计算机科学与技术

一、培养目标

依据“工程教育认证标准”制定的本培养方案，培养具有良好的人文、科学及工程素养，掌握计算机领域的数理基础、计算机专业基础理论和专业核心知识，具备系统的工程实践能力和将所学知识应用于复杂系统的能力，能在信息技术产业、科研部门、高等院校及其相关领域从事计算机科学与技术的研究、设计、开发及管理等工作的人才。

二、基本规格要求

计算机科学与技术专业本科毕业生达到如下要求：

1. 工程知识：能够将数学、自然科学、工程基础和计算机专业知识用于解决计算机系统复杂工程问题。

2. 问题分析：能够应用数学、自然科学和工程科学的基本原理，识别、表达，并通过文献研究分析计算机系统复杂工程问题，以获得有效结论。

3. 设计/开发解决方案：能够设计针对计算机系统复杂工程问题的解决方案，设计满足特定需求的计算机系统、单元（部件）或工艺流程，并能够在设计环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素。

4. 研究：能够基于科学原理并采用科学方法对计算机系统复杂工程问题进行研究，包括设计实验、分析与解释数据，并通过信息综合得到合理有效的结论。

5. 使用现代工具：能够针对计算机系统复杂工程问题，开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具，包括对复杂工程问题的预测与模拟，并能够理解其局限性。

6. 工程与社会：能够基于工程相关背景知识进行合理分析，评价计算机专业工程实践和计算机系统复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

7. 环境和可持续发展：能够理解和评价针对计算机系统复杂工程问题的工程实践对环境、社会可持续发展的影响。

8. 职业规范：具有人文社会科学素养、社会责任感，能够在计算机系统工程实践中理解并遵守工程职业道德和规范，履行责任。

9. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。

10. 沟通：能够就计算机系统复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。

11. 项目管理：理解并掌握工程管理原理与经济决策方法，并能在多学科环境中应用。

12. 终身学习：具有自主学习和终身学习的意识，有不断学习和适应发展的能力。

三、培养特色

本专业在教育部专业目录中属于计算机类专业，培养方案以计算机类专业工程教育认证要求为准则，结合本校实际制定；注重学科核心基础知识与专业技能，突出计算科学、数据科学、计算机系统、系统软件等相关特色方向。

四、学制、毕业基本要求及学位授予

1. 本科基本学制 4 年，弹性学习年限 3—6 年，按照学分制度管理。

2. 计算机科学与技术专业学生毕业最低学分数为 165 学分，其中各类别课程及环节要求学分数如下表：

课程类别	通识必修	学门核心	学类核心	专业核心	专业选修	通识选修	集中实践	合计
学分数	24	24	27	20	29	8	33	165

3. 学生修满培养方案规定的必修课、选修课及有关环节，达到规定的最低毕业学分数，并修完规定必修但不记学分的所有课程和环节，德、智、体合格，即可毕业。满足学位授予相关文件要求的，授予工学学士学位。

五、课程设置及学分分布

（一）通识教育课程〔必修 24＋（6）学分＋选修 8 学分〕

通识教育课程包括必修和选修两部分。通识选修课程按《湖南大学通识选修（文化素质教育）课程方案》实施，通识必修课程如下：

编码	课程名称	学分	备注
GE01101	毛泽东思想和中国特色社会主义理论体系概论	3＋（3）	
GE01039	思想道德修养与法律基础	1.5＋（1.5）	
GE01100	形势与政策	0.5＋（1.5）	
GE01102	中国近现代史纲要	2	
GE01103	马克思主义基本原理（上）	2	
GE01104	马克思主义基本原理（下）	2	
GE01012（－15）	大学英语	8	
GE01107（－13）	心理素质与生涯发展	1	
GE01089（－92）	体育	4	

（二）学门核心课程（24 学分）

编码	课程名称	学分	备注
GE03025	高等数学 A（1）	5	
GE03025	高等数学 A（2）	5	
GE03003	线性代数 A	3	
GE03004	概率论与数理统计 A	3	
GE03005	普通物理 A（1）	3	
GE03006	普通物理 A（2）	3	
GE03007	普通物理实验 A（1）	1	
GE03008	普通物理实验 A（2）	1	

（三）学类核心课程（27 学分）

编码	课程名称	学分	备注
CS04022	高等程序设计	4	
CS04001	离散数学	4	
CS04002	数据结构	4	
CS05054	数字电路与逻辑设计	4	
CS04023	计算机系统	4	
CS05052	算法分析与设计	4	
CS04021	程序设计实验	2	
CS04024	数字系统实验	1	

