目录

0007947 高级语言程序设计

课程编码：0007947

英文名称：High Level Language Programming

学分：3.5　　**学时：**56

适用对象：软件工程专业本科生

先修课程：无

考核形式：笔试

撰写人：祖宝开

课程简介：（200-300 字）

本课程是一门用以培养学生程序设计能力的技术基础课，目的是使学生了解计算机程序的基本概念，培养学生对实际问题进行抽象、算法、设计与程序实现的基本能力。主要介绍 C 语言的基本语法、语句、控制结构，以及程序设计的一般方法。通过本课程的学习，使学生具有熟练使用 C 语言编程解决实际问题的能力；掌握 C 语言的基本控制结构和基本控制语句及相关的语法规范，具有熟练用 C 语言进行程序设计的能力；了解 C 语言的编程环境和上机方法，具有熟练的上机编程和程序调试的能力；掌握一些常用的算法，具有熟练运用这些算法解决实际问题的能力；了解结构化程序设计和模块化设计方法的基本思想，掌握必要的程序设计技巧、程序测试和程序调试技巧。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

1. 廖湖声，叶乃文，周珺. C 语言程序设计案例教程（第三版）. 人民邮电出版社，2018

0007947 High Level Language Programming

Course Number: 0007947

Course Title: High Level Language Programming

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Software Engineering

Prerequisites: None

Evaluation Method: Written Exam

Writer：Zu Baokai

Course Description:

As an introductory course, the goal of this course is to train students' ability in programming design skills. The focus is on helping students grasp the fundamental concepts of computer programming design and develop their ability to abstract, design algorithms, and solve practical problems. The course covers basic grammar, statements, control structures, and general programming design methods. By studying this course, students will gain proficiency in C Language's control structures, statements, and grammar specifications, build up competence in C Language's programming design and debugging skills, learn commonly used algorithms, and apply them to solve practical problems. Upon completion of the course, students will have a solid understanding of structured programming and modular design methods, as well as programming skills and essential program testing and debugging approaches.

Recommended Textbooks/References:

1. Liao Husheng, Ye Naiwen, Zhou Jun. C Programming Tutorial by Examples (3rd Edition). Post & Telecom Press, 2018

0007442 面向对象程序设计（C++）

课程编码：0007442

课程名称：面向对象程序设计（C++）

英文名称：Object-Oriented Programming (C++)

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计

考核形式：平时成绩+考试

撰写人：陈洪丽

课程简介：

面向对象程序设计（C++）是信息学部软件学院为软件工程专业本科生开设的学科基础必修课。本课程的任务是讲授面向对象程序设计的基本思想及 C++语言的实现机制，C++语言的基本语法和 VC++或 VS 集成开发环境下的编程技术，介绍采用面向对象思想分析和解决问题的基本方法。教学内容重点是分析面向对象思想及 C++语言的实现机制，包括面向对象封装、继承、多态概念，类定义和对象声明、虚函数、派生类、抽象基类等 C++语言功能，以及对象设计、对象关联分析、程序结构设计和多态性应用等分析和设计方法。教学内容的难点是继承、多态、对象设计、对象关联分析、多态性应用等分析和设计方法。

推荐教材或主要参考书：

[1]陈维兴，林小茶，C ++面向对象程序设计（第 4 版），清华大学出版社，2018 年 1 月

[2]Ian Sommerville Software Engineering 9th， 机械工业出版社，2011 年 5 月

[3]郑莉，董江鹏，C ++语言程序设计（第 4 版），清华大学出版社，2010 年 7 月

[4]埃克尔（美），C ++编程思想（第 2 版），机械工业出版社，2017 年 8 月

0007442 Object-Oriented Programming (C++)

Course Number: 0007442

Course Title: Object-Oriented Programming (C++)

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software engineering

Prerequisites: High Level Language Programming

Evaluation Method: Course participation + written exams

Writer: Chen Hongli

Course Description:

Object-Oriented Programming (C++) is a required course for software engineering majors in the Department of Software Engineering at the Faculty of Information Technology. This course introduces the fundamental concepts of object-oriented programming and the implementation mechanism of C++ language. It covers the essential syntax of the C++ language and the programming techniques using VC++ or VS integrated development environment. Additionally, the course aims to introduce the basic methods of analyzing and solving problems via object-oriented thoughts.

Specifically, the course contains two teaching focuses: object-oriented thoughts and C++ language's implementation mechanism. The former includes fundamental concepts of object-oriented encapsulation, inheritance, and polymorphism, as well as a series of analysis and design methods, such as object design, object association analysis, program structure design, and polymorphism application. The latter includes specific functionality of C++ Language, such as class definition, object declaration, virtual function, derived class, abstract base class, etc.

The difficulty of this course lies in the analysis and design methods of object-oriented programming, including topics such as inheritance, polymorphism, object design, object association analysis, and the practical application of polymorphism.

Recommended Textbooks/References:

1. Chen Weixing, Lin Xiaocha, C++object oriented programming (4th Edition), Tsinghua University Press, January, 2018

2. Ian Sommerville software engineering 9th, China Machine Press, may 2011

3. Zheng Li, Dong jiangpeng, C++language programming (4th Edition), Tsinghua University Press, July 2010

4. Eckel (USA), C++ programming ideas (2nd Edition), China Machine Press, August 2017

0007909 离散数学

课程编码：0007909

课程名称：离散数学

英文名称：Discrete Mathematics

课程类型：学科基础必修课

学分：3.0　　**总学时：** 54

面向对象：软件工程专业类本科生

先修课程：线性代数（工），高等数学（工）

考核形式： 平时成绩+考试

撰写人：朱绍涛

课程简介：（250-300 字）

离散数学是信息学部为软件工程专业本科生开设的学科基础必修课程类型。本课程的任务是旨在继高等数学后，针对软件工程师培养数学逻辑思维能力、学习基本思维方法和研究方法；使学生具有现代数学的观点和方法，并初步掌握处理离散结构所必须的描述工具和方法；引导学生追求从问题出发，通过逻辑去解决问题，抽象程序模型，使学生具有良好的开拓专业理论的素质和使用所学知识分析和解决实际问题的能力，为学生以后学习其他专业课程打下良好的基础。教学内容重点：有关命题逻辑、谓词逻辑、集合论、代数系统、图论等。教学内容的难点：创新能力、抽象思维和概括能力、严谨的数学推理的能力培养。

推荐教材或主要参考书：

[1] 邓米克，全笑梅，刘兆英主编. 离散数学. 电子工业出版社，2020 年 12 月

0007909 Discrete Mathematics

Course Number: 0007909

Course Title: Discrete Mathematics

Course Type: Professional basic compulsory course

Credit: 3.0 **Total Credit Hours:** 54

Students: Undergraduate students majoring in software engineering

Prerequisites: Linear algebra, advanced mathematics

Evaluation Method: Course participation + written exams

Writer: Zhu Shaotao

Course Description:

Discrete Mathematics is a subject compulsory course for undergraduate students majoring in software engineering at the Faculty of Information Technology.

Following the advanced mathematics course, this course aims to develop the logical thinking ability for software engineers. It introduces to students the fundamental thinking and research methods required to master the view and method of modern mathematics. Students will also learn the necessary tools and methods to deal with discrete structures and be able to abstract a program model by solving problems using logic. This course emphasizes developing students' professional theory and practical problem-solving skills to establish a strong foundation for future courses.

The course covers various topics such as propositional logic, predicate logic, set theory, algebraic systems, and graph theory. Meanwhile, the course content is challenging and requires students to develop their innovation, abstract thinking, generalization, and rigorous mathematical reasoning abilities.

Recommended Textbooks/References:

1.Deng Mike, Quan Xiaomei, Liu Zhaoying, Discrete Mathematics, Publishing House of Electronics Industry, 12-2020

0007958 数字逻辑

课程编码：0007958

课程名称：数字逻辑

英文名称：Digital Logic

课程类型：学科基础必修课

学分： 2.0 **学时：**32

面向对象：软件工程专业本科生

先修课程：离散数学

考核形式：笔试

撰写人：李达

课程简介：（200-300 字）

数字逻辑是数字技术的基础，它以数字电子技术为基础，借助逻辑代数这一数学工具，包括了数字电路设计中的基本原理、基本分析和设计方法，具有很强的工程实践性。通过本课程的教学，使学生掌握数字逻辑电路的基本理论和概念、学会组合逻辑电路、时序逻辑电路的分析方法和设计方法，培养学生运用理论知识解决实际问题的能力，为学生今后深入学习计算机硬件专业知识打下坚实的基础。本课程结合生产实际，讲授了典型数字电路的基础知识和开发工具，并在配套的实验课程中加强了可编程逻辑器件和配套 EDA 软件的应用。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]戴维.哈里斯等著，数字设计和计算机体系结构（第 2 版）,机械工业出版社，2016

[2]王尔乾，杨士强，巴林凤 著. 数字逻辑与数字集成电路（第 2 版）. 清华大学出版社，2002

[3]欧阳星明 著. 数字逻辑（第 4 版）. 华中科技大学出版社，2009

[4]A.B.Marcovitz 著. Introduction to Logic Design(第 3 版). McGraw-Hill Education，2010

0007958 Digital Logic

Course Number: 0007958

Course Title: Digital Logic

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Discrete Mathematics

Evaluation Method: Written Exam

Writer: Li Da

Course Description:

Digital logic is the fundamental building block for all digital technologies, which is based on digital electronic technology as well as leveraging logic algebra. The digital logic course covers basic principles, analysis, and synthesis methodology in digital circuit design, which is of solid practice use. By the end of this course, students will acquire a solid understanding of the fundamental concepts and theories of digital logic circuits, as well as the methods for analysis and design of both combinational and sequential logic circuits. This knowledge will not only pave the way for their future studies in computer hardware but also equip them with the skills needed to tackle engineering problems with confidence. In order to help students better master engineering skills, this course will cover both classic digital circuits and development tools, specifically FPGA and EDA tool suites, which will be applied in the experimental class.

Recommended Textbooks/References:

2. David Harris, etc. Digital Design and Computer Architecture (2nd Edition), Elsevier, 216
3. Wang Erqian，Yang Shiqiang，Ba Linfeng. Digital Logic and Integrated Digital Circuits (2nd Ed). Tsinghua University Press, 2002
4. Ouyang Mingxing. Digital Logic (4th Ed). Huazhong Technology University Press，2009
5. A.B.Marcovitz. Introduction to Logic Design (3rd Ed), McGraw-Hill Education，2010

0008186 数据结构与算法

课程编码：0008186

课程名称：数据结构与算法

英文名称：Data Structures and Algorithms

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，面向对象程序设计（C++），离散数学

考核形式：平时成绩+考试

撰写人：陈洪丽

课程简介：

数据结构与算法是信息学部软件学院为软件工程专业本科生开设的学科基础必修课。数据结构与算法课程是研究数据的各种组织形式以及建立在这些结构上的各种运算算法的实现，它不仅为计算机语言进行编程提供了方法性的理论指导，更高层次上总结了程序设计的常用方法和技巧。同时也包括在计算机中如何有效地表示数据，如何合理地组织数据和处理数据，以及初步的算法设计和算法性能分析技术。教学内容重点是围绕着线性表、栈和队列、数组、串和广义表、树和二叉树、图等基本数据结构，以及查找和内部排序这两种常用的数据处理技术来组织。教学内容难点是理论与实践紧密结合，运用这些知识解决实际的问题。

推荐教材或主要参考书：

[1] 殷人昆 编著，数据结构(用面向对象方法与 C++语言描述) (第 2 版)，清华大学出版社，2018 年 1 月

[2]（美）SARTAJ SAHNI，数据结构、算法与应用—C++语言描述，机械工业出版社，2013 年 9 月

[3] Jeffrey D. Ullman 等，数据结构与算法（影印版），清华大学出版社，2003 年 12 月

[4] 李春葆主编，数据结构教程（第 5 版），清华大学出版社，2017 年 5 月

0008186 Data Structures and Algorithms

Course Number: 0008186

Course Title: Data Structures and Algorithms

Course Type: Professional basic compulsory course

Credit: 3.5 **Total Credit Hours:** 56

Students: Undergraduate students majoring in Software engineering

Prerequisites: High Level Language Programming, Object-Oriented Programming (C++), discrete mathematics

Evaluation Method: Course participation + written exams

Writer: Chen Hongli

Course Description:

Data structures and algorithms is a basic compulsory course for software engineering majors in the Department of Software Engineering at the Faculty of Information Technology. Students in this course will learn various organization forms of data and the implementation of diverse calculation algorithms based on these structures. Not only does it provide theoretical guidance for computer language programming, but it also summarizes the common methods and skills of program design at a higher level. The course introduces how to display, organize, and process data reasonably and effectively and presents preliminary algorithm design and performance analysis technology. The teaching focus of this course covers fundamental data structures (e.g., linear table, stack and queue, array, string and generalized table, tree and binary tree, and graph) and two commonly used search and internal sorting data processing technologies. This course's difficulty is combining theory with practice closely and solving practical problems with this knowledge.

Recommended Textbooks/References:

1. Yin renkun, data structure (described by object-oriented method and C++ language) (2nd Edition), Tsinghua University Press, January 2018

2. Sartaj Sahni, data structure, algorithm and Application – C++language description, China Machine Press, September 2013

3. Jeffrey D. Ullman et al., data structure and algorithm (photocopy edition), Tsinghua University Press, December 2003

4. Li Chunbao, editor in chief, data structure course (5th Edition), Tsinghua University Press, may 2017

0010718 软件工程导论（双语）

课程编码：0010718

课程名称：软件工程导论（双语）

英文名称：Introduction to Software Engineering

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：面向对象程序设计（C++），数据结构与算法，Java 程序设计

考核形式： 平时成绩+考试

撰写人：刘潇健

课程简介：（250-300 字）

软件工程导论是软件学院（信息学部）为软件工程专业开始的学科基础必修课。本课程参考软件工程一级学科知识体系要求，在课程设置过程中注重软件开发的工程性和实践性。以当前流行的统一开发过程、面向对象技术和 UML 语言为核心，以“软件建模与分析”、“软件设计”、“软件验证与确认”、“软件演化”、“软件过程”、“软件质量”为重点，结合软件开发的先进技术、实践和案例分析，讲解软件工程的“需求过程、需求获取方法，分析方法”、“软件架构设计及详细设计”、“软件测试”以及软件开发管理，使学生在理解和实践的基础上掌握基本的软件需求分析、建模、构建和使用相应 CASE 工具的能力，为软件工程专业学生解决复杂工程问题能力奠定基础。

推荐教材或主要参考书：

[1] Fank Tsui 等 软件工程导论 4th . 机械工业出版社，2018.9

[2] Ian Sommerville Software Engineering 9th. 机械工业出版社，2011.5

[3] Stephen R Schach Object-Oriented Classical Software Engineering 8th. 机械工业出版社，2012.7

0010718 Introduction to Software Engineering

Course Number: 0010718

Course Title: Introduction to Software Engineering

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Object-Oriented Programming (C++), Data Structures and Algorithms, Java Programming

Evaluation Method: Course participation + written exams

Writer: Liu Xiaojian

Course Description:

Introduction to Software Engineering is a required course for software engineering majors from the Dept. of Software Engineering (Faculty of Information Technology). This course refers to the requirements of the first-level discipline knowledge system of software engineering and pays attention to the engineering and practice of software development in the course setting. This course incorporates the modern development process, the current popular object-oriented technology, and UML language as its core, with "software modeling and analysis," "software design," "software verification and validation," "software evolution," "software process," "software quality" as its focus. Through applying software development's advanced technology, practice, and case studies, the course introduces requirement engineering, software design and architecture, testing, development, and management. By the end of this course, students will master fundamental software requirements analysis, modeling, construction, and corresponding CASE tools in both understanding and practice. As a major in Software Engineering, students will be equipped with the skills to solve complex engineering problems, which serves as a foundation for their future career.

Recommended Textbooks/References:

1. Fank Tsui Introduction to Software Engineering4th, China Machine Press，2018.9
2. Ian Sommerville Software Engineering 9th. China Machine Press，2011.5
3. Stephen R Schach Object-Oriented Classical Software Engineering 8th. China Machine Press，2012.7

0002549 数据库原理Ⅰ

课程编码：0002549

课程名称：数据库原理Ⅰ

英文名称：Principles of Database

课程类型：学科基础必修课

学分：3.0　**总学时：**48

面向对象：软件工程专业本科生

先修课程：数据结构与算法、计算机组成原理

考核形式：平时成绩+期末考试

撰写人：邵勇

课程简介：（200-300 字）

数据库技术是计算机科学领域发展最快、应用最广的技术之一，是必不可少的应用软件。目前应用软件均要涉及数据的存储和查询，即数据库技术的应用。这样就形成了数据库设计及应用、数据库基本理论、数据库管理系统三个领域的庞大市场，数据库原理是研究这三个领域的基础课程。

数据库原理是研究如何存储、使用和管理数据的一门学科，是计算机软件学科的一个重要分支。随着计算机应用的发展，数据库应用领域已从数据处理、信息管理、事务处理扩大到计算机辅助设计、人工智能、办公信息系统和网络应用等新的应用领域。经过三十多年的发展，数据库技术已形成完整的理论体系和一大批实用系统，因而本课程具有较强的理论性、实用性和可操作性。

推荐教材或主要参考书：

[1] 王珊，萨师煊. 数据库系统概论（第五版）. 北京：高等教育出版社，2014 年 9 月

[2] Baklarz G. DB2 9 for Linux UNIX Windows 数据库管理认证指南（原书第 6 版）. 2009 年 4 月

0002549 Principles of Database I

Course Number: 0002549

Course Title: Principles of Database

Course Type: Professional basic compulsory course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduates majoring in software engineering, undergraduates majoring in computer science

Prerequisites: Data structure, computer principle

Evaluation Method: Normal results + final exam

Writer: Shao Yong

Course Description:

Database technology is one of computer science's fastest-growing and most widely used technologies, and its application plays an essential role in software development. Currently, software inevitably involves data storage and querying, which employs database technology. Meanwhile, in three areas, a vast database market has formed: database design and application, basic theory, and management system development. This course lays the groundwork for studying the three fields mentioned above.

