软件工程专业培养方案

专业名称与代码：软件工程（080902）

专业培养目标：本专业培养基础扎实、知识面广、实践能力强、综合素质高、能适应信息产业和软件产业需求的，具备扎实的软件理论和软件工程专业知识，具有良好的软件设计与实现能力，具备地学信息化软件开发背景知识，掌握GIS应用软件开发方法，掌握项目管理规范、具备良好的交流沟通能力和创新精神的软件设计与开发的工程技术人才。

专业毕业要求：

系统掌握软件工程学科的基本理论和基础知识，掌握软件开发的基本技能与方法，具有熟练使用多种主流软件工具解决实际问题的能力和控制软件质量的能力；了解并掌握一定的管理知识和行业规范，理解工程项目的组织与管理。掌握一门外语，具备良好的阅读、理解专业外语资料的能力和与国外同行进行交流和沟通的能力。

毕业生应获得以下几方面的知识、能力和素质：

1. 具有良好的工程职业道德、坚定的追求卓越的态度、强烈的爱国敬业精神、社会责任感和丰富的人文科学素养；

2. 具备扎实的数学与外语基础，具有从事工程工作所需的相关自然科学知识以及一定的经济管理知识；

3. 掌握扎实的工程基础知识和软件工程专业基本理论、基本知识和基本技能与方法，了解软件工程领域的技术发展趋势以及相关应用领域的基本知识；

4. 具有良好的计算思维能力、算法设计与分析能力、程序设计能力、计算机应用系统的认知、分析、设计和应用能力；掌握软件需求分析、设计、开发、测试和维护等软件过程，熟悉软件过程管理的基本流程，掌握软件工程化开发的方法、技术和工具；

5. 具有主动学习和获取新知识与技术的能力；具有良好的文字和口头表达能力；具有较好的组织管理能力、较强的交流沟通和团队合作的能力；具有一定的独立工作能力和创新精神。

毕业要求实现及途径：

序号	毕　业　要　求	实现途径（教学过程）
1	具有良好的工程职业道德、坚定的追求卓越的态度、强烈的爱国敬业精神、社会责任感和丰富的人文科学素养；	**①课堂教学：**毛泽东思想和中国特色社会主义理论体系概论、马克思主义基本原理、思想道德修养与法律基础、军事理论、中国近现代史纲要、体育Ⅰ-Ⅳ、大学生就业指导、社会科学类、人文艺术类等。 **②课外学习：**开展“大学生青年文化艺术节”、“高雅艺术进校园”等主题教育活动，运动会、定向越野等活动；开展新生入学教育和毕业生系列教育主题活动；开展大学生“暑假社会实践”活动；加强学务指导老师、辅导员队伍建设，加强学生干部队伍建设，提

		高对学生的教育引导。
2	具备扎实的数学与外语基础，具有从事工程工作所需的相关自然科学知识以及一定的经济管理知识；	**①课堂教学：**高等数学、线性代数、概率论与数理统计、离散数学、大学物理、大学英语以及自然科学类、经济管理类选修课等。 **②课外学习：**参加英语竞赛、数学建模比赛等活动等、相关学术报告。
3	掌握扎实的工程基础知识和软件工程专业基本理论、基本知识和基本技能与方法，了解软件工程领域的技术发展趋势以及相关应用领域的基本知识；	**①课堂教学：**信息导论、计算机高级语言程序设计、面向对象程序设计、数据结构、数据库概论、计算机结构与组成、操作系统原理等课程，以及计算机高级语言课程设计、面向对象程序设计课程设计、计算机结构与组成课程设计、数据结构课程设计等实践环节。 **②课外学习**：相关专业领域学术报告、“蓝桥杯”全国软件和信息技术专业人才大赛、计算机技术与软件专业技术资格（水平）考试
4	具有良好的计算思维能力、算法设计与分析能力、程序设计能力、计算机应用系统的认知、分析、设计和应用能力；掌握软件需求分析、设计、开发、测试和维护等软件过程，熟悉软件过程管理的基本流程，掌握软件工程化开发的方法、技术和工具；	**①课堂教学：**算法设计与分析、计算机网络、面向对象软件工程与 UML、Java 和.net 软件开发、软件需求、软件体系结构与设计、计算机图形学、实用数据库、软件项目管理、软件测试、软件过程与 CMMI、设计模式、人机交互技术等课程，以及计算机网络课程设计、软件开发技术课程设计、数据库课程设计、地理信息系统软件开发课程设计、软件工程综合实习、软件企业工作性实践、毕业设计等实践环节。 **②课外学习：**机器人足球比赛、MAPGIS 二次开发大赛等软件技能大赛以及 Oracle 等相关培训。
5	具有主动学习和获取新知识与技术的能力；具有良好的文字和口头表达能力；具有较好的组织管理能力、较强的交流沟通和团队合作的能力；具有一定的独立工作能力和创新精神。	**①课堂教学：**创新创业学习环节以及软件新技术、大数据技术与应用等专业选修课程，以及软件工程综合实习、软件企业工作性实践、毕业设计等综合性实践教学环节。 **②课外学习**：产学研、科研立项、挑战杯、大学生创新创业等课外科技活动，以及学生社团活动等。