（四）专业核心课程（20 学分）

编码	课程名称	学分	备注
CS05073	人工智能导论	4	
CS04007	操作系统	4	含“操作系统实验”
CS05074	计算机网络	4	含“网络系统实验”
CS05075	编译原理	4	含“编译系统实验”
CS05076	数据库原理	4	含“数据库系统实验”

（五）专业选修课程（29 学分）

1. 专业限选课（8 学分）

本专业学生必须从下列课程中选修 2 门，以强化专业基础，总计 8 学分。

编码	课程名称	学分	备注
CS06137	软件工程	4	
CS06138	计算理论导论	4	
CS06139	高性能计算导论	4	

2. 专业任选课（21 学分）

专业选修课程采用方向分组与任选相结合的方式实施，学生首先选定某一分组的所有课程，然后跨组（鼓励院内跨专业）选修课程，共选修 7 门课程，总计 21 学分，课程及分组如下：

编码	课程名称	学分	备注
CS06140	计算方法	3	计算科学组
CS06141	计算理论	3	
CS06142	云计算技术	3	
CS06143	社交网络分析	3	
CS06144	机器学习	3	数据科学组
CS06145	数据智能处理	3	
CS06146	科学计算可视化	3	
CS06071	数据挖掘	3	
CS06147	路由与交换技术	3	计算机系统组
CS06148	分布式与云计算系统	3	
CS06149	计算机视觉系统	3	
CS06150	软件设计模式	3	系统软件组
CS06151	高级数据库设计	3	

注：1）鼓励学生自主选修本专业或跨专业选修类课程，学分不少于应选学分的 50％。

2）在读期间参加学科竞赛或公开发表学术论文等经学院认定（详见《湖南大学信息科学与工程学院学术研究成果分类指导意见和技术创新成果指导意见》），可以申请替代选修 2 学分。

（六）集中实践环节（33 学分）

编码	课程名称	学分	备注
GE01040	军训、军事与国防（含军事理论）	0	
CS10018	入学教育与专业入门	0	
GE09030	中文写作实训	1	一年级夏季学期
GE09028	英文写作实训	1	
GE09001	程序设计	2	
CS10019	电子系统设计	2	二年级夏季学期
CS10020	软件设计	2	
CS10021（22）	专业综合设计（从学院列表选一）：	4	三年级夏季学期
CS10023	毕业实习	2	第 8 学期
CS10034	计算机系统原理实验	2	
CS10035	交换机/路由器实验	1	
CS10038	软件工程文档写作	1	
CS10036	编程新技术实务	1	
CS10026	毕业设计（含导师课程）	14	包含 2 个学分的导师课程。导师课程是“导师制”的具体任务，本课程须是以项目趋动、“CDIO”模式、讨论方式教学，每岗每届指导学生共 3—6 人。课程内容包含：本科生学业指导、一年级与二年级学生夏季学期设计课程监管、三年级学生夏季学期设计课程指导、四年级本科生毕业实习与毕业设计指导。

六、课程责任教师一览表

序号	姓名	职称	学历学位	专业特长	课程（专业核心、专业选修、通识选修）
1	骆嘉伟	教授	博士	数据挖掘、生物信息处理	数据结构、数据挖掘
2	李肯立	教授	博士	并行与分布式处理、生物计算机、组合最优化	高性能计算导论
3	王　东	教授	博士	无线移动网络、车载网络、网络性能测试	计算机网络
4	陈　浩	教授	博士	并行分布式系统	操作系统、分布式与云计算系统
5	肖德贵	副教授	博士	图像/视频处理，计算机视觉	操作系统、计算机视觉系统
6	许　莹	副教授	博士	优化算法	人工智能导论
7	朱宁波	副教授	博士	数字图像处理	人工智能导论、数据智能处理
8	任小西	副教授	博士	嵌入式系统	编译原理
9	范年柏	副教授	博士	形式化方法，数据挖掘	计算理论导论、计算方法

续表

序号	姓名	职称	学历学位	专业特长	课程（专业核心、专业选修、通识选修）
10	吴　昊	副教授	博士	计算理论	计算理论导论、计算理论
11	王永恒	副教授	博士	数据库和数据挖掘	数据库原理、高级数据库技术
12	唐　卓	副教授	博士	云计算与大数据并行处理	高性能计算导论、云计算技术
13	殷　树	副教授	博士	并行存储系统，节能可靠性分析	算法分析与设计
14	李　睿	副教授	博士	计算机网络安全、云计算、数据隐私与完整性保护研究	数据结构、软件设计
15	姜文君	讲师	博士	社会网络	算法分析与设计、社交网络分析
16	刘钰峰	讲师	博士	智能信息检索，移动应用开发	数据结构、软件设计
17	夏　艳	讲师	博士	无线网络、社交网络及大数据	数据结构、机器学习
18	李晓鸿	讲师	博士	可信系统与网络	数据结构、软件设计
19	袁小坊	讲师	博士	网络测量与未来网技术	计算机网络、路由与交换技术
20	吴　帆	讲师	硕士	并行计算	数据结构、科学计算可视化
21	杨晓波	讲师	硕士	软件理论、信息安全	编译原理、编译系统设计与实现
22	王伟胜	工程师	硕士	图像分析及处理	软件工程、软件设计模式

