0010734 模拟电子技术

课程编码：0010734

课程名称：模拟电子技术

英文名称：Analog Electronic Technology

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术（实验班）专业、计算机科学与技术专业、信息安全（实验班）专业、物联网工程专业本科生

先修课程：电路分析基础-1

考核形式： 平时成绩+闭卷考试

撰写人：李硕朋

课程简介：（250-300 字）

模拟电子技术是信息学部计算机学院为计算机科学与技术、信息安全、物联网工程专业本科生开设的学科基础必修课。本课程的任务是使学生掌握模拟电子技术的基本理论和分析方法，培养学生模拟电子技术设计的创新精神、思维能力、分析和解决实际问题能力。教学内容重点是模拟电子技术的基本理论和基本分析方法。教学内容的难点是模拟电子电路的分析、设计方法。

推荐教材或主要参考书：

[1] 童诗白,华成英. 模拟电子技术基础（第五版）.高等教育出版社. 2015 年

0010734 Analog Electronic Technology

Course Number: 0010734

Course Title: Analog Electronic Technology

Course Type: Compulsory course

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

Students: Undergraduate students majoring in Computer Science and Technology (Experimental class), Computer Science and Technology, Information Security (Experimental class), and Internet of things Engineering

Prerequisites: Fundamentals of Circuit Analysis

Evaluation Method: Course participation + written exams

Writer：Shuopeng Li

Course Description:

Analog electronic technology is a basic compulsory course offered by the School of Computer Science, Department of Information Techonology, for undergraduate students majoring in computer science and technology, information security, and Internet of Things engineering. The mission of this course is to enable students to master the basic theories and analysis methods of analog electronic technology, and to cultivate students' innovative spirit, thinking ability, analysis and practical problem-solving abilities in analog electronic technology design. The teaching content focuses on the basic theory and basic analysis methods of analog electronic technology. The difficulty of the teaching content is the analysis and design methods of analog electronic circuits.

Recommended Textbooks/References:

1. Tong shibai, Hua chengying. Fundamentals of Analog Electronics (Fifth Edition.). Higher Education Press. 2015

0005686 数字逻辑Ⅰ

课程编码：0005686

课程名称：数字逻辑 I

英文名称：Digital Logic Ⅰ

课程类型：学科基础必修课

学分： 3.0 **总学时：** 48

面向对象：计算机类专业本科生

先修课程：模拟电子技术

考核形式： 平时成绩+考试

撰写人：王秀娟

课程简介：（250-300 字）

数字逻辑是计算机基础理论的一个重要组成部分,它为计算机组成原理等后续课程提供必要的逻辑基础。本课程的目标是要求学生掌握数字逻辑的基本概念和方法；掌握电路的抽象、分析、设计能力；掌握应用开发工具进行相应的仿真及应用的能力。课程的主要内容包括：必要的数制和码制知识，逻辑代数的基本定律、规则、常用公式、卡诺图，硬件描述语言的语法规则、三种基本建模方法，组合电路的分析与HDL设计，组合电路中的竞争与险象，触发器的工作原理、逻辑特性和硬件描述语言模型，典型时序电路的分析与HDL设计，基于状态机和HDL的一般同步时序电路的设计。

教学内容重点是逻辑代数的理论、知识，组合电路的分析与设计方法，同步时序电路的分析与设计方法，基于硬件描述语言的Verilog建模方法。教学内容难点是组合电路与时序电路的设计方法。

推荐教材或主要参考书：

[1] 王秀娟等. 数字逻辑基础与 Verilog 硬件描述语言（第 2 版）. 清华大学出版社，2020.6

[2] 彭建朝等. 数字电路的逻辑分析与设计. 北京工业大学出版社，2007.9

[3] M. Rafiquzzaman; Steven A. McNinch. Digital Logic: With an Introduction to Verilog and Fpga-Based Design. Wiley. 2019.9

0005686 Digital Logic Ⅰ

Course Number: 0005686

Course Title: Digital Logic Ⅰ

Course Type: Required course of subject basis

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

Students: Undergraduate students majoring in Computer class

Prerequisites: Analog circuit technology

Evaluation Method: Course participation + written exams

Writer： Wang Xiujuan

Course Description:

Digital Logic is one of the required courses of subject basis for undergraduate students Major in Computer class. The main target of this course is students mastering the basic concepts and methods of digital logic, mastering the abstraction, analysis, and design abilities of circuits and developing ability to apply development tools for corresponding simulations and applications. The teaching contents are mainly covered by the following aspects: numerical system and code system; the basic laws, basic rules and formulae commonly used of logic algebraic; Karnaugh map; grammatical rules of HDL; three basic modeling methods; the analysis of the combinational logic circuit and the HDL design; the hazard phenomenon in combination logic circuit; the operation principle of flip-flop; the logical performance and HDL model; the analysis of typical sequential circuits and HDL design; the design of general synchronous sequential logic circuits based on the state machine and HDL.
The teaching contents are mainly covered by the following aspects: Theory and knowledge of logic algebra, analysis and design method of combinational circuit, analysis and design method of synchronous sequential circuit, Verilog modeling method based on hardware description language. The difficulties of teaching contents are described as followings: Design method of combinational circuit and sequential circuit.

Recommended Textbooks/References:

1. WANG Xiujuan, WEI Jianhua, JIA Xibin The basis of digital logic and Verilog hardware description language (The second edition). *Beijing: Tsinghua University Press*, 2020
2. PENG Jianchao. Logic analysis and design of digital circuits. *Beijing: Beijing University of Technology Press*, 2007
3. M. Rafiquzzaman;Steven A. McNinch. Digital Logic: With an Introduction to Verilog and Fpga-Based Design. *Wiley*. 2019.9

0007739+计算机组成原理

课程编码：0007739

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：计算机类专业本科生

先修课程：数字逻辑

考核形式：平时成绩+考试

撰写人：朱文军

课程简介：（250-300 字）

计算机组成原理是信息学部为计算机科学与技术专业、信息安全专业、物联网工程专业本科生开设的一门学科基础必修课。本课程的任务是使学生深入理解计算机各功能部件的组成及实现原理，建立计算机整机概念，通过实例学习计算机系统的设计及其相关的技术，并掌握指令系统的功能、格式、寻址方式等基本概念。教学内容重点：计算机系统的硬软组成、计算机内部数据信息表示、数值运算方法、运算器原理、控制器原理及工作过程、存储器工作原理、存储器字位扩展、输入输入系统功能及常见控制方式。教学内容的难点：运算器原理、控制器原理及工作过程，存储器工作原理、存储器字位扩展。

推荐教材或主要参考书：

[1] 易小琳，朱文军，鲁鹏程，方娟，毛国君，计算机组成原理与汇编语言，清华大学出版社，2009 年 3 月

[2] [美] 戴维·A. 帕特森（David A. Patterson），约翰·L. 亨尼斯(John L. Hennessy)，计算机组成与设计：硬件、软件接口（英文版-原书第 4 版），机械工业出版社，2012 年 1 月

0007739 + Principles of Computer Organization

Course Number: 0007739

Course Title: Principles of Computer Organization

Course Type: Compulsory course

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

Students: Undergraduate students majoring in Computer Science and Technology, Information Security, Internet of things Engineering

Prerequisites: Digital logic

Evaluation Method: Course participation + written exams

Writer：Zhu Wenjun

Course Description:

Principles of computer organization is one of the compulsory courses for undergraduate students Major in computer science and technology, information security and internet of things engineering. The main target of this course is to make students understand each functional unit, the composition and implementation principle of computer. This course is focus on making students grasp the design method of the computer system and its related technology, and master the function, format and addressing mode of the instruction system. The teaching contents are mainly covered by the following aspects: the hardware and software components of the computer system, the representation of the internal data information of the computer, the numerical operation method, the principle of the arithmetic unit, the principle and working process of the controller, the working principle of the memory, the expansion of the memory capacity, the functions of the input and output system and common control methods. The difficulties of teaching contents are described as followings: the principle of the arithmetic unit, the principle and working process of the controller, the working principle of the memory, the expansion of the memory capacity.

Recommended Textbooks/References:

1. Yi xiaolin, Zhu wenjun, Lu pengcheng, Fang juan, Mao guojun, Principles of Computer Organization and Assembly Language, *Tsinghua University Press*, 03-2009.
2. David.A.Patterson,John.L.Hennessy,Computer Organization and Design:The Hardware/Software Interface (Fourth Edition), *China Machine Press*, 01-2012.

