武汉理工大学计算机科学与技术学院

School of Computer Science & Technology of
Wuhan University of Technology

# 本科专业培养方案

# Undergraduate Program

**（Grade 2013）**

**武汉理工大学教务处**

Academic Affairs Office of Wuhan University of Technology

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# 计算机科学与技术专业本科培养方案
# Undergraduate Program for Specialty in Computer Science and Technology

## 一、业务培养目标

**Ⅰ Educational Objectives**

本专业培养具有良好的科学素养、系统地、较好地掌握计算机科学与技术包括计算机硬件、软件与应用的基本理论、基本知识和基本技能与方法，能在科研部门、教育单位、企业、事业、技术和行政管理部门等单位从事计算机教学、科学研究和应用的计算机科学与技术学科的高级专门科学技术人才。

The major trains the high level of specialized technology talented person of computer science and technology. These persons have well scientific quality; grasp computer science and technology well and systematically including basic theory, basic knowledge, basic skill and method of computer hardware, software and application; can be prepared for any professional role they might choose-computer teaching, science study and application in research department, school, corporation, public institution, technology and administrative service division.

## 二、业务培养要求

**Ⅱ Educational Requirement**

本专业学生主要学习计算机科学与技术方面的基本理论和基本知识，接受从事研究与应用计算机的基本训练，具有研究和开发计算机应用系统的工程实践能力。

毕业生应获得以下几方面的知识和能力:

1. 掌握计算机科学与技术的基本理论、基本知识；
2. 掌握计算机系统分析和设计的基本方法；
3. 具备卓越的研究开发计算机软、硬件的工程实践能力；
4. 了解与计算机有关的法规；
5. 了解计算机科学与技术的发展动态；
6. 掌握文献检索、资料查询的基本方法，具有获取信息的能力。
7. 具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The students mainly study the fundamental theory and systematical knowledge of computer science and technology, accept the engineering training on researching and applying computers, and attain the practice abilities of researching and developing the computer application systems.

The graduated students are expected to have the following abilities:

1. Master the basic theory and knowledge of computer science and technology;
2. Master the basic methods of system analysis and design;
3. Have the excellent practice abilities of researching and developing computer software and hardware;
4. Understand the laws and regulations about computer industry;
5. Understand the development and trends in the computer science and technology;
6. Master the basic methods of literature survey, data collection; Have the abilities to get the latest research results in the field of computer science and technology ;
7. Have the ability of applying English language in study, especially for listening and speaking, can efficiently undertake oral and written information exchange in English in the future work.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：计算机科学与技术

Major Disciplines: Computer Science and Technology

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：离散结构、汇编语言程序设计、计算机组成原理、数据结构、操作系统、编译原理、数据库系统原理、计算机网络、高级语言程序设计、软件工程。

Core Courses: These courses are Discrete structure, Assembly language programming, Principles of Computer Organization, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Language Programming, and Software Engineering.

专业特色课程：计算机应用课群包括 JAVA 语言程序设计、可视化编程、信息系统分析与设计、多媒体技术、网页设计。

Characteristic Courses: JAVA Programming, Visualizing Programming, Information System Analysis and Design, Multimedia Design and Website Page Design.

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineer

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别 / 课程性质 | 通识课程 Public Basic Courses | 学科大类课程 Basic Disciplinary Courses | 专业课程 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 | 36.5 | 46.5 | 39 | \ | 21.5 | \ | 190 |
| 选修课 Elective Courses | 9 | \ | 17.5 | 10 | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

本专业最重要的学科大类课程和专业课程共有 10 门，学生在修读时应加以重点关注。

这 10 门课程是：离散结构、汇编语言程序设计、计算机组成原理、数据结构、操作系统、编译原理、数据库系统原理、计算机网络、高级语言程序设计、软件工程。

为体现本专业的专业方向，本专业课程包括了以下三个选修课群：

1.计算机软件课群

主要组成课程：算法设计与分析、人工智能概论、信息安全、软件测试、UML 建模技术。

2.网络工程课群

主要组成课程：通信原理、网络集成技术、Web 技术、TCP/IP 和网络软件编程、分析软件工具。

3.计算机应用课群

主要组成课程：JAVA 语言程序设计、可视化编程、信息系统分析与设计、多媒体技术、网页设计。

在选取选修课程时，建议将 JAVA 语言程序设计、网页设计、信息安全、软件测试、UML 建模技术课程作为共选课程，再根据自己选择的方向分别选取一个课群的其它课程予以选修。

Students in this specialty should pay their attention to the top ten most important courses when taking the the basic courses of disciplines and the specialized courses. These courses are Discrete structure, Assembly language programming, Principles of Computer Organization, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Language Programming, and Software Engineering.

The courses in the specialty can be classified into three groups as followings:

1.Computer Software

The major courses in this group include Algorithm Design and Analysis, Artificial Intelligence, Information Security, Software Testing, UML Modeling Technology.

2.Computer Networks

The major courses in this group include Communication Principles, Network Integration Technology, Web Technology, TCP/IP and Network Programming, Analysis Software Tool.

3.Computer Application

The major courses in this group include Java Language Programming, Visual Programming, Computer Graphics and Image Processing, Information System Analysis and Design, Multimedia Technology, Web Page Design,.

When choose elective courses, it is recommended that take Java Language Programming, Web Page Design, Information Security, Software Testing, and UML Modeling Technology as the common core, then select the other courses from one group according to your interests.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4220001111 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4220002111 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1-6 | | |
| | | 4220003111 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 1-6 | | |
| | | 4220005111 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 1060001111 | 军事理论<br>Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001131 | 心理健康教育<br>Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4210001111 | 体育 1<br>Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002111 | 体育 2<br>Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003111 | 体育 3<br>Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004111 | 体育 4<br>Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002111 | 大学英语 A1<br>College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003111 | 大学英语 A2<br>College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004111 | 大学英语 A3<br>College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005111 | 大学英语 A4<br>College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | 4120027111 | 计算机科学导论<br>Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4120020111 | 高级语言程序设计 A<br>Advanced Language Programming A | 4 | 64 | | 16 | | | 1 | | |
| | | | | | | | | | | | | |
| | | 小　计　Subtotal | | 36.5 | 744 | 10 | 16 | 64 | 64 | | | |
| | 选修课 Elective Courses | 创新创业类<br>Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。<br>All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 人文社科类<br>Arts and Social Science Courses | | | | | | | | | | |
| | | 经济管理类<br>Economy and Management Courses | | | | | | | | | | |
| | | 科学技术类<br>Science and Technology Courses | | | | | | | | | | |
| | | 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | | |

| 课程类别 Course Classification | 课程性质 Course Nature | 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 | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | | | |
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063111 | 高等数学 A 上 Advanced Mathematics AⅠ | 5 | 80 | | | | | 1 | | |
| | | 4050064111 | 高等数学 A 下 Advanced Mathematics AⅡ | 5 | 80 | | | | | 2 | | |
| | | 4110019111 | 电路原理 B Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050229111 | 线性代数 Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4110050111 | 模拟电子技术基础 C Analog Electronic Technology C | 3 | 48 | 8 | | | | 2 | | |
| | | 4050023111 | 大学物理 B Physics B | 5.5 | 88 | | | | | 2 | | |
| | | 4050224111 | 物理实验 B Physics Lab. B | 1 | 32 | 32 | | | | 3 | | |
| | | 4120045111 | 离散结构 Discrete Structure | 4 | 64 | | | | | 2 | | |
| | | 4050058111 | 概率论与数理统计 B Probability and Mathematical Statistic B | 3 | 48 | | | | | 3 | | |
| | | 4120079111 | 数字逻辑 Digital Logic | 3 | 48 | 8 | | | | 3 | | |
| | | 4120048111 | 面向对象程序设计 C Object Oriented Programming C | 2.5 | 40 | | 12 | | | 3 | | |
| | | 4120177121 | 数据结构 Data Structure | 5.5 | 88 | | 16 | 16 | | 3 | | |
| | | 4120003111 | JAVA 语言程序设计 B Java Language Programming B | 2.5 | 40 | | 12 | | | 3 | | |
| | | 小　计 Subtotal | | 46.5 | 760 | 64 | 28 | 16 | | | | |
| 专业课程 Specialized Courses | 必修课 Required Courses | 4120028111 | 计算机数值分析 Computer Numerical Analysis | 2.5 | 40 | | 8 | | | 4 | | |
| | | 4120207131 | 计算机组成原理 A Principles of Computer Organization A | 5.5 | 88 | 10 | | 16 | | 4 | | |
| | | 4120165121 | 汇编语言程序设计 Assembly Language Programming | 4 | 64 | 16 | | 16 | | 5 | 计算机组成原理 | |
| | | 4120200131 | 编译原理 A Compiler Principles A | 5 | 80 | | 12 | 16 | | 5 | 高级语言程序设计 A | |
| | | 4120162121 | 操作系统 Operating System | 5 | 80 | | 12 | 16 | | 5 | 计算机组成原理 | |
| | | 4120178121 | 数据库系统原理 Principles of Database Systems | 4.5 | 72 | | 12 | 16 | | 5 | 数据结构 | |
| | | 4120060111 | 软件工程 B Software Engineering B | 2.5 | 40 | | 8 | | | 5 | | |
| | | 4120052111 | 嵌入式系统应用 A Embedded System and Application A | 2.5 | 40 | 6 | | | | 6 | 汇编语言程序设计 | |
| | | 4120094111 | 微机原理及接口技术 B Microcomputer and Interfacing B | 2.5 | 40 | 8 | | | | 6 | 计算机组成原理 | |
| | | 4120039111 | 计算机系统结构 A Computer Architecture A | 2.5 | 40 | | | | | 6 | 计算机组成原理 | |
| | | 4120033111 | 计算机网络 B Computer Networks B | 2.5 | 40 | | 8 | | | 5 | | |

| 课程类别 Course Classification | 课程性质 Course Nature | 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 | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | | | |
| | | 小 计 Subtotal | | 39 | 624 | 49 | 60 | 80 | | | | |
| | 选修课 Elective Courses | 4120235131 | 人工智能概论<br>Artificial Intelligence | 2.5 | 40 | | 8 | | | 7 | | |
| | | 4120008111 | UML 建模技术<br>UML Modeling Technology | 2 | 32 | | 8 | | | 6 | 软件工程 B | |
| | | 4120087111 | 网络集成技术<br>Network Integration Technology | 2 | 32 | 6 | | | | 6 | 计算机网络 B | |
| | | 4120102111 | 信息安全<br>Information Security | 2 | 32 | 6 | | | | 7 | | |
| | | 4120006111 | TCP/IP 和网络软件编程<br>TCP/IP and Network Programing | 2.5 | 40 | | 10 | | | 7 | 计算机网络 B | |
| | | 4120018111 | 多媒体技术<br>Multimedia Technology | 2 | 32 | 6 | | | | 7 | | |
| | | 4120197131 | SAP 程序设计<br>SAP Programming | 4 | 64 | | | 16 | | 6 | 数据库系统原理 | |
| | | 4120019111 | 分析软件工具<br>Analysis Software Tool | 2 | 32 | | 8 | | | 7 | | |
| | | 4120058111 | 软件测试 B<br>Software Testing B | 2 | 32 | 8 | | | | 6 | 软件工程 B | |
| | | 4120103111 | 信息系统分析与设计<br>Information System Analysis and Design | 2 | 32 | 6 | | | | 7 | 数据库系统原理 | |
| | | 4120009111 | Web 技术<br>Web Technology | 2 | 32 | | 6 | | | 7 | | |
| | | 4120044111 | 可视化编程<br>Visual Programming | 2.5 | 40 | 10 | | | | 4 | | |
| | | 4120081111 | 算法设计与分析 A<br>Algorithm Design and Analysis A | 2.5 | 40 | | 8 | | | 6 | 数据结构 | |
| | | 4120084111 | 通信原理 C<br>Communication Principles C | 2.5 | 40 | 8 | | | | 4 | | |
| | | 4120083111 | 云计算与服务计算<br>Cloud & Service Computing | 2 | 32 | 6 | | | | 7 | | |
| | | 小 计 Subtotal | | 34.5 | 552 | 56 | 48 | 16 | | | | |
| | | 修读说明：要求至少选修 17.5 学分。<br>NOTE：Minimum subtotal credits: 17.5. | | | | | | | | | | |
| 个性课程 Personalized Course | 选修课 Elective Courses | 4120240131 | 移动终端应用开发<br>Mobile Terminal Application Development | 2 | 32 | 12 | | | | 6 | | |
| | | 4120241131 | 软件框架应用技术<br>Application Technology of Software Framework | 2 | 32 | 12 | | | | 6 | | |
| | | 4120242131 | 大数据分析技术<br>Data Analysis Technology | 2 | 32 | 8 | | | | 6 | | |
| | | 4120243131 | ERP 系统原理与实践<br>Principles and Practice of ERP System | 2 | 32 | | | | | 6 | | |
| | | 小 计 Subtotal | | 8 | 128 | 32 | | | | | | |
| | | 修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。<br>NOTE：Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10. | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 周数<br>Weeks | 学分<br>Crs | 建议修读学期<br>Suggested Term | 第二专业<br>Second Major |
|---|---|---|---|---|---|
| 1060002111 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120141111 | 专业教育<br>Professional Education | 1 | 1 | 3 | |
| 4100068111 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120203131 | 计算机软件综合开发实训<br>Computer Software Integrated development | 3 | 3 | 7 | |
| 4120112111 | 毕业实习<br>Practice for Graduation | 3 | 3 | 7 | |
| 4120184121 | 毕业设计<br>Graduation Design (Thesis) | 17 | 11 | 8 | |
| 小　　计　Subtotal | | 29 | 21.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy,* a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

