

计算机科学与技术专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty in Computer Science and Technology (2017)

专业名称	计算机科学与技术	主干学科	计算机科学与技术
Major	Computer Science and Technology	Major Disciplines	Computer Science and Technology
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science and Technology	Duration	1.5 years

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	64	\	28	\	170
选修课 Elective Courses	9	21.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握计算机科学与技术领域的基础理论、专业知识、基本方法和专业实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在教育科研单位、企事业单位、技术和行政管理单位以及建工建材、交通、汽车与信息等行业从事计算机软硬件系统分析与设计、研究与开发、应用和管理等方面工作的专业技术人才。

学生毕业 5 年左右能得到：

- (1) 具有人文社会科学素养、社会责任感、工程职业道德、国际视野，具有强健的体魄和健康的心理，有意愿并有能力服务社会；
- (2) 具有从事计算机科学与技术领域科学研究、系统分析与设计、技术服务等工作所需的数理知识和专业知识，以及综合运用科学理论、专业知识和工具分析解决本专业复杂工程问题，具备计算机科学研究、软硬件研发、系统管理等方面工作的能力。
- (3) 具有质量意识、环境意识和安全意识，能够综合考虑社会、经济、环境、法律、法规、安全等制约因素；
- (4) 具备创新创业意识以及终身学习、人际交往、团队合作、适应发展等能力。
- (5) 通过工作实践、继续深造等方式，毕业生毕业后 5 年左右逐渐成长为 IT 行业团队技术骨干或 IT 项目团队管理人才。

The major educate the students to master the field of computer science and technology basic

theory, professional knowledge, basic methods and professional practice skills, "adaptability, strong enterprising spirit, strong sense of innovation, with international vision, in the education scientific research units, enterprises and institutions, technical and administrative units, building materials, transportation, the car and the information industry in computer software and hardware system analysis and design, research and development, application and management and other aspects of the work of the engineering and technical personnel.

5 years after graduation, students should achieve:

1. humanities and social science literacy, social responsibility, engineering ethics and international vision, strong physique and healthy mentality, willingness and ability to serve the society.
2. having mathematical knowledge and professional knowledge in the field of computer science and technology, scientific research, system analysis and design, technical service and other work, analyzing and comprehensive using of scientific theory, professional knowledge and professional tools to solve the complex engineering problems, ability of scientific research, computer hardware and software development, system management etc. work.
3. quality awareness, environmental awareness and safety awareness, it can take into account the constraints of economy, environment, law, regulations and safety and solve the complex engineering problems of this specialty.
4. the ability of innovative and entrepreneurial awareness, lifelong learning, interpersonal communication, team cooperation, and adaptation to development.
5. through work practice and continuing education, graduates gradually grow into IT industry team technical backbone or IT project team management talent 5 years after graduation.

(二) 毕业要求

- (1) 工程知识：能够将数学、自然科学、工程基础和专业知识用于解决计算机科学与技术领域复杂工程问题。
- (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科学与技术领域复杂工程问题，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科学与技术领域复杂工程问题的解决方案，设计满足特定需求的系统、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科学与技术领域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：能够针对计算机科学与技术领域复杂工程问题，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，包括对计算机科学与技术领域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，评价计算机科学与技术领域专业工程实践和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科学与技术领域复杂工程问题的专业工程实践对环境、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，能够在计算机科学与技术领域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:能够就计算机科学与技术领域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

1. Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems.
2. Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
5. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
6. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
7. Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

附:培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1	✓				
毕业要求 2	✓	✓			

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 3		✓	✓	✓	
毕业要求 4		✓			
毕业要求 5		✓			
毕业要求 6			✓		
毕业要求 7			✓	✓	
毕业要求 8	✓		✓	✓	
毕业要求 9				✓	✓
毕业要求 10				✓	✓
毕业要求 11			✓		
毕业要求 12				✓	✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程:

离散结构、数字逻辑、高级语言程序设计、计算机组成与系统结构、数据结构、操作系统、编译原理、数据库系统原理、计算机网络

Discrete structure, Digital Logic, Advanced Programming Language, Computer Organization and System Architecture, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Programming Language

(二) 专业特色课程:

开设小班教学实验课与计算机学科前沿课程。数据结构与算法综合实验、云计算与服务计算、计算机视觉、数据挖掘, 计算机系统能力实训。

Experiments on Data Structure and Algorithm, Cloud Computing and Service Computing, Computer Vision, Data Mining, Training of Computer System Ability

附: 毕业要求实现矩阵:

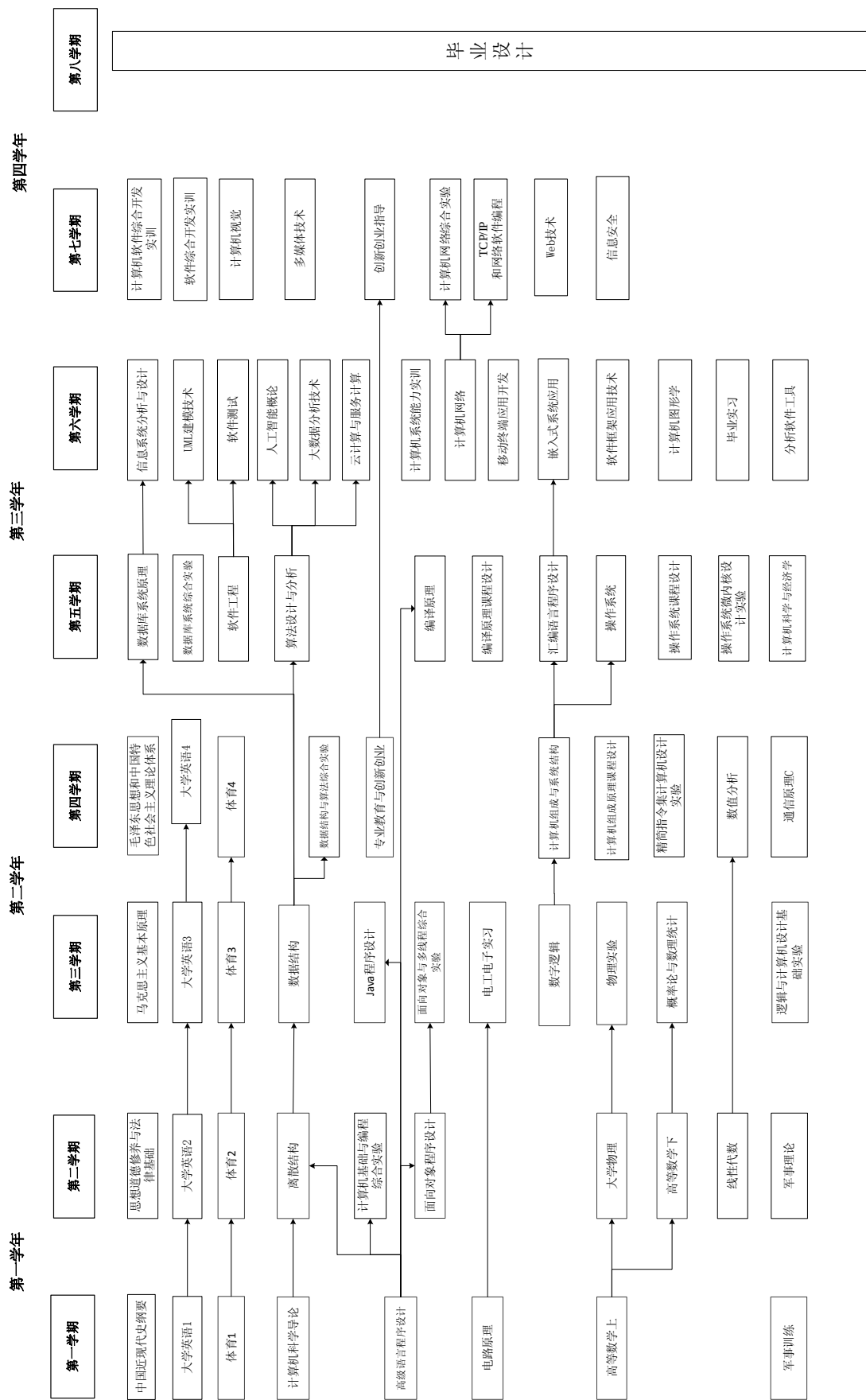
专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础			✓			✓						
		中国近现代史纲要								✓				
		计算机科学导论	✓	✓	✓			✓	✓	✓				
✓		高级语言程序设计		✓			✓	✓						
		毛泽东思想和中国特色社会主义理论体系概论								✓				
		马克思主义基本原理								✓				
		军事理论								✓				
		体育								✓	✓			

专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		大学英语										✓		
		高等数学	✓											
		电路原理	✓	✓										
		线性代数	✓											
		大学物理	✓		✓									
		物理实验	✓			✓								
✓		离散结构	✓	✓										✓
		概率论与数理统计	✓											
		计算机基础与编程综合			✓	✓		✓					✓	
		面向对象程序设计		✓	✓		✓							
✓		数字逻辑		✓	✓									
✓		数据结构		✓			✓							✓
		JAVA 语言程序设计					✓							
		计算机数值分析	✓											
	✓	数据结构与算法综合实验		✓	✓	✓	✓	✓					✓	✓
✓		计算机组成与系统结构	✓	✓		✓								
		汇编语言程序设计		✓			✓							
✓		编译原理	✓	✓		✓								
✓		操作系统	✓	✓		✓								
✓		数据库系统原理		✓		✓		✓						
		数据库系统综合实验		✓	✓	✓	✓							
		软件工程		✓	✓		✓	✓			✓		✓	
		嵌入式系统应用			✓		✓						✓	
✓		计算机网络			✓			✓	✓					
		计算机网络综合实验				✓	✓			✓				
		人工智能概论			✓							✓		

专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		UML 建模技术					✓							
		信息安全												
		TCP/IP 和网络软件编程				✓	✓							
		多媒体技术												
		分析软件工具					✓							
		软件测试					✓							
		信息系统分析与设计		✓			✓		✓					
		Web 技术					✓	✓						
✓		数据挖掘					✓							
		计算机图形学		✓										
✓		计算机视觉						✓						
		算法分析与设计		✓	✓			✓						✓
		通信原理	✓											
✓		云计算与服务计算						✓						
		军事训练								✓				
		计算机专业教育与创新创业		✓				✓		✓		✓		
		创新创业指导			✓			✓	✓	✓		✓		
		电工电子实习	✓										✓	
		计算机软件综合开发实训	✓		✓		✓	✓			✓	✓	✓	
✓		计算机系统能力实训		✓	✓		✓	✓			✓	✓		
		操作系统课程设计		✓	✓	✓			✓			✓		
		编译原理课程设计		✓	✓	✓			✓			✓		
		计算机组成原理课程设计		✓	✓	✓			✓			✓		
		毕业实习				✓	✓	✓	✓	✓	✓		✓	
		毕业设计（论文）			✓	✓	✓	✓	✓					✓

三、课程教学进程图

III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course	
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur			
(一) 通识教育必修课程 General Education Required Courses										
4220001111	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2		
4220002111	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1		
4120347171	计算机科学导论 Introduction to Computer Science	2	32	8				1		
4120348171	高级语言程序设计 A Advanced Language Programming	3.5	56	12				1		
4220003111	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		4		
4220005111	马克思主义基本原理 Marxism Philosophy	3	48			8		3		
1060003131	军事理论 Military Theory	1	32			16		2		
4210001171	体育 1 Physical Education I	1	26					1		
4210002171	体育 2 Physical Education II	1	34					2		
4210003171	体育 3 Physical Education III	1	34					3		
4210004171	体育 4 Physical Education IV	1	34					4		
4030002181	大学英语 1 College English I	3	60				12	1		
4030003181	大学英语 2 College English II	2	44				12	2	大学英语 1	
4030004181	大学英语 3 College English III	2	44				12	3	大学英语 2	
4030004181	大学英语 4 College English IV	2	44				12	4	大学英语 3	
小 计 Subtotal		31.5	664	20	0	64	48			

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类 相关课程并取得至少 2 个学分，在创新创业类课程中至少选修一 门课程，在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307171	电路原理 B Circuit Principle	3.5	56	8				1	
4050063111	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064111	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050229111	线性代数 Linear Algebra	2.5	40					2	
4120349171	离散结构 Discrete Structures	3.5	56					2	计算机科学 导论
4120261141	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	高级语言程 序设计
4050463131	大学物理 B Physics	5	80					2	高等数学上
4050224111	物理实验 B Physics Lab	1	32	32				3	大学物理
4050058111	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4120079111	数字逻辑 Digital Circuits	3	48	8				3	
4120433171	数据结构 C Data Structure	4	64	16				3	高级语言程 序设计
4120430171	计算机数值分析 Computer Numerical Analysis	2.5	40	8				4	线性代数
4120265141	数据结构与算法综合实验 Experiments on Data Structure and Algorithm	1	32	32				4	数据结构

课程编号 Course Number	课 程 名 称 Course Title	学分 CrS	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120041111	计算机组成与系统结构 Computer Organization and System Architectur	4.5	72	10				4	数字逻辑
4120435171	算法设计与分析 B Algorithm Design and Analysis	2	32	6				4	数据结构
4120331151	编译原理 Compiler Principles	3.5	56	8				5	
4120350171	操作系统 A Operating System	3.5	56	8				5	
4120351171	数据库系统原理 B Principles of Database Systems	3.5	56	8				5	数据结构
4120270141	数据库系统综合实验 Experiments on Database System	1	32	32				5	
4120352171	嵌入式系统应用 A Embedded System and Application	2.5	40	8				6	
4120034111	计算机网络 C Computer Networks	2.5	40					6	
4120271141	计算机网络综合实验 Experiments on Computer Network	1	32	32				7	计算机网络
小 计 Subtotal		64	1104	248	0	0	0		
(四) 专业教育选修课程 Specialized Elective Courses									
4120431171	面向对象程序设计 C Object-oriented Methodology	2.5	40	12				2	高级语言程序设计
4120425171	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	高级语言程序设计
4120263141	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	面向对象程序设计
4120084111	通信原理 C Communication Principles	2.5	40	8				4	
4120240131	汇编语言程序设计 C Assembly Language Programming	2.5	40	16				5	
4120432171	软件工程 B Introduction to Software Engineering	2.5	40	8				5	
4120354171	UML 建模技术 UML Modeling Technology	2	32					6	软件工程
4120058111	软件测试 B Software Testing	2	32	8				6	软件工程

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120428171	分析软件工具 Analysis Software Tool	2	32	8				6	
4120103111	信息系统分析与设计 Information System Analysis and Design	2	32	6				6	数据库系统原理
4120083111	云计算与服务计算 Cloud & Service Computing	2	32	6				6	
4120055111	人工智能概论 B Artificial Intelligence	2	32					6	
4120356171	计算机图形学 B Computer Graphics	2	32	6				6	
4120102111	信息安全 Information Security	2	32	6				7	
4120426171	TCP/IP 和网络软件编程 TCP/IP and Network Programing	2.5	40	10				7	计算机网络
4120311141	多媒体技术 C Multimedia Technology	2	32	8				7	
4120372171	Web 技术 Web Technology	2	32	12				7	
4120434171	数据挖掘 C Data Mining	2	32	8				7	
4120357171	计算机视觉 Computer Vision	2	32	6				7	
小 计 Subtotal		40	656	168	0	0	0		
修读说明：要求至少选修 21.5 学分。 NOTE: Minimum subtotal credits:21.5.									
(五) 个性课程 Personalized Elective Courses									
4120393171	逻辑与计算机设计基础实验 A Design and Implementation of the Digital Logic System	1	32	32				3	
4120394171	精简指令集计算机设计实验 A Design and Implementation of the RISC System	1	32	32				4	
4120237121	计算机科学与经济学 A Computer Science and Economics	2	32					5	
4120395171	操作系统微内核设计实验 A Design and Implementation of the Microkernel Operating System	1	32	32				5	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120240131	移动终端应用开发 Mobile Terminal Application Development	2	32	12				6	
4120241131	软件框架应用技术 Application Technology of Software Framework	2	32	12				6	
4120242131	大数据分析技术 C Big Data Analysis Technology	2	32	8				6	
小 计 Subtotal		11	224	128	0	0	0		
修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。 NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.									