七、专业责任教授

序号	姓名	职称	学历学位	专业特长	承担授课课程
1	陈浩	教授	博士	并行分布式系统	操作系统、分布式与云计算系统

Computer Science and Technology

Ⅰ. Objects

On the basis of "Engineering Education Accreditation Standards", our target is to culture undergraduate students with the good qualities on humanity, science and engineering, as well as solid mathematical foundation on the areas of computer, computer major specialty foundation theories, and common core knowledge in computer science. Students are required to build their own knowledge systems based on their majors, scientific ways of thinking, and technologies of engineering practice. It is highly encouraged for students to apply their knowledge system on solving complex engineering problems in computer systems. Hence they are capable to work in computer science related fields including but not limited to information technology industries, research departments, and high education institutes.

Ⅱ. Basic Requirements

The undergraduate students of computer science and technology should have the following qualities and abilities:

1. Engineering Knowledge: The students need to have the knowledge from mathematics, natural science, engineering, and computer science to solve complex engineering problems in computer systems.

2. Problem Analysis: The students need to have the abilities to make use of basic principles from mathematics, natural and engineering science to recognize, define and analyze complex engineering problems in computer systems with searching relevant literature, and finally make a reasonable conclusion.

3. Design and Development: The students need to have the abilities to give solutions for complex engineering problems from computer systems, and design a system, component or process to meet the specific requirements, and be able to reflect the innovation consciousness in the design process, considering the social, health, safety, law, culture, environment and other factors.

4. Research: The students should have such abilities to research complex engineering problems in computer systems based on science principles and scientific methods, as experiment designs, analysis and data interpretation and observation of reasonable conclusions.

5. Utilize Modern Appliances: The students should fully utilize appropriate techniques and tools to study and simulate the complex engineering issues under computer systems. During complex activities in computer systems, the students can develop the proper technology, or make use of the existing resources and methods to solve problems, and also understand the limitations of these approaches.

6. Engineering and Sociality: The students have reasonable thinking of engineering-related environmental information, and can make a fair evaluation about engineering practice on its responsibility and many other factors involved in the areas of sociality, health, safety, law, and culture etc.

7. Social and Environmental Integration: The students have relevant knowledge to understand professional engineering solutions and their influences on society and environment, as well as the necessity on sustainable development.

8. Professional Norm: The students are encouraged to enrich the quality of humanity and social science, to enhance the social responsibility. In addition, the students should understand and obey the professional ethic and standard.

9. Personal and Teamwork: The students should have the ability to cooperate with team members from different education background and act as different roles.

10. Communication: The students need to have the abilities to effectively communicate and exchange with industry peers and the public about complex engineering in computer systems, including report writing and design document, statement, clear expression or to respond to commands. And have a certain international perspective, can communicate and exchange in the cross-cultural context.

11. Project Management: The students are encouraged to understand and master the engineering management principle and economic decision-making method, and can be applied in many subjects environment.

12. Life-long Learning: The students should have the ability of self-learning and accept the idea of life-long learning.

Ⅲ. Program Traits

This major belongs to the computer major in the undergraduate major directory from the Chinese Ministry of Education. The cultivation program is formulated according to the criterion of professional computer and engineering requirements as well as considering the actual environments of our school. We demand our students have core foundation on the knowledge and abilities to apply theoretical knowledge on dealing with complex engineering problems. We also strengthen the interdisciplinary and international collaboration, and highlight research directions such as the computer science, the data science, the computer systems, and the system software.

Ⅳ. Degree Requirements

1. An undergraduate student is expected to graduate in four (4) years preferably, and is also allowed to graduate within the periods between three (3) to six (6) years according to the student's performance in the academic credit system.