# 软件工程专业本科培养方案
# Undergraduate Program for Specialty in Software Engineering

## 一、业务培养目标

**Ⅰ Educational Objectives**

本专业以数学与计算机理论的学习为基础，培养系统地掌握现代软件工程的基本理论、设计方法和基本技能，从事软件工程领域的开发、研究与管理的高级工程技术人才或软件企业管理人才。

The B.S. program in Software Engineering educates professional persons with high level skills in software research and development.. This subject includes materials on software development, process, and management skills that are essential to successful engineering. The core curriculum includes both theoretical knowledge and software engineering tools and techniques. Graduate of the program should have the technical, process, and teamwork skills . They can be prepared for any professional engineering and technology role in development, research and administrative management in the field of software engineering.

## 二、业务培养要求

**Ⅱ Educational Requirement**

本专业学生主要学习软件工程方面的基本理论和基本知识，重点培养学生系统设计、分析、开发以及软件项目工程管理等方面的能力，加强软件工程、项目管理、软件开发与测试等方面的教学与实践内容，加强组织管理、合作与交流等方面能力的训练，使其不仅具有进行软件开发的基本能力，而且具备工程项目的组织与管理能力。

毕业生应获得以下几方面的知识和能力:

1.掌握扎实的数理、计算机基础知识；

2.掌握软件工程的基本方法、基本知识和基本技能；

3.掌握软件系统的分析和设计的基本方法；

4.具有软件开发、组织、管理的能力；

5.了解软件分析、设计、应用的相关法规和标准；

6.了解计算机学科及软件工程的发展动态；

7.掌握文献检索、资料查询的基本方法，具有获取信息的能力；

8.具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The students in our undergraduate program learn theory and knowledge of software engineering. The focus of the Software Engineering curriculum is on the analysis, design, construction, implementation application, and management of software systems. The curriculum is based on a strong score of topics including software engineering methodology, software project management, software development and testing. To strengthen their ability of in practical application development and teamwork, our program is designed to teach not only programming skills, but also engineering skills.

The graduates are expected to

1. Have a solid foundation in mathematics ,science and computer system.
2. Possess the basic theory and knowledge of software engineering;
3. Possess the basic methods of software system analysis and design;
4. Have the basic ability of developing, organizing and managing computer software;
5. Understand laws about software engineering;
6. Understand the development and trend in the computer science and software engineering;
7. have the ability of acquiring information through literature searching, reference reading, and so on;

8. Have the comprehensive ability of English language including oral and written communication skills, and reading achievement which prepare for their future career and social communication.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：软件工程

Major Disciplines: Software Engineering

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统、计算机网络、软件工程导论、软件设计与体系结构、软件项目管理、软件测试

Core Courses: Advanced language programming design, Discrete structure, Data Structure, Composition Principle of Computer, Operating System, Computer Network, Software Engineering, Software design, Management of software project, Software requirement project, Software testing

专业特色课程：网络软件系统设计技术、嵌入式应用软件开发、人机智能交互技术

Characteristic Courses: Network Software System Design, Embedded Application Development，Human-Computer Intelligent Interaction

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineer

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别<br>课程性质 | 通识课程<br>Public Basic Courses | 学科大类课程<br>Basic Disciplinary Courses | 专业课程<br>Specialized Courses | 个性课程<br>Personalized Course | 集中性实践<br>Practice Courses | 课外学分<br>Study Credit after Class | 总学分<br>Total Credits |
|---|---|---|---|---|---|---|---|
| 必修课<br>Required Courses | 36.5 | 46.5 | 35.5 | \ | 23.5 | \ | 190 |
| 选修课<br>Elective Courses | 9 | \ | 19 | 10 | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

1.本专业课程设置方法参考 IEEE2001 SE 推荐的计算机科学优先方法，并按照自底向上的方法展开的软件工程类课程的学习，课程启动策略为程序设计优先方式。

本专业重要的学科大类基础课程和专业课程有：计算机科学导论、高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统、编译原理、数据库系统原理、计算机网络、软件工程导论、软件需求工程、软件设计与体系结构、软件构件与中间件技术、软件项目管理、软件测试、UML 建模技术、软件开发工具、软件过程与 CMM。

2.为体现本专业的专业特色与方向，本专业选修课程包括以下三个课群:

智能软件与系统课群：人工智能概论、数据挖掘、人机智能交互技术、自然语言处理、数字图象处理基础 C；

嵌入式软件与系统课群：嵌入式操作系统、计算机接口技术、嵌入式开发工具、嵌入式应用软件开发、Linux 软件分析与开发；

网络软件与系统课群：信息安全、网络软件系统设计技术、XML 技术、Oracle 数据库技术、网络系统集成与工程设计；

1.Students must work hard on some core disciplines courses and specialty courses.

Major courses: Introduction to Computer Science, Advanced language programming design, Circuit theory, Analog Electronic Technology C, Discrete structure, Data Structure, Assemble language programming design, Composition Principle and Systems Architecture of Computer, Operating System, Compiler Construction Principles, Database System Principle, Software Engineering, Computer Network B, Software design, Management of software project, Software requirement project, Software testing, Communication Principle c

2.According to the concentration fields of the specialty, some Specialized elective courses are arranged into three groups.

Courses in intelligent software and system: Introduction to Artificial Intelligence, Human-Computer Intelligent Interaction , Data Mining, Natural Language Processing , Digital Image Processing and so on.

Courses in embedded software and system: Embedded Operating System, Computer Interface Techniques, Embedded Development Tools, Embedded Application Development ,Software Development on Linux and so on.

Courses in network software and system: Computer Security, Network Software System Design, XML Technology, Oracle Database, Technology of Network System Integration & Engineering and so on.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4220001110 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4220002110 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1-6 | | |
| | | 4120027110 | 计算机科学导论<br>Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4120020110 | 高级语言程序设计 A<br>Advanced Language Programming A | 4 | 64 | | 16 | | | 1 | | |
| | | 4220003110 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 1-6 | | |
| | | 4220005110 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 1060001110 | 军事理论<br>Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001110 | 心理健康教育<br>Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4210001110 | 体育 1<br>Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002110 | 体育 2<br>Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003110 | 体育 3<br>Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004110 | 体育 4<br>Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002110 | 大学英语 A1<br>College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003110 | 大学英语 A2<br>College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004110 | 大学英语 A3<br>College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005110 | 大学英语 A4<br>College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | | | | | | | | | | | |
| | | 小　计　Subtotal | | 36.5 | 744 | 10 | 16 | 64 | 64 | | | |
| | 选修课 Elective Courses | 创新创业类<br>Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。<br>All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 人文社科类<br>Arts and Social Science Courses | | | | | | | | | | |
| | | 经济管理类<br>Economy and Management Courses | | | | | | | | | | |
| | | 科学技术类<br>Science and Technology Courses | | | | | | | | | | |
| | | 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | | |

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extracur | 建议修读学期 Suggested Term | | |
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063110 | 高等数学 A 上<br>Advanced Mathematics AⅠ | 5 | 80 | | | | | 1 | | |
| | | 4050064110 | 高等数学 A 下<br>Advanced Mathematics AⅡ | 5 | 80 | | | | | 2 | 高等数学 A 上 | |
| | | 4110019110 | 电路原理 B<br>Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4050023110 | 大学物理 B<br>Physics B | 5.5 | 88 | | | | | 2 | 高等数学 A 上 | |
| | | 4050224110 | 物理实验 B<br>Physics Lab. B | 1 | 32 | 32 | | | | 3 | 大学物理 B | |
| | | 4120045110 | 离散结构<br>Discrete Structures | 4 | 64 | | | | | 2 | 计算机科学导论 | |
| | | 4050058110 | 概率论与数理统计 B<br>Probability and Mathematics Statistic B | 3 | 48 | | | | | 3 | 高等数学 A 下 | |
| | | 4110050110 | 模拟电子技术基础 C<br>Analog Electronic Techniques C | 3 | 48 | 8 | | | | 2 | 高等数学 A 下 | |
| | | 4120048110 | 面向对象程序设计 C<br>Object-Oriented Methodology | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 4120079110 | 数字逻辑<br>Digital Circuits | 3 | 48 | 8 | | | | 3 | 模拟电子技术基础 C | |
| | | 4120177121 | 数据结构<br>Data Structures | 5.5 | 88 | | 16 | 16 | | 3 | 高级语言程序设计 A | |
| | | 4120153110 | JAVA 语言程序设计 B<br>Java Programming B | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 小　计　Subtotal | | 44 | 760 | 64 | 28 | 16 | | | | |
| 专业课程 Specialized Course | 必修课 Required Courses | 4120028110 | 计算机数值分析<br>Computer Numerical Analysis B | 2.5 | 40 | | 8 | | | 4 | 线性代数 | |
| | | 4120208130 | 计算机组成原理 B<br>Computer Organization B | 4 | 64 | 10 | | 8 | | 4 | 数字逻辑 | |
| | | 4120173120 | 软件工程导论<br>Introduction to Software Engineering | 2 | 32 | | | | | 4 | 面向对象程序设计 C | |
| | | 4120008110 | UML 建模技术<br>UML Modeling Technology | 2 | 32 | 8 | | | | 4 | 面向对象程序设计 C | |
| | | 4120163120 | 操作系统<br>Operating System | 4.5 | 72 | | 12 | 16 | | 5 | | |
| | | 4120233130 | 计算机网络<br>Computer Networks | 3 | 48 | | 8 | | | 5 | | |
| | | 4120158120 | 编译原理<br>Principles of Compiler | 4 | 64 | | 8 | 8 | | 5 | | |
| | | 4120175120 | 软件设计与体系结构<br>Software Design and Architecture | 2 | 32 | 8 | | | | 5 | | |
| | | 4120071110 | 软件需求工程 B<br>Software Requirement Project B | 2 | 32 | 8 | | | | 5 | | |
| | | 4120179120 | 数据库系统原理<br>Principles of Database System | 3.5 | 56 | | 8 | 8 | | 6 | | |
| | | 4120174120 | 软件构件与中间件技术 B<br>Software Component and Middleware B | 2 | 32 | 8 | | | | 6 | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| | | 4120069110 | 软件项目管理 B<br>Software Project Management B | 2 | 32 | 6 | | | | 7 | | |
| | | 4120058110 | 软件测试 B<br>Software Testing B | 2 | 32 | 8 | | | | 7 | | |
| | | 小 计 Subtotal | | 35.5 | 664 | 56 | 60 | 40 | | | | |
| | 选修课 Elective Courses | 模块 0(软件基础工具)<br>Module 0(Software Tools) | | | | | | | | | | |
| | | 4120044110 | 可视化编程<br>Visual Programming | 2.5 | 40 | | 10 | | | 4 | 面向对象程序设计 C | |
| | | 4120065110 | 软件开发工具<br>Software Tool& Environment | 2 | 32 | 16 | | | | 5 | | |
| | | 4120082110 | 算法设计与分析 B<br>Algorithm Design and Analysis B | 2 | 32 | | 6 | | | 5 | | |
| | | 4120018110 | 多媒体技术<br>Multimedia Technique | 2 | 32 | 6 | | | | 6 | 可视化编程 | |
| | | 4120064110 | 软件过程与 CMM<br>Software Process & CMM | 2 | 32 | 8 | | | | 6 | | |
| | | 4120040110 | 计算机系统结构 B<br>Computer Architecture B | 2 | 32 | | | | | 6 | 计算机组成原理 | |
| | | 小 计 Subtotal | | 12.5 | 200 | 30 | 16 | | | | | |
| | | 模块 1(网络软件)<br>Module I (Network Software) | | | | | | | | | | |
| | | 4120084110 | 通信原理 C<br>Principles of Communication C | 2.5 | 40 | 8 | | | | 4 | 数字逻辑 | |
| | | 4120102110 | 信息安全<br>Introduction to Computer Security | 2 | 32 | 6 | | | | 6 | 计算机网络 | |
| | | 4120089110 | 网络软件系统设计技术<br>Network Software System Design | 2 | 32 | 12 | | | | 6 | 计算机网络 | |
| | | 4120010110 | XML 技术<br>XML Technology | 2 | 32 | 8 | | | | 6 | 计算机网络 | |
| | | 4120005110 | Oracle 数据库技术<br>Oracle Database | 2 | 32 | 8 | | | | 6 | 数据结构 | |
| | | 4120088110 | 网络软件编程技术<br>Network Software Programming | 2.5 | 40 | 12 | | | | 7 | | |
| | | 4120239130 | 云计算基础<br>Cloud Computing | 2 | 32 | 12 | | | | 7 | 计算机网络 | |
| | | 小 计 Subtotal | | 15 | 240 | 66 | | | | | | |
| | | 模块 2(智能系统软件)<br>Module II (Intelligence Software) | | | | | | | | | | |
| | | 4120055110 | 人工智能概论<br>Introduction to Artificial Intelligence | 2 | 32 | | | | | 5 | 离散结构 | |
| | | 4120031110 | 计算机图形学基础 B<br>Foundation of Computer Graphics | 2 | 32 | 6 | | | | 5 | | |
| | | 4120056110 | 人机智能交互技术<br>Human-Computer Intelligent Interaction | 2 | 32 | 8 | | | | 6 | 可视化编程 | |
| | | 4120078110 | 数据挖掘 C<br>Data Mining C | 2 | 32 | | 8 | | | 7 | 人工智能概论 | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4120080110 | 数字图像处理 B<br>Digital Image Processing B | 2 | 32 | 6 | | | | 7 | 人工智能概论 | |
| | | 4120105110 | 自然语言处理<br>Natural Language Processing | 2 | 32 | 8 | | | | 7 | 人工智能概论 | |
| | | 小 计 Subtotal | | 12 | 192 | 28 | 8 | | | | | |
| | | 模块 3(嵌入式软件)<br>Module III (Embedded Software) | | | | | | | | | | |
| | | 4120022110 | 汇编语言程序设计<br>Assembly Language Programming | 2.5 | 40 | 16 | | | | 4 | 高级语言程序设计 A | |
| | | 4120049110 | 嵌入式操作系统<br>Embedded Operating System | 2 | 32 | 8 | | | | 6 | | |
| | | 4120050110 | 嵌入式系统基础<br>Embedded System | 2 | 32 | 8 | | | | 6 | 计算机组成原理 | |
| | | 4120054110 | 嵌入式应用软件开发<br>Embedded Application Development | 2 | 32 | 8 | | | | 7 | 嵌入式系统基础 | |
| | | 4120026110 | 计算机接口技术<br>Computer Interface Techniques | 2 | 32 | 8 | | | | 7 | 汇编语言程序设计 | |
| | | 4120004110 | Linux 软件分析与开发<br>Software Development on Linux | 2 | 32 | 8 | | | | 7 | | |
| | | 小 计 Subtotal | | 12.5 | 200 | 56 | | | | | | |
| | | 修读说明：推荐选模块 0+模块 i, (i=1,2 或 3), 要求最少选修 19 学分。<br>NOTE: recommend select module 0+module i(i= Ⅰ or Ⅱ or Ⅲ) and minimum subtotal credits:19 | | | | | | | | | | |
| 个性课程 Personalized Course | 选修课 Elective Courses | 4120247120 | 大数据技术与应用<br>Technology and Application of Large Data | 2 | 32 | | | | | 6 | | |
| | | 4120238120 | 解决问题的思维与策略<br>Thinking and Problem Solving Strategies | 2 | 32 | | | | | 5 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | 小 计 Subtotal | | 4 | 64 | | | | | | | |
| | | 修读说明：学生可跨专业自主选择修读全校其他专业的课程，要求至少选修 10 学分。<br>NOTE：Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10. | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 周数<br>Weeks | 学分<br>Crs | 建议修读学期<br>Suggested Term | 第二专业<br>Second Major |
|---|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120142110 | 专业教育<br>Professional Teach | 1 | 1 | 3 | |
| 4100068110 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120120110 | 基础强化训练（20 学时上机）<br>Foundation Strengthening Training | 1 | 1 | 4（暑期） | |
| 4120228130 | 软件工程综合设计实践（20 学时上机）<br>Synthetical Project of Software Engineering | 1 | 1 | 6 | |
| 4120128110 | 能力拓展训练<br>Ability Development Training | 1 | 1 | 6（暑期） | |
| 4120114110 | 毕业实习（40 学时上机，学期初进行）<br>Final Practice | 3 | 3 | 7 | |
| 4120187120 | 大型软件工程项目实践 B（70 学时上机）<br>Practice of Large-Scale Software Project B | 2 | 2 | 7 | |
| 4120185120 | 毕业设计（340 学时上机）<br>Bachelor Thesis | 17 | 11 | 8 | |
| 小　　计　Subtotal | | 31 | 23.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy*, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

# 物联网工程专业本科培养方案
# Undergraduate Program for Specialty in the Internet of Things Engineering

## 一、业务培养目标

### Ⅰ Educational Objectives

本专业培养拥有良好的科学素养，系统地掌握物联网的基础理论、系统知识和基本技能，能胜任物联网领域的科学研究、系统分析、系统设计、技术开发、管理等多方面工作，并具有创新能力的高级工程技术人才。

This program is committed to train students to become innovation capability of advanced engineering and technical personnel with a sound theoretic foundation, systematical knowledge and skill, of the capability to carry out the scientific research, system analysis, system design, technical development, and management in the field of the Internet of Things.

## 二、业务培养要求

### Ⅱ Educational Requirement

本专业学生主要学习物联网工程方面的基本理论和基本知识，接受从事计算机物联网工程及产品研发的基本训练，具有研究和开发计算机物联网工程系统的综合能力。

The students mainly study the fundamental theory and systematical knowledge of the Internet of Things, accept the engineering training on researching and developing products and projects of the Internet of Things, and attain the abilities of conducting researches and development of the systems in the field.

毕业生应获得以下几方面的知识和能力：

1. 掌握马克思主义、毛泽东思想和邓小平理论的基本原理；具有坚实的信息科学与技术、数学等方面的基础知识；具有较宽的人文、社会科学方面的知识；

2. 系统地掌握电工及电子技术基础知识；系统地掌握本专业的基础理论和基本知识，如信号处理基础、通信原理基础、物联网原理和无线互连网络基础等；掌握数字系统设计的基本理论和实验技术；掌握数据通信网络的基本理论及物联网工程的实用技术（如 RFID 技术、传感器技术、物联网定位技术、智能终端操作系统与应用和嵌入式技术），了解网络协议体系、网络互联技术、组网工程、网络性能评估、网络管理等相关知识；

3. 掌握物联网关键技术、了解物联网主要技术标准，具备从事物联网科学研究能力，具备物联网工程规划设计、施工、测试、管理和维护工作的能力；

4. 了解 IT 产业的基本方针、政策和法规，了解信息科学与技术的发展动态；

5. 掌握文献检索、资料收集的基本方法，具备获取或追踪本专业最新动态和信息的能力；

6. 具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The graduated students are expected to have the following abilities:

1. Master the basic principles of Marxism, Mao Zedong Thought and Deng Xiaoping Theory; Have a strong background of information science and technology, mathematics and so on; Have a wide knowledge in humanities and social science;

2. Systematically master the basics of electrical and electronic technology; systematically master the basic theory and knowledge of the specialty, such as signal processing, communication theory, principles of the Internet of Things, wireless network infrastructure, etc.;

Master the basic theory of digital system design and experimental techniques; master the basic theory of data communication networks and practical skills of the Internet of Things engineering (such as RFID and

Sensor Technology, Wireless Sensor Networks, Technology of IoT Location, Intelligent Terminal OS and Application, Embedded System and Application); Understand the knowledge of network protocols and technology, network engineering, network performance evaluation, and network management;

3. Master key technologies and main technical standards of the Internet of Things; Have the abilities to engage in research, planning and design, construction, testing, management and maintenance in the field of the Internet of Things;

4. Master the basic IT industrial principles, policies and regulations, understand the developments in information science and technology;

5. Master the basic method of literature survey, data collection; Have the abilities to get the latest research results in the field of the Internet of Things;

6. Have the ability of applying English language in study, especially for listening and speaking, can efficiently undertake oral and written information exchange in English in the future work.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：物联网工程

Major Disciplines: the Internet of Things Engineering

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：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、智能终端操作系统与应用、云计算与服务计算、物联网应用工程实训等。

Core courses: Principles of the Internet of Things Engineering, RFID and Sensor Technology, Wireless Sensor Networks, Embedded System and Application, the Internet of Things & Network Engineering, Intelligent Terminal OS and Application, Cloud & Service Computing, Practice of the Internet of Things Application.

专业特色课程： 物联网控制基础、嵌入式系统应用、无线传感器网络、物联网工程与组网技术、智能终端操作系统与应用、云计算与服务计算、物联网定位技术、物联网应用工程实训。

Characteristic Courses: IoT Control Theory Foundation, Embedded System and Application, Wireless Sensor Networks, Intelligent Terminal OS and Application, Cloud & Service Computing, Technology of IoT Location, Practice of the Internet of Things Application.