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002111	军事训练 Military Training	1.5	3	1
4100068111	电工电子实习 A Practice in Electrical Engineering & Electronics	2	2	3
4120403171	计算机专业教育与创新创业 Introduction of CS Major and Innovation and Entrepreneurship	1	1	4
4120126111	计算机组成原理课程设计 Project of Computer Organization	1	1	4
4120117111	操作系统课程设计 Project of Operating System	1	1	5
4120116111	编译原理课程设计 Project of Compiler Principles	1	1	5
4120362171	计算机系统能力实训 Training of Computer System Ability	4	4	6
4120112111	毕业实习 Practical Training for Graduation	3	3	6(暑期)
4120363171	创新创业指导 B Guide to Innovation and Entrepreneurship	2	2	7
4120203131	计算机软件综合开发实训	3	3	7(华为 ICT)

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
	Computer Software Integrated Development			
4120364171	毕业设计 Graduation Design	8.5	17	8
小 计 Subtotal		28	38	

六、其它要求

VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
 - 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。
- 1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.
- 2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌
专业培养方案责任人：彭德巍

软件工程专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty for Software Engineering (2017)

专业名称	软件工程	主干学科	软件工程
Major	Software Engineering	Major Discipline	Software Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science&Technology	Duration	1.5 Years

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践教学环节 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	66.5	\	26.5	\	170
选修课 Elective Courses	9	20.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

结合经济发展对软件人才的需要，以软件学科发展和学科前沿为导向，培养具有较强学术能力、竞争力、创新能力和一定国际视野的高层次复合型软件工程科研、技术及管理人才。

学生毕业 5 年左右能达到：

- (1) 具有良好的职业道德、社会责任感和创业精神，积极为我国经济建设和社会发展服务。
- (2) 具有坚实的自然科学基础、计算机科学与软件工程专业基础，具备扎实的专业能力，能系统地掌握软件开发、组织、管理的基本理论、知识和方法。
- (3) 具有研究与开发方面的科学思维和软件工程实践能力、能够利用相关技术和方法发现问题、综合分析问题和解决复杂问题，推动行业创新发展。
- (4) 掌握一门外语，具备良好的阅读、理解、撰写外语资料的能力和进行国际化交流的能力。
- (5) 具备通过继续教育或其它的终身学习途径拓展自己的能力，紧跟学科和专业发展。

In combination with the needs of economic development of software talents and guided by industry, we aim to cultivate high-level software engineering research, technology and management talents with strong academic ability, competitive ability, innovation ability and certain international visions.

In 5 years, students can achieve the following objects:

1. Have a good work ethic, social responsibility and entrepreneurship, and actively serve China's economic construction and social development.
2. Has a solid foundation of natural science, computer science and software engineering, with solid professional skills, to master the software system development, organization and management of basic theory, knowledge and methods.
3. Research and development aspects of scientific thinking and practical ability, can use the relevant technology and software engineering method to find, comprehensively analyze and solve complex problems, and promote the innovation and development industry.
4. Master a foreign language and have the ability to read, understand, write foreign language materials and communicate internationally.
5. Have the ability to expand their abilities by continuing education or other lifelong learning pathways, and follow the disciplines and professional development.

(二) 毕业要求

- (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:** 具有数理基础、数学建模和科学思维能力, 能够应用数学、自然科学和工程科学的基本原理与方法, 识别与表达复杂工程问题, 并能通过文献检索和分析复杂工程问题, 获得有效结论。
- (3) **设计/开发解决方案:** 掌握计算机科学与软件工程基础知识和相关的方法、技能, 包括计算思维、程序设计与算法、计算机硬件与系统、系统软件等。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:** 能够基于科学原理并采用科学方法对复杂工程问题进行研究, 包括理论探索、设计实验、分析与解释数据、并能够在设计环节中体现创新意识, 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:** 具备基础人文知识、具有高尚的道德情操、远大的人生境界追求以及健康的心理素质。具有工程素质、社会责任感, 能够在实践中理解并遵守工程职业道德和规范, 履行责任, 并能够在设计环节中考虑社会、健康、安全、法律专业理论基础、文化以及环境等因素。
- (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, 理解并掌握工程管理原理与经济决策方法, 具有一定的组织管理能力、表达能力和良好的团队合作能力, 能够在多学科背景下的团队中担当负责人或成员的角色。
- (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。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:** 具有自主学习和终身学习的意识, 及时掌握新知识、新技术, 有不断学习和适应发展的能力, 通过学习不断完善和自我提高。

1. **Engineering Knowledge:** master the engineering knowledge and relevant mathematical basis involved in the software life cycle and be able to apply it to software practice.
2. **Problem Analysis:** mathematical basis, mathematical modeling and scientific thinking ability, able to apply mathematics, natural science and engineering science, the basic principles and methods of identification and expression of complex engineering problems, and can through literature search and study analysis of complex engineering problems, to obtain valid conclusions.
3. **Design/Development Solution:** master the basic knowledge of computer science and software engineering and related methods, skills, including computing, computer hardware, program design and algorithm of thinking and system, the system software, etc. To be able to design solutions for specific software requirements, including function design, system architecture design, the software component design and database design, etc., and link the design embodies the innovative ideology, considering the social, health, safety, legal, cultural and environmental factors.
4. **Scientific Research:** can be based on scientific principles and scientific method for complex engineering problems are studied, including the theoretical exploration, design experiments, analyze and interpret data, and be able to be reflected in the design process innovation consciousness, innovation of complex software problem solution.
5. **Usage of Modern Tools:** to a specific software problems, analysis, and the choice of appropriate technology, resources and modern engineering tools and software tools, improve the efficiency to solve the problem of software, promote the standardization of the solution.
6. **Software Engineering and Society:** can carry on the reasonable analysis based on the engineering background, the evaluation software engineering practices and software solutions to problems for the society, health, safety, legal and cultural influences, and understand the responsibility.
7. **Environment and Sustainable Development:** able to understand and evaluate the software engineering practices for the sustainable development of environment, social influence, and to be able to request for the sustainable development of environment, society embodied in solution.
8. **Occupational Specification:** basic humanistic knowledge, noble moral sentiment, lofty life realm pursuit and healthy psychological quality. Has the engineering quality, social responsibility, to understand and abide by professional ethics and engineering specifications, responsibility, and be able to in the design process considering social, health, safety, and legal professional theory foundation, cultural and environmental factors.
9. **Personal and Teamwork:** has the team consciousness, correctly understand the relationship between the individual and team, to understand and to grasp the method of project management theory and economic decision-making, has certain organization management ability, expression ability and good team cooperation ability, can under the background of the multidisciplinary team members of the head or roles.

10. **Communication skills:** written communication, oral communication ability, able to skillfully use text, charts, the preparation of the software documentation, to oral communication with customers, team members effectively. With a certain international vision, I can communicate and communicate in a cross-cultural context.
11. **Project Management:** understand and master the basic theory of software project management, and be able to apply it to process management in software practice to avoid risk, specification process and efficiency.
12. **Lifelong Learning:** a sense of self-learning and lifelong learning, mastering new knowledge and new technologies in time, and constantly learning and adapting to development, through continuous learning and self-improvement.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1		✓		✓	
毕业要求 2		✓			✓
毕业要求 3		✓	✓	✓	✓
毕业要求 4			✓	✓	✓
毕业要求 5		✓	✓		
毕业要求 6	✓				✓
毕业要求 7	✓		✓		✓
毕业要求 8	✓				
毕业要求 9	✓	✓	✓		
毕业要求 10			✓		✓
毕业要求 11		✓	✓		
毕业要求 12					✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程:

计算机科学导论、高级语言程序设计、离散结构、数据结构、计算机组成与系统结构、操作系统、计算机网络、软件工程基础、数据库系统原理、软件设计与体系结构、软件质量保证与测试。

Introduction to Computer Science, Advanced Language Programming, Discrete Structure, Data Structure, Principles of Computer Organization and System Structure, Operating System, Computer Network, Basic Software Engineering, Principles of Database Systems, Software Design and Architecture, Software Quality and Testing .

(二) 专业特色课程:

Web 技术、嵌入式系统应用、人机智能交互技术、软件工程经济学、UML 建模技术、敏捷软件开发、信息安全。

Web Technology, Embedded System, Human-Computer Intelligent Interaction, Economics of Software Engineering, UML Modeling Technology, Agile Software Development, Information Security.

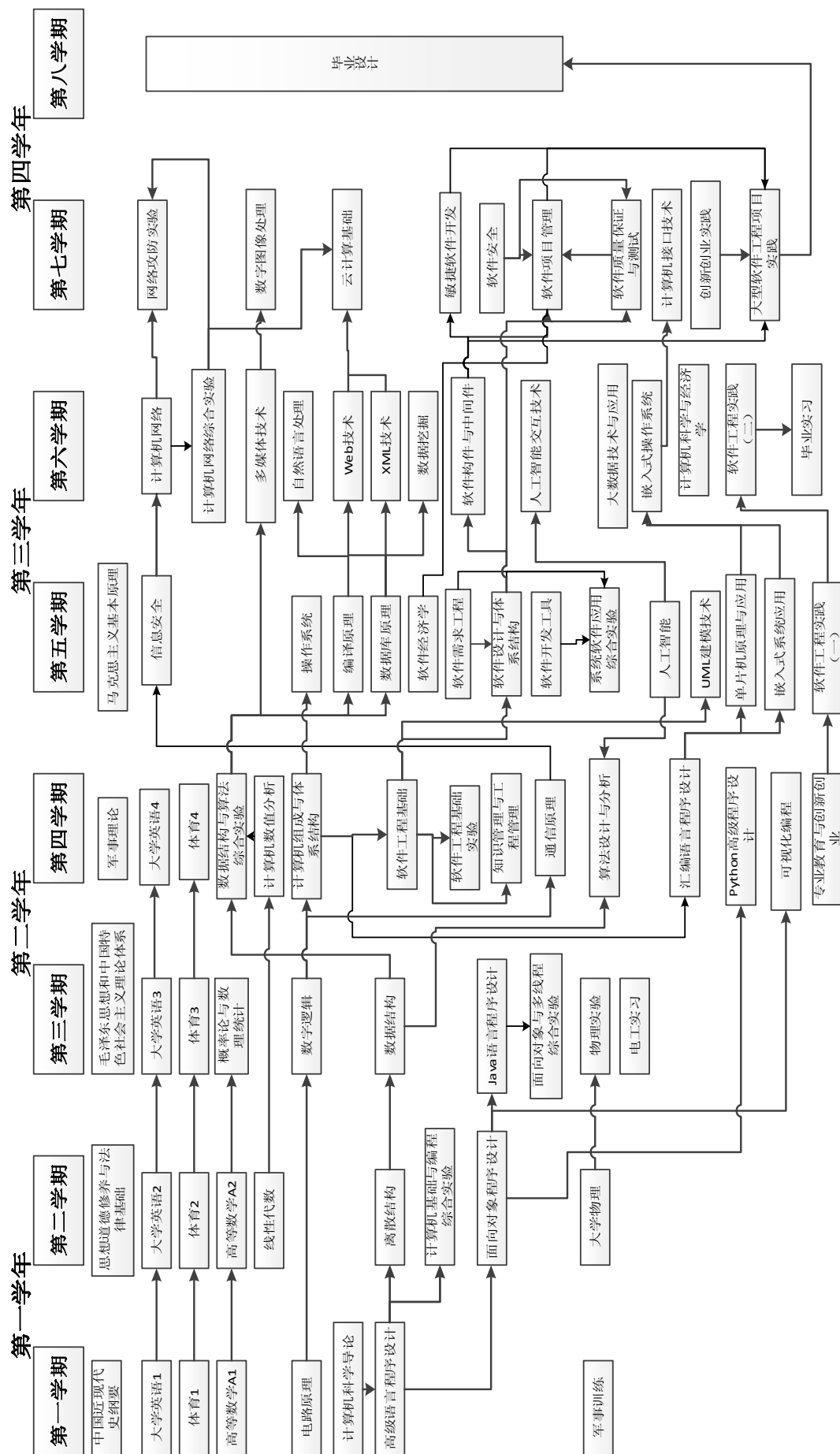
附：毕业要求实现矩阵：

专业核 心课程	专业特 色课程	课程名称	软件工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础						✓	✓	✓				
		中国近现代史纲要								✓				
		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								✓		✓		
		军事理论								✓				
		体育								✓				
		大学英语		✓						✓		✓		✓
		高等数学	✓	✓										
		电路原理	✓	✓										
		大学物理	✓	✓										
		物理实验	✓	✓										
		线性代数	✓	✓										
		概率论与数理统计	✓	✓										
		数字逻辑	✓	✓										
✓		计算机科学导论	✓	✓	✓			✓						
✓		高级语言程序设计		✓	✓									
✓		离散结构	✓	✓	✓									
		计算机基础与编程综合实验		✓	✓		✓							
		面向对象程序设计		✓	✓									
		面向对象与多线程综合实验		✓	✓		✓							
✓		数据结构		✓	✓	✓								
		JAVA 语言程序设计		✓	✓									
		计算机数值分析	✓	✓	✓									
		数据结构与算法综合实验		✓	✓		✓							
✓		计算机组成与系统结构		✓	✓	✓								
✓		软件工程基础		✓	✓	✓					✓			
✓		操作系统		✓	✓			✓	✓					
✓		数据库系统原理		✓	✓	✓								
		编译原理		✓	✓									
		软件需求工程		✓		✓						✓		
✓		软件设计与体系结构			✓	✓								
		数据库系统综合实验		✓	✓		✓							
		软件工程基础实验		✓	✓		✓							