主干学科：软件工程；计算机科学与技术。

核心课程：面向对象程序设计、计算机结构与组成、离散数学、数据结构、数据库概论、操作系统原理、算法设计与分析、计算机网络、面向对象软件工程与 UML、Java 和.net 软件开发、软件需求、软件体系结构与设计、计算机图形学、实用数据库、地理信息系统原理与软件开发、软件测试、软件过程与 CMMI 等。

主要实践性教学环节：计算机高级语言课程设计、面向对象程序设计课程设计、计

算机结构与组成课程设计、数据结构课程设计、计算机网络课程设计、软件开发技术课程设计、数据库课程设计、地理信息系统软件开发课程设计、软件工程综合实习、软件企业工作性实践、毕业设计。

修业年限：四年

授予学位：工学学士

相近专业：计算机科学与技术

Program For Software Engineering

Specialty and Code: Software Engineering(080902)

Education Objective: The students are cultured to have solid foundation, wide knowledge, strong practical ability, high comprehensive quality, and adaptive to information industry and software industry needs. They should master founded knowledge of software theory, software engineering and have good capability of software design and implementation. They will be trained to have the background of software development of Geoscience and master the software development method of GIS application. After graduation, the student will be able to have the senior ability of project management, good communication and creativity in software design and development.

Graduation Requirements: Students should systematically master the fundamental theory and knowledge of software engineering, the basic techniques and methods of software development. They are required to skillfully use a variety of mainstream software tools to solve real problems and control software quality, grasp the knowledge of software management and industry specification, comprehend organization and management of software project. Furthermore, the students should master a foreign language, have the ability to read and understand the professional foreign literature and communicate with foreign counterparts.

Graduates should gain the knowledge, ability and quality from the aspects below:

1. To have merit engineering professional ethics, firm attitude of pursuit excellence, strong patriotic spirit, strong sense of social responsibility, and good humanistic quality；

2. To master solid foundation of Math and English, with related knowledge of natural science and economic management to pursue engineering orientation;

3. To master solid foundation of engineering and software engineering professional theory, knowledge, techniques and methods, understand the trend of technology development in the field of software engineering and basic knowledge with their application areas;

4. To have the ability of good computing thinking, algorithm design and analysis, program design, the ability of cognition, analysis, design and application of computer application systems; To master the process of software requirement analysis, design, development, test and maintenance, familiar with basic process of software process management, master the methods, techniques and tools of software engineering;

5. To have the ability of active learning and acquiring new knowledge and technology，good writing and oral communication skills, good organization and management ability, strong communication and team cooperation ability, independent working ability and innovation spirit.