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineer

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别<br>课程性质 | 通识课程<br>Public Basic Courses | 学科大类课程<br>Basic Disciplinary Courses | 专业课程<br>Specialized Courses | 个性课程<br>Personalized Course | 集中性实践<br>Practice Courses | 课外学分<br>Study Credit after Class | 总学分<br>Total Credits |
|---|---|---|---|---|---|---|---|
| 必修课<br>Required Courses | 36.5 | 46.5 | 38.5 | \ | 21.5 | \ | 190 |
| 选修课<br>Elective Courses | 9 | \ | 19 | 10 | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

本专业最重要的专业课程共有 12 门，以及 3 门专业实验课程和 1 门专业实践课程，学生在修读时应加以重点关注。

这 12 门课程是：计算机组成与系统结构、汇编语言与接口技术、计算机网络 B、射频识别与传感器技术、嵌入式系统应用 B、操作系统、无线传感器网络、数据库系统原理、物联网工程概论、云计算与服务计算、智能终端操作系统与应用、网络协议软件编程。3 门专业实验课程：嵌入式系统应用 B 实验、计算机网络原理实验、物联网组网实验。1 门专业实践课程为：物联网应用系统开发。

为体现本专业的专业方向，本专业选修课程包括了以下两个课程方向：

1. 物联网软件方向

主要组成课程：可视化编程、算法设计与分析 A、软件工程 B、编译原理、Web 技术、人工智能概论、UML 建模技术、数据挖掘 C。

2. 物联网感知与控制方向

主要组成课程：通信原理 C、物联网控制基础、信号处理原理、机器人控制技术概论、现场总线技术与应用、计算机图形图像处理、物联网工程与组网技术、物联网定位技术。

在选取选修课程时，需要在两个方向上都选取课程，要求方向一选择 8 学分，方向二选择 9 学分。

Students in this specialty should pay their attention to these most important courses, including 12 specialized courses, 3 Experiment courses and 1 practices course, when taking the basic courses of disciplines and the specialized courses.

These 12 specialized courses are Computer Organization and Architecture, Assembly Language Programming and Interface Technology, Computer Networks B, RFID and Sensor Technology, Embedded System and Application B, Principles of Operating System, Wireless Sensor Networks, Principles of Database Systems, Principles of the Internet of Things Engineering, Cloud & Service Computing, Intelligent Terminal OS and Application, Programming of network protocol. These 3 experiment courses are Embedded System and Application Experiment B, Computer Networks and Communications Experiment, the experiments on construction IOT. The practices course is the Internet of Things Applications Integrated Design.

The elective courses in the specialty can be classified into two groups as followings:

1. Software of IOT

The major courses in this group include Visual Programming, Algorithm Design and Analysis A, Principles of Compiler Construction, Software Engineering B, Web Technology, Introduction to Artificial Intelligence, UML Modeling Technology, Data Mining C.

2. Perception and Control of IOT

The major courses in this group include Communication Principles C, IoT Control Theory Foundation, Signal Processing, Field Bus Technology and Application, Principles of Robot Control Technology, Computer Graphics and Image Processing, The Internet of Things & Network Engineering, Technology of IoT Location.

When choose elective courses, it is required that students select at least 8 credits on group 1 and at least 9 credits on group 2.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4220001111 | 思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4220002111 | 中国近现代史纲要 Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1-6 | | |
| | | 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 | | 1-6 | | |
| | | 4220005111 | 马克思主义基本原理 Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 1060001111 | 军事理论 Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001111 | 心理健康教育 Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4210001111 | 体育 1 Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002111 | 体育 2 Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003111 | 体育 3 Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004111 | 体育 4 Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002111 | 大学英语 A1 College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003111 | 大学英语 A2 College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004111 | 大学英语 A3 College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005111 | 大学英语 A4 College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | 4120027111 | 计算机科学导论 Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4120020111 | 高级语言程序设计 A Advanced Language Programming A | 4 | 64 | | 16 | | | 1 | | |
| | | | | | | | | | | | | |
| | | 小　计 Subtotal | | 36.5 | 744 | 10 | 16 | 64 | 64 | | | |
| | 选修课 Elective Courses | 创新创业类 Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。 All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 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 | | | | | | | | | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063111 | 高等数学 A 上<br>Advanced Mathematics AⅠ | 5 | 80 | | | | | 1 | | |
| | | 4050064111 | 高等数学 A 下<br>Advanced Mathematics AⅡ | 5 | 80 | | | | | 2 | | |
| | | 4110019111 | 电路原理 B<br>Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050229111 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4110050111 | 模拟电子技术基础 C<br>Analog Electronic Technology C | 3 | 48 | 8 | | | | 2 | | |
| | | 4050023111 | 大学物理 B<br>Physics B | 5.5 | 88 | | | | | 2 | | |
| | | 4050224111 | 物理实验 B<br>Physics Lab. B | 1 | 32 | 32 | | | | 3 | | |
| | | 4120045111 | 离散结构<br>Discrete Structure | 4 | 64 | | | | | 2 | | |
| | | 4050058111 | 概率论与数理统计 B<br>Probability and Mathematical Statistic B | 3 | 48 | | | | | 3 | | |
| | | 4120079111 | 数字逻辑<br>Digital Logic | 3 | 48 | 8 | | | | 3 | | |
| | | 4120048111 | 面向对象程序设计 C<br>Object Oriented Programming C | 2.5 | 40 | | 12 | | | 3 | | |
| | | 4120177121 | 数据结构<br>Data Structure | 5.5 | 88 | | 16 | 16 | | 3 | | |
| | | 4120003111 | JAVA 语言程序设计 B<br>Java Language Programming B | 2.5 | 40 | | 12 | | | 3 | | |
| | | 小 计 Subtotal | | 46.5 | 760 | 64 | 28 | 16 | | | | |
| 专业课程 Specialized Courses | 必修课 Required Courses | 4120041111 | 计算机组成与系统结构<br>Computer Organization and Architecture | 4.5 | 72 | 10 | | | | 4 | 数字逻辑 | |
| | | 4120015111 | 汇编语言与接口技术<br>Assembly Language Programming and Interface Technology | 3 | 48 | | 16 | | | 4 | 计算机组成与系统结构 | |
| | | 4120033111 | 计算机网络 B<br>Computer Networks B | 2.5 | 40 | | 8 | | | 5 | | |
| | | 4120072111 | 射频识别与传感器技术<br>RFID and Sensor Technology | 3.5 | 56 | 12 | | | | 5 | 模拟电子技术基础 C | |
| | | 4120053111 | 嵌入式系统应用 B<br>Embedded System and Application B | 2 | 32 | | | | | 5 | | |
| | | 4120051111 | 嵌入式系统应用 B 实验<br>Embedded System and Application Experiment B | 1 | 32 | 32 | | | | 5 | | |
| | | 4120014111 | 操作系统<br>Principles of Operating System | 3.5 | 56 | | 12 | | | 5 | | |
| | | 4120095111 | 无线传感器网络<br>Wireless Sensor Networks | 2.5 | 40 | 8 | | | | 5 | | |
| | | 4120077111 | 数据库系统原理<br>Principles of Database Systems | 3 | 48 | | 8 | | | 5 | | |
| | | 4120067111 | 物联网工程概论<br>Principles of the Internet of Things Engineering | 2 | 32 | | | | | 5 | | |
| | | 4120038111 | 计算机网络原理实验<br>Computer Networks and Communications Lab | 1 | 32 | 32 | | | | 5 | 计算机网络 B | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4120230131 | 网络协议软件编程<br>Programming of network protocol | 2.5 | 40 | | 8 | | | 6 | 计算机网络 B | |
| | | 4120181121 | 物联网组网实验<br>The experiments on construction IOT | 1 | 32 | 32 | | | | 6 | 射频识别与传感器技术 | |
| | | 4120083111 | 云计算与服务计算<br>Cloud & Service Computing | 2 | 32 | 6 | | | | 6 | | |
| | | 4120096111 | 智能终端操作系统与应用<br>Intelligent Terminal OS and Application | 2.5 | 40 | | | 12 | | 6 | JAVA 语言程序设计 B | |
| | | 4120180121 | 物联网应用系统开发<br>The Internet of Things Applications Integrated Design | 2 | 6 | 4 | | 64 | | 7 | | |
| | | 小 计 Subtotal | | 38.5 | 696 | 132 | 52 | 76 | | | | |
| | 选修课 Elective Courses | 方向一：物联网软件方向<br>direction 1: Software of IOT | | | | | | | | | | |
| | | 4120044111 | 可视化编程<br>Visual Programming | 2.5 | 40 | 10 | | | | 4 | | |
| | | 4120081111 | 算法设计与分析 A<br>Algorithm Design and Analysis A | 2.5 | 40 | | 8 | | | 5 | 数据结构 | |
| | | 4120011111 | 编译原理<br>Principles of Compiler Construction | 3.5 | 56 | | 8 | | | 6 | | |
| | | 4120060111 | 软件工程 B<br>Software Engineering B | 2.5 | 40 | | 8 | | | 7 | | |
| | | 4120009111 | Web 技术<br>Web Technology | 2 | 32 | | 6 | | | 7 | | |
| | | 4120055111 | 人工智能概论<br>Introduction to Artificial Intelligence | 2 | 32 | | | | | 7 | | |
| | | 4120008111 | UML 建模技术<br>UML Modeling Technology | 2 | 32 | 8 | | | | 7 | | |
| | | 4120078111 | 数据挖掘 C<br>Data Mining C | 2 | 32 | | 8 | | | 7 | | |
| | | | 小 计 Subtotal | 19 | 304 | 18 | 38 | | | | | |
| | | 方向二：物联网感知与控制方向<br>Direction2: Perception and Control of IOT | | | | | | | | | | |
| | | 4120084111 | 通信原理 C<br>Communication Principles C | 2.5 | 40 | 8 | | | | 4 | | |
| | | 4120012111 | 物联网控制基础<br>IoT Control Theory Foundation | 2.5 | 40 | | | | | 4 | 数字逻辑 | |
| | | 4120101111 | 信号处理原理<br>Signal Processing | 2.5 | 40 | | | | | 5 | | |
| | | 4120001111 | 现场总线技术与应用<br>Field Bus Technology and Application | 2.5 | 40 | 8 | | | | 6 | 计算机组成与系统结构 | |
| | | 4120201131 | 机器人控制技术概论<br>Principles of Robot Control Technology | 2 | 32 | | | | | 6 | 射频识别与传感器技术 | |
| | | 4120098111 | 物联网工程与组网技术<br>The Internet of Things & Network Engineering | 2 | 32 | 8 | | | | 6 | 无线传感器网络射频识别与传感 | |
| | | 4120029111 | 计算机图形图像处理<br>Computer Graphics and Image Processing | 2 | 32 | 6 | | | | 7 | | |
| | | 4120099111 | 物联网定位技术<br>Technology of IoT Location | 2.5 | 40 | 8 | | | | 7 | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 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 | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | | |
| | | 小 计 Subtotal | | 18.5 | 296 | 38 | | | | | | |
| | | 修读说明：要求至少选修 288 学时，18 学分（要求方向一选择 9 学分，方向二选择 9 学分）。<br>NOTE: Subtotal class hours/credits at least:288/18( Everyone select at least 9 credits on direction1 and at least 9 credits on direction 2 ) | | | | | | | | | | |
| 个性课程 Personalized Course | 选修课 Elective Courses | 4120237121 | 计算机科学与经济学<br>Computer Science and Economics | 2 | 32 | | | | | 5 | | |
| | | 4120244121 | 大数据分析技术<br>Data Analysis Technology | 2.5 | 40 | 8 | | | | 6 | | |
| | | 4120245121 | 信息系统分析与设计<br>Analysis and Design of Information System | 2 | 32 | 6 | | | | 6 | | |
| | | 4120246121 | 计算机与信息安全<br>Computer and Information Security | 2 | 32 | | | | | 6 | | |
| | | 小 计 Subtotal | | 8.5 | 136 | 14 | | | | | | |
| | | 修读说明：学生可跨专业自主选择修读全校其他专业的课程，建议修读以上课程。要求至少选修 10 学分。<br>NOTE：Students can choose any courses from the other specialties, and are especially suggested to choose the courses above. Minimum subtotal credits: 10. | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号 Course Number | 实践环节名称 Practice Courses Name | 周数 Weeks | 学分 Crs | 建议修读学期 Suggested Term | 第二专业 Second Major |
|---|---|---|---|---|---|
| 1060002111 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120143111 | 专业教育<br>Professional Education | 1 | 1 | 3 | |
| 4100068111 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120131111 | 嵌入式系统设计<br>Embedded System Design | 3 | 3 | 6 | |
| 4120113111 | 毕业实习<br>Practice for Graduation | 3 | 3 | 7 | |
| 4120186121 | 毕业设计<br>Graduation Design | 17 | 11 | 8 | |
| 小 计 Subtotal | | 29 | 21.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy*, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

# 软件工程专业（试点班）本科培养方案
# Undergraduate Program for the Specialty in Software Engineering （Reform Trial Class）

## 一、业务培养目标

**Ⅰ Educational Objectives**

本专业培养具有良好的科学素养、系统地、较好地掌握计算机科学与技术，包括软件工程、信息安全工程与应用的基本理论、基本知识和基本技能与方法，并能从事信息系统设计以及信息系统中信息安全技术的研究 、设计、开发、应用、管理等工作的高级工程技术人才。

1. Educational Objectives

The program cultivates high-level scientific and technical personnel with good academic quality and well and systematical skills in computer science and technology, including software engineering, information security engineering and application. Students can trained as professional personnel in the fields of information system and its information security with skills of research, design, development, application and management.