专业核 心课程	专业特 色课程	课程名称	软件工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
✓		计算机网络			✓			✓	✓					
		软件构件与中间件技术			✓	✓								
		计算机网络综合实验			✓		✓							
		软件项目管理						✓			✓		✓	
✓		软件质量保证与测试				✓	✓							
	✓	软件工程经济学		✓				✓	✓					
	✓	敏捷软件开发				✓					✓	✓		
	✓	信息安全			✓	✓		✓						
	✓	Web 技术			✓	✓								✓
		XML 技术			✓	✓								✓
	✓	UML 建模技术			✓	✓								✓
	✓	人机智能交互技术			✓	✓						✓		✓
		数据挖掘	✓		✓	✓								
		云计算基础			✓	✓	✓							
		软件安全			✓	✓		✓						
		网络攻防实验			✓	✓	✓							
		汇编语言程序设计			✓	✓								
	✓	嵌入式系统应用			✓	✓								
		军事训练								✓	✓			
		专业教育								✓				✓
		电工电子实习	✓							✓				
		软件工程实践（一）				✓	✓				✓			
		软件工程实践（二）				✓	✓				✓	✓		
		创新创业指导				✓		✓	✓				✓	
		毕业实习				✓		✓	✓				✓	
		大型软件工程项目实践				✓	✓				✓		✓	
		毕业设计		✓	✓	✓	✓							

三、课程教学进程图

III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(一) 通识教育必修课程 General Education Required Courses									
4120347170	计算机科学导论 Introduction to Computer Science	2	32	8				1	
4120348170	高级语言程序设计 A Advanced Programming Language	3.5	56	12				1	
4220002110	中国近现代史纲要 Outline of Chinese Contemporary and Modern History	2	32					1	
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2	
4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese	4	96			32		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32			16		2	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English I	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
小 计 Subtotal		31.5	664	20	0	64	48		

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类 相关课程并取得至少 2 个学分，在创新创业类课程中至少选修一 门课程，在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307170	电路原理 B Circuit Principle	3.5	56	8				1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高 等 数 学 上
4120261140	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	
4050463130	大学物理 B Physics	5	80					2	
4050229110	线性代数 Linear Algebra	2.5	40					2	
4120349170	离散结构 Discrete Structures	3.5	56					2	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4120079110	数字逻辑 Digital Circuits	3	48	8				3	电路原理
4120433170	数据结构 C Data Structures	4	64	16				3	高 级 语 言 程序设计
4120430170	计算机数值分析 Computer Numerical Analysis	2.5	40	8				4	线性代数
4120265140	数据结构与算法综合实验 Experiments on Data Structure and Algorithms	1	32	32				4	数据结构

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120368170	计算机组成与体系结构 Computer Organization and Architecture	4	64	10		8		4	数字逻辑
4120369170	软件工程基础 Basic Software Engineering	2.5	40					4	高级语言 程序设计
4120275140	软件工程基础实验 Primary Experiments on Software Engineering	1	32	32				4	软件工程 基础
4120427170	操作系统 D Operating System	4	64	12		8		5	
4120273140	数据库系统原理 E Principles of Database Systems	3	48					5	
4120331150	编译原理 Principles of Compiler	3.5	56	8				5	
4120175120	软件设计与体系结构 B Software Design and Architecture	2	32	8				5	软件工程 基础
4120270140	数据库系统综合实验 Experiments on Database System	1	32	32				5	数据库系 统原理 E
4120034110	计算机网络 C Computer Networks	2.5	40					6	
4120271140	计算机网络综合实验 Experiments on Computer Networks	1	32	32				6	计 算 机 网 络
4120329140	软件质量保证与测试 B Software Quality and Testing	2	32	8				7	软件 工 程 基础
小 计 Subtotal		66.5	1160	278	0	16	0		
(四) 专业教育选修课程 Specialized Elective Courses									
方向 1 (程序设计与软件开发) Direction 1 (Programming & Software Implementation)									
4120431170	面向对象程序设计 C Object-oriented Methodology	2.5	40	12				2	高级语言 程序设计
4120263140	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	面 向 对 象 程序设计
4120425170	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	高级语言 程序设计

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120435170	算法设计与分析 B Algorithm Design and Analysis	2	32	6				4	数据结构
4120044110	可视化编程 Visual Programming	2.5	40	10				4	
4120065110	软件开发工具 Software Development Tools	2	32	16				5	
4120371170	软件工程经济学 A Economics of Software Engineering	2	32					5	软 件 工 程 基础
4120040110	计算机系统结构 B Computer Architecture	2	32					5	计 算 机 组 成 与 体 系 结构
4120370170	Python 高级程序设计 Python Programming	2	32	8				6	高 级 语 言 程序设计
方向 2 (软件安全与网络安全) Direction 2 (Software Security & Network Security)									
4120084110	通信原理 C Communication Principles	2.5	40	8				4	数字逻辑
4120102110	信息安全 A Information Security	2	32	6				5	计 算 机 网 络
4120372170	Web 技术 Web Technology	2	32	12				6	数 据 库 系 统原理
4120010110	XML 技术 XML Technology	2	32	8				6	数 据 库 系 统原理
4120373170	网络攻防实验 Network Attack and Defense Experiment	1	32	32				7	计 算 机 网 络
4120374170	软件安全 Software Security	2	32	8				7	
方向 3 (软件工程技术与管理) Direction 3 (Software Engineering Technology and Management)									
4120354170	UML 建模技术 UML Modeling Technology	2	32					5	软 件 工 程 基础
4120071110	软件需求工程 B Software Requirements Engineering	2	32	8				5	软 件 工 程 基础

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120174120	软件构件与中间件技术 B Software Components and Middleware Techniques	2	32	8				6	JAVA 语言 程序设计
4120311140	多媒体技术 C Multimedia Technique	2	32	8				6	
4120402170	软件敏捷开发 Agile Software Development	2	32	8				7	软 件 工 程 基础
4120069110	软件项目管理 B Software Project Management	2	32	6				7	软 件 工 程 基础
方向 4 (大数据处理与管理) Direction 4 (Big data processing and management)									
4120055110	人工智能概论 B Introduction to Artificial Intelligence	2	32					5	离散结构
4120375170	自然语言处理 Natural Language Processing	2	32	6				5	数据结构
4120056110	人机智能交互技术 Human-Computer Intelligent Interaction	2	32	8				6	
4120434170	数据挖掘 C Data Mining	2	32	8				6	
4120317130	云计算基础 B Cloud Computing	2	32	12				7	
4120324140	数字图像处理 E Digital Image Processing	2	32	8				7	
方向 5 (嵌入式软件开发) Direction 5 (Development of Embedded Software system)									
4120240130	汇编语言程序设计 C Assembly Language Programming	2.5	40	16				4	
4120298140	单片机原理及应用 Controller Principles and Application	2	32	10				5	
4120053110	嵌入式系统应用 B Embedded System	2	32					5	
4120049110	嵌入式操作系统 Embedded Operating System	2	32	8				6	操作系统
4120026110	计算机接口技术 Computer Interface Techniques	2	32	8				7	
小 计 Subtotal		62.5	1032	280	0	0	0		
修读说明：学生需要选择 2 个主修方向，至少选修其中 8 门课程，可跨方向选修其他课程，要求最少选修 20.5 学分。 NOTE:Students should take at least 6 courses from 2 main directions and freely take other courses from other directions. Minimum subtotal credits is 20.5.									

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(五) 个性课程 Personalized Elective Courses									
4120376170	知识管理与知识工程 Knowledge Engineering and Management	2	32					4	
4120237120	计算机科学与经济学 A Computer Science and Economics	2	32					5	
4120247120	大数据技术与应用 Technology and Application of Big Data	2	32					6	
小 计 Subtotal		6	96	0	0	0	0		
修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。 NOTE: Sudents can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.									

五、 集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4100068110	电工电子实习 A Practice in Electrical Engineering & Electronics	2	2	3
4120142110	专业教育 Introduction to Software Engineering Major	1	1	4
4120377170	软件工程实践（一） Practice of Software Engineering I	2	2	5
4120378170	软件工程实践（二） Practice of Software Engineering II	3	3	6
4120114110	毕业实习 Practice at Enterprisers	3	3	6（暑期）
4120379170	创新创业指导 A Guidance of Innovation and Entrepreneurship	3	3	7
4120118110	大型软件工程项目实践 A Practice of Large-Scale Software Project	3	3	7
4120380170	毕业设计 Bachelor Thesis	8	17	8
小 计 Subtotal		26.5	37	

六、其它要求

VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
- 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌
专业培养方案责任人：李 琳

物联网工程专业 2017 版本本科培养方案

Undergraduate Education Plan for Specialty in the Internet of Things Engineering (2017)

专业名称	物联网工程	主干学科	物联网工程
Major	Internet of Things Engineering	Major Disciplines	Internet of Things Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science and Technology	Duration	1.5 years

最低毕业学分规定

Graduation Credit Criteria

课程分类 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践教学环节 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	65.5	\	27.5	\	170
选修课 Elective Courses	9	20.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养掌握物联网工程领域的基础理论、专业知识和实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在交通、汽车等行业从事物联网领域的科学研究、设计、应用和管理工作的工程技术人才。

- (1) 具有良好道德与修养，强健的体魄和健康的心理；拥护党的基本路线和方针政策；热爱祖国，遵纪守法；具有良好的职业道德和创业精神，积极为我国经济建设和社会发展服务。
- (2) 具有坚实的自然科学基础，系统地掌握物联网基本理论和技能，能胜任物联网领域的科学研究、系统分析与设计、技术开发与管理等方面工作的能力。
- (3) 掌握从事工程工作所需的相关科学知识和管理知识，具备综合运用所学知识和技术手段解决复杂物联网工程问题的能力，尤其是交通、汽车等行业的物联网工程问题。
- (4) 具有口头和书面表达能力，并能在团队中有效发挥作用。
- (5) 具备通过继续教育或其它的终身学习途径拓展自己的能力，紧跟学科和专业发展。

This program is committed to train students to master the basic theory, professional knowledge and practical skills, with strong adaptability, strong work spirit, strong sense of innovation and international perspective. After training, the students can become engineers and technicians in the field of IoT in transportation, automobile and other industries, carry out the scientific research, system analysis, system design, technical development, and management.

1. Have good morals and self-cultivation, physical and mental health; Support the party's basic line and guidelines and policies; Love our country, abide by the law. Have a good work ethic and entrepreneurial spirit, and actively serve our country's economic construction and social development.
2. Have the solid foundation of natural science, systematically master the basic theory and skills of the Internet of things engineering. Have the ability of scientific research, system analysis and design, development and management capabilities in the field of Internet of things.
3. Systematically master the required in engineering work related scientific knowledge and management knowledge, have the ability to apply the knowledge and technology to solve complex engineering problems in the field of Internet of things, especially the engineering problems in the traffic and automobile industry.
4. Have oral and written communication skills and be good at teamwork;
5. Have the abilities in self-improving through continuing education and other education methods and keep up with the cutting edge development of IoT engineering.

(二) 毕业要求

- (1) **工程知识**: 能够将数学、自然科学、工程基础和专业知用于解决复杂工程问题。
 - (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**: 能够设计针对复杂工程问题的解决方案, 设计满足特定需求的系统、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, 评价专业工程实践和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复杂工程问题的专业工程实践对环境、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
1. Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems.
 2. Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
 3. Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
5. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
6. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
7. Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1		✓	✓		
毕业要求 2		✓			
毕业要求 3		✓	✓		
毕业要求 4		✓	✓		
毕业要求 5		✓	✓		
毕业要求 6	✓		✓		
毕业要求 7	✓		✓		
毕业要求 8	✓				
毕业要求 9				✓	
毕业要求 10				✓	
毕业要求 11	✓	✓	✓	✓	
毕业要求 12					✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程:

计算机组成与系统结构、数据结构、操作系统、计算机网络、物联网工程概论、射频识别与传感器技术、无线传感器网络、嵌入式系统应用、物联网应用系统开发等。

Core courses: Computer Organization and System Architecture, Data Structure, Operating System, Computer Networks, Introduction of IoT Engineering, RFID and Sensor Technology, Wireless Sensor Networks, Embedded System and Application, Practice of the Internet of Things Application.

(二) 专业特色课程:

射频识别与传感器技术、无线传感器网络、物联网工程与组网技术、云计算与服务计算、物联网应用系统开发、物联网智能交通系统、智能终端操作系统与应用。

Characteristic Courses: RFID and Sensor Technology, Wireless Sensor Networks, IoT & Network Engineering, Cloud & Service Computing, IoT Application System Development, IoT Intelligent Traffic System, Intelligent Terminal OS and Application.

附：毕业要求实现矩阵：

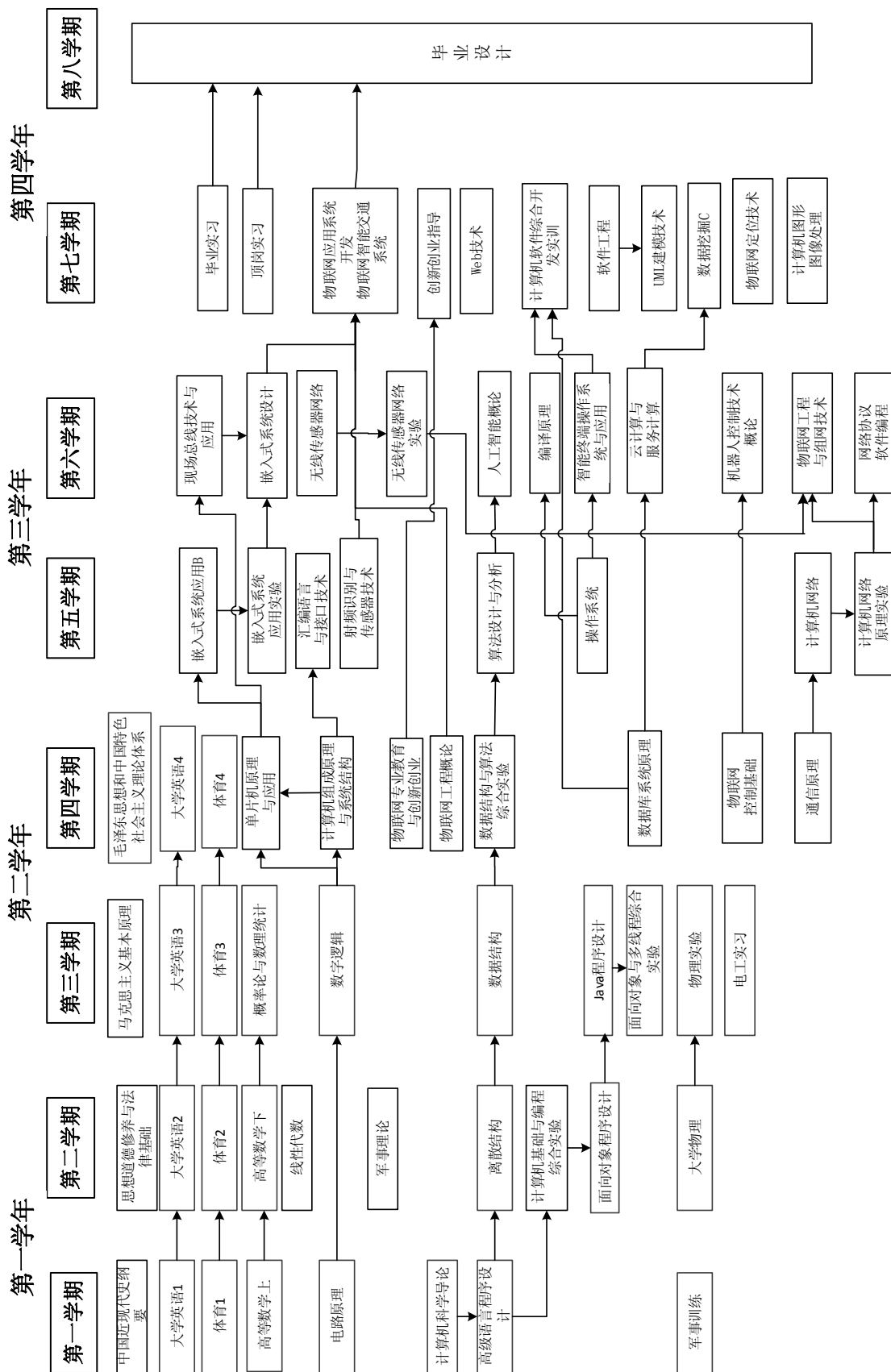
专业核 心课程	专业特色 课程	课程名称	物联网工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础								✓	✓			
		中国近现代史纲要						✓	✓					
		毛泽东思想和中国特色社会主义理论体系概论							✓					
		马克思主义基本原理						✓	✓					
		军事理论		✓										
		体育							✓					
		大学英语										✓		
		计算机科学导论	✓	✓					✓	✓				✓
		高级语言程序设计		✓	✓		✓						✓	
		高等数学	✓	✓										
		线性代数	✓	✓										
		概率论与数理统计	✓	✓										
		大学物理	✓	✓										
		物理实验	✓	✓										
		电路原理	✓	✓										
		离散结构	✓	✓		✓								
		数字逻辑	✓	✓	✓									
		面向对象程序设计		✓	✓		✓						✓	
✓		数据结构		✓	✓		✓	✓						
		数据结构与算法综合实验		✓	✓		✓	✓						