0007375+计算机组成原理课设

课程编码：0007375

课程名称：计算机组成原理课设

英文名称：Principles of Computer Organization Project

课程类型：实践环节必修课

学分： 1.5 **总学时：** 45

面向对象：计算机类专业本科生

先修课程：计算机组成原理

考核形式：平时成绩+课设任务正确性检查成绩+课程设计报告

撰写人：朱文军

课程简介：（250-300 字）

计算机组成原理课设是信息学部为计算机科学与技术专业、信息安全专业、物联网工程专业本科生开设的一门实践环节必修课。本课程的任务是引导学生在系统级上认识计算机整机体系，理解并掌握计算机各核心组成部件的工作原理，加深对计算机“时空”概念的理解，使学生将理论课上学到的计算机组成的知识融会贯通，同时学习设计、实现及调试计算机整机系统的基本步骤和方法，提高分析问题和解决问题的能力，为提高学生的计算机硬件动手实践能力打下坚实的基础。教学内容重点：在 EDA 平台以及硬件实验箱上进行一台简单 MIPS 体系架构模型机的设计、封装和调试。教学内容的难点：模型机的设计和调试。

推荐教材或主要参考书：

[美] 戴维·A. 帕特森（David A. Patterson），约翰·L. 亨尼斯(John L. Hennessy)，计算机组成与设计：硬件、软件接口（英文版-原书第 4 版），机械工业出版社，2012 年 1 月

0007375 + Principles of Computer Organization Project

Course Number: 0007375

Course Title: Principles of Computer Organization Project

Course Type: Practical compulsory course

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students majoring in Computer Science and Technology, Information Security, Internet of things Engineering

Prerequisites: Principles of Computer Organization

Evaluation Method: Course participation + Task correctness check grade + Course design report

Writer：Zhu Wenjun

Course Description:

Principles of computer organization project is one of the practical compulsory courses for undergraduate students Major in computer science and technology, information security and internet of things engineering. The main target of this course is to guide students to know the whole computer system at the system level, understand and master the working principle of each component of the computer. This course is focus on deepening students' understanding of the concept of computer "space and time", enabling them to integrate the knowledge of computer composition learned in theoretical courses, and learn the basic steps and methods of designing, implementing, and debugging computer systems, improve the ability to analyze and solve problems, and lay a solid foundation for improving the students' hands-on computer hardware practical skills. The teaching contents are mainly covered by the following aspects: design, package and debug a simple MIPS architecture model machine on EDA platform and hardware experiment platform. The difficulties of teaching contents are described as followings: design and debugging of a model machine.

Recommended Textbooks/References:

1. David.A.Patterson,John.L.Hennessy,Computer Organization and Design:The Hardware/Software Interface (Fourth Edition), *China Machine Press*, 01-2012.

0004859+计算机系统结构Ⅱ

课课程编码：0004859

课程名称：计算机系统结构Ⅱ

英文名称：Computer Architecture Ⅱ

课程性质：学科基础必修课

学分： 2 **总学时：** 32

面向对象：计算机科学与技术专业，物联网工程专业类本科生

先修课程：数字逻辑Ⅰ、计算机组成原理

考核形式： 平时成绩+考试

撰写人：高明霞

课程简介：（250-300 字）

计算机系统结构Ⅱ是信息学部为计算机科学与技术以及物联网工程专业本科生开设的学科基础必修课程。本课程的任务是通过学习这门课程，学生能掌握系统设计的核心理念和量化思考方式，可以针对计算机系统的瓶颈，运用计算机系统论、设计方法学分析、解决相关问题，从而具备了构建计算机系统复杂工程的能力。教学内容重点：计算机系统结构基本概念，指令系统及 RISC 技术，存储系统概念及 Cache 技术，流水线技术及各种相关，并行系统以及多级网络。教学内容的难点：由知识层面蕴含的技术以及思想培养学生从高层建筑的观点，应用算法、硬件、软件去综合考察、分析及设计计算机系统结构的能力，以及从性能价格比的观点去分析、评估一个计算机应用系统的能力。

推荐教材或主要参考书：

[1] 方娟. 《计算机系统结构（第 2 版）》. 北京：清华大学出版社，2021 年

[2] [美] 约翰·L. 亨尼斯(John L. Hennessy), 戴维·A. 帕特森（David A. Patterson）.《 计算机体系结构：量化研究方法（英文版·原书第 6 版）》. 机械工业出版社，2019 年

0004859 + Computer Architecture II

Course Number: 0004859

Course Title: Computer Architecture Ⅱ

Course Type: Professional required course

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

Students: Undergraduate students majoring in Computer Science and Technology and Internet of Things Engineering

Prerequisites: Digit Logic，Principles of Computer Organization

Evaluation Method: Course participation + written exams

Writer：Mingxia Gao

Course Description:

Computer Architecture Ⅱ is one of the Professional required course for undergraduate students Major in Computer Science and Technology and Internet of Things Engineering. The main target of this course is to enable students to master the basic concepts, basic theories, related technologies and latest trends of computer system structure, and understand how to achieve the best and most reasonable distribution of software and hardware functions, so as to master the structure, composition and realization of computer system as a whole. This course is focus on cache and pipeline technology. The teaching contents are mainly covered by the following aspects: basic concepts of computer system architecture, instruction system and RISC technology, storage system concept and cache technology, pipeline technology and various related technologies, parallel systems, and multi-level interconnection networks. The difficulties of teaching contents are described as followings: cultivate students' ability to comprehensively examine, analyze, and design computer system structures from the perspective of high-rise buildings, using algorithms, hardware, and software, as well as analyze and evaluate a computer application system from the perspective of cost-effectiveness, based on the technology and ideas contained in knowledge.

Recommended Textbooks/References:

1. Fangjuan.《Computer System Architecture (2nd Edition)》. *Beijing: Tsinghua University Press*, 2021
2. John L John L. Hennessy, David A Patterson, David A Computer Architecture: Quantitative Research Methods (English Version Original Book 6th Edition) *Machinery Industry Press*, 2019

0008163+汇编语言程序设计

课程编码：0008163

课程名称：汇编语言程序设计

英文名称：Assembly Language Programming

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术（实验班）专业、物联网工程专业、计算机科学与技术专业本科生

先修课程：计算机组成原理

考核形式： 平时成绩+闭卷考试

撰写人：蔡旻

课程简介：（250-300 字）

汇编语言程序设计是信息学部为计算机科学与技术（实验班）专业、物联网工程专业以及计算机科学与技术专业本科生开设的专业选修课。本课程的任务是系统地培养学生对汇编语言程序设计的认知，使他们深入理解计算机系统理论，并进一步掌握高级程序设计语言在底层如何被转换和执行。教学内容重点：详细介绍汇编语言的格式、伪指令与宏指令的使用，探讨程序设计中的分支、循环及子程序的设计原理，阐述汇编程序的开发与调试过程，深入解读 CPU 的架构和工作原理，以及指令调度、高效存储器管理和基础输入输出处理技术。教学内容的难点：汇编语言中的变量组织方式、深入理解地址的访问机制、机器指令层面上的循环与分支处理逻辑，以及函数调用过程中参数的传递和管理方法。

推荐教材或主要参考书：

[1] 易小琳、朱文军、鲁鹏程、方娟、毛国君.计算机组成原理与汇编语言.北京：清华大学出版社，2009 年

[2] 沈美明、温冬婵. IBM-PC 汇编语言程序设计（第二版）. 北京：清华大学出版社，2001 年

[3] 卜艳萍、周伟.汇编语言程序设计教程（第二版）.北京：清华大学出版社，2007 年

[4] 李国安、李敏.汇编语言编程技术. 郑州：郑州大学出版社，2007 年

0008163 + Assembly Language Programming

Course Number: 0008163

Course Title: Assembly Language Programming

Course Type: Major Electives

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

Students: Undergraduate students majoring in Computer Science and Technology, Internet of Things Engineering

Prerequisites: Principle of computer organization

Evaluation Method: Course participation + written exams

Writer： Cai Min

Course Description:

Assembly Language Programming is a major elective course offered by the Faculty of Information for undergraduate students majoring in Computer Science and Technology and Internet of Things Engineering. The objective of this course is to systematically cultivate students' understanding of assembly language programming, enabling them to delve deeply into the theory of computer systems and further grasp how high-level programming languages are converted and executed at the lower levels. Key teaching content includes: a detailed introduction to the format of assembly language, the use of pseudo-instructions and macro instructions, exploration of the principles of branching, looping, and subroutine design in program development, elaboration on the development and debugging process of assembly programs, in-depth interpretation of CPU architecture and its operational principles, as well as instruction scheduling, efficient memory management, and basic input/output processing techniques. The challenging aspects of the course content are: the organization of variables in assembly language, a deep understanding of addressing mechanisms, the logic of handling loops and branches at the machine instruction level, and the methods of parameter passing and management during function calls.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng, Fang Juan, Mao Guojun. Principles of Computer Composition and Assembly Language. Beijing: Tsinghua University Press, 2009

2. Shen Meiming, Wen Dongchan. IBM-PC Assembly Language Programming (Second Edition). Beijing: Tsinghua University Press, 2001

3. Bu Yanping, Zhou Wei. Assembly language programming tutorial (second edition). Beijing: Tsinghua University Press, 2007

4. Li Guoan, Li Min. Assembly language programming technology. Zhengzhou: Zhengzhou University Press, 2007

0000631 数字系统设计（双语）

课程编码：0000631

课程名称：数字系统设计（双语）

英文名称：Digital System Design

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术、物联网工程专业本科生

先修课程：数字逻辑，电路与电子技术

考核形式： 平时成绩+实验+考试

撰写人：张佳玥

课程简介：（250-300 字）

数字系统设计（双语）是信息学部为计算机科学与技术、物联网工程专业本科生开设的专业任选课。课程除要求学生掌握基于硬件描述语言的数字系统设计、仿真、综合等技术和方法外，还含有数字系统的工程设计实现过程，使学生适应基于大规模可编程集成电路的数字系统设计工作。同时作为双语课程，培养和提升学生应用英语获取和掌握前沿专业知识能力。设计方法包括：系统功能分析、分割、集成及描述，自顶向下的系统设计方法与应用，函数、任务的定义与调用，可复用参数化设计方法，测试平台计划制定、开发与应用，面向代码的可复用性、可综合性的设计方法等。实验环节：利用典型 EDA 开发仿真平台和实验台，设计实现小型数字系统设计与验证。