## 二、业务培养要求

**Ⅱ Educational Requirement**

本专业学生主要学习软件工程、网络与信息安全方面的基本理论和基本知识，重点培养学生系统设计、分析、开发以及软件安全工程等方面的能力，加强软件工程、软件安全方面的教学与实践内容，加强组织管理、合作与交流等方面能力的训练，使其不仅具有进行软件开发的基本能力，而且具备信息安全组织与管理能力。

毕业生应获得以下几方面的知识和能力:

（1）掌握扎实的数理、计算机基础知识；

（2）掌握软件工程的基本方法、基本知识和基本技能；

（3）掌握软件系统的分析和设计的基本方法；

（4）掌握通信、计算机网络和信息系统的基本理论和专业知识，掌握密码、信息安全以及信息安全管理的基本理论与方法；

（5）具备在信息、信息过程和信息系统等方面进行信息安全与保密关键技术的分析、 设计、研究、开发的能力以及安全设备与软件的应用、信息系统安全集成与管理的能力；

（6）了解国家有关信息安全方面的政策和法规以及有关国际法律、法规；了解信息安全 技术领域的理论前沿、应用前景和发展动态

（7）掌握文献检索、资料查询的基本方法，具有获取信息的能力；

（8）具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The students in our undergraduate program learn theory and knowledge of software engineering, network and information security. The focus of the Software Engineering curriculum is on the analysis, design, construction, implementation application, and management of software security engineering. The curriculum enforces the teaching and practice in software engineering, software security, especially in the training courses of team management, collaboration and communication skills. The students in this curriculum can be trained not only on software development, but also in information security .

The graduates are expected to

1. Have a solid foundation in mathematics, science and computer system.
2. Possess the basic theory and knowledge of software engineering;

3. Possess the basic methods of network software system analysis and design;
4. Have the knowledge of communication, computer network and information system including cryptology, information security and its management.
5. Have the basic ability of analysis, designing, research, development in information system and its information security and confidentiality, especially in safety installations, software applications, security integration of information system.
6. Understand laws about information security and its academic development and trend;
7. Have the ability of acquiring information through literature searching, reference reading, and so on;
8. Have the comprehensive ability of English language including oral and written communication skills, and reading achievement which prepare for their future career and social communication.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：软件工程

Major Disciplines: Software Engineering

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统、计算机网络、软件工程导论、软件设计与体系结构、软件项目管理、软件测试、网络软件编程技术、密码学、信息安全、网络安全、软件安全。

Core Courses: Advanced language programming design, Discrete structure, Data Structure, Composition Principle of Computer, Operating System, Computer Network , Introduction to Software Engineering, Software design and its architecture, Management of software project, Software testing, Network Software Programming, Cryptography, Information Security, Network Security and Software Security.

专业特色课程：信息论与编码、网络攻击与防御技术、PKI 原理与技术

Characteristic Courses: Information theory and coding, Attack and defense of network, Theory of PKI

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineer

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别 / 课程性质 | 通识课程 Public Basic Courses | 学科大类课程 Basic Disciplinary Courses | 专业课程 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 | 36.5 | 46.5 | 41 | \ | 24.5 | \ | 190 |
| 选修课 Elective Courses | 9 | \ | 22.5 | \ | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

（1）本专业课程设置方法参考 IEEE2001 SE 推荐的计算机科学优先方法，并按照自底向上的方法展开的软件工程类课程的学习，课程启动策略为程序设计优先方式。

本专业重要的学科大类基础课程和专业课程有：计算机科学导论、高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统与安全、编译原理、数据库系统与安全、计算机网络、软件工程导论、软件设计与体系结构、软件构件与中间件技术、软件项目管理、软件测试、密码学、信息安全、网络安全。

（2）为体现本专业的专业特色与方向，本专业修读课程设置有信息安全课程群和网络工程课群:
信息安全课程群：网络攻击与防御技术、PKI 原理与技术、信息隐藏技术、安全协议、安全扫描技术。
网络课程群：网络软件编程技术、XML 技术、Oracle 数据库技术、云计算、无线网络与移动计算。

（1）Students must work hard on some core disciplines courses and specialty courses.

Major courses: Introduction to Computer Science, Advanced language programming design, Circuit theory, Analog Electronic Technology C, Discrete structure, Data Structure, Assemble language programming design, Composition Principle and Systems Architecture of Computer, Operating System and security, Compiler Construction Principles, Database System Principle and security, Introduction to Software Engineering, Computer Network B, Software design and architecture, Management of software project, Software testing, Cryptography, Information Security, Network Security and Software Security..

（2）In order to show the characteristics of our study program, it has two courses groups, i.e., information security and network engineering.

Information security: Attack and defense of network, Theory of PKI, Information hiding, security protocol, security scanning and so on.

Network engineering: Network Software System Design, XML Technology, Oracle Database, Technology, Cloud Computing ,Wireless Network and Mobile Computing and so on.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4220001110 | 思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4120027110 | 计算机科学导论 Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4220002110 | 中国近现代史纲要 Outline of Chinese Contemporary and Modern History | 2 | 32 | | | | | 1-6 | | |
| | | 4120020110 | 高级语言程序设计 A Foundation of Programming | 4 | 64 | | 16 | | 16 | 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 | | 1-6 | | |
| | | 1060001110 | 军事理论 Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001130 | 心理健康教育 Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4220005110 | 马克思主义基本原理 Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4210001110 | 体育 1 Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002110 | 体育 2 Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003110 | 体育 3 Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004110 | 体育 4 Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002110 | 大学英语 A1 College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003110 | 大学英语 A2 College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004110 | 大学英语 A3 College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005110 | 大学英语 A4 College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | | | | | | | | | | | |
| | | 小 计 Subtotal | | 36.5 | 744 | 10 | 16 | 128 | 64 | | | |
| | 选修课 Elective Courses | 创新创业类 Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。 All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 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 | | | | | | | | | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063110 | 高等数学 A 上<br>Advanced Mathematics A1 | 5 | 80 | | | | | 1 | | |
| | | 4050064110 | 高等数学 A 下<br>Advanced Mathematics A2 | 5 | 80 | | | | | 2 | 高等数学 A 上 | |
| | | 4110019110 | 电路原理 B<br>Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4050023110 | 大学物理 B<br>Physics B | 5.5 | 88 | | | | | 2 | 高等数学 A 上 | |
| | | 4120045110 | 离散结构<br>Discrete Structures | 4 | 64 | | | | | 2 | | |
| | | 4110050110 | 模拟电子技术基础 C<br>Analog Electronic Techniques C | 3 | 48 | 8 | | | | 2 | 电路原理 B | |
| | | 4050058110 | 概率论与数理统计 B<br>Probability and Mathematics Statistic B | 3 | 48 | | | | | 3 | | |
| | | 4050224110 | 物理实验 B<br>Physics Lab. B | 1 | 32 | 32 | | | | 3 | | |
| | | 4120079110 | 数字逻辑<br>Digital Circuits | 3 | 48 | 8 | | | | 3 | 电路原理 B | |
| | | 4120177120 | 数据结构<br>Data Structures | 5.5 | 88 | | 16 | 16 | | 3 | 高级语言程序设计 A | |
| | | 4120048110 | 面向对象程序设计 C<br>Object-Oriented methodology C | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 4120153110 | JAVA 语言程序设计 B<br>Java Programming B | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 小 计 Subtotal | | 46.5 | 760 | 64 | 28 | 16 | | | | |
| 专业课程 Specialized Courses | 必修课 Required Courses | 4120008110 | UML 建模技术<br>UML Modeling Technology | 2 | 32 | 8 | | | | 4 | 面向对象程序设计 C | |
| | | 4120209130 | 密码学<br>Cryptography | 2.5 | 40 | 8 | | | | 4 | 离散结构 | |
| | | 4120028110 | 计算机数值分析<br>Computer Numerical Analysis | 2.5 | 40 | | 8 | | | 4 | 线性代数 | |
| | | 4120208130 | 计算机组成原理 B<br>Computer Organization B | 4 | 64 | 10 | | 8 | | 4 | 数字逻辑 | |
| | | 4120213130 | 软件工程导论 B<br>Introduction to Software Engineering B | 2 | 32 | | | | | 4 | 面向对象程序设计 C | |
| | | 4120158120 | 编译原理<br>Principles of Compiler | 4 | 64 | | 8 | 8 | | 5 | | |
| | | 4120225130 | 操作系统与安全<br>Operating System | 4.5 | 72 | | 12 | 16 | | 5 | | |
| | | 4120175120 | 软件设计与体系结构<br>Software Design and Architecture B | 2 | 32 | 8 | | | | 5 | | |
| | | 4120102110 | 信息安全<br>Introduction to Information Security | 2 | 32 | 6 | | | | 5 | 密码学 | |
| | | 4120234130 | 计算机网络<br>Computer Networks | 3.5 | 56 | | | 16 | | 5 | | |
| | | 4120063110 | 软件构件与中间件技术<br>Software Component and Middleware | 2.5 | 40 | 8 | | | | 6 | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| | | 4120240130 | 数据库系统与安全<br>Principles of Database System | 3.5 | 56 | | 8 | 8 | | 6 | | |
| | | 4120241130 | 网络安全<br>Network Security | 2 | 32 | 8 | | | | 6 | 信息安全 | |
| | | 4120211130 | 软件安全<br>Software Security | 2 | 32 | 6 | | | | 7 | | |
| | | 4120058110 | 软件测试 B<br>Software Testing B | 2 | 32 | 8 | | | | 7 | | |
| | | 小 计 Subtotal | | 41 | 656 | 70 | 36 | 56 | | | | |
| | 选修课 Elective Courses | 模块 0(软件基础工具)<br>Module 0(Software Tools) | | | | | | | | | | |
| | | 4120044110 | 可视化编程<br>Visual Programming | 2.5 | 40 | 10 | | | | 4 | 面向对象程序设计 C | |
| | | 4120065110 | 软件开发工具<br>Software Tool& Environment | 2 | 32 | 16 | | | | 5 | | |
| | | 4120071110 | 软件需求工程 B<br>Software Requirement Project | 2 | 32 | 8 | | | | 5 | | |
| | | 4120082110 | 算法设计与分析 B<br>Algorithm Design and Analysis B | 2 | 32 | | 6 | | | 5 | | |
| | | 4120064110 | 软件过程与 CMM<br>Software Process & CMM | 2 | 32 | 8 | | | | 6 | | |
| | | 4120069110 | 软件项目管理 B<br>Software Project Management B | 2 | 32 | 6 | | | | 7 | | |
| | | 小 计 Subtotal | | 14.5 | 230 | 48 | 6 | | | | | |
| | | 模块 1（软件安全）<br>Module 2(software security) | | | | | | | | | | |
| | | 4120242130 | 信息论与编码<br>Information theory and coding | 2 | 32 | | | | | 5 | 密码学 | |
| | | 4120243130 | 计算机病毒及其防治技术<br>Computer Virus and its control technology | 2 | 32 | 6 | | | | 5 | | |
| | | 4120244130 | 信息隐藏技术<br>Information hiding technology | 2 | 32 | 6 | | | | 6 | 信息安全 | |
| | | 4120245130 | 安全协议<br>secure protocol | 2 | 32 | 6 | | | | 6 | 计算机网络 | |
| | | 4120246130 | 网络攻击与防御技术<br>Network attack and Defense Technology | 2 | 32 | 8 | | | | 6 | 计算机网络 | |
| | | 4120247130 | PKI 原理与技术<br>Principle and technology of PKI | 2 | 32 | 6 | | | | 7 | 信息安全 | |
| | | 4120248130 | 安全扫描技术<br>Security scanning technology | 2 | 32 | 6 | | | | 7 | 信息安全 | |
| | | 4120239130 | 云计算基础<br>Cloud Computing | 2 | 32 | 12 | | | | 7 | 计算机网络 | |
| | | 小 计 Subtotal | | 16 | 256 | 40 | | | | | | |
| | | 修读说明：推荐选模块 0+模块 1，要求最少选修 22.5 学分。<br>NOTE: recommend select module 0+module1 and minimum subtotal credits:22.5 | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 周数<br>Weeks | 学分<br>Crs | 建议修读学期<br>Suggested Term | 第二专业<br>Second Major |
|---|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120144110 | 专业教育<br>Professional Teach | 1 | 1 | 2（暑期） | |
| 4100068110 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120121110 | 基础强化训练（20 学时上机）<br>Foundation Strengthening Training | 1 | 1 | 4（暑期） | |
| 4120228130 | 软件工程综合设计实践（20 学时上机）<br>Synthetical Project of Software Engineering A | 1 | 1 | 6 | |
| 41202205130 | 计算机网络与安全实践<br>Practice of Computer Network and Security | 1 | 1 | 6 | |
| 4120129110 | 能力拓展训练<br>Ability Development Training | 1 | 1 | 6（暑期） | |
| 4120115110 | 毕业实习（40 学时上机，学期初进行））<br>Final Practice | 3 | 3 | 7 | |
| 4120227130 | 软件工程项目实践（70 学时上机，学期末进行）<br>Practice of Network Software Project | 2 | 2 | 7 | |
| 4120185120 | 毕业设计（340 学时上机）<br>Bachelor Thesis | 17 | 11 | 8 | |
| 小　　计　Subtotal | | 32 | 24.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy,* a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