As a crucial branch of computer software, Database Principles is a discipline that studies how to store, use, and manage data. With the development of computer applications, the scenarios where databases are used have expanded to new areas such as computer-aided design, artificial intelligence, office information systems, and network applications, in addition to traditional data processing, information management, and transaction processing scenarios. After over 30 years of development, database technology has established a complete theoretical system along with many practical systems, making this course highly theoretical, practical, and operational.

Recommended Textbooks/References:

1.Wang Shan, Sa Shixuan. Introduction to Database Systems (Fifth Edition). *Beijing: Higher Education Press*, September 2014

2. Baklarz G. DB2 9 for Linux UNIX Windows, *Database Management Certification Guide (Original Book 6th Edition).* April 2009

0008170 计算机组成原理

课程编码：0008170

课程名称：计算机组成原理

英文名称：Principles of Computer Organization

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：软件工程专业的本科生

先修课程：电路分析基础、数字逻辑、高级语言程序设计

考核形式： 平时成绩（20%）+实验成绩（10%）+考试成绩（70%）

撰写人：田锐

课程简介：（250-300 字）

计算机组成原理是软件工程专业一门重要的专业基础课，从软件工程师的角度剖析计算机存储程序、执行程序、以及通信的过程，培养学生对计算机整机有完整、清晰的认知，从而具备编写高效率、高可靠代码的能力。通过本课程的学习，学生能够了解和掌握计算机系统的硬件组成，如典型计算机的五大部件、了解计算机部件在完成基本计算任务过程中的作用、掌握计算机数字表示法与数字运算基础、了解计算机内存管理形式、了解计算机系统结构与指令集、会编写简单的汇编语言程序、掌握 CPU 运行的基本原理。有助于学生对程序设计、操作系统、计算机网络有成体系的知识基础，为学习本专业后继课程如编译原理、计算机体系结构、计算机网络等打下坚实基础。

推荐教材或主要参考书：

[1] 唐朔飞等 计算机组成原理 第二版。高等教育出版社，2008.1；

[2] 深入理解计算机系统（原书第 3 版）。机械工业出版社，2016.12；

[3] 计算机组成与设计：硬件/软件接口（原书第 5 版）。机械工业出版社，2015.7。

0008170 Principles of Computer Organization

Course Number: 0008170

Course Title: Principles of Computer Organization

Course Type: Basic Courses in General Discipline

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in software engineering

Prerequisites: Fundamentals of Circuit Analysis, Mathematical Logic, C Programing Language

Evaluation Method: Course participation (20%) + Written exams (70%) + Experiment (30%)

Writer: Tian Rui

Course Description:

The course "Principles of Computer Organization" presents a programmer's perspective on how computer systems perform tasks, store data, and communicate with others. This course is designed to enhance students' programming skills, developing their capabilities of writing efficient and reliable code. In the meantime, this course provides a foundation for more advanced courses on compilers, networks, and operating systems, where a deeper understanding of systems-level issues is required. Topics covered include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management, networking technology and protocols, and supporting concurrent computation.

Recommended Textbooks/References:

1. Tang Shuofei etc. Computer Organization (2nd edition). Higher Education Press, Jan 2008.

2. Randal E.Bryant etc. Computer Systems: A Programmer’s Perspective (3rd edition). China Machine Press, Dec. 2016.

3. David A. Patterson and John L. Hennessy. Computer Organization and Design (5th edition) China Machine Press, May 2020.

0007359 操作系统原理

课程编码：0007359

课程名称：操作系统原理

英文名称：Operating Systems

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：软件工程专业本科生

先修课程：计算机组成原理，高级语言程序设计，数据结构与算法

考核形式：平时成绩+考试

撰写人：朱娜斐

课程简介：（250-300 字）

操作系统原理是信息学部软件学院为软件工程专业本科生开设的学科基础必修课。本课程的任务是：帮助学生掌握操作系统的基本概念、基本原理和算法，了解操作系统的设计与实现技术，建立操作系统整体概念。使学生能够更好地理解操作系统的各种行为，同时希望操作系统设计中采用的方法和技术能够对学生设计软件系统有所启发，为学生更好地设计和开发各种应用软件奠定必要的基础。教学内容的重点包括：操作系统的概念和功能、处理器的管理、内存的管理、信息存储的管理、外设的管理以及操作系统体系结构等内容。教学内容的难点包括：处理器的管理、内存的管理、信息存储的管理、外设的管理以及操作系统体系结构等章节所涉及的概念、原理和方法。

推荐教材或主要参考书：

[1]Andrew S.Tanenbaum. 陈向群等译. 现代操作系统. 机械工业出版社，2009 年 7 月

[2]孙钟秀,费翔林,骆斌. 操作系统教程（第 4 版）. 北京：高等教育出版社，2011 年

[3]郑然, 庞丽萍, 计算机操作系统实验指导(Linux 版). 人民邮电出版社，2014 年 8 月

[4]Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. 操作系统概念(第七版). 北京：高等教育出版社，2010 年 10 月

0007359 Operating Systems

Course Number: 0007359

Course Title: Operating Systems

Course Type: Basic Subject Compulsory Course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in software engineering

Prerequisites: Computer composition principle and assembly language, C language programming，Data structure

Evaluation Method: Course participation + written exams

Writer: Zhu Nafei

Course Description:

Operating Systems is a professional elective course offered by the Dept. of Software Engineering at the Faculty of Information Technology for undergraduates majoring in software engineering. The task of this course is to help students master the basic concepts, principles, and algorithms of operating systems, understand the design and implementation technology of operating systems, and establish the overall concept of operating systems. The course is designed to help students better understand the various behaviors of operating systems. At the same time, it is hoped that the methods and technologies used in operating system design can inspire students to design software systems and lay a foundation for students to better design and develop various application software. The teaching focus includes the concept and function of the operating system, processor management, memory management, information storage management, peripheral management, and operating system architecture. The difficulties of this course include the concepts, principles, and methods involved in chapters, such as processor management, memory management, information storage management, peripheral management, and operating system architecture.

Recommended Textbooks/References:

1. Andrew S. Tanenbaum. Xiangqun Chen et al. Modern operating system. China Machine Press, July 2009.

2. Zhongxiu Sun, Xianglin Fei, Bin Luo. Operating system tutorial (4th Edition). Beijing: Higher Education Press, 2011.

3. Ran Zheng, Liping Pang, Experimental guidance of computer operating system (Linux version). People's Posts and Telecommunications Press, August 2014.

4. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. Operating system concept (7th Edition). Beijing: Higher Education Press, October 2010.

0010140 软件需求分析与建模

课程编码：0010140

课程名称：软件需求分析与建模

英文名称：Software Requirements Analysis and Modeling

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：软件工程导论

考核形式：平时成绩+考试

撰写人：王伟东

课程简介：（250-300 字）

软件需求分析与建模课程是信息学部为软件工程专业本科生开设的学科基础必修课程。本课程的任务是从软件需求工程的角度出发，以需求开发过程为主线，完整地描述需求获取、需求分析、需求建模、需求规格说明和需求管理 5 个需求工程活动。教学内容重点：密切结合软件开发的先进技术、最佳实践和案例分析，透彻讲解软件需求工程过程、需求获取方法、分析方法、UML 建模方法，及软件需求工程的各项进展。教学内容的难点：努力促进需求工程领域理论、方法和技术的全面融合应用，以指导软件需求工程各阶段的系统化实践。

推荐教材或主要参考书：

[1] 骆斌, 需求工程—软件建模与分析 2nd. 高等教育出版社，2015 年 02 月

[2] 邹盛荣, UML 面向对象需求分析与建模教程 2nd，科学出版社，2019 年 01 月

[3] Leszek A. Maciaszek，Requirements Analysis and System Design 3rd，2020 年 01 月

0010140 Software Requirements Analysis and Modeling

Course Number: 0010140

Course Title: Software Requirements Analysis and Modeling

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Essentials of Software Engineering

Evaluation Method: Course participation + written exams

Writer: Wang Weidong

Course Description:

Software Requirements Analysis and Modeling is one of the professional basic compulsory courses for undergraduate students majoring in Software Engineering. The main objective of this course is to provide a clear understanding of the requirement development process, comprehensively introducing the five requirements engineering activities: requirement acquisition, requirement analysis, requirement modeling, requirement specification, and requirement management. This course focuses on advanced software development technologies, best development practices, and real-world case studies, covering software requirement engineering processes, requirement acquisition methods, analysis methods, UML modeling methods, and the progress of software requirements engineering. The difficulties of this course are described as follows: many efforts should be made to promote the comprehensive integration and application of theory, method, and technology to guide the systematic practice of software requirement engineering at all stages.

Recommended Textbooks/References:

1.Karl Wiegers, Joy Beatty. Software Requirements 3rd，Southeast University Press, Sep, 2014.

2.Grady Booch James, The Unified Modeling Language User Guide 2nd, China Machine Press, Apr, 2006

3.Leszek A. Maciaszek，Requirements Analysis and System Design 3rd，China Machine Press, Jan, 2020

0007749 计算机网络（双语）

课程编码：0007749

课程名称：计算机网络（双语）

英文名称：Computer Networks

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：计算机组成原理，数据结构与算法

考核形式：平时成绩+考试

撰写人：黄志清

课程简介：（250-300 字）

计算机网络是信息学部软件学院为软件工程专业本科生开设的学科基础必修课。本课程综合 OSI/RM 参考模型和 TCP/TP 协议体系，介绍计算机网络的物理层、数据链路层、网络层、传输层和应用层，同时介绍网络安全的基本知识。通过本课程的学习，使学生理解并掌握计算机网络的基本概念、基本原理和基本方法；熟悉计算机网络的体系结构；理解并掌握计算机网络各层的功能、工作原理和主要协议；了解网络安全基本内容；了解计算机网络的新技术以及发展趋势；具备一定的对计算机网络工程问题进行系统分析和综合的能力。为其它专业课程学习以及从事计算机网络方面的技术开发和工程应用打下良好的基础。

推荐教材或主要参考书：

[1] Andrew S. Tanenbaum, David J. Wetherall. 计算机网络(第 5 版). 清华大学出版社, 2012 年 03 月 （中文版）

[2] Andrew S. Tanenbaum, David J. Wetherall. Computer Networks, 5th Ed. 机械工业出版社, 2011 年 10 月 （英文影印版）

0007749 Computer Networks

Course Number: 0007749

Course Title: Computer Networks

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Computer composition principle, data structure and algorithm

Evaluation Method: Course participation + written exams

Writer: Huang Zhiqing

Course Description:

Computer Networks is a discipline basis compulsory course for undergraduate students majoring in software engineering. This course provides an in-depth understanding of computer networks by integrating the OSI/RM reference model and TCP/TP protocol system. It covers the physical, data link, network, transport, and application layers of computer networks, and also introduces the fundamental concepts of network security. Upon completing this course, students will achieve the following: (1) understand and master the fundamental concepts, principles, and methods of computer networks; (2) become familiar with the system structure of computer networks; (3) understand and master the functions, working principles, and main protocols of each layer of computer network; (4) understand the essential content of network security; (5) learn about the latest technology and development trend of computer networks; (6) develop the ability to systematically analyze and synthesize network engineering problems. This course provides a solid foundation for studying the technical development and engineering application of computer networks, as well as other professional courses.

Recommended Textbooks/References:

1.Andrew S. Tanenbaum, David J. wetherall. Computer networks (5th Edition). Tsinghua University Press, March 2012 (Chinese Edition)

2. Andrew S. Tanenbaum, David J. wetherall. Computer networks, 5th ed. Machinery Industry Press, October 2011 (English photocopies)

0008148 软件设计与体系结构（双语）

课程编码：0008148

课程名称：软件设计与体系结构（双语）

英文名称：Software Architecture & Design (Bilingual)

课程类型：学科基础必修课

学分：2.0　　**学时：**32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计基础、面向对象程序设计（C++）、Java 程序设计

考核形式：笔试

撰写人：张建

课程简介：（200-300 字）

本课程主要介绍软件体系结构设计的基本知识结构，和体系结构的设计和实现方法，包括软件体系结构基本概念、软件设计技术基础、软件体系结构设计方法和策略、主流平台上的软件开发基本体系结构的实施等，以独立于编程语言的方式介绍软件体系结构设计的原理。要求学生掌握软件基础设计方法论、软件设计工程基本任务集、几种典型软件体系结构模式及其应用、软件设计中各种组件的设计/实现方法、软件设计质量属性、主流开发环境下（C/C++/Java/.Net Framework/J2EE）体系结构的实施过程、软件体系结构的评估与方法等。课程提升软件工程学生软件系统或程序设计能力、进行复杂软件工程设计的素质培养，突出以模块化、抽象、信息隐藏能力、逻辑推理和规范化表达能力为基础的工程设计能力培养。双语教学拓宽软件工程人才培养中强化国际化、工程型、创新性人才的国际视野，培养跨文化交流能力，加强国际竞争能力。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]Mary Shaw，David Garlan 著，Software Architecture Perspectives On An Emerging Discipline （软件体系结构），牛振江、江鹏和金福生编译，清华大学出版社，2007，3；

[2]Mary Shaw and David Garlan, Software Architecture Perspectives On An Emerging Discipline （影印版），科学出版社，2004;

[3]张友生等编译，软件体系结构，清华大学出版社，2006，11；

[4]张建：现代软件设计与体系结构（讲义），2020

0008148 Software Architecture & Design (Bilingual)

Course Number: 0008148

Course Title: Software Architecture & Design (Bilingual)

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Basic programming & design, OO design & programming, C/C++/Java programming

Evaluation Method: Written Exam

Writer: Zhang Jian

Course Description:

This course provides software engineering students a comprehensive understanding of software system design and architecture. It covers fundamental concepts, skills, techniques, tools, methodologies, and perspectives essential for software professionals and architects to design large-scale or complicated software systems successfully. Specifically, the course focuses on topics as follows: (1) the fundamental concept of software and its role, (2) the definition and importance of software architecture, (3) software system design and principles, (4) standard and classic software patterns/styles, (5) component design and implementation (e.g., GUIs components, business entities and business flow components, data access components), (6) software architecture evaluation and criteria, and (7) relevant case studies.

By the end of this course, students will possess the skills and knowledge necessary for basic software system design and the ability to design complex software systems. This includes expertise in modular design, abstraction, information hiding, logical inference, and formal description.

Besides, this course is taught bilingually, which helps students extend their global vision, develop cross-cultural communication and collaboration skills, and build their competence in engineering, innovation, and globalization.

Recommended Textbooks/References:

1. Mary Shaw，David Garlan，Software Architecture Perspectives On An Emerging Discipline（Translation in Chinese），Translated by Zhengjian Liu、Peng Jiang，Tsinghua University Press，2007，3;
2. Mary Shaw and David Garlan, Software Architecture Perspectives On An Emerging Discipline（photo-copy version）, Science Press，2004;
3. Yousheng Zhang，Software Architecture，Tsinghua University Press，2006，11；
4. Jian Zhang, Modern Software System Architecture & Design（Textbook Draft & Handout）,2020；

0008159 软件过程与项目管理

课程编码：0008159

课程名称：软件过程与项目管理

英文名称：Software Process and Project Management

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：软件工程导论

考核形式：平时成绩+实验成绩

撰写人：阎长顺

课程简介：

软件过程与项目管理是信息学部软件学院为软件工程专业本科生开设的学科基础必修课程。本课程的任务是传授软件过程与项目管理的基本理论、基本方法、一些成功的案例及敏捷项目管理的全新理念。教学内容重点是软件项目管理理念的导入；范围、时间、成本及集成计划的编制；敏捷理念的理解；Scrum 模型的理解。教学内容的难点是敏捷理念的理解和集成计划的编制。通过本门课程的系统学习，要求学生能掌握软件项目的传统管理过程及敏捷项目管理过程。最终具备集成计划编制能力；良好的沟通及团队协作能力；软件项目的立项、执行控制、验收管理等能力。

推荐教材或主要参考书：

[1] 韩万江，姜立新，《软件项目管理案例教程》第 4 版，机械工业出版社，2019 年 6 月

[2] Robert C. Martin，敏捷软件开发：原则、模式与实践，清华大学出版社，2003 年 9 月

[3] Kenneth S. Rubin，Scrum 精髓：敏捷转型指南，清华大学出版社，2014 年 6 月

0008159 Software Process and Project Management

Course Number: 0008159

Course Title: Software Process and Project Management

Course Type: Professional basic compulsory course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Introduction to Software Engineering

Evaluation Method: Course participation + Experimental results

Writer: Yan Changshun

Course Description:

Software Process and Project Management is one of the compulsory courses for undergraduate students majoring in Software Engineering. This course explains software process and project management theories and methods, successful cases, and new agile project management concepts. The teaching focus of this course contains (1) the introduction of software project management concepts, (2) preparation of scope, time, cost, and integration plans, (3) understanding of agile concepts, and (4) understanding the Scrum model. The main challenges of this course involve understanding agile concepts and designing integration plans.

By the end of this course, students will have a thorough understanding of both the traditional management process and the agile project management process for software projects. They will also enhance their abilities in integrated planning, software project approval, implementation control, and acceptance management, while improving their communication and teamwork skills.