推荐教材或主要参考书：

[1] Michael，D.Ciletti 著，李广军，林水生，阎波 等译. Verilog HDL 高级数字设计（第二版）. 电子工业出版社，2019 年 1 月

[2] Zainalabedin Navabi. Digital System Test and Testable Design: Using Hdl Models and Architectures. Springer，2016 年 8 月

[3] 王秀琴，夏洪洋. Verilog HDL 数字系统设计入门与应用实例. 清华大学出版社，2019 年 3 月

[4] Kishore Mishra（基肖尔•米什拉）著，乔庐峰等译. Verilog 高级数字系统设计技术与实例分析. 电子工业出版社，2018 年 2 月

0000631 Digital System Design

Course Number: 0000631

Course Title: Digital System Design

Course Type: Major Elective Course

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

Students: Undergraduate students majoring in Computer Science and Technology, Engineering of Internet of Things(IoT)

Prerequisites: Digital Logic, Electronic Circuit and Electronic Technology

Evaluation Method: Course participation + Lab projects + Written exams

Writer：Jiayue Zhang

Course Description:

Digital System Design (Bilingual) is an elective course offered by Faculty of Information Technology for undergraduate students majoring in Computer Science and Technology and Internet of Things Engineering. The course aims to equip students with the knowledge and skills in digital system design, simulation, synthesis, and other related technologies and methods based on hardware description languages. It also includes the engineering design and implementation processes of digital systems, enabling students to the work of digital system design based on large-scale programmable integrated circuits. Furthermore, being a bilingual course, it aims to cultivate and enhance students' abilities to acquire and master cutting-edge professional knowledge through the application of English. The design methods covered in the course include system functional analysis, partitioning, integration, and description; top-down system design methods and applications; definition and invocation of functions and tasks; reusable parameterized design methods; development and application of test platform plans; code-oriented design methods for reusability and synthesis, and more. Laboratory projects include designing and implementing small-scale digital systems, as well as conducting verification experiments through typical Electronic Design Automation (EDA) development simulation platforms and experimental setups.

Recommended Textbooks/References:

2. Michael D. Ciletti, translated by Li Guangjun, Lin Shuisheng, Yan Bo, and others, Verilog HDL Advanced Digital Design, Electronics Industry Press, January 2019.
3. Zainalabedin Navabi， Digital System Test and Testable Design: Using Hdl Models and Architectures, Springer， August 2016.
4. Wang Xiuqin, Xia Hongyang, Introduction to Verilog HDL Digital System Design and Application Examples, Tsinghua University Press, March 2019.

5. Kishore Mishra, translated by Qiao Lufeng et al., Advanced Verilog Digital System Design Techniques and Example Analysis, Electronics Industry Press, February 2018.

0010693+物联网与云计算

课程编码：0010061

课程名称：物联网与云计算

英文名称：Internet of Things and Cloud Computing

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术、物联网工程专业本科生

先修课程：嵌入式系统及技术，物联网工程导论

考核形式： 平时成绩+考试

撰写人：陆帅冰

课程简介：（250-300 字）

物联网与云计算是信息学部计算科学与技术系为计算机科学与技术、物联网工程专业本科生开设的专业选修课。本课程的任务是让学生了解云计算与物联网的信息融合技术，使学生在了解当前物联网行业发展新技术的同时能够正确认知其发展方向。教学内容重点：物联网与云计算的基本概念、相关技术以及应用模型。教学内容的难点：物联网体系结构以及物联网与云计算之间的关系。

推荐教材或主要参考书：

[1] 陈红松. 云计算与物联网信息融合. 清华大学出版社，2016-12-01

[2] 王见，赵帅，曾鸣，孙昊，曾凡太. 物联网之云：云平台搭建与大数据处理. 机械工业出版社，2018-03-01

0010693 + Internet of Things and Cloud Computing

Course Number: 0010061

Course Title: Internet of Things and Cloud Computing

Course Type: Professional elective courses

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

Students: Undergraduate students majoring in Computer Science and Technology, Internet of Things Engineering

Prerequisites: Embedded Systems and Technologies, Introduction to Internet of Things Engineering

Evaluation Method: Course participation + written exams

Writer：Shuaibing Lu

Course Description:

Internet of Things and Cloud Computing is one of the professional elective courses for undergraduate students Major in computer science and technology and Internet of Things Engineering. The main target of this course is to enable students to understand the information fusion technology of cloud computing and the Internet of Things, so that they can understand the current development of new technologies in the Internet of Things industry and correctly assess their development direction. This course is focus on the basic concepts, related technologies and application models of Internet of Things and cloud computing. The teaching contents are mainly covered by the following aspects: the basic theory and several typical application models of Internet of Things. The difficulties of teaching contents are described as followings: the architecture of the Internet of Things and the relationship between the Internet of Things and cloud computing.

Recommended Textbooks/References:

1. Chen Hongsong. Cloud computing and Internet of Things information fusion. Tsinghua University Press, 2016-12-01.
2. Wang Jian, Zhao Shuai, Zeng Ming, Sun Hao, Zeng Fantai. Cloud of Internet of Things: Cloud Platform Construction and Big Data Processing. China Machine Press, 2018-03-01.

0000334 + 并行计算

课程编码：0000334

课程名称：并行计算

英文名称：Parallel Computing

课程类型：专业选修课程

学分： 2 **总学时：** 32

面向对象：计算机科学与技术专业、物联网工程专业本科生

先修课程：计算机体系结构、操作系统原理、计算机网络

考核形式：平时作业+期末考试

撰写人： 梁毅

课程简介：（250-300 字）

并行计算是信息学部为计算机科学与技术、物联网工程专业本科生开设的专业选修课程。本课程的任务是帮助学生在具备计算机硬件及系统软件基础知识的前提下，掌握并行计算的基本理论、方法与技术。教学内容的重点是并行计算机体系结构、面向共享存储的并行编程模型、面向消息传递的并行编程模型以及并行处理技术。教学内容的难点是结合理论知识，理解和掌握 OpenMP、MPI 和 Map/Reduce 等并行程序的编写、调试与分析方法，并进行相关实验实践。

推荐教材或主要参考书：

[1] （德）贝蒂尔 • 施密特等著，张常有等译，并行程序设计，机械工业出版社，2020 年 6 月

[2] （美）帕切克著，邓倩妮译. 并行程序设计导论. 机械工业出版社，2012 年 11 月

0000334 + Parallel Computing

Course Number: 0000334

Course Title: Parallel Computing

Course Type: Major Elective Course

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

Students: Undergraduate students majoring in Computer Science and Technology or Internet of Things Engineering

Prerequisites: Computer Architecture, Operating System, Computer Network

Evaluation Method: Homework assignments+written exam

Writer: Yi Liang

Course Description:

Parallel computing is one of the major elective courses for undergraduate students majoring in Computer Science and Technology or Internet of Things Engineering. The main target of this course is to help students develop a solid understanding of the fundamental theories, methods, and techniques of parallel computing, assuming a foundation in computer hardware and system software.This course focuses on key aspects such as parallel computer architectures, parallel computing models, shared-memory parallel programming models, message-passing parallel programming models, and parallel processing techniques. The difficulties of teaching contents are described as followings: the integration of theoretical knowledge with practical skills, particularly in developing, debugging, and analyzing parallel programs using tools like OpenMP, MPI, and Map/Reduce.

Recommended Textbooks/References:

1. Bertil.S, Jorge.G.D, Christian.H, Parallel Programming:Concept and Practice. Morgan Kaufmann Publishers, 11-2017

2.Peter.P , An Introduction to Parallel Programming, Morgan Kaufmann Publishers, 03-2011

0010061+边缘计算

课程编码：0010061

课程名称：边缘计算

英文名称：Edge Computing

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术、物联网工程专业本科生

先修课程：计算机组成原理，物联网工程导论

考核形式： 平时成绩+考试

撰写人：陆帅冰

课程简介：（250-300 字）

边缘计算是信息学部计算科学与技术系为计算机科学与技术、物联网工程专业本科生开设的专业选修课。本课程的任务是让学生了解边缘计算的基本概念及关键技术，使学生了解当前物联网行业发展新技术的同时能够正确认知其发展方向。教学内容重点：边缘计算的基本概念、相关技术以及应用模型。教学内容的难点：边缘计算与云计算中的关键技术。

推荐教材或主要参考书：

[1] 施巍松. 边缘计算. 科学出版社，2018-01-01

[2] 谢人超，黄韬，杨帆，刘韵洁. 边缘计算原理与实践. 人民邮电出版社，2019-01-01

0010061 + Edge Computing

Course Number: 0010061

Course Title: Edge Computing

Course Type: Professional elective courses

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

Students: Undergraduate students majoring in Computer Science and Technology, Internet of Things Engineering

Prerequisites: Principle of Computer Organization, Introduction to Internet of Things Engineering

Evaluation Method: Course participation + written exams

Writer：Shuaibing Lu

Course Description:

Edge computing is one of the professional elective courses for undergraduate students majoring in computer science and technology and Internet of Things Engineering. The main target of this course is to provide students with the basic concepts and key technologies of edge computing so that students can understand the current development of new technologies in the field of Internet of Things and correctly assess the direction of development. This course is focus on the basic concepts, related technologies and application models of edge computing. The teaching contents are mainly covered by the following aspects: the basic theory and several typical application models of edge computing. The difficulties of teaching contents are described as followings: related models of edge computing development, key technologies in edge computing, and cloud computing.