专业核心课程	专业特色课程	课程名称	物联网工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		JAVA 语言程序设计		✓	✓		✓							
		计算机基础与编程综合实验		✓	✓		✓							
		面向对象与多线程综合实验		✓	✓		✓	✓					✓	
✓		计算机组成与系统结构		✓	✓		✓					✓		
		汇编语言与接口技术		✓	✓		✓							
✓		计算机网络			✓			✓						
		计算机网络原理实验			✓			✓						
✓	✓	射频识别与传感器技术	✓	✓		✓		✓						
✓		嵌入式系统应用		✓	✓		✓	✓						
		嵌入式系统应用实验		✓	✓		✓	✓						
✓		操作系统		✓	✓			✓						
✓	✓	无线传感器网络			✓	✓								
		无线传感器网络实验			✓	✓								
		数据库系统原理		✓	✓			✓						
✓		物联网工程概论		✓				✓	✓	✓				
		网络协议软件编程		✓	✓		✓							
	✓	云计算与服务计算			✓			✓	✓					
	✓	智能终端操作系统与应用			✓		✓						✓	
✓	✓	物联网应用系统开发			✓		✓				✓	✓	✓	
		算法设计与分析		✓	✓									
		编译原理		✓	✓		✓							
		软件工程		✓	✓						✓	✓	✓	
		Web 技术			✓		✓	✓						
		人工智能概论			✓		✓							
		UML 建模技术			✓		✓				✓		✓	
		数据挖掘		✓			✓							
		通信原理	✓	✓										
		物联网控制基础		✓	✓									
		单片机原理与应用			✓									

专业核 心课程	专业特色 课程	课程名称	物联网工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		现场总线技术与应用			✓									
	✓	物联网工程与组网技术			✓			✓						
		机器人控制技术概论			✓		✓	✓						
		物联网定位技术			✓		✓							
	✓	物联网智能交通系统	✓		✓			✓	✓					
		计算机图形图像处理		✓										
		计算机科学与经济学						✓	✓					
		大数据分析技术				✓		✓						
		信息安全				✓		✓						
		逻辑与计算机设计基础实验		✓	✓		✓	✓						
		精简指令集计算机设计实验		✓	✓		✓	✓						
		操作系统微内核设计实验		✓	✓		✓	✓						
		军事训练									✓	✓		
		物联网专业教育与创新创业						✓	✓	✓				✓
		计算机软件综合开发实训		✓	✓		✓				✓	✓	✓	
		电工电子实习	✓	✓										
		嵌入式系统设计		✓	✓		✓	✓					✓	
		创新创业指导						✓	✓	✓		✓		✓
		顶岗实习	✓	✓	✓	✓	✓	✓			✓	✓	✓	
		毕业实习	✓	✓	✓	✓	✓	✓			✓	✓	✓	
		毕业设计	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓

三、课程教学进程图

III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(一) 通识教育必修课程 General Education Required Courses									
4220001111	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2	
4220002111	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1	
4120347171	计算机科学导论 Introduction to Computer Science	2	32	8				1	
4120348171	高级语言程序设计 A Advanced Language Programming	3.5	56	12				1	
4220003111	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		4	
4220005111	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003131	军事理论 Military Theory	1	32			16		2	
4210001171	体育 1 Physical Education I	1	26					1	
4210002171	体育 2 Physical Education II	1	34					2	
4210003171	体育 3 Physical Education III	1	34					3	
4210004171	体育 4 Physical Education IV	1	34					4	
4030002181	大学英语 1 College English I	3	60				12	1	
4030003181	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004181	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004181	大学英语 4 College English IV	2	44				12	4	大学英语 3
小 计 Subtotal		31.5	664	20	0	64	48		

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类 相关课程并取得至少 2 个学分，在创新创业类课程中至少选修一 门课程，在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307171	电路原理 B Circuit Principle	3.5	56	8				1	
4050063111	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064111	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4120261141	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	
4050229111	线性代数 Linear Algebra	2.5	40					2	
4120349171	离散结构 Discrete Structures	3.5	56					2	计算机科学 导论
4050463131	大学物理 B Physics	5	80					2	高等数学上
4050224111	物理实验 B Physics Lab.	1	32	32				3	大学物理
4120079111	数字逻辑 Digital Circuits	3	48	8				3	
4050058111	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	高等数学下
4120433171	数据结构 C Data Structures	4	64	16				3	高级语言程 序设计
4120067111	物联网工程概论 Principles of the IoT Engineering	2	32					4	
4120265141	数据结构与算法综合实验 Experiments on Data Structure and Algorithm	1	32	32				4	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120041111	计算机组成与系统结构 Computer Organization and Architecture	4.5	72	10				4	数字逻辑
4120420161	数据库系统原理 C Principles of Database Systems	3	48	8				4	
4120350171	操作系统 A Principles of Operating System	3.5	56	8				5	
4120034111	计算机网络 C Computer Networks	2.5	40					5	
4120271141	计算机网络综合实验 Computer Networks and Communications experiment	1	32	32				5	
4120072111	射频识别与传感器技术 B RFID and Sensor Technology	3.5	56	12				5	
4120053111	嵌入式系统应用 B Embedded System and Application	2	32					5	
4120391171	嵌入式系统应用实验 Embedded System and Application Experiment	1	32	32				5	
4120321141	无线传感器网络 B Wireless Sensor Network	2	32					6	
4120297141	无线传感器网络实验 Wireless Sensor Network experiments	1	32	32				6	射频识别与传感器技术
4120180121	物联网应用系统开发 IoT Application System development	2	64	64				7	
小 计 Subtotal		65.5	1176	326	0	0	0		
(四) 专业教育选修课程 Specialized Elective Courses									
方向一：软件开发方向 direction 1: Software of IOT									
4120431171	面向对象程序设计 C Object-oriented Methodology	2.5	40	12				2	高级语言程序设计
4120263141	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	
4120425171	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	高级语言程序设计
4120435171	算法设计与分析 B Algorithm Design and Analysis	2	32	6				5	数据结构
4120322141	智能终端操作系统与应用 B Intelligent Terminal OS and Application	2.5	40			16		6	JAVA 语言程序设计

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120331151	编译原理 Principles of Compiler Construction	3.5	56	8				6	
4120055111	人工智能概论 B Introduction to Artificial Intelligence	2	32					6	
4120354171	UML 建模技术 UML Modeling Technology	2	32					6	
4120083111	云计算与服务计算 Cloud & Service Computing	2	32	6				6	
4120432171	软件工程 B Software Engineering	2.5	40	8				7	
4120372171	Web 技术 Web Technology	2	32	12				7	
4120434171	数据挖掘 C Data Mining	2	32	8				7	
方向二：物联网感知与控制方向 Perception and Control of IOT									
4120084111	通信原理 C Communication Principles	2.5	40	8				4	
4120012111	物联网控制基础 IoT Control Theory Foundation	2.5	40					4	数字逻辑
4120298141	单片机原理及应用 Principles and Application of Microcontroller	2	32	10				4	
4120429171	汇编语言与接口技术 B Assembly Language Programming and Interface Technology	3	48	16				5	计算机组成与系统结构
4120333141	网络协议软件编程 Programming of Network Protocol	2.5	40	8				6	计算机网络
4120323141	现场总线技术与应用 B Field Bus Technology and Application	2.5	40	12				6	计算机组成与系统结构
4120098111	物联网工程与组网技术 IoT & Network Engineering	2	32	8				6	无线传感器网络 射频识别与传感器技术
4120201131	机器人控制技术概论 Principles of Robot Control Technology	2	32					6	射频识别与传感器技术 嵌入式系统应用

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120029111	计算机图形图像处理 Computer Graphics and Image Processing	2	32	6				7	
4120405171	物联网定位技术 B Technology of IoT Location	2	32					7	
小 计 Subtotal		49.5	808	168	0	16	0		
修读说明：要求至少选修 20.5 学分（方向 2 要求至少选择 10 学分）。 NOTE:Subtotal credits at least:20.5(Everyone select at least 10 credits on direction2)									
(五) 个性课程 Personalized Elective Courses									
4120393171	逻辑与计算机设计基础实验 A Design and Implementation of the digital logic system	1	32	32				3	
4120237121	计算机科学与经济学 A Computer Science and Economics	2	32					5	
4120394171	精简指令集计算机设计实验 A Design and Implementation of the RISC system	1	32	32				5	
4120395171	操作系统微内核设计实验 A Design and Implementation of the microkernel operating system	1	32	32				6	
4120242131	大数据分析技术 C Data Analysis Technology	2	32	8				6	
4120102111	信息安全 Information Security	2	32	6				6	
4120392171	物联网智能交通系统 IoT Intelligent Traffic System	2	32					7	
小 计 Subtotal		11	224	110	0	0	0		
修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。 NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.									

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002111	军事训练 Military Training	1.5	3	1
4100068111	电工电子实习 A Practice in Electrical Engineering & Electronics	2	2	3

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
4120361171	物联网专业教育与创新创业 IoT Professional Education & Innovation and Entrepreneurship	1	1	4
4120203131	计算机软件综合开发实训 Practical Training of Computer Software Development	3	3	5
4120131111	嵌入式系统设计 A Embedded System Design	3	3	6
4120113111	毕业实习 Practice for Graduation	3	3	6(暑期)
4120363171	创新创业指导 B Guidance of Innovation and Entrepreneurship	2	2	7
4120367171	顶岗实习 Job Postion Practise	4	4	7
4120396171	毕业设计 Graduation Design	8	17	8
小 计 Subtotal		27.5	38	

六、其它要求

VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
 - 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。
- 1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.
 - 2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌
专业培养方案责任人：姚寒冰

软件工程专业（数字传播工程试点班） 2017 版本本科培养方案

Undergraduate Program for Specialty in Software Engineering (Pilot Class of Digital Media Communication) (2017)

专业名称	软件工程	主干学科	软件工程
Major	Software Engineering	Major Disciplines	Software Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science & Technology	Duration	1.5 Years

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	66.5	\	26.5	\	170
选修课 Elective Courses	9	20.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

结合经济发展对软件人才的需要,以领域软件的行业需求为导向,培养具有较强执行力、竞争力、创新能力和一定国际视野的高层次复合型领域软件工程技术及管理人才。

学生毕业 5 年左右能达到:

- (1) 具有良好的职业道德、社会责任感和创业精神,积极为我国经济建设和社会发展服务。
- (2) 具有坚实的自然科学基础、计算机科学与软件工程专业基础,具备扎实的专业能力,能系统地掌握软件开发(特别是数字传播类软件)、组织、管理的基本理论、知识和方法。
- (3) 具有研究与开发方面的科学思维和软件工程实践能力、能够利用相关技术和方法综合分析和解决复杂工程问题(特别是数字传播工程问题),推动行业创新发展。
- (4) 掌握一门外语,具备良好的阅读、理解、撰写外语资料的能力和进行国际化交流的能力。
- (5) 具备通过继续教育或其它的终身学习途径拓展自己的能力,紧跟学科和专业发展。

In combination with the needs of economic development of domain software talents and guided by industry, we aim to cultivate high-level domain software engineering technology and management

talents with strong executive ability, competitive ability, innovation ability and certain international visions.

In 5 years, students can achieve the following objects:

1. Has good professional ethics, social responsibility and entrepreneurship, and actively serve China's economic construction and social development.
2. Has a solid foundation of natural science, computer science and software engineering, has the solid professional skills, master the basic theory, knowledge and methods of software system development (especially, digital communication software), organization and management.
3. Has the scientific thinking and practical ability in research and development aspects, can use the relevant technology and software engineering method to solve complex engineering problems by comprehensive analysis (especially, digital communication engineering), and promote the innovation and development of industry.
4. Master a foreign language and have the ability of reading, understanding, writing in foreign language and the ability of international communication.
5. Have the ability to expand their abilities by continuing education or other lifelong learning pathways, and follow the disciplines and professional development.