Graduation requirements and ways to achieve：

ID	Graduation requirements	ways to achieve（Teaching Process）
1	To have merit engineering professional ethics, firm attitude of pursuit excellence, strong patriotic spirit, strong sense of social responsibility, and good humanistic quality;	① **Classroom Teaching:** Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, Basic Principles of Marxism, Cultivation of Ethics and Fundamentals of Law, Military Theory, The Essentials of Modern Chinese History, Physical Education Ⅰ-Ⅳ, College Students Career Guidance, Social sciences, Humanities, etc. ② **Extracurricular learning:** To carry out the educational activities, such as "Campus Culture and Art Festival", "High cultural in campus", etc., the physical activities, such as sport game, Orienteering, etc., conduct the specialized education for the freshmen and graduate, promote the college students' summer social practice, strengthen the instructors, counselors student party branches, student cadres' professional construction, improve the guidance to students.
2	To master solid foundation of Math and English, with related knowledge of natural science and economic management to pursue engineering orientation;	① **Classroom Teaching:** Advanced Mathematics, Linear Algebra, Probability and Statics, Discrete Mathematics, College Physics, College English, optional modules of science and economics management, etc. ② **Extracurricular learning:** English competition, Math modeling competition, relevant academic report.
3	To master solid foundation of engineering and software engineering professional theory, knowledge, techniques and methods, understand the trend of technology development in the field of software engineering and basic knowledge with their the application areas;	① **Classroom Teaching:** Introduction to Information, High-level Programming Language（C++）, Object-Oriented Programming, Data Structure, Introduction to Database, Computer Structure and Composing, Operating System, Projects of High-level programming language (C++), Projects of Object-Oriented Programming ,Projects of Computer Structure and Composing, Projects of Data Structure. ② **Extracurricular learning:** Relevant academic report, "Blue Bridge Cup" national software and IT technique competition, Computer technology and software professional technique qualification test
4	To have the ability of good computing	① **Classroom Teaching:**

	thinking, algorithm design and analysis, program design, the ability of cognition, analysis, design and application of computer application systems; To master the process of software requirement analysis, design, development, test and maintenance, familiar with basic process of software process management, master the methods, techniques and tools of software engineering;	Design and Analysis of Algorithms, Computer Networks, Object-Oriented Software Engineering & UML, Java & .net Software Development, Software Requirements, Software Architecture and Design, Computer Graphics A, Practical Database, Software Project Management, Software Testing, Software Process and Capability Maturity Model, Design Pattern, HCI ② **Extracurricular learning:** Robot football competition, MAPGIS re-development competition, relevant training of Oracle
5	To have the ability of good computing thinking, algorithm design and analysis, program design, the ability of cognition, analysis, design and application of computer application systems; To master the process of software requirement analysis, design, development, test and maintenance, familiar with basic process of software process management, master the methods, techniques and tools of software engineering;	① **Classroom Teaching:** Specialty optional modules of Innovation and Entrepreneurship training, Novel Software Technology, Technologies and Applications of Big Data, etc., Projects of Geographical Information System Development, Comprehensive Practice of Software Engineering, Practice of Software Enterprises, Graduation Design (Thesis), etc. ② **Extracurricular learning:** Production-Study-Research integrated activity, research project, challenge cup, activities of student innovation and entrepreneurship, activities of student communities.

Major Disciplines: Software Engineering, Computer Science and Technology

Main Courses: Object-Oriented Programming, Computer Structure and Composing, Data Structure, Discrete Mathematics, Introduction to Database , Operating System, Design and Analysis of Algorithms, Computer Networks, Object-Oriented Software Engineering & UML, Java & .net Software Development ,Software Requirements, Software Architecture and Design, Computer Graphics, Practical Database , Principles of Geographic Information Systems and Software Development, Software Testing, Software Process and Capability Maturity Model, etc.

Practical Work: Projects of High-level Programming Language (C++), Projects of Object-Oriented Programming, Projects of Computer Structure and Composing , Projects of Data Structure, Projects of Computer Network , Projects of Java(.net), Projects of Database, Projects of Geographical Information System Development, Comprehensive Practice of Software Engineering, Practice of Software Enterprises ,Graduation Design(Thesis)

Duration: Four years.

