

# 嵌入式专业本科培养方案

## Undergraduate Program for Specialty in Embedded System

### 一、培养目标

#### I Educational Objectives

本专业按照“加强基础，拓宽专业，强化能力，提高素质，突出特色”的人才培养指导思想，根据嵌入式软件业及其密切相关的电子信息产业的发展需求，培养德、智、体全面发展，具有嵌入式系统应用的基础知识、基本技能并能进行相应的嵌入式系统的开发工作；具有单片机、嵌入式微处理器、嵌入式集成系统等硬件知识并能进行一定的硬件开发的能力；具有嵌入式底层软件、嵌入式操作系统、嵌入式应用开发等软件方面的专业知识和专业技能；能在嵌入式应用领域从事技术开发、测试、维护、及技术支持等工作的高级应用型人才。

Based on reinforcing foundation, expanding specialty, strengthening capability, improving quality and outstanding features guidelines, the training goal of the computer specialty is to educate the advanced engineered and applied specialty persons who develop comprehensively in virtue, wisdom and body and can tightly grasp the basic theory of computer hardware and software and the basic skill of computer application. The persons should have high engineering practice and applied capability and can adapt to the developing requirement of society and software engineering technology. They have the abilities of analyzing and dealing with problem, updating knowledge and innovating idea. They can do such jobs such as designing, installing and maintaining computer hardware, developing computer system software, analyzing, developing and maintaining computer application software, designing, managing and maintaining computer network, teaching and studying computer in scientific research institutes, colleges and enterprises.

### 二、培养要求

#### II Skills Profile

##### 1. 政治素质与思想品德要求

热爱社会主义祖国，具有为国家富强，民族昌盛而奋斗的志向和社会责任感；能树立科学的世界观、人生观和价值观；具有法律意识，自觉遵纪守法；热爱本专业，敬业爱岗，严谨务实，注重职业道德修养；具有良好的思想品德、诚信意识和团队精神。

##### 2. 基本素质要求

具有较扎实的自然科学基础，较好的人文、艺术和社会科学基础；具有较好的文化修养、人际沟通修养和团队协作能力。能正确运用本国语言、文字进行表达的能力；较熟练地掌握一门外语，具有较好的阅读能力和一定的听、说、写能力。

##### 3. 专业素质要求

(1)掌握本学科的基本理论、基本知识和基本技能，具有扎实的自然科学基础、良好的科学思维能力；

(2)掌握嵌入式系统的基本原理及技术，具有设计、开发及系统分析的能力；

(3)熟悉嵌入式系统软件和硬件的设计构造和分析过程；

(4)能够使用基于嵌入式系统的软、硬件开发工具来进行嵌入式系统的分析和设计；

(5)了解嵌入式系统工程学的技术方法、管理方法与工具的使用方法；

(6)应当具备一个完整的嵌入式软、硬件设计经历。

##### 4. 自学能力与创新意识要求

掌握文献资料检索、资料查询的基本方法，具有获得信息的能力；掌握计算机技术的发展动态、新的嵌入式硬件、软件系统平台的发展，具有较强的技术创新能力、终身学习能力；

了解相关领域科技动态与不断拓宽专业面、提高自身业务水平的能力。

#### 5. 身体、心理素质要求

具有较好的身体素质和心理素质，掌握科学锻炼身体方法和基本技能，达到国家规定的大学生体育合格标准，心理健康，积极向上。

The specialty graduates can systematically grasp firm theory and professional knowledge, and they must have the abilities of analyzing and dealing with problems to fit in with the needs of the society. They can be engaged in developing, managing, maintaining, teaching and investigating work in software engineering technology fields. The following represents these concretely.

1. The graduates have good ideological and political quality. They love motherland and support the leading of Chinese Communist, and they have high enterprise and responsibility of striving for the country and nation flourishes.

2. The graduates have fine basis of division of humanities, art and social science and a preliminary correct world view, philosophy and sense of worth. They have nice moral cultivation, culture literacy and healthy body and mentality.

3. The graduates can systematically grasp basic theory and knowledge and basic method of analyzing and designing computer system.

4. The graduates have firm and professional basic knowledge for developing engineering, and they can initiatively grasp the idea, method and technology route of the engineering technology items. And, they also possess normative engineering quality, high practice performance and several professional skills.