(二) 毕业要求

- (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:** 具有数理基础、数学建模和科学思维能力, 能够应用数学、自然科学和工程科学的基本原理与方法, 识别与表达复杂工程问题, 并能通过文献检索和研究分析复杂工程问题, 获得有效结论。
- (3) **设计/开发解决方案:** 掌握计算机科学与软件工程基础知识和相关的方法、技能, 包括计算思维、程序设计与算法、计算机硬件与系统、系统软件等; 掌握数字传播工程的基础理论和专业知识, 包括数字媒体内容的制作、分发与管理。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:** 能够基于科学原理并采用科学方法对复杂工程问题进行研究, 包括理论探索、设计实验、分析与解释数据、并能够在设计环节中体现创新意识, 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工程问题 (特别是数字传播工程问题), 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:** 具备基础人文知识、具有高尚的道德情操、远大的人生境界追求以及健康的心理素质。具有工程素质、社会责任感, 能够在实践中理解并遵守职业道德和规范, 履行责任, 并能够在设计环节中考虑社会、健康、安全、法律专业理论基础、文化以及环境等因素。
- (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, 理解并掌握工

程管理原理、数字出版政策与经济决策方法，具有一定的组织管理能力、表达能力和良好的团队合作能力，能够在多学科背景下的团队中担当负责人或成员的角色。

- (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。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：**具有自主学习和终身学习的意识，及时掌握新知识、新技术，有不断学习和适应发展的能力，通过学习不断完善和自我提高。

1. **Engineering Knowledge:** master the engineering knowledge and relevant mathematical basis involved in the software life cycle and be able to apply it to software practice.
2. **Problem Analysis:** mathematical basis, mathematical modeling and scientific thinking ability, able to apply the basic principles and methods of mathematics, natural science, engineering science to identify and express the complex engineering problems; and can obtain valid conclusions via literature search and analysis of complex engineering problems.
3. **Design/Development Solution:** master the basic knowledge of computer science and software engineering and related methods, skills, including computing, computer hardware, program design and algorithm of thinking and system, the system software, etc; master the theoretical basis and expertise of digital communication engineering, including technologies and tools for the production, dissemination and management of digital content. To be able to design solutions for specific software requirements, including function design, system architecture design, the software component design and database design, etc., and embody the innovative ideology, considering the social, health, safety, legal, cultural and environmental factors by design.
4. **Scientific Research:** based on scientific principles and scientific method, the complex engineering problems are studied, including the theoretical exploration, experiments design, data analysis; be able to embody the consciousness of innovation in the design process of complex software problem.
5. **Usage of Modern Tools:** facing the specific software problems, especially the problems of digital medial communication, be able to analyze and choose the appropriate technology, resources and modern engineering tools and software tools to improve the efficiency of solving the software problems and promote the standardization of the solution.
6. **Software Engineering and Society:** carry on the reasonable analysis based on the engineering background, evaluate the influences of software engineering practices and software solutions on the society, health, safety, legal and cultural, and understand the responsibility.
7. **Environment and Sustainable Development:** able to understand and evaluate the influence of software engineering practices on the sustainable development of environment and society, and to be able to embody the requirement for the sustainable development of environment and society in solution.
8. **Occupational Specification:** has basic humanistic knowledge, noble moral sentiment, lofty life realm pursuit and healthy psychological quality; has the engineering quality, social responsibility; understand and abide by the professional ethics and engineering specifications,

consider social, health, safety, and legal professional theory foundation, cultural and environmental factors in the design process.

9. **Personal and Teamwork:** has the team consciousness, correctly understand the relationship between the individual and team; understand and grasp the method of project management theory and economic decision-making; has the organizational management ability, expression ability and teamwork ability, can be a leader or member under the background of the multidisciplinary team members.
10. **Communication skills:** has written and oral communication ability, able to skillfully use text, charts to prepare the software documentation, has effective communication with the customers and team members; has international view and can communicate in a cross-cultural context.
11. **Project Management:** understand and master the basic theory of software project management, be able to apply it to process management in software practice to avoid risk, specify process and enhance efficiency.
12. **Lifelong Learning:** has a sense of self-learning and lifelong learning, master new knowledge and new techniques in time, has the ability of constant learning and adapting development and realize the self-improvement.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1		✓		✓	
毕业要求 2		✓			✓
毕业要求 3		✓	✓	✓	✓
毕业要求 4			✓	✓	✓
毕业要求 5		✓	✓		
毕业要求 6	✓				✓
毕业要求 7	✓		✓		✓
毕业要求 8	✓				
毕业要求 9	✓	✓	✓		
毕业要求 10			✓		✓
毕业要求 11		✓	✓		
毕业要求 12					✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程

(I) Core Courses

软件工程基础、数字传播概论、数字出版技术、数据库原理与传播应用、网络技术与传播、新媒体设计技术、媒体信息系统分析与设计。

Basic Software Engineering, Introduction to Digit Communication, Digital Publishing Technology, Principles of Database and Applications on Communication, Network Technology and Communication, New Media Design, Media Information System.

(二) 专业特色课程

(II) Characteristic Courses

用户界面设计、传播大数据技术、多媒体技术、计算机动画、信息组织与检索（含自然语言处理）、网络知识产权。

Computer Human Interface, Big Media Data Analytics, Multimedia Technique, Computer Animation, Information retrieval with NLP, Internet Intellectual Property.

附：毕业要求实现矩阵：

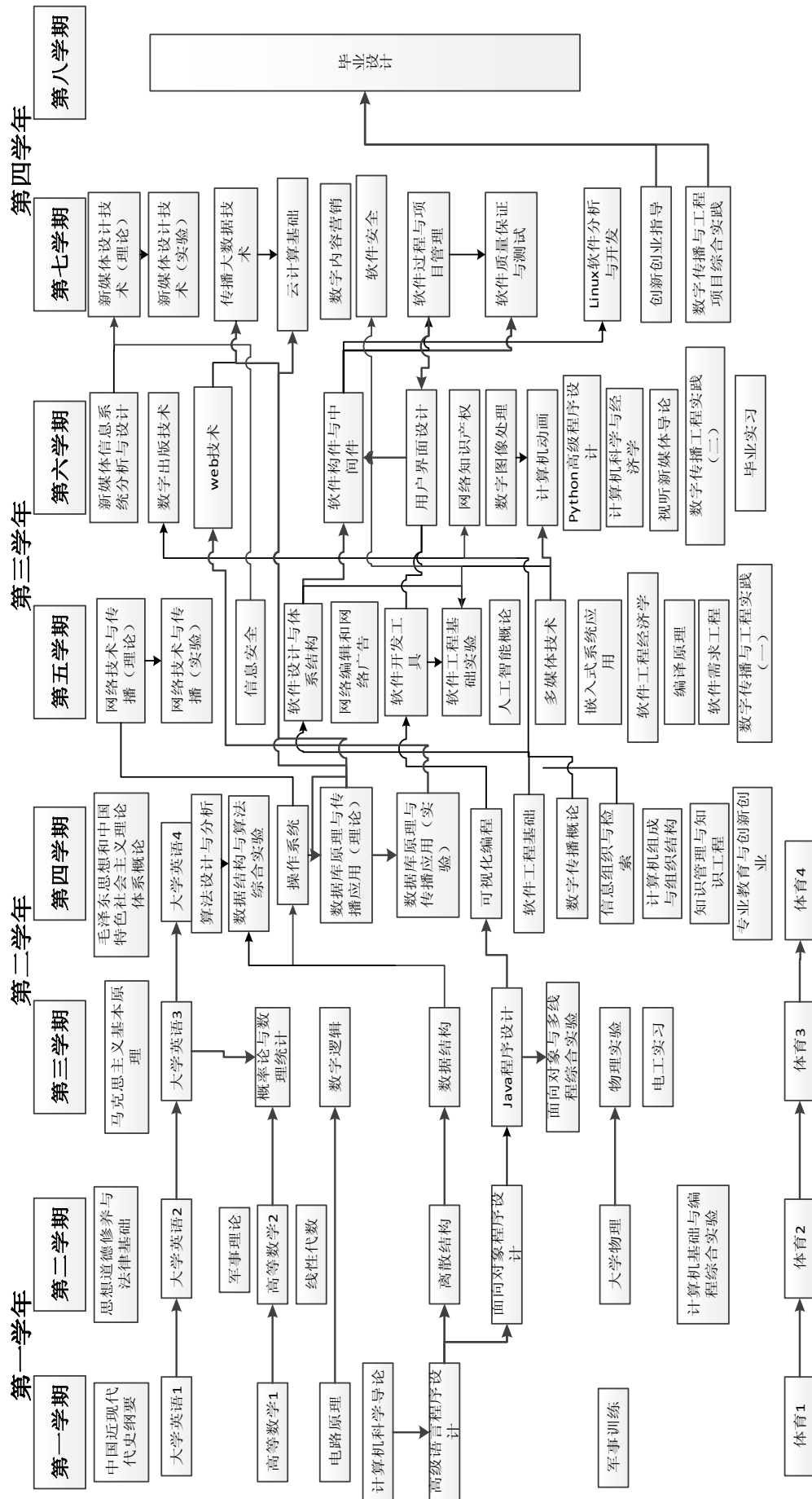
专业 核心 课程	专业 特色 课程	课程名称	软件工程专业（数字传播工程试点班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础						✓	✓	✓				
		中国近现代史纲要								✓				
		毛泽东思想和中国特色社会主义理论体系概论								✓				
		马克思主义基本原理								✓		✓		
		军事理论								✓				
		体育								✓				
		大学英语		✓						✓		✓		✓
		高等数学	✓	✓										
		电路原理	✓	✓										
		大学物理	✓	✓										
		物理实验	✓	✓										
		线性代数	✓	✓										
		概率论与数理统计	✓	✓										
		数字逻辑	✓	✓										
		离散结构	✓	✓	✓									
		计算机科学导论		✓	✓									
		高级语言程序设计	✓	✓	✓									
		计算机基础与编程综合实验		✓	✓		✓							
		数据结构		✓	✓	✓								
✓		数字传播概论			✓		✓			✓				
✓		软件工程基础		✓	✓	✓					✓			
		网络编辑及网络广告			✓		✓			✓				
		操作系统		✓	✓			✓	✓					
		数据结构与算法综合实验		✓	✓		✓							
✓		数字出版技术			✓		✓		✓	✓				
		软件设计与体系结构			✓	✓								

专业 核心 课程	专业 特色 课程	课程名称	软件工程专业（数字传播工程试点班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
✓		数据库原理与传播应用			✓		✓		✓	✓				
		数据库原理与传播应用实验			✓		✓		✓					
✓		网络技术与传播			✓		✓		✓	✓				
		网络技术与传播实验			✓		✓		✓					
		软件工程基础实验		✓	✓		✓							
✓		新媒体设计技术		✓	✓		✓							
		新媒体设计技术实验		✓	✓		✓							
✓		新媒体信息系统分析与设计			✓		✓		✓					
		软件构件与中间件技术			✓	✓								
		软件过程与项目管理						✓			✓		✓	
		软件质量保证与测试				✓	✓							
		面向对象程序设计		✓	✓									
		面向对象与多线程综合实验		✓	✓		✓							
		JAVA 语言程序设计		✓	✓									
		编译原理		✓	✓									
		算法设计与分析		✓	✓									
		可视化编程			✓		✓		✓					
		视听新媒体概论			✓		✓			✓				
	✓	信息组织与检索(含自然语言处理)			✓		✓							
		Python 高级程序设计		✓	✓		✓							
		软件开发工具		✓	✓									
		软件工程经济学		✓				✓	✓					
		计算机组成与体系结构			✓	✓								
		人工智能概论			✓	✓						✓		✓
✓		多媒体技术		✓	✓									
		信息安全			✓		✓		✓					
		嵌入式系统应用			✓	✓								
		软件需求工程		✓		✓						✓		
		Web 技术			✓	✓								✓
		数字内容营销			✓			✓						✓
✓		用户界面设计			✓		✓							
✓		计算机动画			✓		✓							

专业 核心 课程	专业 特色 课程	课程名称	软件工程专业（数字传播工程试点班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		数字图像处理			✓		✓							
	✓	网络知识产权						✓	✓	✓				
		软件安全			✓		✓		✓					
		云计算基础		✓	✓	✓								
	✓	传播大数据技术（算法、采集）		✓	✓	✓								
		Linux 软件分析与开发		✓	✓	✓								
		知识管理与知识工程				✓		✓	✓					
		计算机科学与经济学		✓		✓		✓						
		军事训练								✓	✓			
		专业教育								✓				✓
		电工电子实习	✓							✓				
		数字传播工程实践（一）				✓	✓				✓			
		数字传播工程实践（二）				✓	✓				✓	✓		
		创新创业指导				✓		✓	✓				✓	
		数字传播工程项目综合实践				✓	✓				✓		✓	
		毕业实习				✓		✓	✓				✓	
		毕业设计		✓	✓	✓	✓							

三、课程教学进程图

III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course	
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur			
(一) 通识教育必修课程 General Education Required Courses										
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2		
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1		
4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		4		
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3		
1060003130	军事理论 Military Theory	1	32			16		2		
4210001170	体育 1 Physical Education I	1	26					1		
4210002170	体育 2 Physical Education II	1	34					2		
4210003170	体育 3 Physical Education III	1	34					3		
4210004170	体育 4 Physical Education IV	1	34					4		
4030002180	大学英语 1 College English I	3	60				12	1		
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1	
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2	
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3	
4120347170	计算机科学导论 Introduction to Computer Science	2	32	8				1		
4120348170	高级语言程序设计 A Advanced Programming Language	3.5	56	12				1		
小 计 Subtotal		31.5	664	20	0	64	48			

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分,且必须选修艺术体育类课程中的艺术类相关课程并取得至少 2 个学分,在创新创业类课程中至少选修一门课程,在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307170	电路原理 B Circuit Principle	3.5	56	8				1	
4050063110	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050463130	大学物理 B Physics	5	80					2	
4050229110	线性代数 Linear Algebra	2.5	40					2	
4120349170	离散结构 Discrete Structures	3.5	56					2	
4050058110	概率论与数理统计 B Probability and Mathematical Statistics	3	48					3	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4120079110	数字逻辑 Digital Circuits	3	48	8				3	电路原理 B
4120433170	数据结构 C Data Structures	4	64	16				3	高级语言程序设计
4120261140	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	高级语言程序设计
4120306140	数字传播概论 Introduction to Digital Communication	2	32					4	
4120369170	软件工程基础 Basic Software Engineering	2.5	40					4	高级语言程序设计

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120427170	操作系统 D Operating System	4	64	12		8		4	
4120265140	数据结构与算法综合实验 Experiments on Data Structure and Algorithms	1	32	32				4	数据结构
4120282140	数据库原理与传播应用 Principles of Database System and Applications on Communication	2	32					4	
4120283140	数据库原理与传播应用实验 Principles of Database System and Applications on Communication (Experiments)	1	32	32				4	数据库原理与传播应用
4120307140	网络编辑及网络广告 Online Editing and Advertising	2	32					5	
4120175120	软件设计与体系结构 B Software Design and Architecture	2	32	8				5	软件工程基础
4120284140	网络技术与传播 Network Technology and Communication	2.5	40					5	
4120285140	网络技术与传播实验 Network Technology and Communication (Experiments)	1	32	32				5	网络技术与传播
4120275140	软件工程基础实验 Primary Experiments on Software Engineering	1	32	32				5	软件工程基础
4120280140	新媒体信息系统分析与设计 New Media Information System	3	48	8				6	软件工程基础
4120381170	数字出版技术 Digital Publishing Technology	3	48	16				6	
4120382170	新媒体设计技术 B New Media Design	2	32					7	
4120287140	新媒体设计技术实验 New Media Design (Experiments)	1	32	32				7	新媒体设计技术
小 计 Subtotal		66.5	1176	300	0	8	0		
(四) 专业教育选修课程 Specialized Elective Courses									
4120431170	面向对象程序设计 C Object-oriented methodology	2.5	40	12				2	高级语言程序设计