Recommended Textbooks/References:

1. Shi Weisong. Edge Computing. Science Press, 2018-01-01
2. Xie Renchao, Huang Tao, Yang Fan, Liu Yunjie. Principles and Practice of Edge Computing. People's Posts and Telecommunications Press, 2019-01-01

0005684+计算机网络

课程编码：0005684

课程名称：计算机网络

英文名称：Computer Networks

课程类型：学科基础必修课

学分： 2.5 **总学时：** 40

面向对象：计算机科学与技术、物联网工程专业本科生

先修课程：高级语言程序设计、数字逻辑 I

考核形式： 平时成绩+考试

撰写人：竹翠

课程简介：（250-300 字）

计算机网络是信息学部计算机学院为计算机科学与技术、物联网工程专业本科生开设的学科基础必修课程类型。计算机网络已经无处不在，互联网技术正成为世界经济发展的重要引擎，互联网也日益成为一个复杂的巨型系统，需要更多的网络技术人才。本课程的任务是使计算机类专业的本科学生掌握计算机网络的基本理论、基本原理和基本技术，了解网络新技术和新发展，使学生对分层模型系统加深整体认识，提升解决计算机网络问题和实际运用的能力。教学内容重点：网络体系结构与标准、分层模型中各层次的服务、功能、协议及工作原理和技术、主要网络设备的工作原理。教学内容难点：网络体系结构、路由算法、TCP/IP 协议、域名系统等。

推荐教材或主要参考书：

[1] ANDREW S.TANENBAUM 等著，潘爱民译，教材名称，计算机网络（第六版），清华大学出版社，2022 年 6 月

[2] 谢希仁著，计算机网络（第八版），电子工业出版社，2021 年 6 月

0005684 + Computer Networks

Course Number: 0005684

Course Title: Computer Networks

Course Type: Professional required course

Credit: 2.5 **Total Credit Hours:** 40

Students: Undergraduate students majoring in computer science and Internet of Things engineering

Prerequisites: Advanced Programming Language, Digital Logic

Evaluation Method: Course participation + written exams

Writer： Zhu Cui

Course Description:

Computer Networks is one of the professional required courses for undergraduate students Major in computer science and Internet of Things Engineering. Internet technology is becoming an important engine of world economic development, and the Internet has increasingly become a complex giant system, requiring more network technology talents. The task of this course is to enable undergraduate students of related majors to master the basic theory, principles and technologies of computer networks, understand new technologies and developments of networks. This course also aims to enable students to deepen their overall understanding of hierarchical systems, and improve their ability to solve computer network problems and apply them in practice. The teaching content of this course focuses on network architecture and standards, services and protocols of the hierarchical model, and how a typical network device works. The course difficulties include network architecture, routing algorithms, TCP/IP protocol, etc.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum, Computer Networks (6th Edition), Tsinghua University Press, 6-2022
2. Xie Xi-ren, Computer Networks (8th Edition), Publishing House of Electronics Industry, 6-2021

0010117 计算机网络综合课设

课程编码：0010117

课程名称：计算机网络综合课设

英文名称：Comprehensive Course Design of Computer Network

课程类型：实践环节必修课

学分：1.5　　**总学时：**45

面向对象：计算机类专业本科生

先修课程：计算机网络

考核形式：设计方案+方案实施+实验报告

撰写人：任兴田，竹翠，包振山，王勇，陈锬

课程简介：

计算机网络综合课设是信息学部为计算机类专业本科生开设的一门实践环节必修课。本课程主要内容是建立网络环境，分析网络协议，以及设计与实现一个网络程序。

教学内容重点：常用网络设备的工作原理，静态路由配置，动态路由配置，网络协议分析，网络编程的基本方法和基本流程，网络协议的实现机制。

教学内容难点：路由器的模式，静态路由配置，IEEE 802.3 帧抓取，套接口编程。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1]任兴田，王勇，杨建红，计算机网络课程设计，清华大学出版社．2016

0010117 Comprehensive Course Design of Computer Network

Course Number: 0010117

Course Title: Comprehensive Course Design of Computer Network

Course Type: Practical Requirements

Credit: 1.5 **Total Credit Hours:** 45

Students: Undergraduate students major in Computer

Prerequisites: Computer Network

Evaluation Method: Design scheme + scheme implementation + experimental report

Writer： Xingtian Ren, Cui Zhu, Zhenshan Bao, Yong Wang, Tan Chen

Course Description:

Comprehensive Course Design of Computer Network is one of the practical requirement courses for undergraduate students Major in computer. The main target of this course is to set up a network environment, analyze network protocols, and design and implement a network program.

The teaching contents are mainly covered by the following aspects: the principles of common network devices, static routing configuration, dynamic routing configuration, network protocol analysis, basic methods and processes of network programming, and implementation mechanisms of network protocols.

The difficulties of teaching contents are described as followings: router modes, static routing configuration, IEEE 802.3 frame capture, and socket programming.

Recommended Textbooks/References:

1.Xingtian Ren, Yong Wang, Jianhong Yang, Course Design of Computer Network, Tsinghua University Press, 2016

0010055 IPv6 技术及应用

课程编码：0010055

课程名称：IPv6 技术及应用

英文名称：IPv6 Technology and Application

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：计算机类专业本科生

先修课程：计算机网络

考核形式：平时成绩+考试

撰写人：任兴田

课程简介：

IPv6 技术及应用是信息学部为计算机类专业本科生开设的一门专业选修课。本课程任务是使学生理解和掌握 IPv6 的研究方法、基本概念和基本原理，还能用协议分析软件和命令观察 IPv6 协议的运行，能设计 IPv6 实验床。

教学内容重点：Pv6 变化、IPv6 包头分析、IPv6 地址表示、IPv6 地址划分、单播地址、扩展头用法、扩展头分析、理解 IPv6 路由表、IPv6 路由过程、AH 和 ESP 分析、IPv6 对其他层协议的影响、邻居发现协议、移动 IPv6 工作原理、IPv6 过渡技术、IPv6 获得的支持、IPv6 网络配置、实验床方案设计和实现。

教学内容难点：IPv6 分段、IPv6 地址划分、任播、选路头、IPv6 路由过程、IPSec 实现的安全性服务、为使 DNS 适应 IPv6 所作的扩展、移动 IPv4 中三角路由、隧道工作原理、IPv6 获得的支持、IPv6 网络配置。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] Silvia Hagen 著，夏俊杰译. IPv6 精髓(第 2 版). 人民邮电出版社，2013

[2] Michael Dooley，Timothy Rooney 著，董守玲，王昊翔，胡金龙译. IPv6 部署和管理. 机械工业出版社，2015

[3] Qing Li，Tatuya Jinmei，Keiichi Shima 著，陈涓，赵振平译. IPv6 详解第 1 卷：核心协议实现. 人民邮电出版社，2009

0010055 IPv6 Technology and Application

Course Number: 0010055

Course Title: IPv6 Technology and Application

Course Type: Major Elective Course

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

Students: Undergraduate Students Major in Computer

Prerequisites: Computer Network

Evaluation Method: Course participation + written exams

Writer： Xingtian Ren

Course Description:

IPv6 Technology and Application is one of the major elective courses for undergraduate students Major in computer. The main target of this course is to enable students to understand and master IPv6 research methods, basic concepts and basic principles. They can observe the operation of the IPv6 protocol using protocol analysis software and commands. They can also design IPv6 testbed.

The teaching contents are mainly covered by the following aspects: major changes in Pv6, IPv6 header analysis using Wireshark, IPv6 address notation, IPv6 subnetting, unicast address, extension header analysis using Wireshark, understanding IPv6 routing table, IPv6 routing process, AH and ESP analysis using Wireshark, impact of IPv6 on the protocols of other layers, neighbor discovery protocol, working principle of mobile IPv6, IPv6 transition, support for IPv6, IPv6 network configuration, design and implementation of IPv6 testbed.

The difficulties of teaching contents are described as followings: IPv6 segmentation, IPv6 subnetting, anycast, routing extension header, IPv6 routing process, security services implemented by IPsec, extensions to adapt DNS to IPv6, triangular routing in mobile IPv4, principles of tunnels, IPv6 support, IPv6 network configuration.