2. The minimal requirement for the academic credits is 165 credits totally for the students from the computer science and technology major. The detailed requirements for each kind of the specific courses are listed in the following table:

Course Categories	Required General Education Courses	Core Courses Domain	Core Courses Discipline	Core Courses Major	Electives Major	Electives General	Collective Training	Total
Credit Requirements	24	24	27	20	29	8	33	165

3. Students won't be graduated until all the requirements are fulfilled, including the learning process of core, elective and other specified courses, and satisfying the basic requirements on morality, intelligence, and health. The students who meet the requirements of degree-related policies will be conferred the Bachelor Degree of Engineering.

Ⅴ. Curriculum

1. General Education Courses [required 24+(6) + elective 8 credits]

The general education courses consist of required courses and elective courses. General education electives are designed according to the *Curriculum Design of General Education Electives of Hunan*

University. Required general education courses are illustrated in the following table.

Code	Course Title	Credit(s)	Remarks
GE01101	Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics	3+(3)	
GE01039	Moral Cultivation and Law Basics	1.5+ (1.5)	
GE01100	Current Situation and Policies	0.5+ (1.5)	
GE01102	Outline of Modern Chinese History	2	
GE01103	Fundamentals of Marxism Ⅰ	2	
GE01104	Fundamentals of Marxism Ⅱ	2	
GE01012(-15)	College English	8	
GE01107(-13)	Psychological Health & Career Planning	1	
GE01089(-92)	Physical Education	4	

2. Core courses: domain (24 credits)

Code	Course Name	Credit(s)	Remarks
GE03025	Advanced Mathematics A(Ⅰ)	5	
GE03025	Advanced Mathematics A(Ⅱ)	5	
GE03003	Linear Algebra A	3	
GE03004	Probability Theory and Statistics A	3	
GE03005	General Physics A(Ⅰ)	3	
GE03006	General Physics A(Ⅱ)	3	
GE03007	General Physics lab A(Ⅰ)	1	
GE03008	General Physics lab A(Ⅱ)	1	

3. Core courses: discipline (27 credits)

Code	Course Name	Credit(s)	Remarks
CS04022	Advanced Programming	4	
CS04001	Discrete Mathematics	4	
CS04002	Data Structure	4	
CS05054	Digital Circuit and Logic Design	4	
CS04023	Computer System	4	
CS05052	Algorithm Analysis and Designing	4	
CS04021	Programming Experiment	2	
CS04024	Digital system Experiment	1	

4. Core courses: major (20 credits)

Code	Course Name	Credit(s)	Remarks
CS05073	Introductions to Artificial Intelligence	4	
CS04007	Operating System	4	Includes Experiments to Operating Systems
CS05074	Computer Networks	4	Includes Experiments to Network Systems
CS05075	Principles of Compiling	4	Includes Experiments to Compiling Systems
CS05076	Principles of Database Systems	4	Includes Experiments to Database Systems

5. Electives: major (29 credits)

(1)Major restricted electives(8 credits)

Students must register two courses,8 credits in total,from the following list for the purpose of specialty foundation strengthen.

Code	Course Name	Credit(s)	Remarks
CS06137	Software Engineering	4	
CS06138	Introductions to Computing Theory	4	
CS06139	Introductions to High Performance Computing	4	

(2)Major non-restricted electives(21 credits)

Major non-restricted electives are implemented as groups. Students of computer science and technology major should first take all the courses in one group and then take courses from other groups or even from other majors, with a total of seven (7) non-restricted electives and 21 credits. The non-restricted electives and their groups are listed in the following table:

Code	Course Name	Credit(s)	Remarks
CS06140	Computing Methods	3	Computing Science Group
CS06141	Computing Theory	3	
CS06142	Cloud Computing Technology	3	
CS06143	Social Network Analysis	3	
CS06144	Machine Learning	3	Data Science Group
CS06145	Intelligent Processing of Data	3	
CS06146	Scientific Computing Visualization	3	
CS06071	Data Mining	3	
CS06147	Routing and Switching Technology	3	Computer Systems Group
CS06148	Distributed and Cloud Computing Systems	3	
CS06149	Computer Vision Systems	3	
CS06150	Software Design Patterns	3	System Software Group
CS06151	Advanced Database Designing	3	

Note:1)Students are encouraged to sign up for elective within and across their majors, with the credit hours no less than 50% of the total required credit hours.

