

软件工程

一、培养目标

面向软件产业需求,依据“工程教育认证标准”制定的本培养方案,旨在培养具有良好的人文、科学及工程素养,具备扎实的软件工程领域的数理基础,系统掌握软件工程理论和软件的分析、设计、开发、测试技术和管理技巧,具备较强的团队意识和软技能,能在相关领域从事软件工程技术的研究、软件设计、软件开发、软件测试及项目管理等工作的人才。

二、基本规格要求

软件工程专业本科毕业生应具有如下基本素质:

1. 工程知识:应掌握软件生命周期中涉及的工程知识和相关数理基础,并能够将其应用到软件实践中。
2. 问题分析:能运用数学、自然科学与软件需求工程的基本原理,识别、表达、分析复杂的软件工程问题,以获得有效结论。
3. 设计/开发解决方案:能够针对特定软件需求设计解决方案,包括功能设计、系统架构设计、软件组件设计和数据库设计等,并在设计环节体现创新意识,考虑社会、健康、安全、法律、文化及环境等因素。
4. 研究:能够基于科学理论并采用先进技术手段,从软件技术创新的角度,得出复杂软件问题的创新解决方法。
5. 使用现代工具:能够针对特定的软件问题,分析、选择恰当的技术、资源、现代工程工具和软件工具,提高解决软件问题的效率,提升解决方案的规范性。
6. 工程与社会:能够基于工程相关背景知识进行合理分析,评价软件工程实践和软件问题解决方案对于社会、健康、安全、法律以及文化的影响,并理解应承担的责任。
7. 环境与可持续发展:能够理解和评价软件工程实践对于环境、社会可持续发展的影响,并能够将环境、社会可持续发展的要求体现于解决方案。
8. 职业规范:具有人文社会科学素养、社会责任感,能够在软件工程实践中理解并遵守软件工程职业道德和规范,履行责任。
9. 个人和团队:具备团队意识,能够正确理解个人与团队之间的关系,在软件项目中能够和团队成员协作完成任务。
10. 沟通:具备书面沟通、口头沟通的能力,能够熟练使用文字、图表进行软件文档的编写,能够与客户、团队成员进行有效的口头沟通。具备一定的国际视野,能够进行跨文化背景下的沟通和交流。
11. 项目管理:理解和掌握软件项目管理的基本理论,能够在软件实践中将其应用于过程管理,以规避风险、规范过程和提升效率。
12. 终身学习:具备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

本专业采用3+1培养模式,具有学科交叉、突出系统能力与工程素质培养的特色。培养计划在注重软件工程学科基础知识学习与工程素质培养的同时,体现应用软件、系统软件、领域软件等特色方向。

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. 软件工程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	30	23	18	8	38	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（30 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	
CS04010	数据结构	4	
CS05054	数字电路与逻辑设计	4	
CS04023	计算机系统	4	
CS04025	操作系统原理与设计	4	
CS04021	程序设计实验	2	
CS04024	数字系统实验	2	
CS04025	计算机系统原理实验	2	

(四) 专业核心 (23 学分)

编码	课程名称	学分	备注
CS05065	计算机网络技术	4	
CS05066	计算机算法	4	
CS05067	编译技术	4	
CS05068	软件工程导论	4	(全英文授课)
CS05069	数据库系统	4	
CS05070	数据库系统实验	1	
CS05071	软件工程文档写作	1	
CS05072	软件设计与实现	1	

(五) 专业选修课 (18 学分)**(1) 专业限选课 (3 学分)**

本专业学生必须选修以下课程, 以提升职业素养, 总计 3 学分。

编码	课程名称	学分	备注
CS06125	IT 职业素养	3	

(2) 专业任选课 (15 学分)

专业任选课程采用方向分组与任选相结合的方式实施。学生首先在某个分组(软件工程理论与方法、计算机系统软件与网络、软件工程技术、领域软件工程)内的 4 门课程中选修 3 门, 然后跨组(或跨专业)选修 2 门课程, 建议第四、五学期各选 1 门, 第六学期选 3 门, 总计 15 学分。课程及分组如下:

编码	课程名称	学分	备注
CS06192	JAVA 程序设计思想	3	软件工程理论与方法方向
CS06126	软件系统集成	3	
CS06127	设计模式	3	
CS06128	面向对象分析与设计	3	
CS06083	网络编程技术	3	计算机系统软件与网络
CS06129	Unix 基础及应用	3	
CS06130	网络信息安全	3	
CS06131	图形图像处理技术	3	软件工程技术方向 (必须先选“JAVA 程序设计思想”作为先导课程)
CS05034	软件项目管理	3	
CS06132	JAVAEE 应用与开发	3	
CS06133	软件需求工程	3	
CS06058	软件测试技术	3	
CS06054	嵌入式系统	3	领域软件工 程方向
CS06134	软件架构	3	
CS06135	.NET 应用与开发	3	
CS06136	领域知识工程	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 (38 学分)

课程编码	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	
CS10028	1. 操作系统设计与实现	4	三年级夏季学期 (3 选 1)
CS10029	2. 测试工具设计与实现	4	
CS10030	3. 移动应用软件设计与实现	4	
CS10023	企业实习	12	第 7 学期
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,本课程须是以项目驱动、“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	林亚平	教授	博士	计算机网络	计算机网络
2	杨贯中	教授	硕士	计算机网络	网络编程技术
3	秦 拯	教授	博士	信息安全	软件项目管理
4	杨金民	教授	博士	数据挖掘	数据库系统、软件集成技术
5	金 敏	教授	博士	泛在计算	嵌入式系统
6	李军义	副教授	博士	软件测试	软件测试技术
7	胡 军	副教授	博士	智能软件	软件工程、软件架构
8	边耐政	副教授	硕士	软件工程	软件工程、JAVAEE 应用与开发
9	周四望	副教授	博士	传感器网络	操作系统、图形图像处理技术
10	欧阳柳波	副教授	博士	智能信息处理	软件项目管理、软件需求工程
11	黎文伟	副教授	博士	网络测试	操作系统
12	陈 浩	副教授	博士	移动互联网技术	高等程序设计
13	常炳国	副教授	博士	电子政务	面向对象的程序设计与分析、领域知识工程
14	戴牡红	副教授	硕士	数据库技术	数据库系统
15	缪 力	副教授	博士	软件测试	算法分析与设计
16	廖 鑫	讲师	博士	信息安全	计算机网络、网络信息安全
17	刘 琴	讲师	博士	云计算安全	高等程序设计
18	马 征	讲师	硕士	编译技术	编译原理、Java 程序设计思想
19	杨 柳	讲师	硕士	电子商务	高等程序设计
20	周军海	讲师	硕士	软件架构	面向对象的程序设计与分析、设计模式
21	李 珩	讲师	硕士	项目管理	嵌入式系统
22	李 玮	讲师	硕士	软件测试	软件测试技术

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)
23	肖雄仁	讲师	硕士	操作系统	网络编程技术、Unix 基础及应用
24	周 波	讲师	硕士	软件工程	编译原理、.Net 应用与开发
25	王 涛	讲师	博士	分布式系统中的合作机制	高等程序设计
26	肖光意	讲师	博士	机器学习	算法分析与设计

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	杨金民	教授	博士	数据库	数据库系统

Software Engineering

I . Objects

Demanded by software industry, based on “Engineering Education Certification 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 software engineering. We demand the students should have solid theoretical knowledge on their majors, and good skills of software analysis, design, development, test and management. Moreover, the students should have team spirit and soft skills. So they can work as software technology researchers, software designers, developers, testers or managers.

II . Basic Requirements

Software Engineering graduates should have the following basic qualities:

1. **Engineering Knowledge:** Students should grasp mathematics and other theories involved in software life cycle, and related engineering knowledge and can be applied to software practice.
2. **Analysis:** Students can use principles of mathematics, natural science and engineering software requirements, to identify, express, analyze complex software engineering problems, and obtain valid conclusions.
3. **Design / Development Solutions:** Student can design software solutions for specific needs, including functional design, system architecture design, software component design and database design, and reflect the sense of innovation in design aspects, social, health, safety, law, cultural and environmental factors.
4. **Research:** Students can obtain innovation solution of complex software problem, based on scientific theory and the use of advanced technology, from the perspective of technology innovation.
5. **Using modern tools:** Students can analyze and choose the appropriate technology, resources, modern engineering tools and software tools for specific software problems to improve the efficiency of software problems, improve normative solutions.
6. **Engineering and Society:** Students can carry out rational analysis based on engineering-related background knowledge, to evaluate of software engineering practices and software solutions for social issues, health and safety, legal and cultural influences. They also understand the responsibility they should bear.
7. **Environment and Sustainable Development:** Students can understand and evaluate the software engineering practices for environmental and social impact of sustainable development, and make sure that environmental requirements and social sustainable development is reflected in the solution.
8. **professional norms:** Students should have humanities and social science literacy, social responsibility, to understand and comply with engineering ethics and norms, fulfill its responsibilities in software engineering practice.
9. **Individual and Team:** Students should be equipped with team spirit, able to correctly understand the relationship between the individual and the team, and can collaborate on tasks in software