Recommended Textbooks/References:

1. Silvia Hagen. IPv6 Esentials. Post & Telecom Press, 2013

2. Michael Dooley, Timothy Rooney. IPv6 Deployment and Management. China Machine Press, 2015

3. Qing Li, Tatuya Jinmei, Keiichi Shima. IPv6 Core Protocols Implementation. Post & Telecom Press, 2009

0004846 TCP/IP 协议分析及应用Ⅰ

课程编码：0004846

课程名称：TCP/IP 协议分析及应用Ⅰ

英文名称：TCP/IP Analysis and Application

课程类型：专业选修课

学分：2.0　　**总学时：**32

面向对象：计算机类专业本科生

先修课程：计算机网络

考核形式：平时成绩+考试

撰写人：任兴田

课程简介：

TCP/IP 协议分析及应用 I 是信息学部为计算机类专业本科生开设的一门专业选修课。本课程任务是使学生理解和掌握 TCP/IP 协议的研究方法、基本概念和基本原理，还能用协议分析软件和命令观察协议的运行，能实现简单的客户/服务器程序。

教学内容重点：TCP/IP 参考模型、环回接口处理 IP 包过程、子网划分、IP 路由技术、路由协议、ARP 请求/响应、对收到帧的过滤过程、C/S 程序的设计和实现、FTP 连接管理、DNS 解析过程、SMTP、POP3、HTTP、网络管理功能、SNMP 操作。

教学内容难点：协议分层、环回接口处理 IP 包过程、特殊 IP 地址、子网划分、RIP 对坏消息反映慢、发送/接收 ICMP 报文、多播程序中 socket 设置、UDP 伪首部、基本套接口编程、管理信息结构、管理信息库。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] Kevin R. Fall, W. Richard Stevens 著, 吴英, 张玉, 许昱玮译. TCP/IP 详解: 卷 1. 协议(第 2 版). 机械工业出版社, 2016 年 6 月

[2] Douglas E. Comer 著，林瑶，张娟，王海译. 用 TCP/IP 进行网际互连.第一卷--原理、协议与结构(第五版). 电子工业出版社, 2007 年 2 月

0004846 TCP/IP Analysis and Application I

Course Number: 0004846

Course Title: TCP/IP Analysis and Application I

Course Type: Major Electives Course

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

Students: Undergraduate students major in Computer

Prerequisites: Computer Network

Evaluation Method: Course participation + written exams

Writer： Xingtian Ren

Course Description:

TCP/IP analysis and application is one of the major elective courses for undergraduate students Major in computer. The main target of this course is to enable students to understand and master the research methods, basic concepts and basic principles of the TCP/IP protocol. They can also observe the operation of the protocol using tools, and can implement simple C/S programs.

The teaching contents are mainly covered by the following aspects: TCP/IP reference model, processing of IP datagrams by loopback interface, subnetting, IP routing, routing protocol, ARP request and ARP replay, filtering process of received frames, design and implementation of C/S program, FTP connection management, DNS resolution process, SMTP, POP3, HTTP, functions of network management, SNMP operations.

The difficulties of teaching contents are described as followings: protocol layering, processing of IP datagrams by loopback interface, special IP addresses, subnetting, slow response to bad messages in RIP, sending and receiving ICMP messages, socket setting in multicast program, UDP pseudo headers, basic socket programming, structure of management information and management information base.

Recommended Textbooks/References:

1. Kevin R. Fall, W. Richard Stevens. TCP/IP Illustrated, Volume 1: The Protocols (2nd Edition). China Machine Press, 2016

2.Douglas E. Comer. Internetworking with TCP/IP Volume I: Principles, Protocols, and Architectures (5th Edition). Publishing House of Electronics Industry, 2009

0007354 SOPC 设计技术

课程编码：0007354

课程名称：SOPC 设计技术

英文名称：Design Technique Based On SOPC

课程类型：学科基础选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术（实验班）、计算机科学与技术专业、物联网工程专业本科生

先修课程：计算机组成原理，数字系统设计（双语），微型计算机接口技术III

考核形式：试卷成绩+实验成绩

撰写人：郭黎敏

课程简介：（250-300 字）

“SOPC 设计技术”作为计算机科学与技术的一门重要课程，该课程具有先进性、系统性、综合性和使用性的特点。本课程以 IP 复用方法为基本思路，结合第三方 IP 核的应用以及自主 IP 核的开发，介绍片上可编程系统的设计、实现及应用测试。课程以典型 EDA 工具 Quartus Ⅱ为例证讲授，使同学较好的掌握片上可编程系统构造工具 SOPC Builder；设计以 Nios Ⅱ软核处理器为核心的嵌入式计算机系统；掌握高层次 IP 复用方法；学习自主 IP Core 设计技术和工程实现方法；通过 IDE、内嵌式逻辑分析仪和硬拷贝等工程过程，提高系统设计能力和基于 HAL 的应用编程能力。

推荐教材或主要参考书：

[1] 侯建军，郭勇. SOPC 技术基础教程（第 2 版）. 清华大学出版社，2018 年 2 月

[2] 李兰英. Nios Ⅱ嵌入式软核 SOPC 设计原理及应用. 北航出版社，2006 年 11 月

[3] Pong，P.Chu 著. 金明录，门宏志 译. 基于 Nios II 的嵌入式 SOPC 系统设计与 Verilog 开发实例. 电子工业出版社，2015 年 5 月

[4] 李翠锦，李成勇，代红英. 基于 SOPC 的 FPGA 设计实验指导. 成都西南交大出版社，2018 年 1 月

0007354 Design Technique Based On SOPC

Course Number: 0007354

Course Title: Design Technique Based On SOPC

Course Type: Basic Elective Courses

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

Students: Undergraduate students majoring in computer science and technology, Internet of things Engineering

Prerequisites: Computer composition principle, Digital system design, Microcomputer interface

Evaluation Method: Written exams + experiment exams

Writer：Limin Guo

Course Description:

"SOPC design technology" is an important course in computer science and technology. The course has the characteristics of advanced, systematic, comprehensive and usability. This course takes IP reuse as the basic idea, and introduces the design, implementation and application test of on-chip programmable system in combination with the application of third-party IP core and the development of independent IP core. The course takes Quartus II, a typical EDA tool, as an example to teach, so that students can better master SOPC builder, an on-chip programmable system construction tool, design an embedded computer system with Nios II soft core processor as the core, master the high-level IP reuse method, learn the independent IP core design technology and Engineering implementation method, and use IDE, embedded logic analyzer, hard copy and other engineering processes, Improve the ability of system design and application programming based on Hal.

Recommended Textbooks/References:

1．Jianjun Hou, Yong Guo. SOPC technology basic course (2nd Edition). Tsinghua University Press, February 2018.

2．Lanying Li. Design principle and application of Nios Ⅱ embedded soft core SOPC. Beihang press, November 2006.

3．Pong P.Chu. Embedded SoPC Design with Nios II Processor and Verilog Examples, Electronic Industry Press, May 2015.

4．Cuijin Li, Chengyong Li, Hongying Dai. FPGA design experiment guidance based on SOPC. Chengdu Southwest Jiaotong University Press, January 2018.

0004858 计算机控制原理与技术Ⅱ

课程编码：0004858

课程名称：计算机控制原理与技术 II

英文名称：Principles and Technology of Computer Control

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术专业、物联网工程专业本科生

先修课程：数字逻辑Ⅰ，计算机组成原理，微型计算机接口技术III

考核形式：平时成绩+实验+考试

撰写人：宋书瀛

课程简介：

计算机控制原理与技术是信息学部计算机学院为计算机科学与技术专业和物联网工程专业本科生开设的专业选修课程。本课程的任务是使学生掌握计算机控制系统的基本概念、基本理论、基本分析方法和主要控制技术，巩固所学的计算机专业知识，增强系统能力，将理论与技术应用到模拟系统的实践中去，培养学生综合应用计算机解决实际工程问题的能力。教学内容重点：计算机控制系统的概念及组成结构、连续控制系统的数学模型、典型闭环系统的稳定性及稳态误差分析、过程通道和数据采集系统、数字程序控制技术、数字 PID 控制算法。教学内容的难点：连续控制系统的数学模型、典型闭环系统的稳定性及稳态误差分析、步进电机控制系统原理及程序设计等。

推荐教材或主要参考书：

[1] 蒋心怡等，计算机控制技术，清华大学出版社，2007 年 1 月

[2] 陈祥光等，自动控制原理及应用，清华大学出版社，2018 年 1 月

[3] 蓝益鹏，计算机控制技术，清华大学出版社，2016 年 9 月

[4] 潘新民，微型计算机控制技术(第 2 版)，电子工业出版社，2014 年 11 月

0004858 Principles and Technology of Computer Control

Course Number: 0004858

Course Title: Principles and Technology of Computer Control

Course Type: Major Electives

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

Students: Undergraduate students majoring in Computer Science and IOT Engineering

Prerequisites: Digital logic, computer composition principle, microcomputer interface technology

Evaluation Method: Course participation + Experiment +written exams

Writer： Songshuying

Course Description:

Principles and Technology of Computer Control is one of the Professional elective courses for undergraduate students Major in Computer Science and Technology. The main target of this course is to clarify and master the basic concepts, basic theories, basic analysis methods and main control technologies of computer control systems, consolidate the computer professional knowledge learned, and enhance the ability of the system. and the theory and technology are comprehensively applied to the practice of the simulation system. This course is focus on the concept and structure of computer control system, mathematical model of continuous control system, stability and steady-state error analysis of typical closed-loop system, process channel and data acquisition system, digital program control technology, digital PID control algorithm and so on. The teaching contents are mainly covered by the following aspects: the overview of computer control system, the basic theory of automatic control system, process channel and data acquisition system, digital program control technology, digital PID control algorithm. The difficulties of teaching contents are described as followings: the mathematical model of the continuous control system, the stability and steady-state error analysis of the typical closed-loop system, the principle and program design of the stepper motor control system, and so on.

Recommended Textbooks/References:

1.Jiang Xinyi et al., computer Control Technology, Tsinghua University Press, January 2007.

2.Chen Xiangguang et al., principle and Application of automatic Control, Tsinghua University Press, January 2018.

3.Lan Yipeng, computer Control Technology, Tsinghua University Press, September 2016.