# 软件工程专业（卓越工程师班）本科培养方案
# Undergraduate Program for Specialty in Software Engineering
# （Excellent Engineer Class）

## 一、业务培养目标

**Ⅰ Educational Objectives**

本专业以数学与计算机理论的学习为基础，培养系统地掌握现代软件工程的基本理论、设计方法和基本技能，从事软件工程领域的开发、研究与管理的高级工程技术人才或软件企业管理人才。

The B.S. program in Software Engineering educates professional persons with high level skills in software research and development.. This subject includes materials on software development, process, and management skills that are essential to successful engineering. The core curriculum includes both theoretical knowledge and software engineering tools and techniques. Graduate of the program should have the technical, process, and teamwork skills . They can be prepared for any professional engineering and technology role in development, research and administrative management in the field of software engineering.

## 二、业务培养要求

**Ⅱ Educational Requirement**

本专业学生主要学习软件工程方面的基本理论和基本知识，重点培养学生系统设计、分析、开发以及软件项目工程管理等方面的能力，加强软件工程、项目管理、软件开发与测试等方面的教学与实践内容，加强组织管理、合作与交流等方面能力的训练，使其不仅具有进行软件开发的基本能力，而且具备工程项目的组织与管理能力。

毕业生应获得以下几方面的知识和能力:

1.掌握扎实的数理、计算机基础知识；

2.掌握软件工程的基本方法、基本知识和基本技能；

3.掌握软件系统的分析和设计的基本方法；

4.具有软件开发、组织、管理的能力；

5.了解软件分析、设计、应用的相关法规和标准；

6.了解计算机学科及软件工程的发展动态；

7.掌握文献检索、资料查询的基本方法，具有获取信息的能力；

8.具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The students in our undergraduate program learn theory and knowledge of software engineering. The focus of the Software Engineering curriculum is on the analysis, design, construction, implementation application, and management of software systems. The curriculum is based on a strong score of topics including software engineering methodology, software project management, software development and testing. To strengthen their ability of in practical application development and teamwork, our program is designed to teach not only programming skills, but also engineering skills.

The graduates are expected to

1. Have a solid foundation in mathematics ,science and computer system.
2. Possess the basic theory and knowledge of software engineering;
3. Possess the basic methods of software system analysis and design;
4. Have the basic ability of developing, organizing and managing computer software;
5. Understand laws about software engineering;
6. Understand the development and trend in the computer science and software engineering;

7. have the ability of acquiring information through literature searching, reference reading, and so on;

8. Have the comprehensive ability of English language including oral and written communication skills, and reading achievement which prepare for their future career and social communication.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：软件工程

Major Disciplines: Software Engineering

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统、计算机网络、软件工程导论、软件设计与体系结构、软件项目管理、软件质量保证与测试

Core Courses: Advanced language programming design, Discrete structure, Data Structure, Composition Principle of Computer, Operating System, Computer Network, Software Engineering, Software design, Management of software project, Software requirement project, Software testing

专业特色课程：网络软件系统设计技术、嵌入式应用软件开发、智能系统

Characteristic Courses: Network Software System Design, Embedded Application Development，Intelligent System

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineer

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别 / 课程性质 | 通识课程 Public Basic Courses | 学科大类课程 Basic Disciplinary Courses | 专业课程 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 | 36.5 | 46.5 | 38 | \ | 33.5 | \ | 190 |
| 选修课 Elective Courses | 9 | \ | 16.5 | \ | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

1.本专业课程设置方法参考 IEEE2001 SE 推荐的计算机科学优先方法，并按照自底向上的方法展开的软件工程类课程的学习，课程启动策略为程序设计优先方式。

本专业重要的学科大类基础课程和专业课程有：计算机科学导论、高级语言程序设计、离散结构、数据结构、计算机组成原理、操作系统、编译原理、数据库系统原理、计算机网络 A、软件工程导论、软件需求工程、软件设计与体系结构、软件构件与中间件技术、软件项目管理、软件质量保证与测试、软件建模技术、软件开发工具、软件过程与 CMM。

2.为体现本专业的专业特色与方向，本专业选修课程包括以下三个课群:

智能软件与系统课群：人工智能概论、数据挖掘、智能系统、Oracle 数据库技术；

嵌入式软件与系统课群：嵌入式操作系统、计算机接口技术、嵌入式应用软件开发、Linux 软件分析与开发；

网络软件与系统课群：信息安全、网络软件系统设计技术、XML 技术、网络系统集成与工程设计；

1.Students must work hard on some core disciplines courses and specialty courses.

Major courses: Introduction to Computer Science, Advanced language programming design, Circuit theory, Analog Electronic Technology C, Discrete structure, Data Structure, Assemble language programming design, Composition Principle and Systems Architecture of Computer, Operating System, Compiler Construction Principles, Database System Principle, Software Engineering, Computer Network B, Software design, Management of software project, Software requirement project, Software testing, Communication Principle c

2.According to the concentration fields of the specialty, some Specialized elective courses are arranged into three groups.

Courses in intelligent software and system: Introduction to Artificial Intelligence, Intelligent System , Data Mining, Oracle Database and so on.

Courses in embedded software and system: Embedded Operating System, Computer Interface Techniques, Embedded Development Tools, Embedded Application Development ,Software Development on Linux and so on.