5. The graduates have some abilities of computational thinking, designing and analyzing algorithm, developing program, learning, designing and applying computer system.

6. The graduates have abilities of learning on their own initiative, summarizing, obtaining information, nice writing and oral expressing, and they should hold innovative consciousness and idea.

7. The graduates should understand the rules of software engineering industry and the development of software engineering technology, and they should have the ability of learning and tracing new technology.

8. The graduates can grasp a foreign language and know basic method of document indexing and data query, and they have obtaining information ability.

### 三、专业特点

#### III Characteristic Specialty

本专业是一个强化基础、面向应用、加强实践、分类培养，以应用为主的宽口径专业，培养能从事嵌入式系统设计、开发、测试、维护和技术支持的高级工程技术人才。课程体系贯彻理论与实践并重、知识与能力并重的原则，强化工程实践能力的多方面训练，注重创新性思维的开发，培养学生既具有扎实的理论和专业知识，又具有开拓性、创造性解决工程实际问题的能力。

The specialty is a wide borne specialty which is strengthening basis, facing application, intensifying practice and classified training. The training goal is to educate senior engineering technology persons who can develop and investigate computer software system, embedded system and network system. The class system carries out the rules of laying equal stress on theory and practice, knowledge and capability. It strengthens several trainings of computer engineering practice and emphasizes development of innovating thinking. It educates students who have

steady theory, professional knowledge and trailblazing and can solve practical problems innovatively.

#### 四、主干学科

#### IV Major Disciplines

主干学科: 计算机技术

Major Disciplines: Software engineering

#### 五、主要课程

#### V Major Courses

主要课程: C 语言程序设计、JAVA 语言程序设计、数据结构、数字电子技术、计算机组成原理、单片机原理与接口电路、计算机网络、Linux 操作系统、Linux 下 C 语言编程、Andriod 应用开发、Linux 下底层驱动开发等。

Major Courses: High-level Language Programming (C language), Discrete Mathematics, Data Structure, Circuits and Electronics, Computer Principles and Interface Techniques, Computer Network, Database Principles, Principles of Computer Composition, Object-oriented Programming of C, Linux Operating System, Database Development Technology, Mobile Development Technology, Enterprise Apply Development Technology etc.

#### 六、学制与学位

#### VI Length of Program and Degree

学制: 二年

Length of Program: 4 years

学位: 符合《河南科技大学普通本科生学士学位授予办法》规定的毕业生授予工学学士。

Degree Granted: Engineering bachelor degree can be granted to graduates according to the guideline of bachelor degree granting approach for undergraduates in Henan University of Science and Technology.

#### 七、最低毕业学分要求

#### VII Graduation Credit Criteria

通识教育学分 General Education Courses		学科平台课程学分 Basic Disciplinary Courses		专业方向课程学分 Specialized Courses		实践教学学分 Practice Training Schedule		总学分 Total
必修 学分 Required Credit	课外素质 教育学分 Taught Quality Education Credit	学科基础 必修课学分 Required Basic Disciplinary Courses Credit	学科基础 选修课学分 Elective Basic Disciplinary Courses Credit	专业方向 必修课学分 Required Specialized Courses Credit	专业方向 选修课学分 Elective Specialized Courses Credit	必修 学分 Required Credit	课外 素质教育学分 Extra-curriculum Credit	187.5
38	10	70.5	5	12	6	42	4	