4.Pan Xinmin, Microcomputer Control Technology (2nd Edition), Electronic Industry Press, November 2014

0010654 数据通信原理（双语）

课程编码：0010654

课程名称：数据通信原理（双语）

英文名称：Principle of Data Communication

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：计算机科学与技术专业、物联网工程专业本科生

先修课程：大学物理Ⅰ，数字逻辑Ⅰ，模拟电子技术

考核形式： 平时成绩+考试

撰写人：张文博

课程简介：（250-300 字）

《数据通信原理》是计算机学院为计算机科学与技术专业和物联网工程专业本科生开设的选修课。本课程的任务是：深入浅出地阐述数据通信的基本概念、基础知识、数据传输技术及其应用，展现近年来数据通信技术的最新发展，为后续课程打下基础。教学内容的重点：通信的基本模型，数据通信的基础知识，数据传输信道，信号编码技术、差错检测和纠正、复用技术、广域网技术等数据传输基本技术，以及蜂窝无线网络（含 5G 通信技术）、无线传输技术和无线网络技术（含无线宽带接入、WiMax 和蓝牙）。教学内容的难点：基带信号编码技术，循环冗余校验，非对称数字用户线路和 xDSL 的工作原理，码分复用（CDMA）技术，异步传递方式，4G 和 5G 广泛采用的 OFDM 和 MIMO 技术。

推荐教材或主要参考书：

[1] William Stallings[著]，王海，张娟，周慧，赵红宇[译]，数据与计算机通信（第十版），电子工业出版社，2015 年 9 月

[2] 杨心强，陈国友 [著]，数据通信与计算机网络（第 5 版），电子工业出版社，2018 年 2 月

[3] 中兴通讯学院，对话：通信原理，人民邮电出版社，2010 年 10 月

0010654 Principle of Data Communication（bilingual）

Course Number: 0002359

Course Title: Principle of Data Communication（bilingual）

Course Type: Optional Course

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

Students: Undergraduate students majoring in Computer Science and IOT Engineering

Prerequisites: Physics I, Digital Logic I, Analog circuit

Evaluation Method: Course participation + written exams

Writer： Zhangwenbo

Course Description:

"Principle of Data Communication" is one of the optional courses for undergraduate students Major in Computer science. The main target of this course is to clarify the basic concepts of data communication, basic knowledge, data transmission technology and some applications, to lay the foundation for the next courses. The teaching contents are mainly covered by the following aspects: the basic communications models, the basic knowledge of data communication, data transmission channel, signal coding technology, error detection and correction, multiplexing technology, wan technology and other basic data transmission technologies, as well as cellular wireless network (including 5G), wireless transmission technology and wireless network technology (including wireless broadband access, WiMax and Bluetooth). The difficulties of teaching contents are described as followings: coding technology for the baseband signal, cyclic redundancy check, asymmetric digital subscriber line and xDSL principle, code division multiplexing (CDMA) technology, asynchronous transmission mode, OFDM and MIMO technology widely used in 4G and 5G.

Recommended Textbooks/References:

1.William Stallings, Data and Computer Communications (10th Edition), Pearson *Press,* 09-2013.

2.Yang Xinqiang, Chen Guoyou. Data Communications and Networks (5th Edition), China machine *Press*, 02-2018.

3.College of ZTE communications，Dialogue：Communication Fundamentals，PTR *Press*，10-2010.

0006408 微型计算机接口技术Ⅲ

课程编号：0006408

课程名称：微型计算机接口技术III

英文名称：Microcomputer Interface Techniques

课程类型：专业选修课

学分：2.0　　**学时：**32

面向对象：计算机科学与技术专业、物联网工程专业本科生

先修课程：数字逻辑Ⅰ、计算机组成原理、汇编语言程序设计

考核形式：平时成绩+考试

撰写人：包振山

课程简介：

微型计算机接口技术课程是传统硬件基础课程，为其后的一系列硬件方向的专业课程肩负着“入门门槛”的重要作用。此课程以 16 位 CPU 8086/8088 为基本出发点，内容包括微处理器芯片的基本功能、微型计算机的外围芯片，以及构成微型计算机系统的接口芯片，微型计算机的结构特点以及实现微型计算机与外围连接的软、硬件基础知识和基本技能，各种典型环境下接口设计原则。该课程将使学生能够建立起微型计算机的整体观念，能够理解微机系统 I/O 接口电路，并具有设计、开发 I/O 接口电路的基本能力。此外，课程还对主流的 32 位微型计算机的基本工作原理作概要介绍。

推荐教材或主要参考书：（含主编，教材名，出版社，出版日期）

[1] 戴梅萼等编著.微型计算机技术及应用（第 4 版）.清华大学出版社，2008 年 2 月

[2] 包宋建.微机原理与接口技术.机械工业出版社，2020 年 03 月

[3] 顾晖.微机原理与接口技术—基于 8086 和 Proteus 仿真（第 3 版）.机械工业出版社，2019 年 09 月

0006408 Microcomputer Interface Techniques

Course Number: 0006408

Course Title: Microcomputer Interface Techniques

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

Students: Undergraduate students majoring in Computer Science and IOT Engineering

Prerequisites: Digital Logic, Principles of Computer Organization

Evaluation Method: Course participation +written exams

Writer： Baozhenshan

Course Description:

Microcomputer interface technology is a traditional hardware professional course, which is very important as it is the "entry" to the next series of hardware courses. Begin with 16 bit CPU 8086/8088, the course covers the basic function of the microprocessor chip, the periphery chips in the microcomputer chip, the interface chip in the microcomputer system; the structure character of the microcomputer system, the basic software and hardware knowledge and skills to connect the microcomputer with the other peripheral devices, and the interface design principles in kinds of typical environments. The students are expected to establish the concept of the microcomputer system, understand the I/O interface circuit, and develop the design and develop ability of I/O interface circuit. In addition, the course also overviews the basic running principle in the mainstream 32-bit microcomputer.

Recommended Textbooks/References:

1. Dai Meie. Micro computer technology and application (4th Edition). Tsinghua University Press, 2008.2

2. Bao Songjian. Microcomputer principle and interface technology. China Machine Press. 2020.03

3. Gu Hui. Microcomputer principle and interface technology - Based 8086 and Proteus Simulation (3th Edition). China Machine Press，2019.09

0008194 软件类综合设计课程

课程编码：0008194

课程名称：软件类综合设计课程

英文名称：Integrated Design Curriculum to Software

学分： 2.0 **总学时：** 60

面向对象：物联网工程专业本科生

先修课程：高级语言程序设计，数据结构与算法，数据库原理

考核形式：报告

撰写人：张丽珩

课程简介：（250-300 字）

软件类综合设计课程是信息学部为物联网工程专业本科生开设的实践环节必修课程。软件综合课程设计目的是使学生进一步加深对软件工程中讲授的软件系统分析、设计、实现和测试的理解，增强学生系统软件分析、设计能力和实践能力。在课程设计过程中，学生不仅获得需求建模能力、程序设计与实现能力、项目管理能力以及团队协作能力等，而且学习各种开发技术包括结构化和面向对象的技术。学生将掌握如何利用工具进行大型软件系统的分析、设计、实现、测试和项目管理。该课程给学生提供了参与大规模系统设计与实现的机会。

推荐教材或主要参考书：

[1] Shari Lawrence Pfleeger, Joanne M. Atlee. 杨卫东译. 软件工程-理论与实践(第 4 版). 北京：人民邮电出版社，2010

[2] Ian Sommervill. 程成译. 软件工程（原书第 9 版）. 北京：机械工业出版社，2011

[3] 郑人杰、马素霞、殷人昆编著. 软件工程概论. 北京：机械工业出版社，2010

[4] Stephen R.Schach. 邓迎春等译. 软件工程-面向对象和传统的方法. 北京：机械工业出版社，2012 年 1 月

0008194 Integrated Design Curriculum to Software

Course Number: 0008194

Course Title: Integrated Design Curriculum to Software

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

Students: Undergraduate students major in computer science and technology and internet of things engineering

Prerequisites: High Language Programming, Data Structures and Algorithms, Database Systems Technology

Evaluation Method: project development report and presentation

Writer：Liheng Zhang

Course Description:

Integrated Design Curriculum to Software is one of the compulsory courses in practice for undergraduate students Major in internet of things engineering. Computer software comprehensive curriculum design aims to resolve software developing issues by using engineering methods and technologies. During the design procedure, students will not only obtain the abilities including requirement modeling, program design and implementation, project management, team cooperation etc., but also learn various developing technologies such as structure based and object oriented. Moreover, students will master how to use tools for developing, testing and project management. The course also provides students the chance to join design and implement large-scale complicated system.