Recommended Textbooks/References:

1.Wanjiang Han, Lixin Jiang, Software project management case course, 4th edition, *Mechanical industry Press*, 6-2019

2.Robert c. Martin, agile software development: principles, patterns and practices, Qinghua University press, 9-2003

3.Rubin, Kenneth s. Scrum essence: a guide to agile transformation, Qinghua University press, 6-2014

0008149 软件测试与质量保证

课程编码：0008149

课程名称：软件测试与质量保证

英文名称：Software Testing and Quality Assurance

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：软件工程导论

考核形式：平时成绩+考试

撰写人：李娟

课程简介：（250-300 字）

软件测试与质量保证是信息学部软件学院为软件工程专业本科生开设的学科基础必修课程。本课程的任务是使学生掌握软件测试以及软件质量保证的基本概念，掌握软件测试的一般流程、常用技术和方法，使得学生具备运用测试技术、进行测试管理的能力。教学内容重点：软件测试的基本概念以及测试技术和策略。教学内容的难点：软件测试过程、软件质量度量和测评方法。

推荐教材或主要参考书：

[1] Stephen Brown 等著， 软件测试：原理与实践（英文版第 2 版）， 机械工业出版社，2019 年 4 月

[2] 蔡建平编著，软件测试大学教程，清华大学出版社，2009 年 9 月

[3] Roger S. Pressman 等著，软件工程：实践者的研究方法（原书第 8 版），机械工业出版社， 2016 年 9 月

[4] 殷人昆等著，实用软件工程（第三版），清华大学出版社，2010.年 11 月

0008149 Software Testing and Quality Assurance

Course Number: 0008149

Course Title: Software Testing and Quality Assurance

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Introduction to Software Engineering

Evaluation Method: Course participation + written exams

Writer: Li Juan

Course Description:

Software Testing and Quality Assurance is a major required course offered by the Dept. of Software Engineering for undergraduate students majoring in Software Engineering. This course introduces methodologies and technologies in software testing and quality assurance, developing students' ability to leverage appropriate methods, theories, and tools to solve software testing and quality problems.

The course mainly covers software testing and quality assurance theories and methods, including the software testing process and quality measurement as its difficult parts.

Recommended Textbooks/References:

1.Stephen Brown, Software Testing: Principles and Practice, *China Machine Press,* 4-2019

2.Jianping Cai, University Tutorials of Software Testing, *Tsinghua University Press,* 9-2009

3.Roger S. Pressman, Software Engineering: A Practitioner’s Approach, *Machinery Industry Press,* 9-2016.

4.Renkun Yin, Practical software engineering, *Tsinghua University Press, 11-2010*

0009133 面向对象程序设计（C++）课设

课程编码：0009133

课程名称：面向对象程序设计（C++）课设

英文名称：Course Project of Object-Oriented Programming (C++)

课程类型：学科基础必修课

学分： 1.0 **总学时：** 30

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，面向对象程序设计（C++）

考核形式：平时成绩+学习报告

撰写人：陈洪丽

课程简介：

面向对象程序设计（C++）课设是信息学部软件学院为软件工程专业本科生开设的学科基础必修课程。本课程是“面向对象程序设计（C++）”课程教学的一个重要环节，主要任务是配合课堂教学所讲授的知识内容，进行相应的实验性操作，使学生在完成课设题目的过程中，逐步加深对课堂讲授内容的认识，培养学生面向对象的程序设计能力。教学内容重点是学生依据课堂讲授的相关知识，通过分析、设计、编程、调试等环节完成一个较大的实际应用项目，进而加深掌握程序设计的基本思想、基本流程，掌握程序设计的基本语法及掌握程序调试的基本流程；掌握主流的程序编辑、调试工具。教学内容的难点是综合运用所学的理论知识和方法解决实际问题，具体到分析和设计、编程、调试等环节的完成，用系统的观点和软件开发一般规范进行软件开发。

推荐教材或主要参考书：

无。

0009133 Course Project of Object-Oriented Programming (C++)

Course Number: 0009133

Course Title: Course Project of Object-Oriented Programming (C++)

Course Type: Subject basic compulsory course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Software engineering

Prerequisites: High Level Language Programming, Object-Oriented Programming (C++)

Evaluation Method: Course participation + Study Report

Writer: Chen Hongli

Course Description:

The Course Project of Object-Oriented Programming (C++) is a compulsory course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates. This course is a crucial element of the Object-oriented programming (C++) course. The primary objective of this course is to enable students to apply the knowledge they have learned in the Object-oriented programming (C++) class to perform practical experiments. These experiments will help students deepen their understanding of the course content and develop their ability to code in an object-oriented programming language. Completing the assigned course projects will serve as a means to achieve these goals.

This course focuses on helping students complete a sizeable practical application project by applying analyzing, designing, programming, and debugging skills they have learned in class. Students will gain a deeper understanding of the fundamental concepts and processes of program design, practice the basic grammar of program design and the basic process of program debugging, and learn the mainstream program editing and debugging tools.

The challenge of this course is three-fold: (1) applying theoretical knowledge and methods to solve practical problems, (2) completing tasks such as analysis, design, programming, and debugging, and (3) developing software with a system viewpoint and following general standards of software development.

Recommended Textbooks/References:

None.

0007155 认识实习

课程编码：0007155

课程名称：认识实习

英文名称：Cognitive Practice

课程类型：实践环节必修课

学分： 1.0 **总学时：** 30

面向对象：软件工程专业本科生

先修课程：新生研讨课

考核形式：平时成绩+报告

撰写人：句福娇

课程简介：（250-300 字）

认识实习是本专业实践课程教学环节内容之一，主要为了让学生了解目前国内外软件发展动向，熟悉软件开发的各项工作。通过本课程的学习，使学生了解软件项目开发和维护的一般过程，了解软件开发的传统方法和最新方法，使学生对软件系统生产工程化的具体思想、基本要求和先进方法均有较全面的了解，为更深入的学习和今后从事软件工程实践打下良好基础。本课程主要通过参观相关企业、聆听领域专家报告与行业领先技术人员沟通为主，使学生在学习有关的专业知识和管理知识的同时，能提高自身的综合素质，帮助学生提前进行职业规划，最终使学生对本专业在社会经济改革与发展中的重要地位、作用有较为深刻的认识和理解。

0007155 Cognitive Practice

Course Number: 0007155

Course Title: Cognitive Practice

Course Type: Compulsory course in practice

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Freshman Seminar

Evaluation Method: Course participation + Report

Writer: Ju Fujiao

Course Description:

Cognition Practice is a practical course for software engineering undergraduates. It aims to help students understand trends in software development, both domestically and internationally, and become familiar with the software development process.

In this course, students will learn both traditional and modern software development methodologies and understand the general process of software project development and maintenance. This course provides students with a comprehensive understanding of the specific ideas, basic requirements, and advanced methods of software systems, laying a solid foundation for further study and software engineering practice.

This course consists of three parts: visiting relevant enterprises, listening to expert reports, and communicating with technical personnel in the industry. The course is designed to help students enhance their skills and knowledge in professional and management areas, thereby improving their overall quality. It also guides them toward career planning and provides a better understanding of the significant role this major plays in social and economic development and reform.

0009048 数据结构与算法课设

课程编码：0009048

课程名称：数据结构与算法课设

英文名称：Course Project of Data Structures and Algorithms

课程类型：实践环节必修课

学分： 2 **总学时：** 60

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，面向对象程序设计（C++），离散数学，数据结构与算法

考核形式：平时成绩+学习报告

撰写人：陈洪丽

课程简介：

数据结构与算法课设是信息学部软件学院为软件工程专业本科生开设的实践环节必修课。本课程是“数据结构与算法”课程教学的一个重要环节，主要任务是配合课堂教学所讲授的知识内容，进行相应的实验性操作，使学生在完成各个实验题目的过程中，逐步加深对课堂讲授内容的认识，并在理解基本数据结构和算法的基础上，掌握利用数据结构的相关知识与技术，解决实际问题的基本技能。教学内容重点是学生依据课堂讲授的相关知识，通过分析、设计、编程、调试等环节独立完成一个较大的实际应用项目。教学内容的难点是综合运用所学的理论知识和方法解决实际问题，具体到分析和设计、编程、调试等环节的完成，用系统的观点和软件开发一般规范进行软件开发。

推荐教材或主要参考书：

无。

0009048 Course Project of Data Structures and Algorithms

Course Number: 0009048

Course Title: Course Project of Data Structures and Algorithms

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 60

Students: Undergraduate students majoring in Software Engineering

Prerequisites: High Level Language Programming, Object-Oriented Programming (C++), discrete mathematics, Data Structures and Algorithms

Evaluation Method: Course participation + Study Report

Writer: Chen Hongli

Course Description:

The Course Project of Data Structures and Algorithms is a compulsory course for software engineering undergraduates in the Dept. of Software Engineering. The course aims to help students understand the basic knowledge of data structure they have learned in the Data Structures and Algorithms course, and build up their competence in solving practical problems by practicing data structure-related methods and technologies step-by-step.

The teaching focus consists of two parts: guiding students to complete a sizeable practical application project independently by applying analysis, design, programming, and debugging skills they have learned in class.

The challenge of this course is three-fold: (1) applying the theoretical knowledge and methods to solve practical problems, (2) completing the entire task, from analyzing, designing, programming, and debugging, and (3) developing the software with a system viewpoint and the general standard of software development.

Recommended Textbooks/References:

None.

0010655 移动软件开发

课程编码：0010655

课程名称：移动软件开发

英文名称：Mobile Software Development

课程类型：实践环节必修课

学分： 2.0 **总学时：** 60

面向对象：软件工程专业本科生

先修课程：面向对象程序设计，数据库原理，Web 开发实践

考核形式：实验过程+最终考核

撰写人：刘海兵 俞敏

课程简介：

移动软件开发是软件学院(信息学部)为软件工程专业本科生开设的专业实践必修课程。本课程的任务使学生掌握基于移动软件开发的核心技术，并将前期所学的基础技术应用于工程实践，从而快速开发出美观、可交互的移动设备应用界面，为将来的工作打下坚定的基础。教学内容重点：掌握移动软件开发的软件环境配置、需求分析、设计、代码实现、测试、发布的综合性应用开发技术。教学内容难点：对于移动软件开发领域复杂工程问题及在开发中使用这些框架遇到的问题能够有效的与他人交流，团结协助，能采用多种手段清晰呈现以及陈述表达，能够跟踪相关专业领域及相关行业的国内外发展趋势及研究热点。

推荐教材或主要参考书：

[1] 梁柏青，钟伟彬，林玮平等，移动终端应用软件开发实战，人民邮电出版社，2015.02.01

[2] 聚慕课教育研发中心编，Android 从入门到项目实践，清华大学出版社，2019.10.01

[3] 吕鸣，HTML5 移动 Web+Vue.js 应用开发实战，清华大学出版社，2020.06.01

0010655 Mobile Software Development

Course Number: 0010655

Course Title: Mobile Software Development

Course Type: Compulsory course in practice

Credit: 2.0 **Total Credit Hours:** 60

Students: Undergraduate students majoring in Software engineering

Prerequisites: Object oriented programming, Principles of Database, Web Development Practice

Evaluation Method: Experimental process + Final assessment

Writer: China Soft International/Yu Min

Writer: Liu Haibing, Yu Min

Course Description:

Mobile software development is a required practical course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates.

The objective of this course is to enable students to gain mastery of core mobile software development technologies. The basic technology acquired during the early stages was applied to engineering practice, resulting in the rapid development of a beautiful and interactive mobile application interface. This has laid a solid foundation for future work.

The challenge of this course is two-fold: (1) building up students' effective communication, presentation, and cooperation skills during mobile software development, especially in the face of complex and knotty engineering problems, and (2) developing their ability to follow domestic and international development trends as well as research hotspots in relevant professional fields and related industries.

Recommended Textbooks/References:

1. Liang Baiqing, Zhong Weibin, Lin Weiping, mobile terminal application software development, people's Posts and Telecommunications Press, 2015.02.01
2. Edited by jumoke education research and development center, Android from introduction to project practice, Tsinghua University Press, October 1, 2019
3. [3] LV Ming, HTML5 mobile web+ Vue.js Practical application and development, Tsinghua University Press, June 1, 2020

0008153 计算机网络实验

课程编码：0008153

课程名称：计算机网络实验

英文名称：Computer Networks Experiment

课程类型：实践环节必修课

学分： 1.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：计算机网络

考核形式： 平时成绩+实验

撰写人：朱婉婷

课程简介：（250-300 字）

计算机网络实验是信息学部软件学院为软件工程专业本科生开设的实践环节必修课。本课程是“计算机网络”这门软件工程专业学科基础必修课的配套实验课，旨在继学习计算机网络知识后，通过将计算机网络课程中所学到的理论和技术进行实践训练，加深学生对计算机网络理论和技术的理解，提高学生对理论和技术的掌握程度，同时培养学生的动手实践能力，增强学生将理论与实践相结合的能力。通过本实践课程的学习可以为后续软件体系架构、网络编程技术、物联网技术等方面的专业课程打下坚实的基础。

推荐教材或主要参考书：

无

0008153 Computer Networks Experiment

Course Number: 0008153

Course Title: Computer Networks Experiment

Course Type: Compulsory course in practice

Credit: 1.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in software engineering

Prerequisites: Computer Networks

Evaluation Method: Course participation + Experiments

Writer: Zhu Wanting

Course Description:

Computer Networks Experiment is a compulsory practical course for undergraduate students majoring in software engineering. As a supporting experimental course, it allows students to put into practice the theories and technologies they learned in the "Computer Network" course. This course combines computer network theory with practice, improving students' practical abilities, deepening their understanding of computer network knowledge, and enhancing their mastery of network theory and technology. The study of this practical course can lay a solid foundation for subsequent professional courses such as software architecture, network programming technology, Internet of Things.

Recommended Textbooks/References:

None

0008155 软件开发综合实践

课程编码：0008155

课程名称：软件开发综合实践

英文名称：Comprehensive Practice of Software Development

课程类型：实践环节必修课

学分： 3.0 **总学时：** 90

面向对象：软件工程专业本科生

先修课程：面向对象程序设计，数据库原理，Web 开发实践

考核形式：实验过程+最终考核

撰写人：刘海兵 俞敏

课程简介：（250-300 字）

软件开发综合实践是软件学院（信息学部）为软件工程专业本科生开设的专业实践必修课程类型。本实践课程以一个中型项目为主线，以团队为单位，按照软件工程的规范和要求，综合使用前三学年软件工程专业知识、技能和工具，完成项目从立项、团队组建、需求分析、原型设计、系统设计到开发、测试、提交、归档等全过程，为今后在 IT 相关领域工作和研究奠定坚实的工程基础。训练学生使用系统的观点和软件开发一般规范进行软件开发，培养软件工作者所应具备的科学的工作方法、作风和相互合作的精神。教学内容重点：项目从立项、团队组建、需求分析、原型设计、系统设计到开发、测试、提交、归档等全过程。教学内容的难点：以一个中型项目为主线，以团队为单位，按照软件工程的规范和要求完成项目设计和开发。

推荐教材或主要参考书：

[1] 张海藩，牟永敏 著. 软件工程导论. 清华大学出版社，2013.08.01

[2] 李爱萍，崔冬华，李东生 编. 软件工程. 人民邮电出版社，2014.03.01

[3] 岳希，唐聃，周子洪 编. 软件工程综合实践案例. 机械工业出版社，2020.01.01

0008155 Comprehensive Practice of Software Development

Course Number: 0008155

Course Title: Comprehensive Practice of Software Development

Course Type: Practical required course

Credit: 3.0 **Total Credit Hours:** 90

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Object oriented programming, Principles of Database, Web development technologies

Evaluation Method: Experimental process + Final assessment

Writer: Liu Haibing, Yu Min

Course Description:

Comprehensive practice of software development is a required practical course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates.

This practice course involves a medium-sized project as the main focus, with the team as the unit. Following the specifications and requirements of software engineering, the course comprehensively employs the professional knowledge, skills, and tools of software engineering from the first three academic years. The project is completed from project establishment, team building, demand analysis, prototype design, and system design to development, testing, submission, and archiving. In order to achieve optimal results, software development must be approached in a systematic and scientific manner, paying attention to detail throughout the process. This process aims to lay a solid engineering foundation for future work and research in related fields.

The course focuses on the entire software engineering process, from project initiation and team setup to requirement analysis, prototype design, system design, development, testing, submission, and documentation. The course's challenge is two-fold: (1) to focus on a medium-sized project with the team as a unit and (2) to complete project design and development according to software engineering specifications and requirements.

Recommended Textbooks/References:

1. Zhang Haifan, Mou Yongmin. Introduction to software engineering. Tsinghua University Press, August 1, 2013
2. Li Aiping, Cui Donghua, Li Dongsheng. Software engineering. People's Posts and Telecommunications Press, 2014.03.01
3. Yue Xi, Tang Zhen, Zhou Zihong. Comprehensive practice case of software engineering. China Machine Press, January 1, 2020

0008464 工作实习

课程编码：0008464

课程名称：工作实习

英文名称：Work Internship

课程类型：实践环节必修课

学分：4.0　**总学时：**120

面向对象：软件工程专业本科生

先修课程：面向对象程序设计(C++)课设，软件工程导论，软件开发综合实践

考核形式：考查

撰写人：宿浩茹

课程简介：（250-300 字）

工作实习是信息学部为软件工程专业本科生开设的实践环节必修课程。本课程的任务是在学生已经掌握了大部分专业知识、有一定的实践能力的情况下，学部与企业共同创建学生工作实习的机会，初步接触社会，获得一定的感性认识；使得学生通过参与企业项目的设计与开发、运用已经掌握的基础知识和专业知识，了解、研究、分析计算系统的设计、开发、使用中实际的复杂问题；并通过文献查阅、小组讨论、信息综合以获得有效结论，了解软件技术的应用现状、发展趋势；增强其独立解决实际问题的能力，具有一定的创新能力，并能够综合考虑和评价其对社会、健康、安全、法律以及文化的影响；通过工作实习过程中与企业导师、团队的讨论、项目验收和撰写工作实习报告等，培养良好的表达能力和报告撰写能力与沟通交流能力。

0008464 Work Internship

Course Number: 0008464

Course Title: Work Internship

Course Type: Compulsory course in practice

Credit: 4.0 **Total Credit Hours:** 120

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Object-Oriented Programming (C++) Course Design, Software Engineering, Comprehensive Practice of Software Development

Evaluation Method: Course participation + written report + oral presentation + defense

Writer: Su Haoru

Course Description:

Work Internship is a compulsory course for undergraduate students majoring in Software Engineering. The course offers students the opportunity to work on an actual project in a company, allowing them to gain practical knowledge of society and future work. It provides a platform for students to practice their skills in researching, analyzing, designing, developing, and testing software systems, using the basic and professional knowledge they have acquired. Through literature review, group discussion, and information synthesis, students can draw practical conclusions. They will also gain an understanding of the current state and developmental trends of software technology.