#### 八、教学进程计划表

#### VIII Taught Course Schedule

课程 类别	课程 性质	课程名称 Course Title	学分 Credit	学时分配 Hours Distribution	考试/ 考查 Graded	建议修 读学期	开课 单位
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			总学时 Tot hrs.	理论 Taught	实验 Exp.	实践 Practice				
		大学英语(3) College English(3)	4	64	64			考查	3	外语
		大学英语(4) College English(4)	4	64	64			考试	4	外语
		体育(1) Physical Education(1)	1	30	30			考查	1	体育
		体育(2) Physical Education(2)	1	30	30			考查	2	体育
		思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	2.5	40	40			考查	1	马院
		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	4.5	72	72			考试		马院
		军事理论 Military Theory	2	32	32			考查		体育
		马克思主义基本原理 Marxism Philosophy	3	48	48			考试		马院
		中国近现代史纲要 Outline of Contemporary and Modern Chinese	2	32	32			考查		马院
		形势与政策	2	64	32		32	考查	1-4	马院
		小 计 Subtotal	26	476	444		32			
		课内素质教育(全校公选课) General Education Courses (Public Elective Courses)	人文社科类 Humanities and Social Sciences Courses	2	要求全体学生至少取得 10 学分, 每类课程至少选修 2 学分。 All students are required to achieve at least ten credits, and at least two credits are required in each category. 课程设置见附件 (See appendix)					
管理经济类 Economics and Management Courses	2									
艺术教育类 Arts Education Courses	2									
自然科学类 Natural Sciences Courses	2									
就业指导类 Career Guidance Courses	2									
小 计 Subtotal	10									
学 程 科 平 台 课 Basic Disciplinary Courses	学科基础必修课 Required Courses	高等数学 A Higher Mathematics A	10.5	168	168	0		考试	1,2	数学
		线性代数 Linear Algebra	2	32	32	0		考试	3	数学
		离散数学 Discrete Mathematics	4	64	64	0		考试	1	软件
		C 语言程序设计 C Language Programming	5	80	60	20		考试	1	软件
		数据结构 Data Structure	5	80	64	16		考试	2	软件
		专业英语 Specialty English	2	32	32	0		考查	3	软件
		数字电子技术 Digital Electronic Technology	4	64	48	16		考查	2	软件
		单片机原理与接口电路 Single-chip microcomputer and interface circuit	4	64	48	16		考查	3	软件
		Java 程序设计 Java Programming	5	64	40	40		考试	1	软件

		课程名称 Course Title	学分 Credit	学时分配 Hours Distribution				考试/考查 Graded Course / Pass - Fail Course	建议修读学期 Suggested Term	开课单位 Course-offering Department	
				总学时 Tot hrs.	理论 Taught	实验 Exp.	实践 Practice				
		小 计 Subtotal	41.5	648	540	108			软件		
Courses	选 修 课 学 科 基 础	计算机网络 Computer Network	4	64	56	8		考查	3	软件	
		计算机组成原理 A Principle of Computer Organization	3.5	56	48	8		考试	3	软件	
		小 计 Subtotal	7.5	120	104	16					
专 业 方 向 课 程 Specialized Courses	专 业 方 向 必 修 课 Required Courses	Linux 操作系统 Linux Operating System	4	64	32	32		考试	3	软件	
		Linux 下 C 高级编程 Senior C programming under Linux	4	64	32	32		考试	3	软件	
		Andriod 应用开发	4	64	32	32		考试	3	软件	
		小 计 Subtotal	12	192	96	96					
		专 业 方 向 选 修 课 Elective Courses	Linux 下驱动程序开发 Driver Program Developing under Linux	2	32	16	16		考查	4	软件
			Andriod 底层驱动开发 Driver Program Developing under Andriod	2	32	16	16		考查	4	软件
			专业前沿技术 Specialty Frontier Technologies	2.5	40	32	8		考查	4	软件
			小 计 Subtotal	6.5	104	64	40				

备注：专业方向课程模块应依据专业办学基础、办学条件和社会需求，设置专业方向类课程。

Note: The specialized direction course modules should be set according to the specialty teaching foundation, teaching condition and social needs.

### 九、实践教学进程表

#### IX Practice Training Schedule

实践环节名称 Practice Courses Title	学分	周数	建议学期	开课单位
	Credits	Weeks	Suggested Term	Course-offing Department
思政课社会实践 Ideological and Political Social Practice	2	2	1,3	马院
认识实习 Cognition Practice	1	1	2	软件
单片机控制电路开发 Single chip microcomputer control circuit development	2	2	3	软件
实用嵌入式系统工程训练 Practical embedded system engineering training	2	2	3	软件

Andriod 项目开发 Andriod Project development	2	2	4	软件
生产实习 Production Practice	3	3	4	软件
毕业设计 Undergraduate Design	13	13	4	软件
课外素质教育 Extra-curriculum Quality Education	2			
小计 Subtotal	23	23		