Recommended Textbooks/References:

1. Shari Lawrence Pfleeger, Joanne M. Atlee. Software Engineering: Theory and Practice. (Fourth Edition). The People's Posts and Telecommunications Press. 2010
2. Ian Sommerville. Software Engineering (ninth Edition). China Machine Press. 2011
3. Zheng Renjie, Ma Suxia, Yin Renkun. An Introduction to Software Engineering (second Edition). China Machine Press.2010
4. Stephen R.Schach. Object-Oriented and Classical Software Engineering (eighth Edition). China Machine Press.2012

0007386 软件工程引论

课程编码：0007386

课程名称：软件工程引论

英文名称：Introduction to Software Engineering

学分： 2.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：高级语言程序设计，数据结构与算法，数据库原理

考核形式：平时成绩+考试

撰写人：张丽珩

课程简介：（250-300 字）

软件工程引论是指导计算机软件开发与维护的工程学科。本课程的任务是研究应用计算机科学、数学及管理等学科的理论来指导软件开发，它借鉴传统工程的原则、方法，以提高软件质量，降低软件开发成本。课程主要讲授内容包括软件生存周期模型、可行性分析、需求分析、概要设计、详细设计、面向对象分析与设计、编码、软件质量与质量保证、项目计划与管理等。通过学习，学生将了解软件工程发展的概况，掌握软件工程相关的基本概念、技术与方法，以及如何运用软件工程的技术和方法。课程的学习使学生具备一定的软件系统设计、开发的能力，为从事软件工程实践和更深入地研究软件工程理论打下良好的基础。

推荐教材或主要参考书：

[1] Shari Lawrence Pfleeger, Joanne M. Atlee. 杨卫东译. 软件工程-理论与实践(第 4 版). 北京：人民邮电出版社，2010

[2] Ian Sommervill. 程成译. 软件工程（原书第 9 版）. 北京：机械工业出版社，2011

[3] 郑人杰、马素霞、殷人昆编著. 软件工程概论. 北京：机械工业出版社，2010

[4] Stephen R.Schach. 邓迎春等译. 软件工程-面向对象和传统的方法. 北京：机械工业出版社，2012 年 1 月

0007386 Introduction to Software Engineering

Course Number: 0007386

Course Title: Introduction to Software Engineering

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

Prerequisites: High Language Programming, Data Structures and Algorithms, Database Systems Technology

Evaluation Method: Course participation + written exams

Students: Undergraduate students major in Internet of Things Engineering

Writer: Liheng Zhang

Course Description:

Introduction to Software Engineering is one of the Basic Elective Courses for undergraduate students Major in Internet of Things. Software engineering is concerned with theories, methods and tools for professional software development. The students are expected to understand the basic concepts, theories, methods, and techniques of software development. The basic topics include: the concepts of software lifecycle and software development model, feasibility analysis, software requirement analysis, system design, function design, object-oriented analysis and design method, UML(Unified Modeling Language), coding and selection of programming language, software testing, software reuse, software maintenance, software project plan, software engineering management, software quality management, and software engineering environment are introduced in this course.

Recommended Textbooks/References:

1. Shari Lawrence Pfleeger, Joanne M. Atlee. Software Engineering: Theory and Practice (fourth Edition). The People's Posts and Telecommunications Press. 2010
2. Ian Sommerville. Software Engineering (ninth Edition). China Machine Press. 2011
3. Zheng Renjie, Ma Suxia, Yin Renkun. An Introduction to Software Engineering (second Edition). China Machine Press.2010
4. Stephen R.Schach. Object-Oriented and Classical Software Engineering (eighth Edition). China Machine Press.2012

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 Structure and Algorithm

课程类型：学科基础必修课

学分： 3.5 **总学时：** 56

面向对象：计算机科学与技术（实验班）专业、计算机科学与技术专业、信息安全（实验班）、物联网工程专业本科生

先修课程：高级语言程序设计、集合与图论

考核形式：平时成绩+笔试

撰写人：赵青

课程简介：

数据结构与算法分析是信息学部为计算机科学与技术、物联网工程、信息安全专业本科生开设的必修课程类型，对于学生的专业能力的培养具有重要作用。本课程是面对非数值性处理问题形成的一门学科，其主要目的是培养学生的计算思维、系统分析与设计、算法设计与分析、程序设计与实现专业基本能力。主要内容涉及基本数据结构、排序、索引、检索、高级数据结构等内容，从逻辑结构的角度系统介绍线性表、字符串、二叉树、树和图等各种基本数据结构；从算法的角度系统地介绍各类排序、检索和索引算法；从应用的角度介绍更复杂的数据结构与算法分析技术。通过本课程的学习，学生应该掌握数据结构与算法的基本概念、合理组织数据的基本方法、高效处理数据的基本算法、并具备面对实际问题选择恰当数据结构与相应算法的能力。

推荐教材或主要参考书：

[1] 张铭、王腾蛟、赵海燕，数据结构与算法，高等教育出版社，2011 年 1 月。

[2] 严蔚敏、吴为民，数据结构（C 语言版），人民邮电出版社，2017 年 8 月。

[3] 张乃孝、裘宗燕，数据结构—C++与面向对象的途径，高等教育出版社，2003 年 4 月。

[4] Clifford A S. 数据结构与算法（C++）2 版，电子工业出版社，2010 年 1 月。

[5] Michael Main, Data Structures & Other Object Using C++(3Rd Edition)，清华大学出版社，2007 年 1 月。

0008186 Data Structure and Algorithm

Course Number: 0008186

Course Title: Data Structure and Algorithm

Course Type: Required Courses

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

Students: Undergraduate students majoring in Computer Science and Technology, Internet of Things Engineering, Information Security.

Prerequisites: High-level Language Programming, Data Structures and Algorithms

Evaluation Method: Course participation + written exam

Writer: Qing Zhao

Course Description:

The Data Structure and Algorithm is one of the required courses for undergraduate students Major in the College of Computer Sciences of Faculty of Information Technology. This course faces non-numerical processing problems. The main target of this course is to clarify cultivating students' basic abilities in computational thinking, system analyzing and design, algorithm design and analyzing, program design and realization. The main content involves basic data structure, sorting, indexing, retrieval, advanced data structure, etc. From the perspective of logical structure, it systematically introduces various basic data structures such as linear tables, strings, binary trees, trees and graphs; systematically from the perspective of algorithms introduce various sorting, retrieval and indexing algorithms; introduce more complex data structures and algorithm analysis techniques from the perspective of application. Through the study of this course, students should master the basic concepts of data structures and algorithms, the basic methods of rationally organizing data, the basic algorithms for efficiently processing data, and the ability to choose appropriate data structures and corresponding algorithms in the face of practical problems.

Recommended Textbooks/References:

1. Zhang Ming,Wang Tengjiao, Zhao Haiyan. Data Structure and Algorithm. Beijing. Higher Education Press. 2011.1.

2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press，2017.8.

3. Zhang Naixiao, Qiu Zongyan. Data Structure - C++ and Object-Oriented Approach. Beijing, Higher Education Press. 2003.4.

4. Clifford A S. Data Structure and Algorithm（C++）(2nd Edition). Beijing. Publishing House of Electronics Industry. 2010.1.

5. Michael Main, Data Structures & Other Object Using C++(3rd Edition). Beijing, Tsinghua University Press. 2007.1.

0002761 数据结构课设Ⅰ

课程编码：0002761

课程名称：数据结构课设Ⅰ

英文名称：Curriculum Design for Data Structure

课程类型：实践环节必修课

学分： 2.0 **总学时：** 60

面向对象：计算机科学与技术（实验班）专业、计算机科学与技术专业、信息安全（实验班）专业、物联网工程专业本科生

先修课程：高级语言程序设计，数据结构与算法

考核形式：实验验收+课程设计报告

撰写人：赵青

课程简介：

数据结构课设是信息学部为计算机科学与技术、物联网工程、信息安全专业本科生开设的实践课程类型。本课程是一个综合性的实践教学环节，其目标是让学生运用所学数据结构知识上机解决与实际应用结合紧密的、规模较大的问题。通过分析、设计、编码、调试等各个环节的训练，使学生深刻理解、牢固掌握、综合应用数据结构和算法设计技术，增强分析、解决实际问题的能力，培养项目管理能力和团队合作精神等软件工作者的综合素质。课程设计所设计的题目，在难度和深度方面都大于课内的上机训练，要求最终提交一个具有一定实用价值、界面友好、功能完整、基本可靠的应用程序，从而体现数据结构与算法设计的重要作用。

推荐教材或主要参考书：

[1] 张铭、王腾蛟、赵海燕，数据结构与算法，高等教育出版社，2011 年 1 月。

[2] 严蔚敏、吴为民，数据结构（C 语言版），人民邮电出版社，2017 年 8 月。

[3] 张乃孝、裘宗燕，数据结构—C++与面向对象的途径，高等教育出版社，2003 年 4 月。

[4] Clifford A S. 数据结构与算法（C++）2 版，电子工业出版社，2010 年 1 月。

[5] Michael Main, Data Structures & Other Object Using C++(3Rd Edition)，清华大学出版社，2007 年 1 月。

0002761 Curriculum Design for Data Structure

Course Number: 0002761

Course Title: Curriculum Design for Data Structure

Course Type: Required Courses

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

Students: Undergraduate students majoring in Computer Science and Technology, Internet of Things Engineering, Information Security.

Prerequisites: High-level Language Programming, Data Structures and Algorithms

Evaluation Method: Project realization+Experimental Report

Writer: Qing Zhao

Course Description:

The Curriculum Design for Data Structure is one of the practice courses for undergraduate students Major in the College of Computer Sciences of Faculty of Information Technology. The design practice for the data structure course is a comprehensive teaching practice process. The main target of this course is to clarify applying students' knowledge within the practical application of the close and the larger problem on the computer. During the training process of analysis, design, coding and debugging, the students can get a deep understanding of the algorithm and they can firmly grasp the comprehensive application of data structure and algorithm design techniques. It can enhance the ability of solve practical problems, and also develop project management capabilities and teamwork spirit.

Arrangements of the subject in curriculum design, it is greater than curricular-on training in terms of difficulty and depth. It is claimed to eventually submit a certain practical, user-friendly, full-featured and basic reliable application. It reflects the important role of the design on the data structures and algorithms.

Recommended Textbooks/References:

1. Zhang Ming,Wang Tengjiao, Zhao Haiyan. Data Structure and Algorithm. Beijing. Higher Education Press. 2011.1.

2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press，2017.8.