projects with other team members.

10. Communication: Students should have written communication, oral communication ability. They can skillfully write software documentation, and communicate with customers, team members efficiently through oral communication. They should also have a certain international vision, can communicate and exchange under the cross-cultural background.

11. Project management: Students can understand and master the basic theory of software project management, and apply in software practice's process management, to avoid risks, standardize processes and improve efficiency.

12. Lifelong learning: Students should be equipped with self-learning and awareness of lifelong learning, and meet the development needs through continuous learning.

III. Program Traits

This major adopts 3+1 training mode which is 3 years knowledge learning and 1 year enterprise internship. This major has 3 characteristics such as inter-disciplines, outstanding abilities on system and engineering. We demand our students have a core foundation on the knowledge from engineering disciplines, emphasize their engineering practices on software engineering, and train their abilities on scientific researches and technological innovations. We also strengthen some featured directions such as application software, system software, and domain software and so on.

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 intelligence science and technology major. The detailed requirements for each kind of the specific courses are listed in the following table:

Course categories	Core courses General	Core courses Domain	Core courses Discipline	Core courses Major	Electives Major	Electives General	Collective Training	Total
Credit requirements	24	24	30	23	18	8	38	165

3. A student can graduate if he/she fulfills the course study of core courses, electives, and other courses as specified in the program, and satisfies the basic requirements on morality, intelligence, and health. We will confer the Bachelor Degree of Engineering on students if they satisfy the requirements of degree according to the related policies.

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 (30 credits)

Code	Course Name	Credit(s)	Remarks
CS04022	Advanced Programming	4	
CS04001	Discrete Mathematics	4	
CS04010	Data Structure	4	
CS05054	Digital Circuit and Logic Design	4	
CS04023	Computer System	4	
CS04025	Operating System Principle and Design	4	
CS04021	Programming Experiment	2	
CS04024	Digital System Experiment	2	
CS04025	Computer System Engineering Experiment	2	

4. Core courses; major (23 credits)

Code	Course Name	Credit(s)	Remarks
CS05065	Computer Network Technology	4	
CS05066	Computer Algorithm	4	
CS05067	Compiler Technology	4	
CS05068	Software Engineering Introduction	4	Course taught in English
CS05069	Database System	4	
CS05070	Database System Experiment	1	
CS05071	Software Engineering Document Writing	1	
CS05072	Software Design and Implement	1	

5. Electives; major (18 credits)

(1) Major restricted electives (3 credits)

In order to strengthen the knowledge base, students in the software engineering major are required to take 1 elective, for a total of 3 credits.

Code	Course Name	Credit(s)	Remarks
CS06125	IT Professional Quality	3	

(2) Major non-restricted electives (15 credits)

Major non-restricted electives are assigned as four groups such as software engineering theory and method group, computer system software and network group, software engineering technology group, and domain software engineering group. Students of software engineering major should take three (3) courses in one group and then take two (2) courses from other groups or even from other majors, with a total of five (5) non-restricted electives and 15 credits at least. We recommend the fourth and fifth semester each selected one, sixth semester selected three courses. These selection strategies will help students cultivate their abilities in professional systems and expand their professional knowledge and skills. The non-restricted electives and their groups are listed in the following table:

Code	Course Name	Credit(s)	Remarks
CS06192	Thinking in JAVA	3	Software engineering theory and method group
CS06126	Software System Integration	3	
CS06127	Design Pattern	3	
CS06128	Object-oriented Analysis and Design	3	
CS06083	Network Programming Technology	3	Computer system software and network group
CS06129	Unix Foundation and Application	3	
CS06130	Network Information Security	3	
CS06131	Graphics Technology Process	3	
CS05034	Software Project Management	3	Software engineering technology group (Students are advised to take "Thinking in JAVA" as pilot course)
CS06132	JAVAAEE Application and Development	3	
CS06133	Software Requirement Engineering	3	
CS06058	Software Testing Technology	3	
CS06054	Embedded System	3	Domain software engineering group
CS06134	Software Architecture	3	
CS06135	.NET Application and Development	3	
CS06136	Domain Knowledge Engineering	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 (38 credits)

Code	Course Name	Credit(s)	Remarks
GE01040	Military training, Military Affairs and National Defense (including Military Theory)	0	
CS10018	University and "the Information Security (Secrecy Technology)" Major Introduction	0	
GE09030	Practices for Chinese Writing	1	Summer semester of the first year
GE09028	Practices for English Writing	1	
GE09001	Practices for Programming	2	

Cont

Code	Course Name	Credit(s)	Remarks
CS10019	Practices for Digital Systems Design	2	Summer semester of the second year
CS10020	Practices for Software Design	2	
CS10028	1. Practices for Operating System Design 2. Practices for Tool Design 3. Practices for Application Software Design	4	Summer semester of the third year (Choosing 1 project from 3 courses)
CS10029		4	
CS10030		4	
CS10023	Enterprise internship	12	The seventh semester
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 fourth (final) year undergraduate students.

VI. Major Course Teachers

No.	Name	Title	Education	Research Domain	Courses
1	Lin Yaping	Professor	Ph. D	Computer Network	Computer Network
2	Yang Guanzhong	Professor	Master	Computer Network	Network Programing Technology
3	Qin Zheng	Professor	Ph. D	Information Security	Software Project Management
4	Yang Jinmin	Professor	Ph. D	Data Mining	Database System, Software Integration Technology
5	Jin Min	Professor	Ph. D	Ubiquitous Computing	Embedded System
6	Li Junyi	Associate Professor	Ph. D	Software Testing	Software Testing Technology
7	Hu Jun	Associate Professor	Ph. D	Intelligent Software	Software Engineering, Software Architecture
8	Bian Naizheng	Associate Professor	Master	Software Engineering	Software Engineering, JAVEEE Application and Development

Cont

No.	Name	Title	Education	Research Domain	Courses
9	Zhou Siwang	Associate Professor	Ph. D	Sensor Network	Operating System, Graphics Processing Technology
10	Ouyang Liubo	Associate Professor	Ph. D	Intelligent Information Processing	Software Project Management, Software Requirement Engineering
11	Li Wenwei	Associate Professor	Ph. D	Network Testing	Operating System
12	Chen Hao	Associate Professor	Ph. D	Mobile Communication Technology	Advanced Programming Design
13	Chang Bingguo	Associate Professor	Ph. D	Electronica Government	Object Oriented Programming Design and Analysis, Domain Knowledge Engineering
14	Dai Muhong	Associate Professor	Master	Database Technology	Database System
15	Liao Li	Associate Professor	Ph. D	Software Testing	Algorithm Design and Analysis
16	Liao Xin	Lecturer	Ph. D	Information Security	Computer Network, Network Information Security
17	Liu Qin	Lecturer	Ph. D	Cloud Computing Security	Advanced Programming Design
18	Ma Zheng	Lecture	Master	Compiler Technology	Compiler Principles, Thinking in JAVA
19	Yang Liu	Lecture	Master	Electronic Commerce	Advanced Programming Design
20	Zhou Junhai	Lecture	Master	Software Architecture	Object Oriented Programming Design and Analysis, Design Pattern
21	Li Hang	Lecture	Master	Project Management	Embedded System
22	Li Wei	Lecture	Master	Software Testing	Software Testing Technology
23	Xiao Xiongren	Lecture	Master	Operating System	Network Programming, Unix Foundation and Application
24	Zhou Bo	Lecture	Master	Software Engineering	Compiler Principles, . Net Application and Development
25	Wang Tao	Lecture	Ph. D	Collaborative Mechanism in Distributed System	Advanced Programming Design
26	Xiao Guangyi	Lecture	Ph. D	Machine Learning	Algorithm Analysis and Design

VII. Professors-in-charge

No.	Name	Title	Education	Research Domain	Courses
1	Yang Jinmin	Professor	Ph. D	Database	Database System

(翻译人:李军义)