课程编号 Course Number	课 程 名 称 Course Title	学分 CrS	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120263140	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	
4120425170	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	高级语言程序设计
4120082110	算法设计与分析 B Algorithm Design and Analysis	2	32	6				4	
4120044110	可视化编程 Visual Programming	2.5	40	10				4	高级语言程序设计
4120288140	信息组织与检索（含自然语言处理） Information Retrieval (NLP)	2	32					4	数据结构
4120368170	计算机组成与体系结构 Computer Organization and Architecture	4	64	10		8		4	数字逻辑
4120065110	软件开发工具 Software Development Tools	2	32	16				5	JAVA 语言程序设计
4120371170	软件工程经济学 A Economics of Software Engineering	2	32					5	软件工程基础
4120055110	人工智能概论 B Introduction to Artificial Intelligence	2	32					5	离散结构
4120311140	多媒体技术 C Multimedia Technique	2	32	8				5	
4120102110	信息安全 Information Security	2	32	6				5	
4120331150	编译原理 Principles of Compiler	3.5	56	8				5	
4120352170	嵌入式系统应用 A Embedded System	2.5	40	8				5	
4120071110	软件需求工程 B Software Requirements Engineering	2	32	8				5	软件工程基础
4120370170	Python 高级程序设计 Python Programming	2	32	8				6	高级语言程序设计
4120383170	视听新媒体导论 Introduction to New Audio-Visual Media	2	32					6	
4120372170	Web 技术 Web Technology	2	32	12				6	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120290140	用户界面设计 Computer Human Interface	3	48	16				6	
4120291140	计算机动画 Computer Animation	2	32					6	
4120324140	数字图像处理 E Digital Image Processing	2	32	8				6	
4120174120	软件构件与中间件技术 B Software Components and Middleware Technology	2	32	8				6	JAVA 语言程 序设计
4120384170	网络知识产权 Internet Intellectual Property	2	32					6	
4120334140	数字内容营销 Digital Content Marketing	2	32					7	
4120374170	软件安全 Software Security	2	32	8				7	
4120317130	云计算基础 B Cloud Computing	2	32	12				7	
4120292140	传播大数据技术（算法、采集） Big Media Data Technique	2	32					7	
4120004110	Linux 软件分析与开发 Software Development on Linux	2	32	8				7	
4120328140	软件过程与项目管理 Software Process and Project Management	2	32	8				7	软件工程基 础
4120329140	软件质量保证与测试 B Software Quality and Testing	2	32	8				7	软件工程基 础
小 计 Subtotal		65.5	1064	228	0	8	0		
修读说明：要求至少选修 20.5 学分。 NOTE: Minimum subtotal credits:20.5.									
（五）个性课程 Personalized Elective Courses									
4120376170	知识管理与知识工程 Knowledge Management and Knowledge Engineering	2	32					4	
4120237120	计算机科学与经济学 A Computer Science and Economics	2	32					5	
小 计 Subtotal		4	64	0	0	0	0		
修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。 NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.									

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4100068110	电工电子实习 A Practice of Electrical Engineering & Electronics	2	2	3
4120142110	专业教育 Introduction to Software Engineering Major	1	1	4
4120385170	数字传播工程实践（一） Basic Practice of Digital Communication Engineering I	2	2	5
4120386170	数字传播工程实践（二） Basic Practice of Digital Communication Engineering II	3	3	6
4120115110	毕业实习 Practice at Enterprisers	3	3	6（暑假）
4120387170	数字传播工程项目综合实践 System Practice of Digital Communication Engineering	3	3	7
4120379170	创新创业指导 A Guidance of Innovation and Entrepreneurship	3	3	7
4120380170	毕业设计 Bachelor Thesis	8	17	8
小 计 Subtotal		26.5	37	

六、其它要求

VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
- 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌
专业培养方案责任人：李琳

软件工程专业（卓越工程师）2017 版本本科培养方案

Undergraduate Education Plan for Specialty for Software Engineering （Excellent Engineering Class）（2017）

专业名称	软件工程	主干学科	软件工程
Major	Software Engineering	Major Disciplines	Software Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science & Technology	Duration	1.5 Years

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践教学环节 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	66.5	\	26.5	\	170
选修课 Elective Courses	9	20.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

（一）培养目标

结合经济发展对软件技术和应用人才的需要，以行业为导向，培养具有较强执行力、竞争力、创新能力和国际视野的高层次复合型软件工程技术及应用人才。

学生毕业 5 年左右能达到：

- （1）具有良好的职业道德、社会责任感和创业精神，积极为我国经济建设和社会发展服务。
- （2）具有坚实的自然科学基础、软件工程专业基础，具备扎实的专业工程实践能力，能系统地掌握软件开发、组织、管理的基本理论、方法和技术。
- （3）具备运用先进的工程化方法、技术和工具从事软件系统的分析、设计、验证、确认、实现、应用和维护，能够利用相关技术和方法综合分析和解决实践应用中的复杂工程问题，推动行业创新发展。
- （4）掌握一门外语，具备良好的阅读、理解、撰写外语资料的能力和进行国际化交流的能力。
- （5）具备通过继续教育或其它的终身学习途径拓展自己的能力，紧跟专业技术和应用的发展。

In combination with the needs of economic development of software talents and guided by industry, we aim to cultivate high-level software engineering technology and application-oriented talents with strong executive ability, competitive ability, innovation ability and certain international visions.

In 5 years, students can achieve the following objects:

1. Have a good work ethic, social responsibility and entrepreneurship, and actively serve China's economic construction and social development.
2. Have a solid foundation of natural science and software engineering, with solid professional engineering practice skills, to master the software system development, organization and management of basic theory, methods and technologies.
3. Have the abilities of engaging in the analysis, design, verification, validation, implementation, application and maintenance of software system by using advanced engineering methods, techniques and tools. And can use the relevant technology and software engineering method to solve complex engineering problems by comprehensive analysis, and promote the innovation and development industry.
4. Master a foreign language and have the ability to read, understand, write foreign language materials and communicate internationally.
5. Have the ability to expand their abilities by continuing education or other lifelong learning approaches, and follow the development of professional technology and application.

(二) 毕业要求

- (1) **工程知识:** 应掌握软件生命周期中涉及的工程知识和方法技术基础,并能够将其应用到软件设计、开发和管理实践中。
- (2) **问题分析:** 具有数理基础、数学建模和科学思维能力,能够应用数学、自然科学和工程科学的基本原理与方法,识别与表达复杂工程问题,并能通过文献检索和研究分析复杂工程问题,获得有效结论。
- (3) **设计/开发解决方案:** 掌握计算机科学与软件工程基础知识和相关的方法、技能,包括计算思维、程序设计与算法、计算机硬件与系统、系统软件等。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:** 能够基于科学原理和方法,运用工程化思想对复杂工程问题进行研究,包括技术探索、设计实验、分析与解释数据、并能够在设计环节中体现创新意识,得出复杂软件问题的创新解决技术。
- (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:** 具备基础人文知识、具有高尚的道德情操、远大的人生境界追求以及健康的心理素质。具有工程素质、社会责任感,能够在实践中理解并遵守工程职业道德和规范,履行责任,并能够在设计环节中考虑社会、健康、安全、法律专业理论基础、文化以及环境等因素。
- (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,理解并掌握工程管理原理与经济决策方法,具有一定的组织管理能力、表达能力和良好的团队合作能力,能够在多学科背景下的团队中担当负责人或成员的角色。
- (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。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:** 具有自主学习和终身学习的意识, 及时掌握新技术和新工具的实际应用, 有不断学习和适应发展的能力, 通过学习不断完善和自我提高。
 - 1. **Engineering Knowledge:** master the engineering knowledge and method technical basis involved in the software life cycle and be able to apply it to software practice of design, development and management.
 - 2. **Problem Analysis:** mathematical basis, mathematical modeling and scientific thinking ability, able to apply mathematics, natural science and engineering science, the basic principles and methods of identification and expression of complex engineering problems, and can through literature search and study analysis of complex engineering problems, to obtain valid conclusions.
 - 3. **Design/Development Solution:** master the basic knowledge of computer science and software engineering and related methods, skills, including computing, computer hardware, program design and algorithm of thinking and system, the system software, etc. To be able to design solutions for specific software requirements, including function design, system architecture design, the software component design and database design, etc., and link the design embodies the innovative ideology, considering the social, health, safety, legal, cultural and environmental factors.
 - 4. **Scientific Research:** can be based on scientific principle, scientific method and engineering conception for complex engineering problems are studied, including the technical exploration, design experiments, analyze and interpret data, and be able to be reflected in the design process innovation consciousness, innovation of complex software problem solution.
 - 5. **Usage of Modern Tools:** to a specific software problems, analysis, and the choice of appropriate technology, resources and modern engineering tools and software tools, improve the efficiency to solve the problem of software, promote the standardization of the solution.
 - 6. **Software Engineering and Society:** can carry on the reasonable analysis based on the engineering background, the evaluation software engineering practices and software solutions to problems for the society, health, safety, legal and cultural influences, and understand the responsibility.
 - 7. **Environment and Sustainable Development:** able to understand and evaluate the software engineering practices for the sustainable development of environment, social influence, and to be able to request for the sustainable development of environment, society embodied in solution.
 - 8. **Occupational Specification:** basic humanistic knowledge, noble moral sentiment, lofty life realm pursuit and healthy psychological quality. Has the engineering quality, social responsibility, to understand and abide by professional ethics and engineering specifications, responsibility, and be able to in the design process considering social, health, safety, and legal professional theory foundation, cultural and environmental factors.
 - 9. **Personal and Teamwork:** has the team consciousness, correctly understand the relationship between the individual and team, to understand and to grasp the method of project management theory and economic decision-making, has certain organization management ability, expression ability and good team cooperation ability, can under the background of the

multidisciplinary team members of the head or roles.

10. **Communication skills:** written communication, oral communication ability, able to skillfully use text, charts, the preparation of the software documentation, to oral communication with customers, team members effectively. With a certain international vision, I can communicate and communicate in a cross-cultural context.
11. **Project Management:** understand and master the basic theory of software project management, and be able to apply it to process management in software practice to avoid risk, specification process and efficiency.
12. **Lifelong Learning:** a sense of self-learning and lifelong learning, mastering new knowledge and new technologies in time, and constantly learning and adapting to development, through continuous learning and self-improvement.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1		✓	✓		
毕业要求 2		✓	✓		
毕业要求 3	✓	✓	✓		
毕业要求 4			✓	✓	✓
毕业要求 5			✓	✓	
毕业要求 6	✓				✓
毕业要求 7	✓		✓		✓
毕业要求 8	✓				
毕业要求 9	✓	✓	✓		
毕业要求 10			✓		✓
毕业要求 11		✓	✓		
毕业要求 12			✓	✓	✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程:

高级语言程序设计、离散结构、数据结构、计算机组成与系统结构、操作系统、计算机网络、软件工程基础、软件设计与体系结构、软件质量保证与测试。

Advanced Language Programming, Discrete Structure, Data Structure, Principles of Computer Organization and System Structure, Operating System, Computer Network, Basic Software Engineering, Software Design and Architecture, Software Testing.

(二) 专业特色课程:

Web 技术、软件工程与计算机科学前沿、软件构件与中间件技术、软件敏捷开发、云计算基础、软件系统设计与开发实践。

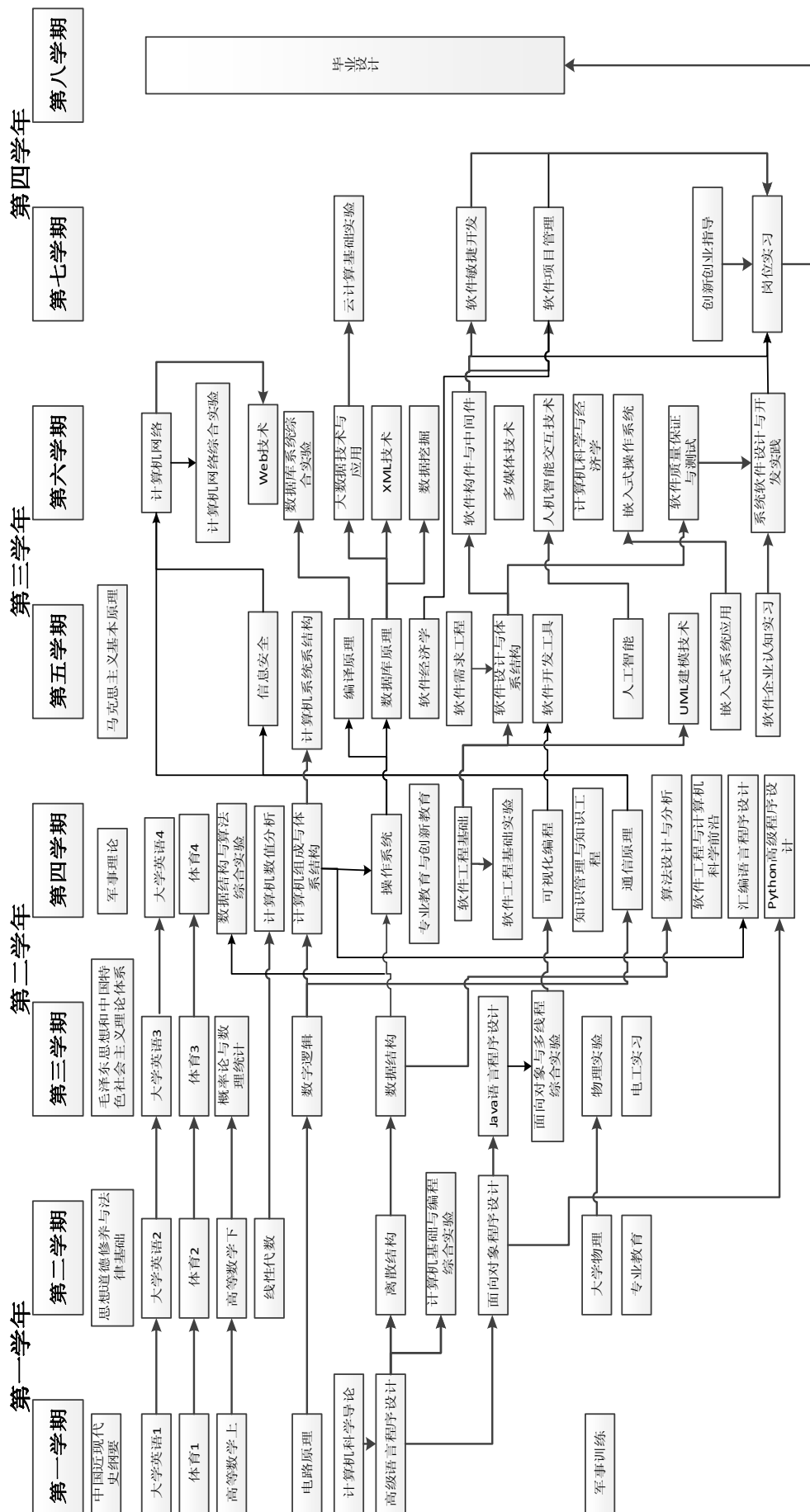
Web Technology, Frontiers of Software Engineering & Computer Science, Software Components and Middleware, Agile Software Development, Cloud Computing, Practice of Software Design and Development.