Courses in network software and system: Computer Security, Network Software System Design, XML Technology, Technology of Network System Integration & Engineering and so on.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4120027110 | 计算机科学导论<br>Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4120020110 | 高级语言程序设计 A<br>Foundation of Programming | 4 | 64 | | 16 | | 16 | 1 | | |
| | | 4220002110 | 中国近现代史纲要<br>Outline of Chinese Contemporary and Modern History | 2 | 32 | | | | | 1-6 | | |
| | | 4220001110 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4220003110 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 1-6 | | |
| | | 4220005110 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 1060001110 | 军事理论<br>Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001130 | 心理健康教育<br>Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4210001110 | 体育 1<br>Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002110 | 体育 2<br>Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003110 | 体育 3<br>Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004110 | 体育 4<br>Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002110 | 大学英语 A1<br>College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003110 | 大学英语 A2<br>College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004110 | 大学英语 A3<br>College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005110 | 大学英语 A4<br>College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | | | | | | | | | | | |
| | | 小　计 Subtotal | | 36.5 | 744 | | 26 | 128 | | | | |
| | 选修课 Elective Courses | 创新创业类<br>Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。<br>All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 人文社科类<br>Arts and Social Science Courses | | | | | | | | | | |
| | | 经济管理类<br>Economy and Management Courses | | | | | | | | | | |
| | | 科学技术类<br>Science and Technology Courses | | | | | | | | | | |
| | | 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063110 | 高等数学 A 上<br>Advanced Mathematics A1 | 5 | 80 | | | | | 1 | | |
| | | 4050064110 | 高等数学 A 下<br>Advanced Mathematics A2 | 5 | 80 | | | | | 2 | 高等数学 A 上 | |
| | | 4110019110 | 电路原理 B<br>Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050023110 | 大学物理 B<br>PhysicsB | 5.5 | 88 | | | | | 2 | | |
| | | 4050229110 | 线性代数<br>Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4120045110 | 离散结构<br>Discrete Structures | 4 | 64 | | | | | 2 | | |
| | | 4050058110 | 概率论与数理统计 B<br>Probability and Mathematics Statistic B | 3 | 48 | | | | | 3 | | |
| | | 4110050110 | 模拟电子技术基础 C<br>Analog Electronic Techniques C | 3 | 48 | 8 | | | | 2 | 电路原理 B | |
| | | 4050224110 | 物理实验 B<br>Physics Lab. B | 1 | 32 | 32 | | | | 3 | | |
| | | 4120079110 | 数字逻辑<br>Digital Circuits | 3 | 48 | 8 | | | | 3 | 电路原理 B | |
| | | 4120177120 | 数据结构<br>Data Structures | 5.5 | 88 | | 16 | 16 | | 3 | 高级语言程序设计 A | |
| | | 4120048110 | 面向对象程序设计 C<br>Object-Oriented methodology | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 4120153110 | JAVA 语言程序设计 B<br>Java Programming B | 2.5 | 40 | | 12 | | | 3 | 高级语言程序设计 A | |
| | | 小 计 Subtotal | | 46.5 | 760 | 64 | 40 | 16 | | | | |
| 专业课程 Specialized Courses | 必修课 Required Courses | 4120028110 | 计算机数值分析<br>Computer Numerical Analysis B | 2.5 | 40 | | 8 | | | 4 | 线性代数 | |
| | | 4120208130 | 计算机组成原理 B<br>Computer Organization B | 4 | 64 | 10 | | 8 | | 4 | 数字逻辑 | |
| | | 4120212130 | 软件工程导论 A<br>Introduction to Software Engineering B | 2.5 | 40 | | | | | 4 | 面向对象程序设计 C | |
| | | 4120008110 | UML 建模技术<br>Software Modeling Technology | 2 | 32 | 8 | | | | 4 | 面向对象程序设计 C | |
| | | 4120163120 | 操作系统<br>Operating System | 4.5 | 72 | | 12 | 16 | | 4 | | |
| | | 4120158120 | 编译原理<br>Principles of Compiler | 4 | 64 | | 8 | 8 | | 5 | | |
| | | 4120175120 | 软件设计与体系结构<br>Software Design and Architecture B | 2 | 32 | 8 | | | | 5 | | |
| | | 4120071110 | 软件需求工程 B<br>Software Requirement Project B | 2 | 32 | 8 | | | | 5 | | |
| | | 4120179120 | 数据库系统原理<br>Principles of Database System | 3.5 | 56 | | 8 | 8 | | 5 | | |
| | | 4120232130 | 计算机网络<br>Computer Networks A | 4. | 64 | | 8 | 8 | | 6 | | |
| | | 4120063110 | 软件构件与中间件技术<br>Software Component and Middleware | 2.5 | 40 | 8 | | | | 6 | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| | | 4120068110 | 软件项目管理 B<br>Software Project Management | 2. | 32 | 6 | | | | 6 | | |
| | | 4120057110 | 软件质量保证与测试 A<br>Software Quality Assure and Testing A | 2.5 | 40 | 8 | | | | 6 | | |
| | | 小 计 Subtotal | | 38 | 608 | 56 | 44 | 48 | | | | |
| | 选修课 Elective Courses | 4120044110 | 可视化编程<br>Visual Programming | 2.5 | 40 | 10 | | | | 4 | 面向对象程序设计 C | |
| | | 4120150110 | 软件工程经济学<br>Economics of Software Engineer | 1 | 16 | | | | | 4 | 计算机科学导论 | |
| | | 4120151110 | 软件工程与计算机科学前沿<br>Software engineering & computer | 1 | 16 | | | | | 4 | 计算机科学导论 | |
| | | 4120022110 | 汇编语言程序设计<br>Assembly Language Programming | 2.5 | 40 | 16 | | | | 4 | 面向对象程序设计 C | |
| | | 4120082110 | 算法设计与分析 B<br>Algorithm Design and Analysis B | 2 | 32 | | 6 | | | 5 | | |
| | | 4120065110 | 软件开发工具<br>Software Tool& Environment | 2 | 32 | 12 | | | | 5 | | |
| | | 4120102110 | 信息安全<br>Introduction to Computer Security | 2 | 32 | 6 | | | | 5 | 计算机网络 | |
| | | 4120149110 | 通信原理 C<br>Principles of Communication C | 2.5 | 40 | 8 | | | | 5 | 模拟电子技术基础 C | |
| | | 4120055110 | 人工智能概论<br>Introduction to Artificial Intelligence | 2 | 32 | | | | | 5 | 离散结构 | |
| | | 4120018110 | 多媒体技术<br>Multimedia Technique | 2 | 32 | 6 | | | | 5 | 面向对象程序设计 C | |
| | | 4120089110 | 网络软件系统设计技术<br>Network Software System Design | 2 | 32 | 12 | | | | 6 | 计算机网络 | |
| | | 4120010110 | XML 技术<br>XML Technology | 2 | 32 | 8 | | | | 6 | 计算机网络 | |
| | | 4120005110 | Oracle 数据库技术<br>Oracle Database | 2 | 32 | 8 | | | | 6 | 数据结构 | |
| | | 4120078110 | 数据挖掘 C<br>Data Mining | 2 | 32 | 8 | | | | 6 | 数据结构 | |
| | | 4120210130 | 嵌入式系统基础<br>Embedded System | 2 | 32 | 8 | | | | 6 | | |
| | | 4120049110 | 嵌入式操作系统<br>Embedded Operating System | 2 | 32 | 8 | | | | 6 | | |
| | | 4120054110 | 嵌入式应用软件开发<br>Embedded Application Development | 2 | 32 | 8 | | | | 6 | 汇编语言程序设计 | |
| | | 4120088110 | 网络软件编程技术<br>Network Software Programming | 2.5 | 40 | 12 | | | | 7 | 计算机网络 | |
| | | 4120239130 | 云计算基础<br>Cloud Computing | 2 | 32 | 12 | | | | 7 | 计算机网络 | |
| | | 4120164110 | 行业应用软件设计与开发<br>Application Software Design & | 2 | 32 | 8 | | | | 7 | 软件开发工具 | |
| | | 4120004110 | Linux 软件分析与开发<br>Software Development on Linux | 2 | 32 | 8 | | | | 7 | | |
| | | 小 计 Subtotal | | 42 | 672 | 174 | | | | | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 课程编号 Course Number | 课 程 名 称 Course Title | 学分 Crs | 学时分配 Including | | | | | | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | 建议修读学期 Suggested Term | | |
| | | 修读说明：至少选修 16.5 学分<br>Study shows : recommend select minimum subtotal credits:16.5. | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号 Course Number | 实践环节名称 Practice Courses Name | 周数 Weeks | 学分 Crs | 建议修读学期 Suggested Term | 第二专业 Second Major |
|---|---|---|---|---|---|
| 1060002110 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120142110 | 专业教育<br>Professional Teach | 1 | 1 | 2(暑期) | |
| 4100068110 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120120110 | 基础强化训练<br>Foundation Strengthening Training | 1 | 1 | 4（暑期） | |
| 4120228130 | 软件工程综合设计实践<br>Synthetical Project of Software Engineering B | 1 | 1 | 6 | |
| 4120152110 | 软件生产实习<br>Software Practice | 2 | 2 | 6（企业） | |
| 4120128110 | 能力拓展训练<br>Ability Development Training | 1 | 1 | 6（暑期） | |
| 4120194110 | 职业教育<br>Occupation Education | 1 | 1 | 7（企业） | |
| 4120229130 | 软件开发基础设计训练<br>Software Development Design Training | 2 | 2 | 7（企业） | |
| 4120118110 | 大型软件工程项目实践<br>Practice of Large-Scale Software Project | 3 | 3 | 7（企业） | |
| 4120226130 | 软件岗位实习<br>Software Post Practice | 7 | 7 | 7（企业） | |
| 4120185120 | 毕业设计<br>Bachelor Thesis | 17 | 11 | 8（企业） | |
| 小　　计　Subtotal | | 41 | 33.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy,* a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.

# 计算机科学与技术专业（卓越工程师班）本科培养方案
# Undergraduate Program for Specialty in Computer Science & Technology(Excellent Engineer Pilot)

## 一、业务培养目标

**Ⅰ Educational Objectives**

本专业培养具有良好的科学素养、系统地、较好地掌握计算机科学与技术包括计算机硬件、软件与应用的基本理论、基本知识和基本技能与方法，具备卓越的工程实践能力，能在科研部门、教育单位、企业、事业、技术和行政管理部门等单位从事计算机软硬件开发和应用的应用型工程型技术人才。

This program is committed to train students to become applied engineering and technical talented professionals with a sound theoretic foundation, systematical knowledge and skill of the capability to carry out the scientific research, system analysis, system design, technical development, and management in the field of computer science and technology and capability of engineering practice in computer software and hardware development and application in science research departments, education institution, enterprises, technical and administrative departments.

## 二、业务培养要求

**Ⅱ Educational Requirement**

本专业学生主要学习计算机科学与技术方面的基本理论和基本知识，接受从事研究与应用计算机的基本训练，具有研究和开发计算机应用系统的卓越工程实践能力。

毕业生应获得以下几方面的知识和能力:

1. 掌握计算机科学与技术的基本理论、基本知识；
2. 掌握计算机系统分析和设计的基本方法；
3. 具备卓越的研究开发计算机软、硬件的工程实践能力；
4. 了解与计算机有关的法规；
5. 了解计算机科学与技术的发展动态；
6. 掌握文献检索、资料查询的基本方法，具有获取信息的能力。
7. 具有较强的英语综合应用能力，特别是听、说能力，在今后工作和社会交往中，能用英语有效地进行口头和书面的信息交流，能熟练进行外文阅读，有一定的外语写作能力。

The students mainly study the fundamental theory and systematical knowledge of computer science and technology, accept the engineering training on researching and applying computers, and attain the practice abilities of researching and developing the computer application systems.

The graduated students are expected to have the following abilities:

1. Master the basic theory and knowledge of computer science and technology;
2. Master the basic methods of system analysis and design;
3. Have the excellent practice abilities of researching and developing computer software and hardware;
4. Understand the laws and regulations about computer industry;
5. Understand the development and trends in the computer science and technology;
6. Master the basic methods of literature survey, data collection; Have the abilities to get the latest research results in the field of computer science and technology ;
7. Have the ability of applying English language in study, especially for listening and speaking, can efficiently undertake oral and written information exchange in English in the future work.

## 三、主干学科

## Ⅲ Major Disciplines

主干学科：计算机科学与技术

Major Disciplines: Computer Science and Technology

## 四、专业核心课程与专业特色课程

## Ⅳ Core Courses and Characteristic Courses

专业核心课程：离散结构、汇编语言程序设计、计算机组成原理、数据结构、操作系统、编译原理、数据库系统原理、计算机网络、高级语言程序设计、软件工程。

Core Courses: Discrete structure, Assembly language programming, Principles of Computer Organization, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Language Programming, and Software Engineering.

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，包括系统软件开发实训、信息系统开发实训和嵌入式系统开发实训。

Characteristic Courses: Performing all kinds of system development practice and training in cooperation with enterprises based on the recommendation of Excellent Engineer Program.

## 五、计划学制与学位

## Ⅴ Length of School and Degree

修业年限：四年

Duration： Four Years

授予学位：工学学士

Degree Granted: Bachelor of Engineering

## 六、最低毕业学分规定

## Ⅵ Graduation Credit Criteria

| 课程类别<br>课程性质 | 通识课程<br>Public Basic Courses | 学科大类课程<br>Basic Disciplinary Courses | 专业课程<br>Specialized Courses | 个性课程<br>Personalized Course | 集中性实践<br>Practice Courses | 课外学分<br>Study Credit after Class | 总学分<br>Total Credits |
|---|---|---|---|---|---|---|---|
| 必修课<br>Required Courses | 36.5 | 46.5 | 39 | \ | 31.5 | \ | 190 |
| 选修课<br>Elective Courses | 9 | \ | 17.5 | \ | \ | 10 | |

## 七、课程修读指导建议

## Ⅶ Recommendations on Course Studies

本专业最重要的学科大类课程和专业课程共有 10 门，学生在修读时应加以重点关注。

这 10 门课程是：离散结构、汇编语言程序设计、计算机组成原理、数据结构、操作系统、编译原理、数据库系统原理、计算机网络、高级语言程序设计、软件工程。

为体现本专业的专业方向，本专业课程包括了以下三个选修课群：

1.计算机软件课群

主要组成课程：算法设计与分析、人工智能概论、信息安全、软件测试、UML 建模技术。

2.网络工程课群

主要组成课程：通信原理、网络集成技术、Web 技术、TCP/IP 和网络软件编程、分析软件工具。

3.计算机应用课群

主要组成课程：JAVA 语言程序设计、可视化编程、信息系统分析与设计、多媒体技术、网页设计。

在选取选修课程时，建议将 JAVA 语言程序设计、网页设计、信息安全、软件测试、UML 建模技术课程作为共选课程，再根据自己选择的方向分别选取一个课群的其它课程予以选修。

Students in this specialty should pay their attention to the top ten most importent courses when taking the the basic courses of disciplines and the specialized courses. These courses are Discrete structure, Assembly language programming, Principles of Computer Organization, Data Structure, Operating System, Principles of Compiler Construction, Principles of Database Systems, Computer Networks, Advanced Language Programming, and Software Engineering.

The courses in the specialty can be classified into three groups as followings:

1.Computer Software

The major courses in this group include Algorithm Design and Analysis, Artificial Intelligence, Information Security, Software Testing, UML Modeling Technology.

2.Computer Networks

The major courses in this group include Communication Principles, Network Integration Technology, Web Technology, TCP/IP and Network Programming, Analysis Software Tool.

3.Computer Application

The major courses in this group include Java Language Programming, Visual Programming, Computer Graphics and Image Processing, Information System Analysis and Design, Multimedia Technology, Web Page Design,.

When choose elective courses, it is recommended that take Java Language Programming, Web Page Design, Information Security, Software Testing, and UML Modeling Technology as the common core, then select the other courses from one group according to your interests.