This course aims to improve students' ability to independently and innovatively solve practical problems. In doing so, students should take a comprehensive approach and evaluate the impact of the system on society, health, safety, law, and culture. To ensure thorough discussion and understanding, students are encouraged to engage with their enterprise tutor and team members. Upon completion, students will submit a project report and participate in an oral presentation defense. These activities will allow students to practice their written and oral communication skills.

0006456 毕业设计（论文）

课程编码：0006456

课程名称：毕业设计（论文）

英文名称：Graduation Project

课程类型：实践环节必修课

学分： 8.0 **总学时：** 480

面向对象：软件工程专业本科生

先修课程：

考核形式： 论文+答辩

撰写人：张丽

课程简介：

毕业设计是信息学部为软件工程专业本科生开设的实践环节必修课。本课程的任务是通过课题选择与实施、撰写论文等实践活动，使学生进一步掌握本专业的基本知识、基本技术和基本方法，综合地、灵活地运用所学基础理论和专业技能解决软件工程学科和专业实际问题，并经历解决复杂工程问题的求解过程，从而得到全面训练。在毕业设计期间，学生必须通过选题、资料阅读、选择和使用开发环境和工具、制定研究、设计和开发计划、撰写开题报告、撰写毕业论文、参加答辩等环节，在老师的指导下，独立完成对问题的分析、求解（含设计和实现）和总结，最终完成经过审定的题目。重点使学生完整参与一个解决工程问题的全过程。难点在于学生综合能力的提升。

0006456 Graduation Project

Course Number: 0006456

Course Title: Graduation Project

Course Type: Compulsory practice course

Credit: 8.0 **Total Credit Hours:** 480

Students: Undergraduate students majoring in Software Engineering

Prerequisites:

Evaluation Method: Thesis + Defense

Writer: Zhang Li

Course Description:

Graduation Project is a compulsory practice course for software engineering undergraduates. The objective of this course is to help students master the fundamental knowledge, technology, and methods of software engineering. They will learn to apply the basic concepts and professional skills to solve practical problems and gain experience in solving complex engineering problems. The course provides comprehensive training to students and prepares them to become skilled professionals in the field of software engineering.

During the period of the graduation project, students are required to work independently on the analysis, solution (including design and implementation), and summary of the problems. This involves selecting appropriate topics, reading relevant papers, choosing and utilizing appropriate development tools and environments, formulating research, designing and developing a plan, writing an opening report, composing a graduation thesis, participating in defense, and so on. All of these tasks are carried out under the guidance of teachers. The ultimate goal is to independently complete the problem analysis, solution (including design and implementation), and summary, and finally complete the approved topic.

The teaching focus is to engage students in the entire process of solving engineering problems, with a difficult part in improving their overall abilities.

0008185 数字逻辑实验

课程编码：0008185

课程名称：数字逻辑实验

英文名称：The Experiments of Digital Logic

课程类型：实践环节选修课

学分： 1.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：数字逻辑

考核形式：平时成绩

撰写人：贺国平

课程简介：（250-300 字）

本课程属于软件工程学科基础课，开设在第三学期，是学生学习专业及相关领域基础知识、掌握实验基本技能的重要阶段。本课程通过对数字逻辑理论知识的学习和对数字电路实验环节的培训，为学生下一步的专业课学习和研究奠定基础。数字逻辑实验是数字逻辑课程的重要组成部分。通过课堂讲授和实验操作，使学生加深对理论知识的理解，学会常用电子仪器、工具、材料的使用方法，掌握数字逻辑电路的设计方法、实验方法以及计算机辅助设计的方法，为今后的专业学习打好基础。通过实验使学生在理论联系实际、科学态度、动手能力等方面的综合素质有所提高。

推荐教材或主要参考书：

[1] 数字逻辑实验指导书

0008185 The Experiments of Digital Logic

Course Number: 0008185

Course Title: The Experiments of Digital Logic

Course Type: Professional practice elective course

Credit: 1 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Digital Logic

Evaluation Method: Course participation+ experimental results and reports

Writer: He Guoping

Course Description:

The Experiments of Digital Logic is a course for undergraduate students majoring in software engineering. This course covers digital logical knowledge and provides hands-on experience with digital logic experiments, establishing a solid foundation for students in their third semester. Experiments are a critical component of the Digital Logic course, providing students with the opportunity to gain a deep understanding of digital logic and develop their ability to use equipment, tools, and resources. This course focuses on digital logic design experimentation and computer-aided design practice. Through these practices, students will enhance their ability to apply theory to practical projects, develop their skills in digital logical design, and cultivate an excellent scientific attitude.

Recommended Textbooks/References:

1.Guidebook for the Experiments of Digital Logic.

0008400 数据库应用实验

课程编码：0008400

课程名称：数据库应用实验

英文名称：Database Application Experiment

课程类型：实践环节选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：数据库原理

考核形式：实验报告+期末项目考核

撰写人：邵勇

课程简介：（250-300 字）

“数据库应用”实验课程是高等学校本科软件工程专业、计算机应用技术专业及其他相关专业的一门重要的专业基础实践课。本课程的主要任务是帮助学生掌握使用基础数据库软件、提高数据应用能力和分析问题能力。

“数据库应用”实验课程知识的逻辑性和基础性强，工程背景广阔。通过数据库实验，学生从系统需求分析、数据库分析、E-R 图分解与合并、表的设计、编程、数据库管理等方面进行了完整的设计和实现。学生们通过工程性、功能性实践分析与系统设计等实践环节，培养学生积极思考、主动学习、自主动手和独立解决应用数据库工程问题的应用能力和创新的意识，为后续专业课程和从事数据库技术研究奠定基础。

推荐教材或主要参考书：

[1] 牛新庄，《DB2 高级管理、系统设计与诊断案例》（第 3 版），清华大学出版社，2017 年

[2] 牛新庄，《循序渐进 DB2 DBA 系统管理、运维与应用案例》（第 3 版），清华大学出版社，2017 年

[3] IBM DB2 V9 的典型数据库应用“数据库应用实验指导书”

0008400 Database Application Experiment

Course Number: 0008400

Course Title: Database Application Experiment

Course Type: Professional practice elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduates majoring in Software Engineering, undergraduates majoring in Computer Science

Prerequisites: Principles of Database

Evaluation Method: experimental results + project assessment

Writer: Shao Yong

Course Description:

This course is a critical professional basic practice course for undergraduates majoring in software engineering, computer application technology, and other related fields at Beijing University of Technology.

The course aims to equip students with basic database software skills, data application proficiency, and problem-solving abilities. The course "Database Application Experiment" provides a solid foundation in logic, engineering, and breadth of knowledge.

In this course, students will design and implement database experiments, including system requirement and database analysis, E-R diagram decomposition and merging, table design, programming, and management. By studying the practical aspects of engineering, conducting functional practice analysis, and designing systems, students develop their ability to apply their knowledge and think innovatively. They also learn to actively seek out solutions for application database engineering problems. Additionally, this course establishes a strong footing for students to delve deeper into database technology research, providing a sturdy foundation for their future pursuits in this field.

Recommended Textbooks/References:

1. Niu Xinzhuang, "DB2 Advanced Management, System Design and Diagnosis Cases" (3rd edition), *Tsinghua University Press*, 2017

2. Niu Xinzhuang, "Step by Step DB2 DBA System Management, Operation and Maintenance and Application Cases" (3rd edition), *Tsinghua University Press*, 2017

3. IBM DB2 V9 typical database application "Database Application Experiment Guide"

0010119 开源软件创意设计与开发实践

课程编码：0010119

课程名称：开源软件创意设计与开发实践

英文名称：Open Source Software Creative Design and Development Practice

课程类型：实践环节选修课

学分： 1.0 **总学时：** 30

面向对象：软件工程专业本科生

先修课程：软件需求分析与建模，数据结构与算法，高级程序语言设计

考核形式： 平时成绩+期末项目考核

撰写人：贺国平

课程简介：（250-300 字）

开源软件创意设计与开发实践是信息学院（部）为软件工程专业本科生开设的实践环节选修课程类型。本课程的任务是让学生在学习开源软件技术的基础上，通过自行创意或者在老师的指导下基于开源项目进行创意设计与开发实践，最终完成一个完整的软件创意项目。教学内容重点：通过案例帮助学生理解和掌握开源软件精神和开源协议，学习和熟练使用开源软件相关技术及方法，最后基于开源软件项目设计和实现一个完整的创意软件项目。教学内容的难点：多种开源协议的学习和理解运用，软件创意的产生和提炼，如何基于开源相关技术以及学生之前先修课程积累的知识和方法设计实现一个完整的创意软件项目，项目类型的多样化对师生的综合实践能力要求较高。

推荐教材或主要参考书：

[1] 何宝宏，《开源法则》，人民邮电出版社，2020 年 12 月

0010119 Open Source Software Creative Design and Development Practice

Course Number: 0010119

Course Title: Open Source Software Creative Design and Development Practice

Course Type: Professional practice elective course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Software Engineering

Prerequisites： Software requirement analysis and modeling，Data structure and algorithm，High Level Language Programming design

Evaluation Method: Course participation + Project assessment

Writer: He Guoping

Course Description:

Open Source Software Creative Design and Development Practice is an elective practice course for undergraduates majoring in Software Engineering.

The aim of this course is to enable students to engage in creative design and development practices, using open source projects as a basis. They will have the opportunity to apply their own creativity or receive guidance from teachers while learning open source software technology. The final objective is to complete a software creative project from scratch.

The teaching focus of this course is to guide students in (1) comprehending and excelling in the philosophy of open-source software and open-source agreements by presenting case studies, (2) learning and proficiently applying relevant technologies and methods of open-source software, and (3) devising and executing a comprehensive, innovative software project based on an open-source software project.

The challenge of this course is four-fold: (1) learning and understanding various open source protocols, (2) generating and refining software creativity, (3) designing and implementing a complete creative software project using open source related technologies and the knowledge and methods accumulated in previous courses, and (4) requiring teachers and students to have high comprehensive practical ability to handle various project types.

Recommended Textbooks/References:

1.Baohong He, Open source principle, *People's Posts and Telecommunications Press*, 12-2020

0008151 Web 开发实践

课程编码：0008151

课程名称：Web 开发实践

英文名称：Web Development in Practice

课程类型：实践环节选修课

学分： 1.0 **总学时：** 30

面向对象：软件工程专业本科生

先修课程：面向对象程序设计（C++），数据库原理

考核形式：实验过程+最终考核

撰写人：刘海兵 俞敏

课程简介：

Web 开发实践课是软件学院（信息学部）为软件工程专业本科生开设的专业选修课程类型。本课程的任务是掌握 Web 开发技术，能够在多学科背景下的团队中，利用 Web 开发相关知识和技术开发工具解决实际工程问题，为在软件开发领域的深入研究奠定必要基础，培养终身学习和探索的意识与素质。教学内容重点：通过对 Web 开发实践课程的学习，能够掌握前端框架的设计理论与方法,能够在前端业务逻辑复杂问题解决方案的过程中掌握程序设计理论与方法，具备前端页面的设计开发能力。教学内容的难点：能够基于 Web 前端框架(如 jQuery,Vue,React 等)的基本概念和原理，对用户需求合理进行分析，选择最恰当的方式，设计一套可行的开发方案，并编码实现。

推荐教材或主要参考书：

[1] 储久良. Web 前端开发技术. 清华大学出版社，2018.06.01

[2] 储久良. Web 前端开发技术实验与实践. 清华大学出版社，2018.07.01

[3] [美] 亚拉文·谢诺伊（Aravind Shenoy）乌尔里希·索松（Ulrich Sossou） 著，吴晓嘉 译. BootStrap 开发精解. 机械工业出版社，2016.03.01

0008151 Web Development in Practice

Course Number: 0008151

Course Title: Web Development in Practice

Course Type: Professional practice elective course

Credit:1.0 **Total Credit Hours:** 30

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Object oriented programming, Principles of Database

Evaluation Method: Experimental process + Final assessment

Writer: Liu Haibing, Yu Min

Course Description:

Web Development in Practice is a professional elective course offered by the Dept. of Software Engineering at the Faculty of Information Technology for undergraduates majoring in software engineering.

The goal of this course is to tackle real-world engineering challenges by utilizing web development knowledge and technology development tools as part of a multidisciplinary team. This requires a firm grasp of relevant concepts and theories in web development technology, which will establish a solid foundation for future research in software development. Additionally, this course aims to foster a lifelong learning mindset and encourage exploration in this field.

The key points of this course are to help students become proficient in the design theories and methods of front-end frameworks, and to develop their technical skills to solve complex problems in front-end business logic and easily develop front-end pages.

The challenges of this course are (1) to help students grasp the fundamental concepts and principles of web front-end frameworks like jQuery, Vue, React, etc., and (2) to enable students to apply this knowledge to analyze user requirements reasonably, select the most appropriate approach, design a workable development plan, and effectively code it. The course provides students with a comprehensive understanding of web development and equips them with the necessary skills to succeed in this field.

Recommended Textbooks/References:

1. Chu Jiuliang. Web development technologies. Tsinghua University Press, 2018.08.01
2. Chu Jiuliang. Web development technologies and practice. Tsinghua University Press, 2018.07.01
3. Aravind Shenoy and Ulrich Sossou. Bootstrap development technologies. Machinery Industry Press, 2016.03.01

0008152 网络通信程序设计

课程编码：0008152

课程名称：网络通信程序设计

英文名称：Networking Programming

课程类型：实践环节选修课

学分：1.0　　**总学时：**30

面向对象：软件工程专业本科生

先修课程：操作系统、计算机网络、高级语言程序设计

考核形式：平时成绩+报告成绩

撰写人：张丽

课程简介：（200-300 字）

本课程要求学生掌握应用协议的顺序和并发实现的基本算法，能够理解网络应用软件的设计、构建和优化。学生要掌握基于 Linux 操作系统的、基于 socket API 的网络服务器的设计、开发与优化这些开发各种网络服务器的基础。通过本课程学生能够理解客户/服务器计算模式，了解访问底层协议软件的应用程序接口，掌握实现客户以及服务器软件的基本算法，构建基于 TCP/IP 协议栈的分布式应用程序。本课程主要锻炼学生实践操作系统以及网络程序设计接口。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

1. Douglas E. Comer, David L. Stevens，TCP/IP 网络互连 第 3 卷：客户/服务器编程及应用，Linux/POSIX Sockets 版，人民邮电出版社，2002 年 1 月

0008152 Networking Programming

Course Number: 0008152

Course Title: Networking Programming

Course Type: Professional practice elective course

Credit:1.0 **Total Credit Hours:**30

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Operating Systems，Computer Networks，High Level Language Programming

Evaluation Method: Course participation + Assignment

Writer: Zhang Li

Course Description:

This course requires students to master the basic algorithm of the iterative and concurrent implementation of application protocols. Students should master the basic knowledge to design, develop, and optimize network servers based on the socket API in Linux. Through the course, students can understand the client/server computing model and application programming interface to access the underlying protocol software, master the basic algorithm of client and server software, and construct distributed applications based on the TCP/IP protocol stack. This course is designed to train students to practice operating systems and network programming interfaces.

Recommended Textbooks/References:

1. Douglas E. Comer, David L. Stevens. Internetworking with TCP/IP volume 3: client-server programming and applications linux/POSIX sockets version. people's Press.2002

0007747 基于 FPGA 的数字电路设计

课程编码：0007747

课程名称：基于 FPGA 的数字电路设计

英文名称：Digital Circuit Design based on FPGA

课程类型：实践环节选修课

学分：1.0　**总学时：** 30

面向对象：软件工程专业本科生

先修课程：嵌入式系统设计原理

考核形式：平时成绩

撰写人：李达

课程简介：（250-300 字）

基于 FPGA 的数字电路设计是信息学部为软件工程专业本科生开设的专业选修课程。本课程的任务是掌握嵌入式数字系统设计技术，包含数字电路理论、逻辑硬件的电路设计和应用。教学内容重点：数字电路设计的基本理论和方法，数字逻辑电路编程，数字电路系统设计的开发流程。教学内容的难点：掌握使用 FPGA 完成数字电路设计的基本理论和方法，掌握数字电路设计的方法流程。能够利用 FPGA 设计开发嵌入式产品，解决实际应用问题。

推荐教材或主要参考书：

[1] 夏宇闻，Verilog 数字系统设计教程(第 3 版），北京航空航天大学出版社，2013 年 7 月，2013

0007747 Digital Circuit Design based on FPGA

Course Number: 0007747

Course Title: Digital Circuit Design based on FPGA

Course Type: Professional elective course

Credit: 1.0 **Total Credit Hours:** 30

Students: Undergraduate grade three students in Software Engineering

Prerequisites: Principles of Embedded System Design

Evaluation Method: Course participation

Writer: Li Da

Course Description:

Digital Circuit Design based on FPGA is an elective course for third-year Software Engineering students. The main target of this course is to have a good command of knowledge of embedded digital systems and circuit design technology, including digital circuit knowledge, circuit design, and applications for logical circuits. The teaching contents are mainly covered by the following aspects: (1) the basic theory and method of digital circuit design, (2) digital logic circuit programming, and (3) digital circuit system design development process. The difficulties of this course are described as follows: (1) the method flow of digital circuit design, (2) using FPGA design and development of embedded products to solve practical application problems.