附：毕业要求实现矩阵:

专业核 心课程	专业特 色课程	课程名称	软件工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础						✓	✓	✓				
		中国近现代史纲要								✓				
		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								✓		✓		
		军事理论								✓				
		体育								✓				
		大学英语		✓						✓		✓		✓
		高等数学	✓	✓										
		电路原理	✓	✓										
		大学物理	✓	✓										
		物理实验	✓	✓										
		线性代数	✓	✓										
		概率论与数理统计	✓	✓										
		数字逻辑	✓	✓										
✓		计算机科学导论	✓	✓	✓			✓						
✓		高级语言程序设计		✓	✓									
✓		离散结构	✓	✓	✓									
		计算机基础与编程综合实验		✓	✓		✓							
		面向对象程序设计		✓	✓									
		面向对象与多线程综合实验		✓	✓		✓							
✓		数据结构		✓	✓	✓								
		JAVA 语言程序设计		✓	✓									
		计算机数值分析	✓	✓	✓									
		数据结构与算法综合实验		✓	✓		✓							
✓		计算机组成与系统结构		✓	✓	✓								
✓		软件工程基础		✓	✓	✓					✓			
✓		操作系统		✓	✓			✓	✓					
✓		数据库系统原理		✓	✓	✓								
		编译原理		✓	✓									
		软件需求工程		✓		✓						✓		
✓		软件设计与体系结构			✓	✓								
		数据库系统综合实验		✓	✓		✓							
		软件工程基础实验		✓	✓		✓							
✓		计算机网络			✓			✓	✓					

专业核 心课程	专业特 色课程	课程名称	软件工程专业（卓越工程师班）毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		软件构件与中间件技术			✓	✓								
		计算机网络综合实验			✓		✓							
		软件项目管理						✓			✓		✓	
✓		软件质量保证与测试				✓	✓							
	✓	可视化编程					✓				✓			
	✓	算法设计与分析		✓	✓									
	✓	软件开发工具	✓				✓	✓						✓
	✓	软件工程经济学	✓					✓	✓				✓	
		多媒体技术			✓									
	✓	Python 高级程序设计			✓		✓							
	✓	软件工程与计算机科学前沿				✓		✓	✓					✓
		软件敏捷开发			✓						✓		✓	
		通信原理		✓	✓									
		信息安全			✓			✓		✓				
		Web 技术					✓	✓						
		XML 技术					✓							
	✓	人工智能概论		✓		✓								
		人机智能交互技术					✓					✓		
		软件安全		✓				✓						
		网络攻防实验		✓					✓	✓				
		数据挖掘	✓	✓	✓	✓								
		云计算基础			✓	✓	✓							
		汇编语言程序设计			✓	✓								
		嵌入式操作系统			✓	✓								
		嵌入式系统应用			✓	✓								
		军事训练								✓	✓			
		专业教育									✓			✓
		电工电子实习	✓							✓				
		软件企业认知实习								✓	✓	✓	✓	
		软件系统设计与开发实践			✓		✓				✓	✓		
		创新创业教育指导							✓					✓
		岗位实习						✓		✓	✓	✓		
		毕业设计		✓	✓	✓	✓				✓	✓		

三、课程教学进程图 III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(一) 通识教育必修课程 General Education Required Courses									
4120347170	计算机科学导论 Introduction to Computer Science	2	32	8				1	
4120348170	高级语言程序设计 A Advanced Programming Language	3.5	56	12				1	
4220002110	中国近现代史纲要 Outline of Chinese Contemporary and Modern History	2	32					1	
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2	
4220003110	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese	4	96			32		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32			16		2	
4210001170	体育 1 Physical Education I	1	26					1	
4210002170	体育 2 Physical Education II	1	34					2	
4210003170	体育 3 Physical Education III	1	34					3	
4210004170	体育 4 Physical Education IV	1	34					4	
4030002180	大学英语 1 College English 1	3	60				12	1	
4030003180	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004180	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004180	大学英语 4 College English IV	2	44				12	4	大学英语 3
小 计 Subtotal		31.5	664	20	0	64	48		

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类 相关课程并取得至少 2 个学分，在创新创业类课程中至少选修一 门课程，在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307170	电路原理 B Circuit Principle B	3.5	56	8				1	
4050063110	高等数学 A 上 Advanced Mathematics 1	5	80					1	
4050064110	高等数学 A 下 Advanced Mathematics 2	5	80					2	高等数学 上
4050463130	大学物理 B Physics	5	80					2	
4050229110	线性代数 Linear Algebra	2.5	40					2	
4120349170	离散结构 Discrete Structures	3.5	56					2	
4120261140	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	
4050058110	概率论与数理统计 B Probability and Mathematics Statistic B	3	48					3	
4050224110	物理实验 B Physics Lab.	1	32	32				3	
4120079110	数字逻辑 Digital Circuits	3	48	8				3	电路原理
4120433170	数据结构 C Data Structures	4	64	16				3	高级语言 程序设计
4120430170	计算机数值分析 Computer Numerical Analysis	2.5	40	8				4	线性代数
4120265140	数据结构与算法综合实验 Experiments on Data Structure and Algorithms	1	32	32				4	数据结构

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120368170	计算机组成与体系结构 Computer Organization and Architecture	4	64	10		8		4	数字逻辑
4120369170	软件工程基础 Basic Software Engineering	2.5	40					4	高级语言程序设计
4120275140	软件工程基础实验 Primary Experiments on Software Engineering	1	32	32				4	软件工程基础
4120272140	操作系统 D Operating System	4	64	12		8		4	
4120273140	数据库系统原理 E Principles of Database Systems	3	48					5	
4120331150	编译原理 Principles of Compiler	3.5	56	8				5	
4120175120	软件设计与体系结构 B Software Design and Architecture	2	32	8				5	软件工程基础
4120270140	数据库系统综合实验 Experiments on Application Software	1	32	32				5	数据库系统原理 E
4120034110	计算机网络 C Computer Networks	2.5	40					6	
4120271140	计算机网络综合实验 Experiments on Computer Networks	1	32	32				6	
4120329140	软件质量保证与测试 B Software Quality and Testing	2	32	8				6	软件工程基础
小 计 Subtotal		66.5	1160	278	0	16	0		
(四) 专业教育选修课程 Specialized Elective Courses									
4120431170	面向对象程序设计 C Object-oriented methodology	2.5	40	12				2	高级语言程序设计
4120263140	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	
4120425170	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	高级语言程序设计
4120044110	可视化编程 Visual Programming	2.5	40	10				4	高级语言程序设计

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120435170	算法设计与分析 B Algorithm Design and Analysis	2	32	6				4	数据结构
4120240130	汇编语言程序设计 C Assembly Language Programming	2.5	40	16				4	
4120151110	软件工程与计算机科学前沿 Frontiers of Software Engineering & Computer Science	1	16					4	
4120084110	通信原理 C Principles of Communication	2.5	40	8				4	数字逻辑
4120065110	软件开发工具 Software Development Tools	2	32	16				5	JAVA 语言 程序设计
4120371170	软件工程经济学 A Economics of Software Engineering	2	32					5	计 算 机 科 学导论
4120102110	信息安全 Introduction to Computer Security	2	32	6				5	计 算 机 网 络
4120354170	UML 建模技术 UML Modeling Technology	2	32					5	软 件 工 程 基础
4120055110	人工智能概论 B Introduction to Artificial Intelligence	2	32					5	离散结构
4120071110	软件需求工程 B Software Requirements Engineering	2	32	8				5	软 件 工 程 基础
4120040110	计算机系统结构 B Computer Architecture B	2	32					5	计 算 机 组 成与体系 结构
4120053110	嵌入式系统应用 B Embedded System	2	32					5	
4120370170	Python 高级程序设计 Python Programming	2	32	8				6	高 级 语 言 程序设计
4120049110	嵌入式操作系统 Embedded Operating System	2	32	8				6	操作系统
4120372170	Web 技术 Web Technology	2	32	12				6	数 据 库 系 统原理 E
4120010110	XML 技术 XML Technology	2	32	8				6	数 据 库 系 统原理 E

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120174120	软件构件与中间件技术 B Software Components and Middleware Techniques	2	32	8				6	JAVA 语言 程序设计
4120311140	多媒体技术 C Multimedia Technique	2	32	8				6	
4120056110	人机智能交互技术 Human-Computer Intelligent Interaction	2	32	8				6	
4120434170	数据挖掘 C Data Mining	2	32	8				6	
4120373170	网络攻防实验 Network Attack and Defense Experiment	1	32	32				7	计 算 机 网 络
4120374170	软件安全 Software Security	2	32	8				7	
4120317130	云计算基础 B Cloud Computing	2	32	12				7	
4120402170	软件敏捷开发 Agile Software Development	2	32	8				7	软 件 工 程 基础
4120069110	软件项目管理 B Software Project Management	2	32	6				7	软 件 工 程 基础
小 计 Subtotal		57.5	952	256					
修读说明：要求最少选修 20.5 学分。 NOTE:Minimum subtotal credits:20.5.									
(五) 个性课程 Personalized Elective Courses									
4120376170	知识管理与知识工程 Knowledge Engineering and Management	2	32					4	
4120237120	计算机科学与经济学 A Computer Science and Economics	2	32					5	
4120247120	大数据技术与应用 Technology and Application of Big Data	2	32					6	
小 计 Subtotal		6	96	0	0	0	0		
修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。 NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.									

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4100068110	电工电子实习 A Practice in Electrical Engineering & Electronics	2	2	3
4120142110	专业教育 Introduction to Software Engineering Major	1	1	4（企业）
4120316140	软件企业认知实习 Practice at Software Enterprisers	3	3	5（企业）
4120388170	软件系统设计与开发实践 Practice of Software Design and Development	2	2	6（企业）
4120379170	创新创业指导 A Guidance of Innovation and Entrepreneurship	3	3	7（企业）
4120389170	岗位实习 B Internship Project	6	6	7（企业）
4120380170	毕业设计 Bachelor Thesis	8	17	8（企业）
小 计 Subtotal		26.5	37	

六、其它要求

VI Recommendations on Course Studies

- 1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。
- 2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌
专业培养方案责任人：李 琳

计算机科学与技术专业（卓越工程师） 2017 版本本科培养方案

Undergraduate Program for Specialty in Computer Science and Technology (Excellent Engineer Pilot) (2017)

专业名称	计算机科学与技术	主干学科	计算机科学与技术
Major	Computer Science and Technology (Excellent Engineer Pilot)	Major Disciplines	Computer Science and Technology
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering
所属大类	计算机类	大类培养年限	1.5 年
Disciplinary	Computer Science and Technology	Duration	1.5 years

最低毕业学分规定

Graduation Credit Criteria

课程类别 Course Classification 课程性质 Course Nature	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses	31.5	64	\	29	\	170
选修课 Elective Courses	9	20.5	6	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

（一）培养目标

本专业培养掌握计算机科学与技术领域的基础理论、专业知识、基本方法和工程实践技能，“适应能力强、实干精神强、创新意识强”，具有一定国际视野，能够在教育科研单位、企事业单位、技术和行政管理单位以及建工建材、交通、汽车与信息等行业从事计算机软硬件系统分析与设计、研究与开发、应用和管理等方面工作的卓越工程技术人才。

学生毕业 5 年左右能达到：

- 具有人文社会科学素养、社会责任感、工程职业道德、国际视野，具有强健的体魄和健康的心理，有意愿并有能力服务社会；
- 具有从事计算机科学与技术领域工作所需的数理知识、专业知识和工程实践技能，以及综合运用科学理论、专业知识、工程实践技能和相关工具分析解决本专业复杂工程问题的能力。
- 具有质量意识、环境意识和安全意识，能够综合考虑社会、经济、环境、法律、法规、安全等制约因素；
- 具备创新创业意识以及终身学习、人际交往、团队合作、适应发展等能力。

- (5) 通过工作实践、继续深造等方式，毕业生毕业后 5 年左右逐渐成长为 IT 行业团队技术骨干或 IT 项目团队管理人才。

The major educate the students to master the field of computer science and technology basic theory, professional knowledge, basic methods and professional practice skills, "adaptability, strong enterprising spirit, strong sense of innovation, with international vision, in the education scientific research units, enterprises and institutions, technical and administrative units, building materials, transportation, the car and the information industry in computer software and hardware system analysis and design, research and development, application and management and other aspects of the work of the engineering and technical personnel.

5 years after graduation, students should achieve:

1. humanities and social science literacy, social responsibility, engineering ethics and international vision, strong physique and healthy mentality, willingness and ability to serve the society.
2. having mathematical knowledge and professional knowledge in the field of computer science and technology, scientific research, system analysis and design, technical service and other work, analyzing and comprehensive using of scientific theory, professional knowledge and professional tools to solve the complex engineering problems, ability of scientific research, computer hardware and software development, system management etc. work.
3. quality awareness, environmental awareness and safety awareness, it can take into account the constraints of economy, environment, law, regulations and safety and solve the complex engineering problems of this specialty.
4. the ability of innovative and entrepreneurial awareness, lifelong learning, interpersonal communication, team cooperation, and adaptation to development.
5. through work practice and continuing education, graduates gradually grow into IT industry team technical backbone or IT project team management talent 5 years after graduation.

(二) 毕业要求

- (1) 工程知识：能够将数学、自然科学、工程基础和专业知用于解决计算机科学与技术领域复杂工程问题。
- (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科学与技术领域复杂工程问题，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科学与技术领域复杂工程问题的解决方案，设计满足特定需求的系统、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科学与技术领域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：能够针对计算机科学与技术领域复杂工程问题，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，包括对计算机科学与技术领域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，评价计算机科学与技术领域专业工程实践和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科学与技术领域复杂工程问题的专业工程实践对环境、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，能够在计算机科学与技术领域工

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：能够就计算机科学与技术领域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
1. Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems.
 2. Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
 3. Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
 4. Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
 5. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
 6. Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
 7. Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
 8. Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
 9. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
 10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
 11. Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
 12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

附：培养目标实现矩阵

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 1	✓				
毕业要求 2	✓	✓			
毕业要求 3		✓	✓	✓	

	培养目标 1	培养目标 2	培养目标 3	培养目标 4	培养目标 5
毕业要求 4		✓			
毕业要求 5		✓			
毕业要求 6			✓		
毕业要求 7			✓	✓	
毕业要求 8	✓		✓	✓	
毕业要求 9				✓	✓
毕业要求 10				✓	✓
毕业要求 11			✓		
毕业要求 12				✓	✓

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程:

离散结构、数字逻辑、高级语言程序设计、计算机组成与系统结构、数据结构、操作系统、编译原理、数据库系统原理、计算机网络

Discrete structure, Digital Logic, Advanced Programming Language, Computer Organization and System Architecture, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Programming Language

(二) 专业特色课程:

按照卓越工程师培养建议,与企业结合开展各类系统开发实训,包括应用软件开发技术实训、企业认知实习、顶岗实习和计算机系统能力实训。

Characteristic Courses: Performing all kinds of system development practice and training in cooperation with enterprises based on the recommendation of Excellent Engineer Program, including software development technology, practice in the job position and Training of Computer System Ability.