Degree Granted: Bachelor of Engineering

Related Specialties: Computer Science and Technology

软件工程专业课程教学计划表

Course Descriptions of Software Engineering

课程类别 Classi-fication		课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
						讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
通识教育课 Liberal Education Courses	必修 Compulsory	11706200	马克思主义基本原理 Principles of Marxism	3	48	48				3						
		11706500	毛泽东思想与中国特色社会主义理论体系概论 Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64						4				
		11711800	中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32					2					
		120002*0	思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	48			1.5	1.5						
		113076*0	体育 Physical Education	4	144	144			1	1	1	1				
		109116*0	大学英语（ABC） College English（ABC）	12	192	192			3	3	3	3				
		21919400	计算机高级语言程序设计(C++) High-level Programming Language(C++)	3.5	56	36	20		3.5							
		21114500	信息导论 Introduction to Information	1	16	16			1							
		14300100	军事理论 Military Theory	2	32	32			2							
	选修 Elective	总计 12 学分，含创新创业选修课学分，跨学科选修课不低于 6 学分		12	192											
		小计 Sum		**46.5**	**824**	**612**	**20**		**12**	**8.5**	**6**	**8**				
Disciplinary Fundamental Courses	学科基础课	212127*1	高等数学 A Advanced Mathematics A	11.5	184	184			5	6.5						
		21212801	线性代数 A Linear Algebra A	3.5	56	56			3.5							
		21906800	面向对象程序设计 B Object-Oriented Programming B	3	48	28	20	计算机高级语言程序设计(C++)		3						
		21213100	大学物理基础 College Physics	3.5	56	56				3.5						
		20107300	自然地理与地质学 Physical Geography and Geology	2.5	40	40				2.5						

课程类别 Classi-fication	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
	21216502	离散数学 B Discrete Mathematics B	3.5	56	56					3.5					
	21908701	数据库概论 A Introduction to Database A	3.5	56	44	12	数据结构			3.5					
	21915900	数据结构 A Data Structure A	4	64	48	16	面向对象程序设计 B			4					
	21213501	概率论与数理统计 A Probability and Statics A	3.5	56	56					3.5					
	21121400	计算机结构与组成 Computer Structure and Composing	3.5	56	48	8				3.5					
	21117400	算法设计与分析 Design and Analysis of Algorithms	2.5	40	32	8	数据结构				2.5				
	21902001	操作系统原理 A Operating SystemA	3.5	56	44	12	数据结构				3.5				
	小计 Sum		**48**	**768**	**692**	**76**		**8.5**	**15.5**	**18**	**6**				
专业主干课 Main Specialty Courses	21921001	计算机网络 A Computer Networks A	3.5	56	44	12					3.5				
	21115400	面向对象软件工程与 UML （A） Object-Oriented Software Engineering & UML （A）	3	48	28	20	面向对象程序设计				3				
	21121600	Java 和.net 软件开发 Java & .net Software Development	3.5	56	40	16					3.5				
	21107300	软件需求 Software Requirements	2	32	20	12						2			
	21115600	软件体系结构与设计 Software Architecture and Design	3	48	32	16						3			
	21921301	计算机图形学 A Computer Graphics A	3.5	56	40	16						3.5			
	21107700	实用数据库(SQL Server, Oracle) Practical Database	3	48	28	20						3			
	21121700	地理信息系统原理与软件开发 Principles of Geographic Information Systems and Software Development	3	48	28	20						3			
	21115800	软件测试 Software Testing	2.5	40	28	12							2.5		
	21121800	软件过程与 CMMI Software Process and Capability Maturity Model Integration	3	48	32	16							3		
	小计 Sum		**30**	**480**	**320**	**160**					**10**	**14.5**	**5.5**		
专业选修课 Specialty Elective Courses		具体见专业选修课列表	**12**	**192**											
合计 Sub-total			**136.5**	**2264**	**1624**	**256**		**20.5**	**24**	**24**	**24**	**14.5**	**5.5**		
实践环节 Practic	44300200	军事训练 Military Training	2	2 周				2							