Recommended Textbooks/References:

1.Xia Yuwen, Verilog Digital Circuit Design, Beihang University Press, 2013.7

0003338 Java 程序设计

课程编码：0003338

课程名称：Java 程序设计

英文名称：Java Programming

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，面向对象程序设计（C++），数据结构与算法

考核形式：平时成绩+学习报告

撰写人：陈洪丽

课程简介：

Java 程序设计是信息学部软件学院为软件工程专业本科生开设的专业选修课。本课程的任务是讲授 Java 面向对象编程思想及其 Java 语言的实现机制，Java 语言的基本语法和 Eclipse 等集成开发环境下的编程技术，介绍采用面向对象思想分析和解决问题的基本方法。培养学生掌握面向对象程序设计的思想，掌握面向对象程序设计的 Java 语言实现方法，掌握 Java 语言的基本语法，熟悉用户界面软件开发和数据库应用接口等常见的软件开发应用技术，获得从事互联网应用程序设计的基本能力。教学内容重点是 Java 语言及其应用技术的学习，为后续课程中各种互联网软件系统开发技术的学习提供基础。教学内容的难点是用面向对象思想分析和解决实际问题的基本方法和软件开发应用技术。

推荐教材或主要参考书：

[1]郎波，Java 语言程序设计（第 3 版），清华大学出版社，2016 年 7 月

[2] (美)埃克尔(Eckel,B.) 著， 陈昊鹏 等译，Java 编程思想(第 4 版)，机械工业出版社，2007 年 6 月

[3]孙卫琴，Java 面向对象编程（第 2 版）.清华大学出版社，2017 年 1 月

0003338 Java Programming

Course Number: 0003338

Course Title: Java Programming

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software engineering

Prerequisites: High Level Language Programming, Object-Oriented Programming (C++), Data Structures and Algorithms

Evaluation Method: Course participation + Study Report

Writer: Chen Hongli

Course Description:

Java Programming is an elective course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates.

The goal of this course is to teach the concept of Java object-oriented programming and how it is implemented, as well as the basic syntax of the Java language and programming techniques using integrated development environments such as Eclipse. Additionally, the course will introduce fundamental methods for analyzing and solving problems using object-oriented principles.

Students receive training in mastering the concepts of object-oriented programming, implementation methods of the Java language for object-oriented programming, basic syntax of Java, and common software development and application technologies such as user interface software development and database application interface. This equips them with the fundamental skills needed for designing internet application programs.

The course focuses on studying Java language and its application technology, which form the basis for learning various internet software development technologies in subsequent courses.

The challenge of this course is to introduce the basic method of analyzing and solving practical problems with object-oriented thinking, as well as software development and application technology.

Recommended Textbooks/References:

1. Lang Bo. Java language programming (3rd Edition). Tsinghua University Press, July 2016

2. (American) Eckel (B.), translated by Chen haopeng, et al. Java programming ideas (4th Edition). China Machine Press, June 2007

3.Sun Weiqin. Java object oriented programming (2nd Edition). Tsinghua University Press, January 2017

0008401 Python 程序开发

课程编码：0008401

课程名称：Python 程序开发

英文名称：Python Programming

课程类型：专业选修课、校选专业课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生、理工类本科生

先修课程：高级语言程序设计

考核形式：平时成绩+实验+考试

撰写人：李亚芳

课程简介：

Python 程序开发是信息学部软件学院开设的一门专业选修课程。Python 是一种解释型的、面向对象的、带有动态语义的高级程序设计语言，拥有丰富和强大的开源库，是大数据时代的核心编程基础技术之一，在人工智能、云计算、金融分析、大数据开发、WEB 开发、自动化运维、测试等方向应用广泛。本课程的教学任务是掌握 Python 语言的基础语法，引导学生熟练掌握基础编程技能，了解和熟悉一些常用库，如：NumPy、Pandas、Matplotlib 等，并能熟练应用 Python 语言进行程序开发、数据采集和处理以及数据分析。

推荐教材或主要参考书：

[1]Magnus Lie Hetland 著、袁国忠译. Python 基础教程（第 3 版）. 人民邮电出版社，2018.02

[2]张建、张良均等，Python 编程基础. 人民邮电出版社，2018.03

[3]Wes McKinney 著，徐敬一译. 利用 Python 进行数据分析. 机械工业出版社，2018.08

0008401 Python Programming

Course Number: 0008401

Course Title: Python Programming

Course Type: Professional elective course, Public professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering, Undergraduate students majoring in Science and Engineering

Prerequisites: Advanced Programming

Evaluation Method: Course participation + experiments + written exams

Writer: Li Yafang

Course Description:

Python programming is an optional course offered by the Dept. of Software Engineering at the Faculty of Information Technology for undergraduate students. Python is a popular high-level programming language that features interpretation, dynamic semantics, and an object-oriented approach. With a rich and powerful open-source library, Python is one of the core programming basic technologies in the era of big data. It is widely used in artificial intelligence, cloud computing, financial analysis, big data development, web development, automatic operation and maintenance, and testing. The main target of this course is to master the basic syntax of Python and basic programming skills, to understand and be familiar with some common libraries, such as Numpy, Pandas, Matplotlib, etc., and be proficient in using Python language for program development, data acquisition and processing, and data analysis.

Recommended Textbooks/References:

1. Magnus lie Hetland, translated by Yuan Guozhong. Python basic course (3rd Edition). People's Posts and Telecommunications Press, February 2018.
2. Zhang Jian, Zhang Liangjun, et al. Fundamentals of Python programming. People's Posts and Telecommunications Press, March 2018.
3. Wes McKinney, translated by Xu Jingyi. Data analysis using python. China Machine Press, August 2018.

0008158 算法设计与分析

课程编码：0008158

课程名称：算法设计与分析

英文名称：Design and Analysis of Algorithms

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：面向对象程序设计(C++)、 离散数学、数据结构与算法

考核形式：平时成绩+报告

撰写人：朱绍涛

课程简介：（250-300 字）

《算法设计与分析》是软件工程专业本科生的一门学科基础课。在计算机学科中，无论是软件设计、还是硬件设计都离不开算法，算法是计算机科学的核心。本课程为学生打开算法之门，介绍常用的算法设计策略和技术、众多经典问题及其算法设计思想、算法证明和分析的方法等，在解决实际问题时，对于较复杂的问题能抽象出问题的数学模型，设计出有效的算法。通过本课程的学习，学生能掌握分治算法、动态规划算法、贪心算法、回溯法和分支限界法的基本思想，提高学生设计和编写算法的能力、算法复杂度的分析能力以及算法改进的能力，最后可以使学生获得利用常见的算法设计方法来解决软件开发中的实际问题的技能。

推荐教材或主要参考书：

[1] 屈婉玲，刘田，张立昂，王捍贫,《算法设计与分析》,清华大学出版社，2016 年
[2] 王晓东，《算法设计与分析》，清华大学出版社，2018 年

0008158 Design and Analysis of Algorithms

Course Number: 0008158

Course Title: Design and Analysis of Algorithms

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software engineering

Prerequisites: Object oriented programming, discrete mathematics, data structure and algorithm

Evaluation Method: Course participation and Report

Writer: Zhu Shaotao

Course Description:

Design and Analysis of Algorithms is a basic course for software engineering undergraduates. In computer science, both software design and hardware design are inseparable from algorithms, which is the core of computer science. Students can gain access to the world of algorithms by taking this course, which covers the following topics: (1) common strategies and technologies for designing algorithms, (2) the algorithmic design approaches for many classic problems, (3) methods for analyzing and proving algorithms, and more. In solving practical problems, students can abstract the mathematical model of the problem for more complex problems and design effective algorithms. By studying this course, students can master the basic ideas of divide-and-conquer, dynamic programming, greedy, backtracking-branch bounds algorithms. This course improves students' ability to design and write algorithms, analyze algorithm complexity, and improve algorithms. Finally, it can also enable students to obtain the technology of using standard design methods to solve practical problems in software development.

Recommended Textbooks/References:

1. Qu Wanling, Liu Tian, Zhang Li’ ang, Wang Hanpin, Design and Analysis of Algorithms, Tsinghua University Press, 2016.

2. Wang Xiaodong, Design and Analysis of Algorithms, Tsinghua University Press, 2018.

0008336 人工智能导论

课程编码：0008336

课程名称：人工智能导论

英文名称：Introduction to Artificial Intelligence

课程类型：学科专业选修课

学分： 2 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，数据结构

考核形式： 平时成绩+考试

撰写人：李蓉

课程简介：（250-300 字）

人工智能导论是信息学部软件学院为软件工程专业本科生开设的学科专业选修课程。本课程的任务是通过对人工智能的一些理论和算法的基础性介绍，激发学生兴趣，使得学生能对人工智能学科有一个整体的认识，同时能掌握上述算法，并能编程实现。教学内容重点包括：人工智能基本概念，图搜索算法，约束满足问题，博弈及对抗搜索，不确定性搜索，基于谓词逻辑的机器推理，机器学习简介和本领域前沿研究介绍。教学内容的难点是：约束传播中的推理，博弈中的α-β剪枝算法，不确定搜索中的马科夫决策过程和强化学习算法。

推荐教材或主要参考书：

[1] [美]Stuart Russell，Peter Norvig，姜哲等译，人工智能——一种现代方法（第三版），人民邮电出版社，2013 年 11 月

[2] Piero Scaruffi 著，张瀚文译，人工智能通识课，人民邮电出版社，2020 年 6 月

0008336 Introduction to Artificial Intelligence

Course Number: 0008336

Course Title: Introduction to Artificial Intelligence

Course Type: Elective Course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: High-level language Programming，Data Structure

Evaluation Method: Course participation + written exams

Writer: Li Rong

Course Description:

Introduction to Artificial Intelligence is one of the elective courses for Undergraduate students majoring in Software Engineering. The main aim of this course is to introduce basic concepts and algorithms in artificial intelligence, and to inspire students to develop an interest in the subject, while also providing them with the ability to master algorithms and program them effectively. This course focuses on basic concepts and algorithms in artificial intelligence, covering the following topics: (1) basic concepts of artificial intelligence, (2) graph search algorithm, (2) constrain satisfied problem, (4) games and adversarial search, (5) search under uncertainty, (6) machine reasoning based on predicate logic, and (7) machine learning and cutting-edge research in this field. The difficulties of this course are described as follows: (1) reasoning in Constraint Propagation, (2) α-β pruning algorithm in game theory, (3) Markov decision process, and (4) reinforcement learning.

Recommended Textbooks/References:

1. Stuart Russell， Peter Norvig， Artificial intelligence--A morden Approch(Third edition), *Posts&Telecom Press*, November-2013

2. Piero Scaruffi, General education course of artificial intelligence, *Posts&Telecom Press*, June-2020

0008160 Web 中间件技术

课程编码：0008160

课程名称：Web 中间件技术

英文名称：Technology of Web Middleware

课程类型：专业选修课

学分：2.0　　**学时：**32

面向对象：软件工程专业本科生

先修课程：Java 程序设计

考核形式：笔试

撰写人：张建

课程简介：（200-300 字）

中间件（Middleware）是指一种运行于操作系统与客户端应用之间的基础性软件。本课程覆盖基J2EE的 Web中间件技术。J2EE是开发分布式计算环境下进行企业级应用开发的体系结构、规范和标准: 一个软件应用/系统模型根据功能把应用逻辑分成客户端层、Web表示层、业务逻辑层、信息系统层及其可拓展的层次化体系架构，每一个层次支持相应的中间件（服务器）和组件，组件在服务器容器中运行，容器间通过通讯协议进行调用，实现组件间的相互调用。本课程主要介绍进行J2EE 企业应用程序实施的基本概念、模式、核心架构及技术框架，重点介绍 J2EE中间件（Web Container，EJB 容器）相关概念、 J2EE结构设计方法和策略、以及Servlet、JSP、EJB、JDBC、JMS、JNDI等相关的技术。从工程实施的角度指导，如何基于 MyEclipse +Tomcat+ JBoss 来配置和搭建J2EE的开发环境和平台，以Servlet、JSP、EJB组件程序的设计、开发、编码、编译，进行软件系统完整生命周期的开发。

课程培养软件工程学生进行复杂软件设计、实施与实践所必需的方法论、规范和技术标准、工具与技术、和集成开发技术；提升软件工程学生软件系统或程序设计、实施能力和经验。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]Abdalla Mahmoud, Developing Middleware in Java EE 8, Packt Publishing Limited, 2018;

[2]郝玉龙、姜韡编著，J2EE 编程技术，清华大学出版社与北京交通大学出版社，2007 年 3 月；

[3]Paul J. Perrone、 Venkata S. R. R. Chaganti、 Tom Schwenk 著，刘文红、罗友平等译，J2EE 开发使用手册，电子工业出版社 2004;

[4]Paul J. Perrone、 Venkata S. R. R. Chaganti、 Tom Schwenk 著，J2EE Developer’s Handbook, Sams Publiser, 2003;

0008160 Technology of Web Middleware

Course Number: 0008160

Course Title: Technology of Web Middleware

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Java programming

Evaluation Method: Written Exam

Writer: Zhang Jian

Course Description:

Middleware is a system-level software entity that hosts and supports J2EE components at Runtime implementation. J2EE is a platform-independent, Java-centric environment/standard for developing, building, deploying, and component-based, multi-tired/web-based enterprise applications, in which a system is divided into the client/presentation/business logic/source integration tiers, each tier hosts and supports middleware container & technologies. This course is designed to provide undergraduate students in software engineering with a thorough understanding of middleware technologies within the J2EE environment. The course covers fundamental concepts, design patterns, techniques, tools, methodologies, and perspectives essential for IT professionals to successfully implement enterprise applications using Java programming language and J2EE middleware. More specifically, the course mainly focuses on the following topics: Servlet, JSP, EJB, JDBC, JMS, JNDI middleware technologies, as well as J2EE middleware containers(Web Container, EJB Container). Using MyEclipase+TOMCAT+JBOSS as the development environment, students should be able to understand the principle topics of middleware technologies and be capable of demonstrating knowledge of the environment setup, design, programming, implementation, configuration and distribution for an enterprise-level system/application life-cycle via Servlet/JSP/EJB/etc. The course aims to expand students' knowledge of middleware methodologies and perspectives while enhancing their hands-on engineering capabilities and experiences.

Recommended Textbooks/References:

1. Hao Yulong，J2EE Programming Technologies，Tsinghua University Press, 2007；
2. Paul J. Perrone、Venkata S. R. R. Chaganti、Tom Schwenk，J2EE Development Handbook，Electronic Industrial Press, 2004；
3. Paul J. Perrone、 Venkata S. R. R. Chaganti、 Tom Schwenk 著，J2EE Developer’s Handbook, Sams Publiser, 2003；
4. Eric Jendrock, Jennifer Ball, Debbie Carson, Ian Evans, Scott Fordin, Kim Haase， The Java™ EE 5 Tutorial, Third Edition: For Sun Java System Application Server Platform Edition，

Addison Wesley Professional，2006

0008403 云服务工程

课程编码：0008403

课程名称：云服务工程

英文名称：Cloud-based Service Engineering

课程类型：专业选修课

学分：2.0　　**学时：**32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计、面向对象程序设计（C++）、Web 中间件技术

考核形式：笔试

撰写人：林绍福

课程简介：（200-300 字）

本课程覆盖在云计算平台进行服务计算软件开发所必须具备的云服务工程基本概念、面向服务（SOA）设计模式、云服务工程开发编程语言基础（Java/C#）、云服务工程开发基础的规范和标准、云服务工程设计方法与知识（针对多租户、共享、可管理、可扩展、安全、统一身份认证与授权、共享数据资源等功能特征）、云服务工程的实现技术方法、以及进行云服务系统完整的生命周期的开发方法。重点介绍 SaaS、PaaS、IaaS 服务相关概念，SaaS/PaaS 结构设计方法和策略，以及服务契约、服务端点、服务绑定、服务托管、服务事务等相关技术。从工程实施的角度指导，如何基于J2EE/MyEclipse或C#/Visual Studio平台 + IIS/TOMCAT/JBOSS/Weblogic + MySQL/SQLServer来配置和搭建云服务工程的开发环境和平台，进行 SaaS 服务组件、PaaS 服务组件的设计、开发、编码、编译、配置、部署的实现。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]林绍福：云服务工程及实践（讲义），2022

[2]张建：云服务工程及实践（讲义），2019

[3]Mike Rosen,Boris Lublinsky etc., Applied SOA Service-Oriented Architecture and Design Strategies, Wiley Publishing, Inc., 2008；

[4]Thomas Erl, Andre Tost, etc., SOA with Java-Realizing Service-Orientation with Java Technologies,Pretice Hall Publishing,2014；

[5]Michael J. Kavis, Architecting The Cloud-Design Decision For Cloud Computing Service Models(SaaS,PaaS,IaaS), John Wiley & Sons, Inc, Hoboken, New Jersey, 2014；

[6]Pethuru Raj Cheliah, Torsten Winterberg, etc.,Next Generation SOA - Real-World Guide to Modern Service-Oriented Computing, Prentice Hall Publising, 2014；

[7]David Chou, John deVadoss, Thomas Erl,etc., SOA With .Net and Windows Azure-Realizing Service-Orientation with the Microsoft Platform,PRENTICE HALL,2014；

0008403 Cloud-based Service Engineering

Course Number: 0008403

Course Title: Cloud-based Service Engineering

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Basic Programming, OO Design & Programming, Web Middleware Technologies

Evaluation Method: Written Exam

Writer: Lin Shaofu

Course Description:

This course is designed to provide junior students in software engineering with a basic understanding of service computing, SOA (Service-Oriented Architecture) design patterns, and cloud-based platform programming and implementation. This course covers important topics including fundamental concepts, skills, techniques, tools, and methodologies necessary for software professionals and architects to successfully conduct and implement design tasks for cloud-based service systems and applications. The course will introduce students to the fundamental concepts of cloud computing, service computing, and service engineering, as well as the SOA system design and principle, cloud-based design and technologies such as multi-tenancy, multi-organization, collaborative, sharing, manageability, security authentication, and more. More specifically, the course mainly focuses on the following topics: (1) SaaS、PaaS、IaaS concepts; (2) SaaS/PaaS design & methodologies; (3) Service Contract/Endpoint/Binding/Hosting/Transaction technologies; (4) using J2EE/MyEclipse or C#/Visual Studio + IIS/TOMCAT/JBOSS/Weblogic + MySQL/SQLServer to setup and construct the developing environment and platform, to carry out the designing, developing, coding, compiling, configuring and publishing SaaS and PaaS service components.