附: 毕业要求实现矩阵:

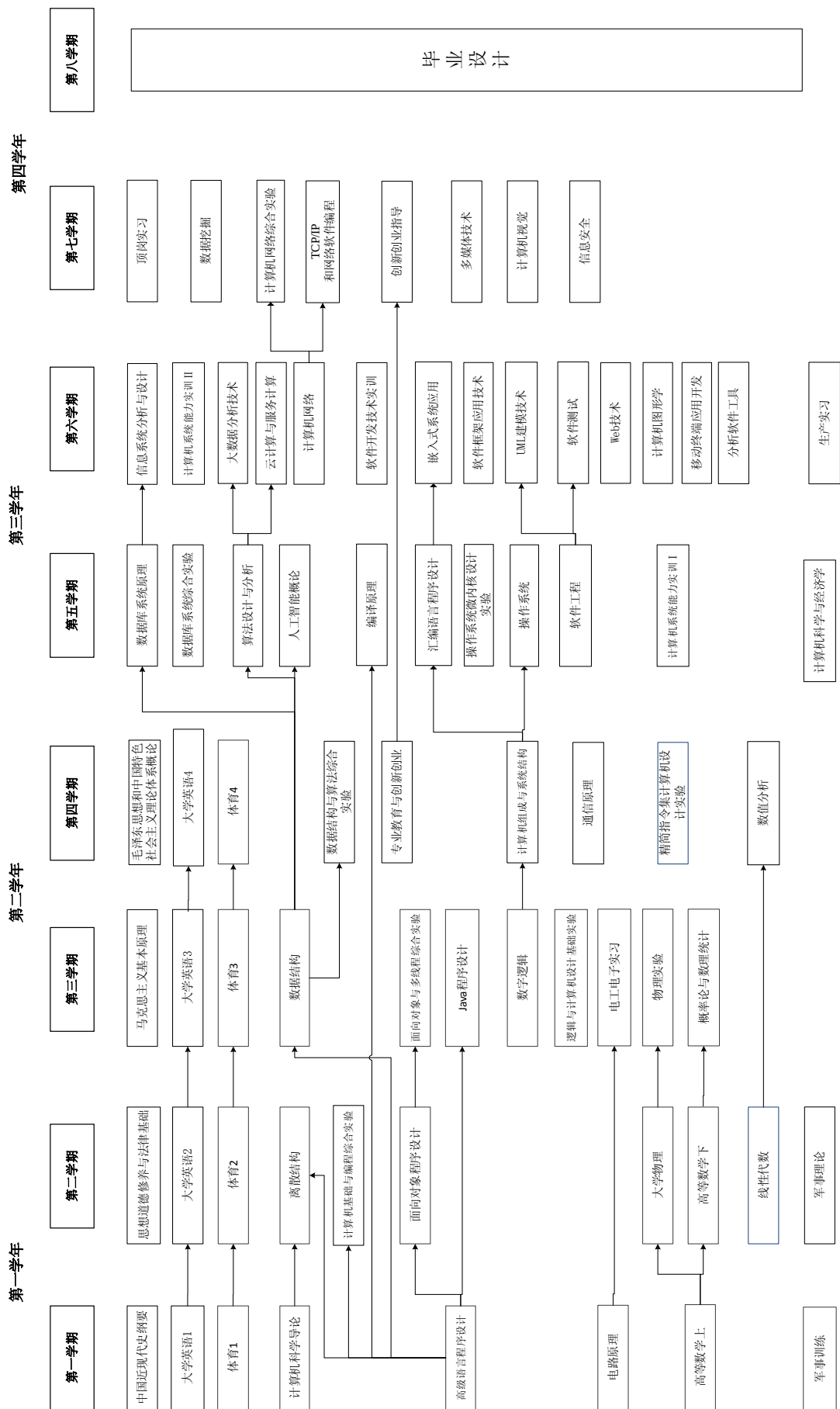
专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业(卓越工程师班)毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		思想道德修养与法律基础			✓			✓						
		中国近现代史纲要								✓				
		计算机科学导论	✓	✓	✓			✓	✓	✓				
✓		高级语言程序设计		✓			✓	✓						
		毛泽东思想和中国特色社会主义理论体系概论								✓				
		马克思主义基本原理								✓				
		军事理论								✓				
		体育								✓	✓			
		大学英语										✓		

专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业(卓越工程师班)毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		高等数学	✓											
		电路原理	✓	✓										
		线性代数	✓											
		大学物理	✓		✓									
		物理实验	✓			✓								
✓		离散结构	✓	✓										✓
		概率论与数理统计	✓											
		计算机基础与编程综合			✓	✓		✓					✓	
		面向对象程序设计		✓	✓		✓							
✓		数字逻辑		✓	✓									
✓		数据结构		✓			✓							✓
		JAVA 语言程序设计					✓							
		计算机数值分析	✓											
	✓	数据结构与算法综合实验		✓	✓	✓	✓	✓					✓	✓
✓		计算机组成与系统结构	✓	✓		✓								
		汇编语言程序设计		✓			✓							
✓		编译原理	✓	✓		✓								
✓		操作系统	✓	✓		✓								
✓		数据库系统原理		✓		✓		✓						
		数据库系统综合实验		✓	✓	✓	✓							
		软件工程		✓	✓		✓	✓			✓		✓	
		嵌入式系统应用			✓		✓						✓	
✓		计算机网络			✓			✓	✓					
		计算机网络综合实验				✓	✓			✓				
		人工智能概论			✓							✓		
		UML 建模技术					✓							
		信息安全												
		TCP/IP 和网络软件编程				✓	✓							
		多媒体技术												
		分析软件工具					✓							

专业 核心 课程	专业 特色 课程	课程名称	计算机科学与技术专业(卓越工程师班)毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		软件测试					✓							
		信息系统分析与设计		✓			✓		✓					
		Web 技术					✓	✓						
	✓	数据挖掘					✓							
		计算机图形学		✓										
	✓	计算机视觉						✓						
		算法分析与设计		✓	✓			✓						✓
		通信原理	✓											
	✓	云计算与服务计算						✓						
		军事训练								✓				
		专业教育		✓				✓		✓		✓		
		创新创业指导			✓			✓	✓	✓		✓		
		电工电子实习	✓										✓	
		软件开发技术实训	✓		✓		✓	✓			✓	✓	✓	
	✓	计算机系统能力实训		✓	✓		✓	✓			✓	✓		
	✓	顶岗实习		✓	✓		✓		✓	✓		✓		
	✓	企业认知实习		✓				✓	✓			✓		
		毕业实习				✓	✓	✓	✓	✓	✓		✓	
		毕业设计（论文）			✓	✓	✓	✓	✓					✓

三、课程教学进程图

III Teaching Process Map



四、 理论教学建议进程表

IV Theory Course Schedule

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(一) 通识教育必修课程 General Education Required Courses									
4220001111	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2	
4220002111	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1	
4120347171	计算机科学导论 Introduction to Computer Science	2	32	8				1	
4120348171	高级语言程序设计 A Advanced Language Programming	3.5	56	12				1	
4220003111	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		4	
4220005111	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003131	军事理论 Military Theory	1	32			16		2	
4210001171	体育 1 Physical Education I	1	26					1	
4210002171	体育 2 Physical Education II	1	34					2	
4210003171	体育 3 Physical Education III	1	34					3	
4210004171	体育 4 Physical Education IV	1	34					4	
4030002181	大学英语 1 College English 1	3	60				12	1	
4030003181	大学英语 2 College English II	2	44				12	2	大学英语 1
4030004181	大学英语 3 College English III	2	44				12	3	大学英语 2
4030004181	大学英语 4 College English IV	2	44				12	4	大学英语 3
小 计 Subtotal		31.5	664	20	0	64	48		

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得 9 个学分，且必须选修艺术体育类课程中的艺术类相关课程并取得至少 2 个学分，在创新创业类课程中至少选修一门课程，在人文社科类或经济管理类课程中至少选修一门。 Students are required to obtain at least 9 credits, which must cotain art courses of 2 credits from the category of Art and Physical Education Courses,at least one course from the category of Innovation and Entrepreneurship Courses, and at least one course from the category of Arts and Social Science Courses or the category of Economy and Management Courses.							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary RequiredCourses									
4110307171	电路原理 B Circuit Principle	3.5	56	8				1	
4050063111	高等数学 A 上 Advanced Mathematics I	5	80					1	
4050064111	高等数学 A 下 Advanced Mathematics II	5	80					2	高等数学上
4050229111	线性代数 Linear Algebra	2.5	40					2	
4120349171	离散结构 Discrete Structures	3.5	56					2	计算机科学 导论
4050463131	大学物理 B Physics	5	80					2	高等数学上
4050224111	物理实验 B Physics Lab.	1	32	32				3	大学物理
4050058111	概率论与数理统计 B Probability and Mathematics Statistic	3	48					3	高等数学下
4120261141	计算机基础与编程综合实验 Experiments on Computer and Programming	1	32	32				2	高级语言程 序设计
4120079111	数字逻辑 Digital Circuits	3	48	8				3	
4120433171	数据结构 C Data Structure	4	64	16				3	高级语言程 序设计
4120430171	计算机数值分析 Computer Numerical Analysis	2.5	40	8				4	线性代数
4120265141	数据结构与算法综合实验 Experiments on Data Structure and Algorithm	1	32	32				4	数据结构

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120041111	计算机组成与系统结构 Computer Organization and System Architecture	4.5	72	10				4	数字逻辑
4120435171	算法设计与分析 B Algorithm Design and Analysis	2	32	6				4	数据结构
4120331151	编译原理 Compiler Principles	3.5	56	8				5	数据结构
4120350171	操作系统 A Operating System	3.5	56	8				5	高级语言程序设计
4120351171	数据库系统原理 B Principles of Database Systems	3.5	56	8				5	计算机组成原理
4120270141	数据库系统综合实验 Experiments on Database System	1	32	32				5	数据库系统原理
4120352171	嵌入式系统应用 A Embedded System and Application	2.5	40	8				6	
4120034111	计算机网络 C Computer Networks	2.5	40					6	
4120271141	计算机网络综合实验 Experiments on Computer Network	1	32	32				7	计算机网络
小 计 Subtotal		64	1104	248	0	0	0		
(四) 专业教育选修课程 Specialized Elective Courses									
4120431171	面向对象程序设计 C Object-oriented Methodology	2.5	40	12				2	
4120425171	JAVA 语言程序设计 D Java Programming	2.5	40	8				3	
4120263141	面向对象与多线程综合实验 Experiments on Object-oriented and Multithreading Programming	1	32	32				3	
4120084111	通信原理 C Communication Principles	2.5	40	8				4	
4120240171	汇编语言程序设计 C Assembly Language Programming	2.5	40	16				5	
4120055111	人工智能概论 B Artificial Intelligence	2	32					5	
4120432171	软件工程 B Introduction to Software Engineering	2.5	40	8				5	
4120354171	UML 建模技术 UML Modeling Technology	2	32					6	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议 修读 学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120428171	分析软件工具 Analysis Software Tool	2	32	8				6	
4120058111	软件测试 B Software Testing	2	32	8				6	
4120103111	信息系统分析与设计 Information System Analysis and Design	2	32	6				6	
4120372171	Web 技术 Web Technology	2	32	12				6	
4120083111	云计算与服务计算 Cloud & Service Computing	2	32	6				6	
4120356171	计算机图形学 B Computer Graphics	2	32	6				6	
4120311141	多媒体技术 C Multimedia Technology	2	32	8				7	
4120102111	信息安全 Information Security	2	32	6				7	
4120426171	TCP/IP 和网络软件编程 TCP/IP and Network Programing	2.5	40	10				7	
4120434171	数据挖掘 C Data Mining	2	32	8				7	
4120357171	计算机视觉 Computer Vision	2	32	6				7	
小 计 Subtotal		40	656	168	0	0	0		
修读说明：要求至少选修 20.5 学分。 NOTE: Minimum subtotal credits:20.5									
(五) 个性课程 Personalized Elective Courses									
4120393171	逻辑与计算机设计基础实验 A Design and Implementation of the digital logic system	1	32	32				3	
4120394171	精简指令集计算机设计实验 A Design and Implementation of the RISC system	1	32	32				4	
4120237121	计算机科学与经济学 A Computer Science and Economics	2	32					5	
4120395171	操作系统微内核设计实验 A Design and Implementation of the microkernel operating system	1	32	32				5	
4120240131	移动终端应用开发 Mobile Terminal Application Development	2	32	12				6	
4120241131	软件框架应用技术 Application Technology of Software Framework	2	32	12				6	

课程编号 Course Number	课 程 名 称 Course Title	学分 Crs	学时分配 Including					建议修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120242131	大数据分析技术 C Big Data Analysis Technology	2	32	8				6	
小 计 Subtotal		11	224	128	0	0	0		

修读说明：学生从以上个性课程和学校发布的其它个性课程目录中选课，要求至少选修 6 学分。
NOTE: Students can select courses from above and the other personalized courses in catalog, and are required to obtain at least 6 credits.

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002111	军事训练 Military Training	1.5	3	1
4100068111	电工电子实习 A Practice in Electrical Engineering & Electronics	2	2	3
4120361171	专业教育与创新创业 Introduction of Major and Innovation and Entrepreneurship	1	1	4
4120404171	计算机专业认知实习 Introduction of Major and Innovation and Entrepreneurship	1	1	4（企业）
4120365171	软件开发技术实训 System Software Development Practise and training	2	2	5（企业）
4120362171	计算机系统能力实训 Training of Computer System Ability	4	4	6（企业）
4120366171	生产实习 Practical Training for Graduation	3	3	6(暑期)（企业）
4120363171	创新创业指导 B Guide to Innovation and Entrepreneurship	2	2	7（企业）
4120367171	顶岗实习 Job Postion Practise	4	4	7（企业）
4120364171	毕业设计 Graduation Design (Thesis)	8.5	17	8（企业）
小 计 Subtotal		29	39	

六、其它要求

VI Recommendations on Course Studies

1、《形势与政策》和《心理健康教育》课程为课外必修课程，分别计 2 个和 1 个课外学分。

2、学生选修的通识选修课程和从学校发布的个性课程目录中选修的个性课程，要求与本专业培养方案内设置的课程内容不重复。

1.Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

2.The selected General Education Elective Courses and Personalized Elective Courses from the courses program by university must be different from the major undergraduate education plan in content.

学院教学责任人：袁景凌

专业培养方案责任人：彭德巍