课程类别 Classi-fication	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
	41919500	计算机高级语言课程设计（C++） Projects of High-level Programming Language (C++)	1.5	1.5 周				1.5							
	41920200	面向对象程序设计课程设计 Projects of Object-Oriented Programming	1.5	1.5 周					1.5						
	40115300	自然地理与地质学实习 Practice of Physical Geography and Geology	2	2 周					2						
	41121900	计算机结构与组成课程设计 Projects of Computer Structure and Composing	1	1 周						1					
	41920901	数据结构课程设计 A Projects of Data Structure A	2	2 周						2					
	41921102	计算机网络课程设计 B Projects of Computer Network B	1	1 周							1				
	41121500	软件开发技术课程设计 Projects of Java（.net）	2	2 周							2				
	41921200	数据库课程设计 Projects of Database	2	2 周								2			
	41122000	地理信息系统软件开发课程设计 Projects of Geographical Information System Development	2	2 周								2			
	41122100	软件工程综合实习 Comprehensive Practice of Software Engineering	4	4 周									4		
	41122200	软件企业工作性实践 Practice of Software Enterprises	16	16 周										16	
	41122300	毕业设计（论文） Graduation Design (Thesis)	16	16 周											16
	小计 Sum		**53**	**53 周**				**3.5**	**3.5**	**3**	**3**	**4**	**4**	**16**	**16**
创新创业学习学分 Freedom study	ZZ35S	社会调查 Social Investigation	2												
		其他(学科竞赛、发明创造、科研报告) Others (Contest, Invention, Innovation and Research Presentation)	3												
	小计 Sum		**5**												
总计 Total			**194.5**	**2264+ 53 周**	**1624**	**256**		**24**	**27.5**	**27**	**27**	**18.5**	**9.5**	**16**	**16**
专业选修课 Specialty Elective Course	21107200	软件项目管理 Software Project Management	2.5	40	40							2.5			
	21901802	编译原理 B Compiler Principle B	3	48	40	8						3			
	21907202	人工智能 B Artificial Intelligence B	2.5	40	40								2.5		
	21122400	数据挖掘与数据分析 Data Mining and Data Analysis	2.5	40	24	16							2.5		

课程类别 Classi-fication	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
	21116400	人机交互技术 Human-Computer Interaction Techniques	2.5	40	24	16							2.5		
	21116500	设计模式 Design Patterns	2.5	40	24	16							2.5		
	21122500	软件新技术 Novel Software Technology	2.5	40	40							2.5			
	21112800	智能终端软件开发 Intelligent Terminal Software Development	3	48	40	8						3			
	21119900	高性能计算 High Performance Computing	2.5	40	24	16						2.5			
	21116300	移动计算技术 Mobile Computing Technology	2.5	40	28	12						2.5			
	21115700	Web 软件开发 Web Software Development	2	32	20	12	Java 和.net 软件开发						2		
	21122600	大数据技术与应用 Technologies and Applications of Big Data	2.5	40	40								2.5		
	21917500	物联网技术与应用 Technologies and Applications of Internet of Things	2.5	40	32	8							2.5		
	21122700	空间统计与分析 Spatial Statistics and Analysis	2.5	40	24	16						2.5			
	21122800	移动地理信息系统 Mobile GIS	2.5	40	28	12							2.5		
	21122900	空间信息可视化 Spatial Information Visualization	2	32	20	12							2		
	21123000	地理建模方法 Geographical Modeling Methods	2.5	40	24	16							2.5		

注：通识教育选修课学分和创新创业自主学习学分未列入具体学期。

软件工程专业课程分类统计

	通识教育课程 Liberal Education Courses		学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环节 Practical Work	创新创业自主学习 Freedom Study	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/学分	632/34.5	192/12	768/48	480/30	192/12	53 周/53	5	2264+53 周	194.5
学分所占比例	23.90%		24.68%	15.42%	6.17%	27.25%	2.57%		100%