Recommended Textbooks/References:

1. Shaofu Lin：Cloud-based Service Engineering & Practice（Book Draft & Handout），2022
2. Jian Zhang：Cloud-based Service Engineering & Practice（Book Draft & Handout），2019
3. Mike Rosen,Boris Lublinsky etc., Applied SOA Service-Oriented Architecture and Design Strategies, Wiley Publishing, Inc., 2008；
4. Thomas Erl, Andre Tost, etc., SOA with Java-Realizing Service-Orientation with Java Technologies,Pretice Hall Publishing,2014；
5. Michael J. Kavis, Architecting The Cloud-Design Decision For Cloud Computing Service Models(SaaS,PaaS,IaaS), John Wiley & Sons, Inc, Hoboken, New Jersey, 2014；
6. Pethuru Raj Cheliah, Torsten Winterberg, etc.,Next Generation SOA - Real-World Guide to

Modern Service-Oriented Computing, Prentice Hall Publising, 2014；

7. David Chou, John deVadoss, Thomas Erl,etc., SOA With .Net and Windows Azure-Realizing Service-Orientation with the Microsoft Platform,PRENTICE HALL,2014

0008408 大数据技术导论

课程编码：0008408

课程名称：大数据技术导论

英文名称：Introduction to Big Data Technologies

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：概率论与数理统计（工），面向对象程序设计（C++），数据库原理

考核形式：平时成绩+期末成绩

撰写人：李建强

课程简介：（250-300 字）

大数据技术导论课是软件学院（信息学部）为软件工程专业大数据方向本科生开设的专业选修课程类型。本课程的任务是在学生掌握大数据技术的相关概念和理论的基础上，能够在多学科背景下的团队中，利用大数据相关知识和技术开发工具解决实际工程问题，为在大数据领域的深入研究奠定必要基础，培养终身学习和探索的意识与素质。教学内容重点：本课程以大规模 web 数据处理、数据挖掘、信息检索、信息推荐和相关支撑平台为主线，主要介绍大数据技术的基本概念、原理、方法和技术等。教学内容的难点：学生需要在多学科团队中利用大数据相关知识和技术开发工具解决实际中的工程问题，为大数据领域的深入研究奠定好基础，培养终身学习和探索的意识与多学科团队协作的专业素质。

推荐教材或主要参考书：

[1] 王宏志. 大数据分析原理与实践. 机械工业出版社，2017.07.01

[2] 翟成祥等. 文本数据挖掘与分析：信息检索与文本挖掘的实用导论. 机械工业出版社，2019.04.01

[3] 陈封能 (Pang-Ning Tan)等. 数据挖掘导论. 机械工业出版社，2019.08.01

[4] Fensel D, Şimşek U, Angele K, et al. Knowledge Graphs. Springer International Publishing, 2020.

[5] 汤姆·怀特（Tom White）. Hadoop 权威指南：大数据的存储与分析. 清华大学出版社，2017.07.01

0008408 Introduction to Big Data Technologies

Course Number: 0008408

Course Title: Introduction to Big Data Technologies

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Probability theory and Mathematical statistics, Object oriented programming, Principles of Database

Evaluation Method: Course participation + Course project

Writer: Li Jianqiang

Course Description:

Introduction to Big Data Technologies is an elective course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates with the direction of big data. The objective of this course is to equip students with the necessary knowledge and skills to comprehend the concepts and technologies associated with big data, as well as to foster the students' creativity and practical abilities to utilize big data knowledge, technologies, and tools to address real-world challenges. It will lay the necessary foundation for the students to conduct big data-related research and engineering activities in the future. The course focuses on web search, data mining, recommendation, and relevant supportive big data storage and computing platforms, through which to help the students comprehend the basic requirements, concepts, principles, methods, tools and platforms related to big data technologies. The difficulty of this course lies in the fact that the students need to utilize the knowledge related to big data to develop practical tools and solve real-world engineering problems within a multi-disciplinary team, through which to motivate the consciousness of life-long learning and cultivate the professional quality of cooperation and collaborative innovation.

Recommended Textbooks/References:

1. Wang Hongzhi. Principle and Practice of Big Data Analysis. China Machinery Industry Press, 2017.07.01
2. Zhai Chengxiang et al. Text Data Mining and Analysis: A Practical Introduction to Information Retrieval and Text Mining. China Machinery Industry Press, 2019.04.01
3. Pang-Ning Tan et al. Introduction to Data Mining. Machinery Industry Press, 2019.08.01
4. Fensel D, Ş im U ş ek, Angele K, et al. The Knowledge Graphs. Springer International Publishing, 2020.
5. Tom White. Hadoop Authoritative Guide: Storage and Analysis of Big Data. Tsinghua University Press, 2017.07.01

0010132 嵌入式系统设计原理

课程编码：0010132

课程名称：嵌入式系统设计原理

英文名称：Principles of Embedded System Design

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高级语言程序设计、计算机组成原理

考核形式： 平时成绩+考试

撰写人：黄樟钦

课程简介：（250-300 字）

嵌入式系统的应用在日常生活中已无处不在，嵌入式系统的开发者遍布世界，嵌入式系统的研究在广度和深度上日益增加。嵌入式系统是以具体应用为核心，以计算机技术为基础，对功能、可靠性、成本、体积、功耗有严格要求的专用计算机系统，是物联网、移动计算时代最热门的研究领域之一。

本课程主要讲授嵌入式系统软硬件协同设计原理与方法。通过本课程的学习，使学生了解复杂嵌入式系统的基本概念、工作原理及设计方法，理解由底向上与自顶向下相结合的嵌入式系统设计流程。同时，通过课程实验，使学生在自行设计一个典型的嵌入式系统时获得较多的实际设计经验，提高学生的动手能力。

推荐教材或主要参考书：

[1] Marilyn Wolf, Princeton University. Computers as Components: Principles of Embedded Computing System Design. Academic Press, 2013.1

[2] (美) Marilyn Wolf 著、宫晓利等译. 嵌入式计算系统设计原理. 机械工业出版社, 2018.7

[3] 陆佳华等编著. 嵌入式系统软硬件协同设计实战指南—基于 Xilinx ZYNQ. 机械工业出版社, 2014.7

[4] (美)Christopher Hallinan. Embedded Linux Primer. 人民邮电出版社, 2016.4

[5] 陶松著. Ubuntu Linux 从入门到精通. 人民邮电出版社, 2017.8

0010132 Principles of Embedded System Design

Course Number: 0010132

Course Title: Principles of Embedded System Design

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduates majoring in software engineering, undergraduates majoring in computer science

Prerequisites: Program Design, Principles of Computer Composition

Evaluation Method: usual grades + exam

Writer: Huang Zhangqin

Course Description:

The application of embedded systems is ubiquitous in daily life, the developers of embedded systems are worldwide, and the research on embedded systems is increasing in breadth and depth. The embedded system is a dedicated computer system with specific applications as the core, computer technology as the basis, and strict requirements on function, reliability, cost, volume, and power consumption. It is one of the most popular research fields in the Internet of Things and mobile computing era.

This course mainly introduces embedded system software and hardware collaborative design principles and methods. Through the study of this course, students will learn the basic concepts, working principles, and design methods of complex embedded systems, and understand the embedded system design process that combines bottom-up and top-down. At the same time, through course experiments, students can gain more practical design experience when designing a typical embedded system by themselves, and improve students' practical ability.

Recommended Textbooks/References:

1. Marilyn Wolf, Princeton University. Computers as Components: Principles of Embedded Computing System Design. Academic Press, 2013.1

2. (United States) Marilyn Wolf, Gong Xiaoli, etc. Translated. Embedded computing system design principles. Machinery Industry Press, 2018.7

3.Edited by Lu Jiahua, etc. Embedded System Software and Hardware Co-design Practical Guide—Based on Xilinx ZYNQ. Machinery Industry Press, 2014.7

4. ((United States)Christopher Hallinan. Embedded Linux Primer. People Post Press, 2016.4

5. Tao Song. From entry to proficient in Ubuntu Linux. People Post Press, 2017.8

0010130 嵌入式微处理器结构与设计

课程编码：0010130

课程名称：嵌入式微处理器结构与设计

英文名称：Embedded Microprocessor Architecture and Design

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：计算机组成原理、数字逻辑

考核形式：平时成绩+考试

撰写人：王素玉

课程简介：（250-300 字）

嵌入式微处理器结构与设计是软件学院为软件工程专业本科生开设的专业选修课。本课程的任务是培养学生理解掌握嵌入式微处理器的基本结构体系;理解嵌入式微处理器的特点及基本开发流程；了解嵌入式微处理器的设计方法等，使其在工作中具有利用嵌入式微处理器开发嵌入式产品、解决实际问题以及分析设计简单嵌入式微处理器的基本能力。教学内容重点：嵌入式 CPU 的结构、内部组成、加速技术以及总线结构以及典型的嵌入式 CPU 的设计方法等。教学内容的难点是嵌入式 CPU 的设计方法。

推荐教材或主要参考书：

[1] 胡振波 著. 手把手教你设计 CPU—RISC-V 处理器. 人民邮电出版社, 2018.6

[2] Ian Mcloughlin. 王沁,齐悦译. 计算机体系结构-嵌入式方法.机械工业出版社, 2012.6

[3] 陈丽蓉,李际炜,于喜龙,杨霞编著. 嵌入式微处理器系统及应用. 清华大学出版社,2010.5

0010130 Embedded Microprocessor Architecture and Design

Course Number： 0010130

Course Title： Embedded Microprocessor Architecture and Design

Course Type： Professional Elective Courses

Credit： 2.0 **Total Credit Hours：** 32

Students: Undergraduate students majoring in software engineering

Prerequisites ： Principles of Computer Organization; digital logic; Assembly language programming

Evaluation Method: Course participation + written exams

Writer: Wang Suyu

Course Description:

Embedded microprocessor structure and design is an elective course offered by the Dept. of Software Engineering for software engineering undergraduates.

The goal of this course is to equip students with a comprehensive understanding of (1) the fundamental structure systems of embedded microprocessors, (2) the characteristics and basic development processes of embedded microprocessors, and (3) the design method of embedded microprocessors. Students will develop skills in embedded product development, practical problem-solving, and analysis and design of simple embedded microprocessors.

The critical points of this course include structure, internal composition, acceleration technology, bus structure, and typical design method of embedded CPU. The difficult part of this course is the design method of embedded CPUs.

Recommended Textbooks/References:

1.Hu Bo. Hand in hand teaching you to design CPU-RISC-V processor. Post & Telecom Press. 06-2018

2.Ian McLoughlin. Computer Architecture-An Embedded Approach. China machine Press. 06-2012

3.Chen Lirong. Li Jiwei, Yu Xilong, Yang Xia. Embedded microprocessor system and its application. Tsinghua University Press. 05-2010

0009027 数字图像处理

课程编号：0009027

课程名称：数字图像处理

英文名称：Digital Image Processing

课程类型：专业选修课

学分：2.0　　**学时：**32

面向对象：软件工程本科生

先修课程：高等数学（工）、概率论与数理统计（工）、高级语言程序设计

考核形式：平时成绩+考试

撰写人：任柯燕

课程简介

数字图像处理是信息科学中发展最快的热点研究方向，随着无人机、无人驾驶、机器人、人工智能等新一代信息技术的应用和发展，计算机视觉取代人工视觉成为趋势，数字图像处理是计算机视觉的基础课程。图像处理科学与技术已渗透到计算机、通信、交通运输、医学、物理、化学、生物学、军事、经济各个领域，甚至人们的生活也与其紧密相关。它作为当前信息技术的核心科学之一，为通信、计算机应用以及各类信息处理技术提供基础理论、基本方法、实用算法和实现方案。它探索图像获取与数字化、图像基本运算、图像变换、图像增强复原、图像压缩编码、彩色图像处理、图像分割、图像表示与描述等原理和技术方法。

推荐教材或主要参考书：

[1] 冈萨雷斯, 伍兹著，阮秋琦等译. 数字图像处理（第三版）电子工业出版社, 2011.6

[2] 冈萨雷斯, 伍兹著，阮秋琦等译. 数字图像处理(MATLAB 版)（第 2 版）电子工业出版社, 2014.1

[3] 图像处理、分析与机器视觉（第四版），Milan Sonka, Vaclav Hlavac, Roger Boyle 著，清华大学出版社，2016.06

[4] Computer Vision: Algorithms and Applications, Richard Szeliski 著, Springer, 2010.10

[5] 深度学习, Ian，Goodfellow，Yoshua，Bengio，Aaron 著, 人民邮电出版社, 2017.08

0009027 Digital Image Processing

Course Number： 0009027

Course Title： Digital Image Processing

Course Type： Professional Elective Courses

Credit： 2.0 **Total Credit Hours：** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites： Advanced Mathematics, Theory of Matrices, Probability and Statistics, Advanced Language Programming

Evaluation Method: Course participation + written exams

Writer: Ren Keyan

Course Description

Digital image processing is the fastest-developing research direction in information science. With the application and development of new-generation information technologies (such as UAVs, unmanned vehicles, robots, and artificial intelligence), computer vision has become a trend to replace artificial vision. Digital image processing is a fundamental course of computer vision. Also, image processing has become ubiquitous in fields such as computer science, communication, transportation, medicine, physics, chemistry, biology, economics, and military, and is even intertwined with people's daily lives.

As one of the core sciences of current information technology, Digital image processing provides basic theory, basic methods, practical algorithms, and implementation schemes for communication, computer application, and various information processing technologies. In general, it explores the principles and technical methods of image acquisition and digitization, the basic operation of images, image transformation, image enhancement and restoration, image compression and coding, color image processing, image segmentation, image representation and description, etc.

Recommended Textbooks/References:

1. Digital Image Processing (3rd Edition). Rafael，C.Gonzalez，Richard，E.，Woods, Electronic Industry Press, 2011.6

2. Digital Image Processing (MATLAB) (Version 2). Rafael，C.Gonzalez，Richard，E.，Woods, Electronic Industry Press, 2014.1

3. Image Processing, Analysis and Machine Vision (4th Edition)，Milan Sonka, Vaclav Hlavac, Roger Boyle, Tsinghua University Press, 2016.06

4. Computer Vision: Algorithms and Applications. Richard Szeliski, Springer, 2010.10

5. Deep Learning. Ian，Goodfellow，Yoshua，Bengio，Aaron, Mit Press, 2017.08

0008162 数据挖掘

课程编码：0008162

课程名称：数据挖掘

英文名称：Data Mining

课程类型：专业选修课

学分：2.0　　**学时：**32

面向对象：软件工程专业本科生

先修课程：数据结构与算法、数据库原理、离散数学

考核形式：平时成绩+考试

撰写人：刘希亮

课程简介：（250-300 字）

数据挖掘是信息学部为软件工程专业本科生开设的专业选修课。本课程的任务是介绍数据挖掘的概念与技术，结合数据挖掘实际应用案例，使学生掌握从数据库、数据仓库、Web 等大型或者海量数据存储中，发现、提取隐藏模式、信息和知识的方法。课堂教学集中讨论模式发现技术的可行性、有用性和有效性问题，帮助学生明确数据挖掘的应用和研究方向。教学内容重点：数据预处理，分类、聚类、回归、预测、关联规则挖掘算法、科学可视化。教学内容的难点：度量数据的相似性和相异性、数据归约、多维数据建模、频繁项集挖掘方法、神经网络、决策树等。

推存教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] Pang-Ning Tan, Michael Steinbach, Vipin Kumar, 著, 范明, 范宏建 等译. 数据挖掘导论(完整版). 北京: 人民邮电出版社, 2020

[2] Jiawei Han, 著, 范明, 孟小峰 译. 数据挖掘: 概念与技术（原书第 3 版）, 机械工业出版社 , 2012

[3] 李航, 著. 统计学习方法（第二版）. 北京: 清华大学出版社, 2019

0008162 Data Mining

Course Number: 0008162

Course Title: Data Mining

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software engineering

Prerequisites: Data Structure and Algorithms. Database Theory. Discrete Mathematics

Evaluation Method: Course participation + written exams

Writer: Liu Xiliang

Course Description:

Data Mining is an elective course offered by Faculty of Information Technology, Beijing University of Technology for undergraduate students majoring in Software Engineering. The objective of this course is to introduce the concepts and techniques of data mining, and through practical application cases, enable students to master methods of discovering, extracting hidden patterns, information, and knowledge from large-scale or massive data storage such as databases, data warehouses, and the Web. In-class discussions primarily focus on the feasibility, usefulness, and effectiveness of pattern discovery techniques, assisting students in identifying the applications and research directions of data mining. Key topics covered in the course include data preprocessing, classification, clustering, regression, prediction, association rule mining algorithms, and scientific visualization. The challenging aspects of the curriculum include measuring data similarity and dissimilarity, data reduction, multidimensional data modeling, frequent itemset mining methods, neural networks, decision trees, etc..

Recommended Textbooks/References:

[1] Tan, P. N., Steinbach, M., Kumar, V., Fan, Ming, & Fan, Hongjian. (2020). Introduction to Data Mining (Full version). Beijing: Posts & Telecom Press.

[2] Han, J., Fan, Ming, & Meng, Xiaofeng. (2012). Data Mining: Concepts and Techniques (3rd ed.). Beijing: Machinery Industry Press.

[3] Li, H. (2019). Statistical Learning Methods (2nd ed.). Beijing: Tsinghua University Press.