2)Students who take part in computer competitions or publish technical papers can apply to substitute two selective credit hours (see instructions of academic research and techniques invocation of the college of computer science and electronic engineering, hunan university)

6. Collective training (33 credits)

Code	Course Name	Credit(s)	Remarks
GE01040	Military Training, Military Affairs and National Defense (Including Military Theory)	0	
CS10018	University and Computer Science and Technology Major Introduction	0	
GE09030	Practices for Chinese Writing	1	Summer semester of the first year of study
GE09028	Practices for English Writing	1	
GE09001	Practices for Programming	2	
CS10019	Practices for Digital systems Design	2	Summer semester of the second year of study
CS10020	Practices for Software Design	2	
CS10021(22)	Major Specific Integrated Design	4	Summer semester of the third year of study (Choosing 1 project from the college's list)
CS10023	Internship for Graduation Project	2	Spring semester of the forth year of study
CS10034	Experiments to Principles of Computer Systems	2	

Cont

Code	Course Name	Credit(s)	Remarks
CS10035	Experiments to Routing and Switch Technology	1	
CS10038	Software Engineering Documents Composition	1	
CS10036	Programing with New Techniques	1	
CS10026	Graduation Project(Including Mentor Courses)	14	Mentor courses (2 credits) are included. Mentor courses are the tasks of the mentor system. These courses are project-driven with "CDIO" model, and are taught by discussions. Every mentor takes charge of 3—6 students of each class year. The course contents include: academic guidance for undergraduate students, monitoring on summer semester design courses for first and second year undergraduate students, mentoring on summer semester design courses for third year undergraduate students, mentoring on graduation project and internship for forth (final) year undergraduate students.

Ⅵ. Major Course Teachers

No.	Name	Title	Education	Research Domain	Courses
1	Luo Jiawei	Professor	Ph. D	Data Mining, Biological Information Processing	Data Structure, Data Mining
2	Li Kenli	Professor	Ph. D	Parallel and Distributed Processing, Bio-computer, Combinational Optimization	Introductions to High Performance Computing
3	Wang Dong	Professor	Ph. D	Wireless Mobile Network, In-Car Network, Network Analysis	Computer Network
4	Chen Hao	Professor	Ph. D	Parallel and Distributed Systems	Operating Systems, Distributed and Cloud Systems
5	Xiao Degui	Associate Professor	Ph. D	Image and Video Processing, Computer Vision	Operating Systems, Computer Vision Systems
6	Xu Ying	Associate Professor	Ph. D	Optimization Algorithm	Introductions to Artificial Intelligence
7	Zhu Ningbo	Associate Professor	Ph. D	Digital Image Processing	Introductions to Artificial Intelligence, Intelligent Processing of Data
8	Ren Xiaoxi	Associate Professor	Ph. D	Embedded Systems	Principles of Compiling

Cont

No.	Name	Title	Education	Research Domain	Courses
9	Fan Nianbo	Associate Professor	Ph. D	Formalized Method, Data Mining	Introductions to Computing Theory, Computing Methods
10	Wu Hao	Associate Professor	Ph. D	Computing Theory	Introductions to Computing Theory, Computing Theory
11	Wang Yongheng	Associate Professor	Ph. D	Database, Data Mining	Principles of Database, Advanced Database Technology
12	Tang Zhuo	Associate Professor	Ph. D	Cloud Computing and Big Data Parallel Processing	Introductions to High Performance Computing, Cloud Computing Technology
13	Yin Shu	Associate Professor	Ph. D	Parallel Storage Systems, Reliability Analysis of Energy Efficient Systems	Algorithm Analysis and Designing
14	Li Rui	Associate Professor	Ph. D	Computer Network Security, Cloud Computing, Data Privacy and Integrity Research	Data Structure, Software Designing
15	Jiang Wenjun	Lecturer	Ph. D	Social Networks	Algorithm Analysis and Designing, Social Networks Analysis
16	Liu Yufeng	Lecturer	Ph. D	Intelligence Information Searching, Mobile Apps Development	Data Structure, Software Designing
17	Xia Yan	Lecturer	Ph. D	Wireless Network, Social Network and Big Data	Data Structure, Machine Learning
18	Li Xiaohong	Lecturer	Ph. D	Trusty Systems and Networks	Data Structure, Software Designing
19	Yuan Xiaofang	Lecturer	Ph. D	Network Measurement and Future Network Technology	Computer Networks, Routing and Switching Technology
20	Wu Fan	Lecturer	Master	Parallel Computing	Data Structure, Scientific Computing Visualization
21	Yang Xiaobo	Lecturer	Master	Software Theory, Information Security	Principles of Compiling, Designing and Implementation of Compiling Systems
22	Wang Weisheng	Engineer	Master	Image Analysis and Processing	Software Engineering, Software Designing Patterns

Ⅶ. Professors-in-charge

No.	Name	Title	Education	Research Domain	Courses
1	Chen Hao	Professor	Ph. D	Parallel and Distributed Systems	Operating Systems, Distributed and Cloud Computing Systems

（翻译人：殷树）