## 八、理论教学建议进程表

## Ⅷ Theory Course Schedule

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 通识课程 Public Basic Courses | 必修课 Required Courses | 4220001111 | 思想道德修养与法律基础<br>Morals, Ethics and Fundamentals of Law | 3 | 48 | | | 8 | | 1-6 | | |
| | | 4220002111 | 中国近现代史纲要<br>Outline of Contemporary and Modern Chinese History | 2 | 32 | | | | | 1-6 | | |
| | | 4220003111 | 毛泽东思想和中国特色社会主义理论体系概论<br>Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics | 4 | 96 | | | 32 | | 1-6 | | |
| | | 4220005111 | 马克思主义基本原理<br>Marxism Philosophy | 3 | 48 | | | 8 | | 1-6 | | |
| | | 1060001111 | 军事理论<br>Military Theory | 1 | 32 | | | 16 | | 2-4 | | |
| | | 1050001131 | 心理健康教育<br>Mental Health Education | 1 | 16 | | | | | 1-2 | | |
| | | 4210001111 | 体育 1<br>Physical Education Ⅰ | 1 | 32 | | | | | 1 | | |
| | | 4210002111 | 体育 2<br>Physical Education Ⅱ | 1 | 32 | | | | | 2 | 体育 1 | |
| | | 4210003111 | 体育 3<br>Physical Education Ⅲ | 1 | 32 | | | | | 3 | 体育 2 | |
| | | 4210004111 | 体育 4<br>Physical Education Ⅳ | 1 | 32 | | | | | 4 | 体育 3 | |
| | | 4030002111 | 大学英语 A1<br>College English A 1 | 3 | 64 | | | | 16 | 1 | | |
| | | 4030003111 | 大学英语 A2<br>College English A Ⅱ | 3 | 64 | | | | 16 | 2 | 大学英语 A1 | |
| | | 4030004111 | 大学英语 A3<br>College English A Ⅲ | 3 | 64 | | | | 16 | 3 | 大学英语 A2 | |
| | | 4030005111 | 大学英语 A4<br>College English A Ⅳ | 3 | 64 | | | | 16 | 4 | 大学英语 A3 | |
| | | 4120027111 | 计算机科学导论<br>Introduction to Computer Science | 2.5 | 40 | 10 | | | | 1 | | |
| | | 4120020111 | 高级语言程序设计 A<br>Advanced Language Programming A | 4 | 64 | | 16 | | | 1 | | |
| | | | | | | | | | | | | |
| | | 小　计 Subtotal | | 36.5 | 744 | 10 | 16 | 64 | 64 | | | |
| | 选修课 Elective Courses | 创新创业类<br>Innovation and Entrepreneurship Courses | 全校学生要求至少取得 9 学分，建议在每个类别中分别至少选修一门课程。<br>All students are required to obtain at least nine credits, and suggested to select at least one course in five categories respectively. | | | | | | | | | |
| | | 人文社科类<br>Arts and Social Science Courses | | | | | | | | | | |
| | | 经济管理类<br>Economy and Management Courses | | | | | | | | | | |
| | | 科学技术类<br>Science and Technology Courses | | | | | | | | | | |
| | | 艺术体育类<br>Art and Physical Education Courses | | | | | | | | | | |

| 课程类别 Course Classification | 课程性质 Course Nature | 课程编号 Course Number | 课程名称 Course Title | 学分 Crs | 学时分配 Including 总学时 Tot hrs. | 实验 Exp. | 上机 Operation | 实践 Practice | 课外 Extra-cur | 建议修读学期 Suggested Term | 先修课程 Prerequisite Course | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 学科大类课程 Basic Disciplinary Courses | 必修课 Required Courses | 4050063111 | 高等数学 A 上 Advanced Mathematics AⅠ | 5 | 80 | | | | | 1 | | |
| | | 4050064111 | 高等数学 A 下 Advanced Mathematics AⅡ | 5 | 80 | | | | | 2 | | |
| | | 4110019111 | 电路原理 B Circuit Principle B | 4 | 64 | 16 | | | | 1 | | |
| | | 4050229111 | 线性代数 Linear Algebra | 2.5 | 40 | | | | | 2 | | |
| | | 4110050111 | 模拟电子技术基础 C Analog Electronic Technology C | 3 | 48 | 8 | | | | 2 | | |
| | | 4050023111 | 大学物理 B Physics B | 5.5 | 88 | | | | | 2 | | |
| | | 4050224111 | 物理实验 B Physics Lab. B | 1 | 32 | 32 | | | | 3 | | |
| | | 4120045111 | 离散结构 Discrete Structure | 4 | 64 | | | | | 2 | | |
| | | 4050058111 | 概率论与数理统计 B Probability and Mathematical Statistic B | 3 | 48 | | | | | 3 | | |
| | | 4120079111 | 数字逻辑 Digital Logic | 3 | 48 | 8 | | | | 3 | | |
| | | 4120048111 | 面向对象程序设计 C Object Oriented Programming C | 2.5 | 40 | | 12 | | | 3 | | |
| | | 4120177121 | 数据结构 Data Structure | 5.5 | 88 | | 16 | 16 | | 3 | | |
| | | 4120003111 | JAVA 语言程序设计 B Java Language Programming B | 2.5 | 40 | | 12 | | | 3 | | |
| | | 小 计 Subtotal | | 46.5 | 760 | 64 | 28 | 16 | | | | |
| 专业课程 Specialized Courses | 必修课 Required Courses | 4050028111 | 计算机数值分析 Computer Numerical Analysis | 2.5 | 40 | | 8 | | | 4 | | |
| | | 4120042111 | 计算机组成原理 A Principles of Computer Organization A | 4.5 | 72 | 10 | | | | 4 | | |
| | | 4120022111 | 汇编语言程序设计 Assembly Language Programming | 3 | 48 | | 16 | | | 5 | 计算机组成原理 A | |
| | | 4120159121 | 编译原理 Compiler Principles | 4 | 64 | | 12 | | | 5 | 高级语言程序设计 A | |
| | | 4120161121 | 操作系统 Operating System | 4 | 64 | | 12 | | | 5 | 计算机组成原理 A | |
| | | 4120179121 | 数据库系统原理 Principles of Database Systems | 3.5 | 56 | | 12 | | | 5 | 数据结构 | |
| | | 4120060111 | 软件工程 B Software Engineering B | 2.5 | 40 | | 8 | | | 5 | | |
| | | 4120052111 | 嵌入式系统应用 A Embedded System and Application A | 2.5 | 40 | 6 | | | | 6 | 汇编语言程序设计 | |
| | | 4120094111 | 微机原理及接口技术 B Microcomputer and Interfacing B | 2.5 | 40 | 8 | | | | 6 | 计算机组成原理 A | |
| | | 4120039111 | 计算机系统结构 A Computer Architecture A | 2.5 | 40 | | | | | 6 | 计算机组成原理 A | |
| | | 4120033111 | 计算机网络 B Computer Networks B | 2.5 | 40 | | 8 | | | 5 | | |

| 课程类别 Course Classifi-cation | 课程性质 Course Nature | 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 | 第二专业 Second Major |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 总学时 Tot hrs. | 实验 Exp. | 上机 Ope-ration | 实践 Prac-tice | 课外 Extra-cur | | | |
| | | 4120204131 | 计算机网络应用开发<br>Computer Network Application development | 2 | 32 | | | 32 | | 6 | | |
| | | 4120147111 | 应用软件开发实训<br>Application Software Practise and Training | 3 | 48 | | | 48 | | 7 | | |
| | | 小 计 Subtotal | | 39 | 624 | 24 | 76 | 80 | | | | |
| | 选修课 Elective Courses | 4120235131 | 人工智能概论<br>Artificial Intelligence | 2.5 | 40 | | 8 | | | 5 | | |
| | | 4120008111 | UML 建模技术<br>UML Modeling Technology | 2 | 32 | | 8 | | | 6 | 软件工程 B | |
| | | 4120087111 | 网络集成技术<br>Network Integration Technology | 2 | 32 | 6 | | | | 6 | 计算机网络 B | |
| | | 4120102111 | 信息安全<br>Information Security | 2 | 32 | 6 | | | | 7 | | |
| | | 4120006111 | TCP/IP 和网络软件编程<br>TCP/IP and Network Programing | 2.5 | 40 | | 10 | | | 7 | 计算机网络 B | |
| | | 4120018111 | 多媒体技术<br>Multimedia Technology | 2 | 32 | 6 | | | | 5 | | |
| | | 4120197131 | SAP 程序设计<br>SAP Programming | 4 | 64 | | | 16 | | 6 | 数据库系统原理 | |
| | | 4120019111 | 分析软件工具<br>Analysis Software Tool | 2 | 32 | | 8 | | | 6 | | |
| | | 4120058111 | 软件测试 B<br>Software Testing B | 2 | 32 | 8 | | | | 6 | 软件工程 B | |
| | | 4120103111 | 信息系统分析与设计<br>Information System Analysis and Design | 2 | 32 | 6 | | | | 6 | 数据库系统原理 | |
| | | 4120009111 | Web 技术<br>Web Technology | 2 | 32 | | 6 | | | 6 | | |
| | | 4120044111 | 可视化编程<br>Visual Programming | 2.5 | 40 | 10 | | | | 4 | | |
| | | 4120081111 | 算法设计与分析 A<br>Algorithm Design and Analysis A | 2.5 | 40 | | 8 | | | 6 | 数据结构 | |
| | | 4120084111 | 通信原理 C<br>Communication Principles C | 2.5 | 40 | 8 | | | | 4 | | |
| | | 4120083111 | 云计算与服务计算<br>Clouding & Service Computing | 2 | 32 | 6 | | | | 7 | | |
| | | 小 计 Subtotal | | 34.5 | 552 | 56 | 48 | 16 | | | | |
| | | 修读说明：要求至少选修 17.5 学分。<br>NOTE：Minimum subtotal credits: 17.5. | | | | | | | | | | |

## 九、集中性实践教学环节建议进程表

## Ⅸ Practice Schedule

| 课程编号<br>Course Number | 实践环节名称<br>Practice Courses Name | 周数<br>Weeks | 学分<br>Crs | 建议修读学期<br>Suggested Term | 第二专业<br>Second Major |
|---|---|---|---|---|---|
| 1060002111 | 军事训练<br>Military Training | 3 | 1.5 | 1 | |
| 4120141111 | 专业教育<br>Professional Education | 1 | 1 | 3 | |
| 4100068111 | 电工电子实习 A<br>Practice in Electrical Engineering & Electronics A | 2 | 2 | 3 | |
| 4120206131 | 计算机硬件综合设计<br>Computer Hardware Integrated Course Project | 2 | 2 | 4 | |
| 41201391 | 系统软件开发实训<br>System Software Development Practise and Training | 2 | 2 | 5(校企合作) | |
| 4140222111 | 能力拓展训练<br>Ability Development Training | 1 | 1 | 6(暑期) | |
| 41201401 | 信息系统开发实训<br>Information System Practise and Training | 4 | 4 | 7(校企合作) | |
| 41201301 | 嵌入式系统开发实训<br>Embeded System Practise and Training | 4 | 4 | 7(校企合作) | |
| 4120113111 | 毕业实习<br>Practice for Graduation | 3 | 3 | 7(企业) | |
| 4120184121 | 毕业设计<br>Graduation Design (Thesis) | 17 | 11 | 8 | |
| 小　　计　Subtotal | | 39 | 31.5 | | |

## 十、其它要求

## Ⅹ Other Demands

《形势与政策》课程，平均每学期 16 学时，一般按专题进行，在第七学期末考核，计 2 个课外学分，具体由学校学生发展指导中心负责组织落实。

*Situation & Policy*, a 16 hours/term with 2 credits course, is taught according to topics and tested at the end of the 7th term . The course will be arranged by the University Students' Affairs' Department in each school.