0007833 编译原理

课程编码：0007833

课程名称：编译原理

英文名称：Principles of Compiler

课程类型：专业选修课

学分： 3.0 **总学时：** 48

面向对象：软件工程专业本科生

先修课程：高级语言程序设计，数据结构与算法

考核形式：平时成绩+考试

撰写人：朱娜斐

课程简介：（250-300 字）

编译原理是信息学部软件学院为软件工程专业本科生开设的专业选修课。本课程的任务是培养学生的计算思维、程序设计与实现、算法设计与分析、计算机系统四大专业基本能力；增强学生对抽象、理论、设计三个学科形态/过程的理解；引导学生追求从问题出发，通过形式化去实现自动计算（翻译），强化学生数字化、算法、模块化等专业核心意识等。教学内容的重点主要是编译过程中所涉及的主要步骤和环节，包括：词法分析、语法分析、语义分析和中间代码生成等内容。教学内容的难点包括：编译的理论基础、词法分析方法、语法分析方法、语法制导的翻译、语义分析、中间代码的生成以及代码优化等内容所涉及的概念、原理和方法。

推荐教材或主要参考书：

[1]陈火旺，程序设计语言编译原理(第三版). 国防工业出版社，2003.08

[2]Alfred Aho, Ravi Sethi, Jeffrey D. Ullman. 编译原理. 赵建华等译. 机械工业出版社，2009.01

[3]Steven S. Muchnick. Advanced Compiler Design and Implementation. 沈志宇，赵克佳译. 北京：机械工业出版社，2005.07

0007833 Principles of Compiler

Course Number: 0007833

Course Title: Principles of Compiler

Course Type: Professional elective course

Credit: 3.0 **Total Credit Hours:** 48

Students: Undergraduate students majoring in software engineering

Prerequisites: High Level Language Programming, Data structure and algorithm analysis

Evaluation Method: Course participation + written exams

Writer: Zhu Nafei

Course Description:

The Principles of Compiler is an elective course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates.

The course aims to achieve four goals: (1) to develop students' four significant skills in the field of software engineering, which include computational thinking, program design and implementation, algorithm design and analysis, and computer system understanding; (2) to enhance students' comprehension of abstract, theoretical, and design concepts and processes; (3) to guide students towards problem-solving and formalization techniques to achieve automatic calculation (translation); and (4) to strengthen students' core awareness of digitization, algorithm, and modularization.

The teaching focuses mainly on the main steps in the compilation process, including lexical analysis, syntax analysis, semantic analysis, and intermediate code generation. The difficulties of this course include the theoretical basis of compilation, lexical analysis method, grammar analysis method, grammar-guided translation, semantic analysis, generation of intermediate code, and code optimization.

Recommended Textbooks/References:

1. Huowang Chen. Compiler principle of programming language (3rd Edition). National Defense Industry Press, August 2003.

2. Alfred aho, Ravi Sethi, Jeffrey D. Ullman. Compiler principles. Translated by Jianhua Zhao et al. China Machine Press, January 2009.

3. Steven s. Muchnick. Advanced compiler design and implementation. Translated by Shen Zhiyu and Zhao Kejia. Beijing: China Machine Press, July 2005.

0008404 机器学习与数据分析

课程编码：0008404

课程名称：机器学习与数据分析

英文名称：Machine Learning and Data Analysis

课程类型：学科专业选修课

学分： 2 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高等数学，线性代数，概率论，高级语言程序设计，数据结构

考核形式： 平时成绩+考试

撰写人：李蓉

课程简介：（250-300 字）

机器学习与数据分析是信息学部软件学院为软件工程专业本科生开设的学科专业选修课程。本课程的任务是通过对机器学习和数据分析的基本概念和算法的介绍，使得学生掌握机器学习的常用算法以及数据分析的主要方法，并掌握本领域主流的编程语言和工具包的使用。教学内容重点包括：机器学习基本概念，机器学习算法性能的度量，线性回归，logistic 回归，神经网络，支持向量机，决策树算法，贝叶斯分类，聚类算法，数据降维算法，本领域前沿研究介绍。教学内容的难点是：神经网络的反向传播算法，支持向量机算法，数据降维的主成分分析算法。

推荐教材或主要参考书：

[3] 周志华， 机器学习，清华大学出版社，2016 年 1 月

[4] 李航，统计学习方法(第 2 版)， 清华大学出版社，2019 年 5 月

[5] 斯坦福大学网络公开课“机器学习”课程讲义

[6] Peter Harrington 等， 机器学习实战，人民邮电出版社，2015 年 7 月

0008404 Machine Learning and Data Analysis

Course Number: 0008404

Course Title: Machine Learning and Data Analysis

Course Type: Elective Course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Advanced mathematics，Linear Algebra, Probability theory，High-level language Programming，Data Structure

Evaluation Method: Course participation + written exams

Writer: Li Rong

Course Description:

Machine Learning and Data Analysis is one of the elective courses for Undergraduate students majoring in Software Engineering. The main target of this course is to introduce the basic concepts and algorithms in machine learning and data analysis and enable students to master the usage of mainstream programming language and toolbox. This course focuses on machine learning algorithms. The main teaching contents cover the following topics: Basic concepts of machine learning, Measurement of machine learning algorithm performance, Linear Regression, Logistic Regression, neural network, support vector machine, decision tree, Bayesian classification, Clustering, Dimension reduction, and an introduction of cutting-edge research in this field. The difficulties of this course are the following: Back propaganda algorithm of the neural network, support vector machine, principle component analysis algorithm.

Recommended Textbooks/References:

1. Zhou zhihua, Machine Learning, *Tsinghua university Press*, January-2016
2. Li Hang, Statistical Learning Methods, *Tsinghua university Press*, May-2019
3. Stanford University Open Online Course "Machine Learning" Course Notes
4. Peter Harrington， Machine Learning in Action，Posts&Telecom Press，July-2015

0008165 嵌入式系统软硬件综合设计

课程编码：0008165

课程名称：嵌入式系统软硬件综合设计

英文名称： Integrated Design of Embedded System Software and Hardware

课程类型：专业选修课

学分：2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：嵌入式系统设计原理

考核形式： 平时成绩+考试

撰写人：李达

课程简介：（250-300 字）

嵌入式系统软硬件综合设计是信息学部为软件工程专业本科生开设的专业选修课程。本课程的任务是掌握嵌入式系统设计技术，包含系统软硬件及综合、应用的学科知识，从嵌入式系统原理概念、应用领域、设计开发流程出发，结合应用实践的综合培养。教学内容重点：本课程涉及 Zynq 嵌入式 SoC 平台的完整软硬件系统设计方法，既有逻辑硬件的电路设计，又有系统软件架构的开发，并结合特定应用方向进行设计实现，是理论和实践相结合的高级综合实践。教学内容的难点：使学生能理解掌握 zynq SoC 设计的基本理论基础，掌握基于 Xilinx 的 zynq 平台实现软硬件综合设计的基本流程，主要设计方法以及典型应用示例的实现。

推荐教材或主要参考书：

[1] 陆佳华，潘祖龙，彭竞宇，嵌入式系统软硬件协同设计实战指南：基于 Xilinx ZYNQ（第 2 版）机械工业出版社，2013

[2] Crockett, Louise H.; Elliot, Ross a.; Enderwitz, Martin a. The Zynq Book: Embedded Processing with the Arm Cortex-A9 on the Xilinx Zynq-7000 All Programmable Soc. Strathclyde Academic Media，2014 年 7 月

[3] 何宾，Xilinx All Programmable Zynq-7000 SoC 设计指南，清华大学出版社，2013

0008165 Integrated Design of Embedded System Software and Hardware

Course Number: 0008165

Course Title: Integrated Design of Embedded System Software and Hardware

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate grade three students in Software Engineering

Prerequisites: Principles of Embedded System Design

Evaluation Method: Course participation + written exams

Writer: Li Da

Course Description:

"Integrated Design of Embedded System Software and Hardware" is a subject elective course for third-year undergraduates in Software Engineering.

The primary goal of this course is to equip students with a comprehensive understanding of embedded system design technology. This includes the integration of software and hardware, as well as the design and development process. Through this course, learners will gain knowledge of fundamental concepts and their practical applications, and acquire practice in applying this knowledge to real-world scenarios. This course involves an advanced and comprehensive combination of theoretical concepts and practical applications, and its main teaching content covers the following topics: (1) design of the Zynq embedded SoC platform, including the design of hardware logic circuits and the development of software architectures., and (2) design and implementation based on specific application scenarios.

The difficulties of this course are the following: (1) understanding the basic theory of Zynq SoC design, (2) mastering the basic process to realize the hardware and software design of Xilinx based on Zynq platform, (3) the primary design method and implementation of typical application examples.

Recommended Textbooks/References:

1. Lu Jiahua, Pan Zulong, Peng Jingyu, embedded system software and hardware co design practice guide: Based on ZYNQ Xilinx (Second Edition) Machinery Industry Press, 2013
2. Crockett, Louise H.; Elliot Ross, a. Enderwitz, Martin a. The; Zynq Book: Embedded Processing with the Arm Cortex-A9 on the Xilinx Zynq-7000 All Programmable Soc. Strathclyde Academic Media, July 2014
3. He Bin, All Programmable Zynq-7000 SoC Xilinx design guide, Tsinghua University press, 2013

0010091 高级嵌入式软件开发技术

课程编码：0010091

课程名称：高级嵌入式软件开发技术

英文名称：Advanced Technology of Embedded Software Development

课程类型：专业选修课，校选专业课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生，工学本科生

先修课程：软件工程导论、嵌入式系统设计原理，面向对象程序设计（C++）

考核形式：平时成绩+考试

撰写人：何坚

课程简介：（250-300 字）

本课程是软件工程（嵌入式系统方向）的一门专业限选课。将阐述嵌入式系统的总体构架，嵌入式软件、硬件之间的紧密关系，以及嵌入式软件开发的流程和关键技术。其中，以嵌入式系统快速面向对象过程模型为核心，重点介绍嵌入式软件开发过程中的分析、设计技术。结合具体案例分析，透彻讲解嵌入式软件的需求分析、对象分析、构架设计、机制设计以及详细设计技术。同时，针对主流嵌入式 Linux 操作系统，详细介绍相关引导程序烧写、内核与文件系统定制，以及驱动程序编写等关键技术，使学生在理解和实践的基础上掌握嵌入式软件的开发方法、技术和相关工具。

推荐教材或主要参考书：

[1] 何坚，王素玉，王晓懿. 嵌入式软件高级开发技术. 西安电子科技大学出版社，2020 年 3 月

0010091 Advanced Technology of Embedded Software Development

Course Number: 0010091

Course Title: Advanced Technology of Embedded Software Development

Course Type: Professional elective course，School elective professional course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering，Engineering undergraduates

Prerequisites: Introduction to Software Engineering, Principles of Embedded System Design, Object-Oriented Programming (C++)

Evaluation Method: Course participation + exams

Writer: He Jian

Course Description:

Advanced Technology of Embedded Software Development is a professional course for software engineering undergraduates.

The course covers the following topics: the general framework of embedded systems, the close relationship between embedded software and hardware, and the Rapid Object Oriented Process for Embedded System (namely ROOPES) development. This course focuses on presenting a comprehensive analysis and design methodology for embedded software, focusing on ROOPES. Specifically, it provides detailed explanations of requirements analysis, object analysis, architecture design, mechanism design, and detailed design technology of embedded software, supported by case studies.

Moreover, this course aims to introduce students to the development method, technology, and related tools of embedded software, focusing on the mainstream embedded Linux operating system. It covers in detail the process of porting the Linux OS, including writing the boot program, customizing the kernel and file system, and programming drivers. By the end of the course, students will have mastered these skills, enabling them to become proficient in embedded software development.

Recommended Textbooks/References:

1.Jian He, Suyu Wang, Xiaoyi Wang. Advanced Software Developing Technology for Embedded System, *Xidian University Publishing House*, 4-2020

0008166 物联网技术与应用

课程编码：0008166

课程名称：物联网技术与应用

英文名称：Technologies and Applications of Internet of Things

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：计算机网络

考核形式：平时成绩+考试

撰写人：李永

课程简介：（250-300 字）

物联网技术与应用是软件学院（信息学部）为软件工程专业本科生开设的专业任选课程类型。本课程的任务是结合物联网作为新一代信息技术的重要应用方式，培养学生进行软件开发与技术应用的工程性和实践性。教学内容重点：讲授物联网的基本概念、物联网的关键和典型应用，以“物联网基本概念”、“应用场景设计”、“物联网通讯协议的验证与确认”、“RFID 关键技术应用”、“设计过程”、“项目管理”为主要知识点要求，密切结合物联网应用于开发的先进技术、最佳实践和案例分析。教学内容的难点：物联网通讯协议、典型案例分析和面向重点行业的场景设计等。

推荐教材或主要参考书：

[1] 《数字逻辑与数字集成电路》（第 2 版），王尔乾，杨士强，巴林凤 著，清华大学出版社，2002 年

[2] 《物联网导论》（第一版），刘云浩主编，科学出版社，2013 年

[3]《物联网核心技术》，黄玉兰编著，机械工业出版社。

[4]《The Internet of things: from RFID to the next-Generation pervasive networked systems》， Lu Yan, Yan Zhang, Laurence T. Yang

0008166 Technologies and Applications of Internet of Things

Course Number: 0008166

Course Title: Technologies and Applications of Internet of Things

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in software engineer

Prerequisites: computer network

Evaluation Method: Course participation + written exams

Writer: Li Yong

Course Description:

"Technologies and Applications of Internet of Things" is a professional optional course offered by the Dept. of Software Engineering for software engineering undergraduates.

By emphasizing the Internet of Things as an essential mode of the new generation of information technology, this course aims to equip students with practical software development skills and technology applications.

The key points of this course are the following: (1) the basic concepts of the Internet of Things, (2) the key and typical applications of the Internet of Things. This course takes "The Basic Concept of the Internet of Things," "Application Scenario Design," "Verification and Confirmation of the Communication Protocol of the Internet of Things," "Application of RFID Key Technology", "Design Process," and "Project Management" as the primary knowledge points, while closely combining the advanced technologies applied in the development of the Internet of Things with best practices and case studies. The difficulties of this course are the following: (1) Internet of Things communication protocol, (2) typical case studies, and (3) scenario design for key industries.

Recommended Textbooks/References:

1. 《Digital logic and digital integrated circuits 》(2nd Edition), written by Wang Erqian, Yang Shiqiang and balinfeng, Tsinghua University Press, 2002
2. 《Introduction to the Internet of things》 (First Edition), edited by Liu Yunhao, Science Press, 2013
3. 《Core technology of Internet of things》, edited by Huang Yulan, China Machine Press
4. 《The Internet of things: from RFID to the next-Generation pervasive networked systems》, Lu Yan, Yan Zhang, Laurence T. Yang

0003677 信息安全概论（双语）

课程编码：0003677

课程名称：信息安全概论（双语）

英文名称：Introduction to Information Security

课程类型：专业选修课

学分：2.0　**总学时：**32

面向对象：软件工程专业本科生

先修课程：计算机网络、操作系统原理、数据结构与算法、计算机组成原理

考核形式：平时成绩+考试

撰写人：何泾沙

课程简介：（250-300 字）

信息安全概论（双语）是信息学部为软件工程专业本科生开设的专业选修课。本课程的任务是使学生学习和掌握信息安全的基本概念和原理，了解信息系统面临的安全挑战，学习信息安全保障的基础理论及相关算法、协议和技术。教学内容重点：信息安全面临的主要威胁、安全模型、密码算法、密钥交换、数字签名、身份认证、访问控制、信息流分析、安全审计及安全保障。教学内容的难点：基于公钥的加密算法、密钥交换协议、数字签名、PKI、机密性模型、密码攻击与防御技术、网络环境中的单点登录技术 Kerberos、访问控制列表、隐形信息流分析与安全应对方法。

推荐教材或主要参考书：

[1] (美) Matt Bishop. Computer Security: Art and Science, 2nd Ed., Addison-Wesley Professional, 2019.

0003677 Introduction to Information Security

Course Number: 0003677

Course Title: Introduction to Information Security

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Computer Networks, Operating Systems, Data Structures and Algorithms, Computer Architecture

Evaluation Method: Course participation + written exams

Writer: He Jingsha

Course Description:

Introduction to Information Security is one of the professional elective courses for undergraduate students majoring in Software Engineering. The main target of this course is for the students to learn and master basic concepts and general principles of information security, understand security challenges facing today's information systems, and learn the theories, algorithms, protocols, and techniques for protecting information. This course focuses on the main security threats of information systems, security models, cryptography, key exchange, digital signature, identification and authentication, access control, information flow analysis, auditing, and security assurance. The difficulties of this course include the following: public-key-based cryptography, key exchange protocols, digital signature, confidentiality models, password attacks and counter-measures, single sign-on and Kerberos, access control lists, and covert channel analysis and techniques of dealing with covert channels.

Recommended Textbooks/References:

1. Matt Bishop. Computer Security: Art and Science, 2nd Ed., Addison-Wesley Professional, 2019.

0007371 计算机视觉

课程编码：0007371

课程名称：计算机视觉

英文名称：Computer Vision

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高等数学（工）、线性代数（工）、概率论与数理统计、数据结构与算法、数字图像处理

考核形式：平时成绩+考试

撰写人：王素玉

课程简介：（250-300 字）

计算机视觉是软件学院为软件工程专业本科生开设的专业选修课。本课程的任务是拓宽学生的专业和学术视野，引导学生建立计算机视觉的基本概念，了解掌握计算机视觉领域的基础知识和热点方向，为后续从事相关工作或学术研究奠定基础。教学内容重点：计算机视觉的基本理论、特征与分类器的概念，卷积神经网络的原理与实现方法，典型的计算机视觉技术等。教学内容的难点是卷积神经网络的基础理论和实现方法，典型应用等。

推荐教材或主要参考书：

[1] 萨尔曼·汗（Salman Khan）等，卷积神经网络与计算机视觉. 机械工业出版社，2019 年 4 月；

[2] 章毓晋编，计算机视觉教程（第二版），人民邮电出版社，2017 年 2 月

[3] Szeliski， Computer Vision: Algorithms and Applications， Springer， 2011 年 12 月

0007371 Computer Vision

Course Number： 0007371

Course Title： Computer Vision

Course Type： Professional Elective Courses

Credit： 2.0 **Total Credit Hours：** 32

Students: Undergraduate students majoring in software engineering

Prerequisites： Advanced Mathematics, Linear Algebra, Probability, Data Structures, Digital Image Processing

Evaluation Method: Course participation + written exams

Writer: Wang Suyu

Course Description:

Computer Vision is a professional elective course for software engineering undergraduates in the Dept. of Software Engineering. The task of this course is to broaden students' professional and academic horizons, guide students to establish the basic concepts of computer vision, understand and master the basic knowledge and hot topics in the computer vision field, and lay a foundation for future work or academic research.

