degree management related documents.

(2) Thesis requirements

In strict accordance with the requirements list in Central South University Degree Awarding Work Regulations, Central South University Computer Science and Technology Subject Doctoral Degree, Master Degree Awarding Standards, Central South University Graduate Degree Thesis Writing Regulations, Central South University Graduate Degree Thesis Academic Misconduct Detection Mistakes Management Measures.

Postgraduate dissertation is required to be written in Chinese, and completed independently by the graduates under the guidance of his/her supervisor. Postgraduate work for dissertations should be no less than one year.

The thesis is carefully written in accordance with the requirements of the uniform format of the school's degree thesis, and the Code for Writing Postgraduate Thesis of Central South University is strictly implemented. The content of the thesis should reflect the author's ability to comprehensively apply basic theory and professional knowledge to solve practical engineering problems, and it should be shown that the graduate students have reached the requirements of the training goals.

(3) Thesis review, defence and degree award

Strictly implement the requirements of the Central South University Degree

Awarding Work Regulations, Central South University's Defence Management Measures, and Central South University Graduate Degree Thesis Evaluation Management Methods.

After writing the dissertation as required, a pre-defence or pre-review of the dissertation is required. Those who pass the pre-defence or pre-examination can apply for defence of the dissertation with the consent of the supervisor and the college's review.

The dissertation must be with a correct point of view, clear organization, reliable arguments, sufficient arguments, rigorous reasoning, strong logic, and fluent text, indicating that the graduate students have reached the requirements of the training goals.

Graduate students who have passed the defence of their dissertation submit a degree application to the Degree Evaluation Sub-Committee of the second-level training unit, which is reviewed by the Degree Evaluation Sub-Committee. And the degree can be awarded after discussion the school's Degree Evaluation Committee, and a degree certificate can be issued.

十三、毕业论文工作

According to the Separation of Graduation and Degree in Central South University for Doctoral Graduates Means, graduates who reaches the following requirement can apply defence for graduation only.

Requirement on Academic Achievements

The students should publish at least 1 paper on journals or EI index conferences. The content of the paper should be closely related to the graduation thesis. The author affiliation and order of the paper should conform to the university's regulations on paper work.

Requirements on Graduation Thesis

The graduation thesis should strictly conform to the regulations on academic degree thesis specified in this document.

Requirements on Graduation Defence

The thesis review and defence should strictly conform to the regulations on academic degree thesis reviewing and defence procedure.

附：
附：修订专家名单

王建新、邓晓衡、王斌、刘伟荣、冯启龙、张士庚、张祖平、廖胜辉、王伟平、黄家玮、赵颖、黄东军