The course's key points include the basic theory of computer vision, features and concept of classifiers, principle and implementation method of convolution neural network, typical computer vision technologies, etc. The difficulties of the course include the basic theory and implementation method of convolutional neural network, typical applications, and so on.

Recommended Textbooks/References:

1.Salman Khan, Hossein Rahmani, Syed Afaq Ali Shah, Mohammed Bennamoun. A guide to Convolutional Neural Networks for Computer Vision. China Machine Press, 04-2019.

2.Zhang Yujin, A Course of Computer Vision(Second Edition).Post & Telecom Press. 02-2017

3.Szeliski, Computer Vision: Algorithms and Applications, Springer, 12-2011

0010651 云计算与边缘计算

课程编码：0010651

课程名称：云计算与边缘计算

英文名称：Cloud and Edge Computing

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：操作系统、数据结构与算法、计算机网络

考核形式：平时成绩+课程大作业

撰写人：毕敬

课程简介：（250-300 字）

云计算与边缘计算是信息学部软件学院为软件工程专业本科生开设的专业限选课程类型。本课程的任务是围绕云边协同的关键技术问题展开，以云计算和边缘计算的发展为主线，大数据处理及云边协同资源优化管理、实时负载均衡调度、计算资源节能调度、离线和在线节能调度以及典型智能优化算法作为主要内容，并讨论云计算和边缘计算典型的开源及主流服务提供商系统设计与实现及其相关的应用场景。教学内容重点：对大数据背景下的云边协同优化调度管理领域内的主要挑战性问题进行深入分析。教学内容的难点：实时负载均衡调度、能耗敏感调度、资源分配优化调度和典型的智能优化算法等关键内容。

推荐教材或主要参考书：

[1] Ian Foster, Dennis B. Gannon. Cloud Computing for Science and Engineering. The MIT Press, 2017 年.

[2] 拉库马·布亚（Rajkumar Buyya），萨蒂 著，彭木根 孙耀华译 译. 雾计算与边缘计算：原理及范式. 机械工业出版社，2019 年 12 月.

[3] 田文洪，赵勇. 数据中心资源优化调度. 北京：电子工业出版社，2014 年 3 月.

[4] Kai H., et al. 武永卫等译. Distributed and Cloud Computing From Parallel Processing to the Internet of Things. 云计算与分布式系统从并行处理到物联网. 北京：机械工业出版社，2015 年 1 月.

[5] Luiz A. B., et al. The Datacenter as a Computer: An Introduction to the Design of Warehouse-Scale Machines. Morgan & Claypool Publishers, 2018 年.

[6] Thomas H. 殷建平等译. Introduction to Algorithms. 算法导论.北京：机械工业出版社，2014 年 11 月.

0010651 Cloud and Edge Computing

Course Number: 0010651

Course Title: Cloud and Edge Computing

Course Type: Professional elective course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering (Junior)

Prerequisites: Operating Systems, Data Structures and Algorithm Analysis, Computer Network

Evaluation Method: Usual performance + Course assignment

Writer: Bi Jing

Course Description:

Cloud and Edge Computing is a specialized distributional elective course for undergraduate students majoring in Software Engineering.

The main target of this course is the critical technologies of cloud and edge collaboration. This course focuses on the main challenges in cloud and edge computing, that is, how to optimize collaboration and schedule management with big data.

The course covers the following topics: (1) the development of cloud computing and edge computing as the main line; (2) big data processing and the optimization management of cloud-edge collaborative resources; (3) real-time load balancing scheduling; computing resource energy-saving scheduling; (4) offline and online energy-saving scheduling; and typical intelligent optimization algorithms; (5) designs and implementation of cloud and edge computing systems, along with related applications. The difficulties of this course are the following: real-time load scheduling, energy-sensitive scheduling, resource allocation optimization, and typical intelligent optimization algorithms.

Recommended Textbooks/References:

1.Ian Foster, Dennis B. Gannon. Cloud Computing for Science and Engineering. The MIT Press, 2017.

2.Rajkumar Buyya，Satish Narayana Srirama. Fog Computing and Edge Computing: Principles and Paradigms. China Machine Press, December 2019.

3.Wenhong Tian, Yong Zhao. Data center resource optimal scheduling. Beijing: Publishing House of Electronics Industry, March 2014.

4.Kai H., et al. Distributed and Cloud Computing From Parallel Processing to the Internet of Things. China Machine Press, January 2015.

5.Luiz A. B., et al. The Datacenter as a Computer: An Introduction to the Design of Warehouse-Scale Machines. Morgan & Claypool Publishers, 2018.

6.Thomas H. Introduction to Algorithms. Beijing：China Machine Press, November, 2014.

0010656 数字产业概论

课程编号： 0010656

课程名称：数字产业概论

英文名称：Introduction to Digital Industry

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：软件工程专业本科生

先修课程：数据库原理、大数据技术导论

考核形式：平时成绩+期末项目考核

撰写人：林鹏飞

课程简介：（250-300 字）

“数字产业概论”是一门理论性和实践性都很强的课程。本课程根据软件工程一级学科知识体系要求，并以此为基础构建内容框架，在课程设置过程中注重数字产业相关技术的工程性和实践性。以国家数字经济产业发展战略为核心，以“数字产业概念”、“数字产业发展历程”、“数字产业技术”、“数字资源”、“数字产业市场”、“数字产业政策规划”与“数字产业未来发展”为主要知识点要求，密切结合国内外云计算、物联网、大数据、移动通信、信息服务、电子商务等数字产业相关技术趋势、最佳实践和案例分析，透彻讲解数字产业的“技术创新、应用创新、产品创新、市场创新、服务创新的基本理论和方法，使学生在理解和实践的基础上掌握数字产业相关技术与应用的基本知识和技能，了解当前数字产业相关技术发展方向、产业化重点和创新创业的基本方法。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] 仝新顺,《电子商务概论》,人民邮电出版社, 2015.10

[2] 周苏、王文,《大数据导论》，清华大学出版社，2016.9

[3] 赵兴峰,《数字蝶变-企业数字化转型之道》，电子工业出版社，2019.8

[4] David M.Kroenke，David J.Auer. Database Concepts,5E . 北京：清华大学出版社，2011 年 11 月

0010656 Introduction to Digital Industry

Course Number: 0010656

Course Title: Introduction to Digital Industry

Course Type: Professional elective course

Credit: 2 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Database principle，Introdcuyion to Big Data

Evaluation Method: Course participation + Project assessment

Writer: Lin Pengfei

Course Description:

The course "Introduction to Digital Industry" offers a strong foundation in both theoretical and practical aspects of the subject, building a content framework based on the knowledge system of the first-level discipline of software engineering.

Taking the National Digital Economy Industry Development Strategy as the core, this course is established based on the knowledge points of "digital industry concept," "digital industry development process," "digital industry technology," "digital resources," "digital industry market," "digital industry policy planning," and "digital industry future development."

Specifically, the course closely integrates digital industry trends, best practices, and case studies related to a large number of areas, including cloud computing, the Internet of Things, big data, mobile communications, information services, E-COMMERCE, etc. Meanwhile, it explains the basic theories and methods of technological innovation, applied innovation, product innovation, market innovation, and service innovation in the digital industry. By the end of this course, students will be able to gain expertise in the fundamental concepts and skills of technology and its applications relevant to the digital industry. They will also be able to comprehend the development directions, industrialization emphasis, and fundamental approaches to innovation and entrepreneurship in the digital industry.

Recommended Textbooks/References:

1. Tong xinshun, Introduction to E-Commerce, *People's Posts and Telecommunications Press*,10- 2015.
2. David M.Kroenke，David J.Auer. Database Concepts,5E . *Tsinghua University Press*，12-2011.

0009394 新生研讨课

课程编码：0009394

课程名称：新生研讨课

英文名称：Freshman Seminar

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：软件工程专业本科生

先修课程：

考核形式：课程报告

撰写人：张丽

课程简介：

新生研讨课是信息学部为软件工程专业本科生开设的自主课程。本课程任务是使学生了解软件工程专业的培养目标、课程设置、以及专业背景。通过本课程，学生可以了解软件的发展过程、软件开发与软件技术，以及嵌入式软件与系统、软件与信息服务、大数据及云计算等相关领域的基本概念、发展和应用，软件企业的创业与发展。通过师生互动研讨，让学生了解软件工程在现代社会和生活中的重要性，思考软件工程的特点、能力和潜力，并了解软件工程的学习、创新和方法。重点是指导学生掌握在软件工程上的正确学习方法以及对专业前景及方向有初步的了解和认识。难点在于提升学生在软件工程及软件开发、嵌入式系统、信息服务等专业方向的学习兴趣。

推荐教材或主要参考书：

无。

0009394 Freshman Seminar

Course Number: 0009394
Course Title: Freshman Seminar
Course Type: School-based course
Credit: 1.0 **Total Credit Hours:** 16
Students: Undergraduate students majoring in Software Engineering
Prerequisites:
Evaluation Method: Report
Writer: Zhang Li
Course Description:
Freshman Seminar is a school-based course offered by the Faculty of Information Technology for undergraduates majoring in Software Engineering. The task of this course is to make students understand the software engineering major's objectives, curriculum, and background. Through this course, students can understand the advancement of software, software development and technology, and the basic concepts, development and application of embedded software and systems, software and information services, big data and cloud computing, as well as the entrepreneurship and development of software enterprises. Through the interactive discussion between teachers and students, students can understand the importance of software engineering in modern society and daily life, think about the characteristics, ability, and potential of software engineering, and understand the learning, innovation, and methods of software engineering. The key point is to guide students to master the correct learning methods in software engineering and to have a preliminary understanding of the professional prospects and directions. The difficulty is to enhance students' interest in software engineering and software development, embedded systems, information services, and other professional directions.
Recommended Textbooks/References:
None

0010663 学术写作课程

课程编码：0010663
课程名称：学术写作课程
英文名称：Academic Writing
课程类型：自主课程
学分：1.0　　**总学时：**16
面向对象：软件工程专业本科生
先修课程：
考核形式：平时成绩+大作业
撰写人：谌云莉
课程简介：

学术写作课是软件学院（信息学部）为软件工程专业本科生开设的自主课程。学术写作是以研究科学和技术为主要内容的写作理论与方法，探索科技事物的表达规律与技巧的学科。学术写作贯穿于科学技术研究工作的全过程，是从事科学技术研究工作的专业技术人员必备的一项基本功，也是必备的基本能力。通过对科技论文的概念、学位论文编写格式、学术论文编写格式、科技论文写作指南和写作规范等方面的讲授，使学生了解科技论文写作的基本内容，掌握科技论文写作的基本方法，熟悉科技论文写作的基本规范，为后续将自己的研究成果写作成符合科技写作要求的和高质量的科技论文打下良好的基础。

推荐教材或主要参考书：

[1] 姚养无编著. 科技论文写作基础. 国防工业出版社，2017 年 4 月
[2] Barbara Gastel、Robert A. Day 著，任治刚译. 科技论文写作与发表教程（第八版）. 电子工业出版社，2018 年 1 月
[3] 刘振海、刘永新、陈忠财、臧庆军、李桃编著. 中英文科技论文写作教程. 高等教育出版社，2007 年 9 月

0010663 Academic Writing

Course Number: 0010663
Course Title: Academic Writing
Course Type: school-based course
Credit:1.0 **Total Credit Hours:**16
Students: Undergraduate students majoring in Software Engineering
Prerequisites:
Evaluation Method: Course participation + Assignment
Writer: Chen Yunli
Course Description:

Academic Writing is a school-based course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates. Academic Writing is regarding the writing theory and method with the research of science and technology as the main content, which explores the expression rules and skills of scientific and technological results. Academic Writing runs through the whole process of scientific and technological research. It is an essential basic skill and a necessary basic ability for professional and technical personnel engaged in scientific and technological research. Through the teaching of the writing format of dissertations, the writing formats of academic papers, the writing guidelines and writing standards of scientific and technological papers, the students can understand the fundamental contents of scientific and technological papers, master the basic methods of writing scientific and technological papers, and be familiar with the basic principles of scientific and technological thesis writing, so as to write their own research results in line with the requirements of scientific and technological writing.

Recommended Textbooks/References:

1. Yao Yangwu, Fundamentals of scientific and technological paper writing, National Defense Industry Press, 2017.4
2. Barbara Gastel, Robert A. Day, How To Write And Publish A Scientific Paper, 8th Edition, Publishing House of Electronics Industry, 2018.1
3. Liu Zhenhai, Liu Yongxin, Chen Zhongcai, Zang Qingjun, Li Tao, A course for writing Chinese and English scientific papers, Higher education press, 2007.9

0010719 学术前沿课程

课程编码：0010719
课程名称：学术前沿课程
英文名称：Academic Frontiers
课程类型：自主课程
学分：1.0　　**总学时：**16
面向对象：软件工程专业本科生
先修课程：无
考核形式：平时成绩+报告成绩
撰写人：谌云莉
课程简介：

学术前沿课是软件学院（信息学部）为软件工程专业本科生开设的自主课程。本课程旨在引导学生关注本学科的发展前沿，了解相关科学技术的前沿知识，拓宽学术视野，同时培养创新性思维，提高逻辑分析能力和解决问题的能力。本课程主要介绍软件工程领域的各个分支方向，深入介绍每个方向的前沿理论和前沿工作，重点涉及软件过程、物联网、网络安全、云计算、大数据、人工智能等方向的前沿技术。具体教学内容的重点和难点会根据本学科前沿科学研究的发展而做出相应的调整。

推荐教材或主要参考书：
无

0010719 Academic Frontiers

Course Number: 0010719

Course Title: Academic Frontiers

Course Type: School-based course

Credit: 1.0 **Total Credit Hours:**16

Students: Undergraduate students majoring in Software Engineering

Prerequisites:

Evaluation Method: Course participation + Report

Writer: Chen Yunli

Course Description:

Academic Frontiers is a school-based course offered by the Dept. of Software Engineering at the Faculty of Information Technology for software engineering undergraduates. The goal of this course is to guide students to pay attention to the development frontiers of Software Engineering, understand the frontier knowledge of related science and technology, broaden academic vision, cultivate innovative thinking, and improve logical analysis ability and problem-solving ability. This course mainly introduces various directions of the software engineering field. Further, it deeply introduces each direction's frontier theory and work, focusing on the frontier technologies of the software process, the Internet of Things, network security, cloud computing, big data, artificial intelligence, etc. The key points and difficulties of the specific teaching content will be adjusted according to the development of the frontier scientific research of the subject.

Recommended Textbooks/References:

None

0010072 电路分析基础-1

课程编码：0010072

课程名称：电路分析基础-1

英文名称：Circuit Analysis Foundation-1

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：软件工程专业本科生

先修课程：高等数学、大学物理、工程数学、线性代数

考核形式：平时成绩+实验+考试

撰写人：何东之

课程简介：

“电路分析基础[I]”是信息类大一学生的必修课，该课程主要系统论述电路基本理论、直流电路分析和动态电路分析的基本方法。本课程共三部分内容：第一部分电路基本理论是在电源和电阻基本元件基础上，引入电压和电流的约束关系，在标注参考方向前提下分析电路的电功率，最后引入基尔霍夫定律和电压定律；第二部分直流电路分析包括手算电路的基本方法和计算机处理电路的基本方法，手算电路方法主要是电源的等效和负载的等效，介绍了戴维南、诺顿定理和叠加定理，计算机处理电路主要是列写独立的方程，侧重于节点电压法和回路电流法；第三部分是动态电路的分析方法，研究对象是电容和电感组成的电路，这两种电气元件的电压电流约束关系，初始值求法及一阶电路的三要素算法。

推荐教材或主要参考书：

[1] 邱关源原著，罗先觉主编，电路（第 6 版），高等教育出版社，2022.6

[2] 李翰荪，简明电路分析基础，高等教育出版社，2004.07

0010072 Circuit Analysis Foundation-1

Course Number: 0010072

Course Title: Circuit Analysis Foundation-1

Course Type: Professional basic compulsory course

Credit: 2.0 **Total Credit Hours:** 32

Students: Undergraduate students majoring in Software Engineering

Prerequisites: Advanced Mathematics, College Physics, Engineering Mathematics, Linear Algebra

Evaluation Method: Course participation + Experimental results+ Written exams

Writer: He Dongzhi

Course Description:

"Fundamentals of Circuit Analysis [1]" is a compulsory course for first-year students majoring in information technology. The course mainly discusses the basic theory of circuits, the basic methods of DC circuit analysis, and dynamic circuit analysis. Specifically, The course can be divided into three parts:

(1) the first part is the basic circuit theory, which introduces the constraint relationship between voltage and current based on the basic components of power supply and resistance, analyzes the electrical power of the circuit under the premise of labeling the reference direction, and finally introduces Kirchhoff's law and voltage law.

(2) The second part is the analysis of DC circuits, which includes the basic methods of manual circuits and computer processing circuits. Moreover, the manual circuit method mainly focuses on the equivalent transformation of supply power and equivalent transformation of load, and introduces the Thevenin-Norton Theorem and Superposition Theorem. Further, the computer processing circuit mainly presents independent equations, focusing on the node voltage method and the loop current method.

(3) The third part is the analysis method of dynamic circuits, which focuses on the circuit composed of capacitors and inductors, the voltage and current constraints of these two electrical components, the initial value calculation method, and the three-element algorithm of first-order circuits.

Recommended Textbooks/References:

1. Qiu Guanyuan, Luo Xianjue, Circuit (6th edition), Higher Education Press, 2022.06.
2. Li Hansun, Fundamentals of Concise Circuit Analysis, Higher Education Press，2004.07.

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