3. Zhang Naixiao, Qiu Zongyan. Data Structure - C++ and Object-Oriented Approach. Beijing, Higher Education Press. 2003.4.

4. Clifford A S. Data Structure and Algorithm（C++）(2nd Edition). Beijing. Publishing House of Electronics Industry. 2010.1.

5. Michael Main, Data Structures & Other Object Using C++(3rd Edition). Beijing, Tsinghua University Press. 2007.1.

0007947 高级语言程序设计

课程编码：0007947

课程名称：高级语言程序设计

英文名称：High Level Language Programming

课程类型：公共基础必修课程

学分： 3.5 **总学时：** 56

面向对象：计算机科学与技术（实验班）、物联网工程、信息安全、计算机大类

先修课程：无

考核形式： 平时成绩+阶段编程测验+期末考试

撰写人： 蔡越江

课程简介：

本课程依托 C 语言进行计算机科学的启蒙教育，初步培养学生的计算思维能力，训练程序设计的基本方法和技巧，使学生能够通过使用高级语言编写程序解决简单的实际问题，为解决复杂工程问题打下坚实基础。本课程在传授知识的同时，还要训练学生动手能力、培养分析问题和解决工程问题的能力，注重能力的培养、个性的发展。课程是后续理论和实践教学的基础和重要工具。课程主要内容包括 C 语言基础语法、三种基本的程序控制结构、数据的组织结构、函数、程序的组织结构、模块化的程序设计思想与方法、初识计算机算法以及程序的基本调试技巧等。

推荐教材或主要参考书：

[1] 廖湖声，叶乃文，周珺编著. C 语言程序设计案例教程(第 3 版). 人民邮电出版社, 2018 年 11 月

[2] 李文新等. 程序设计导引及在线实践(第 2 版). 清华大学出版社, 2017 年 1 月

[3] （美）Brian W.Kernighan,Dennis M.Ritchie 著. C 程序设计语言(英文版)(第 2 版). 机械工业出版社, 2006 年 8 月

[4] P.J.Deitel,H.M.Deitel 著. C 大学教程(第 5 版)(英文版). 电子工业出版社, 2010 年 5 月

0007947 High Level Language Programming

Course Number: 0007947

Course Title: High Level Language Programming

Course Type:

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

Students: Undergraduate students majoring in computer science

Prerequisites: no

Evaluation Method: Course participation + Stage programming test +written exams

Writer： Cai Yuejiang

Course Description:

High-level language programming is one of the public basic compulsory courses for undergraduate students Major in computer science. This course relies on the C language for computer science initiation education, initially cultivates students' computational thinking ability, trains the basic methods and skills of program design, enables students to write programs to solve simple practical problems, and lays a solid foundation for solving complex engineering problems. While imparting knowledge, this course also trains students' hands-on ability, develops the ability to analyze and solve engineering problems, and emphasizes the cultivation of abilities and the development of individuality. The course is the foundation and important tool for subsequent theoretical and practical teaching. The teaching contents are mainly covered by the following aspects: C language basic grammar, three basic program control structures, data organization structure, function, program organization structure, modular program design ideas and methods, first understanding of computer algorithms and basic debugging skills of programs

Recommended Textbooks/References:

1. Liao Husheng, Ye Naiwen, and Zhou Jun. C Language Programming Case Tutorial (3rd Edition). People's Posts and Telecommunications Publishing House, November 2018
2. Li Wenxin, etc. Program Design Guide and Online Practice (2nd Edition). Tsinghua University Press. January 2017
3. Brian W. Kernighan, Dennis M. Ritchie. C Programming Language (2nd Edition). Machinery Industry Press. August 2006
4. P.J.Deitel, H.M.Deitel. C University Course (5th Edition). Electronic Industry Press. May 2010

0008187 面向对象程序设计

课程编码：0008187

课程名称：面向对象程序设计

英文名称：Object Oriented Programming

课程类型：专业选修课

学分：2.5　**总学时：** 40

面向对象：计算机科学与技术（实验班）专业、计算机科学与技术专业、信息安全（实验班）专业、物联网工程专业本科生

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：杨惠荣

课程简介：（250-300 字）

面向对象程序设计（Object Oriented Programming，OOP）是一种被广泛应用的计算机编程架构，OOP 达到了软件工程的三个主要目标：重用性、灵活性和扩展性。课程通过分析 OOP 的基本思想及 Java 语言的实现机制，讨论 OOP 的方法，培养学生采用面向对象的方法分析和求解问题的能力。要求学生掌握面向对象的基本思想和有关的基本概念、基本方法，掌握基于 OOP 思想的 Java 语言实现机制，掌握 Java 语言的基本语法和 Java 集成开发环境下的编程技术，能够运用 OOP 方法分析和求解一般应用问题。并培养学生的面向对象系统分析、设计能力，提高解决复杂工程问题的能力。

推荐教材或主要参考书：

[1] 叶乃文，王丹，杨惠荣，面向对象程序设计(第 3 版)，清华大学出版社，2013 年 8 月

[2] 邢国波，杨朝晖，郭庆，徐遵义，Java 面向对象程序设计，清华大学出版社，2019 年 6 月

[3] 刘彦君，张仁伟，满志强，Java 面向对象思想与程序设计，人民邮电出版社，2018 年 11 月

0008187 Object Oriented Programming

Course Number: 0008187

Course Title: Object Oriented Programming

Course Type: Major Electives

Credit: 2.5 **Total Credit Hours:** 40

Students: Undergraduate students majoring in Computer Science and Technology

Prerequisites: High-Level Language Programming

Evaluation Method: Course participation + experiment + written exams

Writer： Huirong Yang

Course Description:

Object oriented programming (OOP) is a widely used computer programming architecture. It achieves three main goals of software engineering: reusability, flexibility and expansibility. Our course analyzes the basic idea of OOP and the implementation mechanism of Java language, discusses the methods of OOP and cultivates students' ability to analyze and solve problems with object-oriented method. Students are required to master the basic idea of OO and related basic concepts and methods, to master the implementation mechanism of Java language based on OOP ideas, to master the basic syntax of Java language and the programming technology under the Java integrated development environment. The students should also able to analyze and solve general application problems with OO method. At the same time, students' ability of OOA(Object-Oriented system Analysis) and OOD(Object-Oriented Design) is trained, the ability of solving complex engineering problems is improved.

Recommended Textbooks/References:

1. Ye Naiwen, Wang Dan, Yang Huirong. Object oriented programming (3rd Edition). Tsinghua University Press. August 2013
2. Xing Guobo, Yang Chaohui, Guo Qing, Xu Zunyi. Java object-oriented programming. Tsinghua University Press. June 2019
3. Liu Yanjun, Zhang Renwei, manzhiqiang. Java object-oriented idea and program design. People's Posts and Telecommunications Press. November 2018

0007360 传感器技术

课程编码：0007360

课程名称：传感器技术

英文名称：Sensor Techniques

课程性质：专业选修课

学分： 2.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：数字信号处理技术与应用、电路分析基础-1、模拟电子技术

考核形式：平时成绩+考试

撰写人：郭黎敏

课程简介：（250-300 字）

传感器技术是现代科技领域中的一门重要学科，是现代科学技术的重要组成部分，在各个领域都发挥着关键作用。本课程要求学生掌握传感器技术的基本原理、测量方法及其应用，了解常规敏感元器件的工作原理和特性，掌握常见的物理量检测方法，培养学生解决物联网感知层中的实际测量问题的能力。具体知识包括：传感器基础理论；测量技术；电阻式传感器原理、测量及应用；电感式传感器原理、测量及应用；电容式传感器原理、测量及应用；光电式传感器原理、测量及应用；压电式传感器原理、测量及应用；电热式传感器原理、测量及应用等。

教学内容重点：传感器基础理论；各种类型传感器的原理、测量及应用。教学内容的难点：各种类型传感器的测量及应用。

推荐教材或主要参考书：

[1] 戴焯. 传感器原理与应用. 北京理工大学出版社，2010 年 10 月

[2] 张志勇. 现代传感器原理及应用. 电子工业出版社，2014 年 1 月

[3] （爱尔兰） 迈克 J.麦格拉思，克莱娜 N.斯克奈尔著，胡宁，王君，王平译. 智能传感器：医疗、健康和环境的关键应用. 机械工业出版社，2018 年 7 月

[4] 董春利. 传感器与检测技术(第 2 版). 机械工业出版社，2016 年 6 月

0007360 Sensor Techniques

Course Number: 0007360

Course Title: Sensor Techniques

Course Type: Major Elective Course

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

Students: Undergraduate students majoring in Internet of Things

Prerequisites: Technology and Appliecation of Digital Signal Processing, Fundamentals of Electronic Circuits-1, Analog Electronic Technology

Evaluation Method: Course participation + written exams

Writer： Limin Guo

Course Description:

Sensor techniques is an important course in the field of modern technology, sensor technology is an important component of modern science and technology, which plays a crucial role in various fields. The students are expected to understand the basic principle and measuring method of sensor technology as well as its applications, understand the working principle and characteristics of conventional sensitive components, grasp the detection method of common physical data, through which their abilities in solving the practical measuring problems in the perception layer of IOT will be improved. The teaching contents are mainly covered by the following aspects: the general theory of sensors; measuring techniques; the principle, measurement and application of resistance sensor; the principle, measurement and application of inductive sensor; the principle, measurement and application of capacitive sensor; the principle, measurement and application of photoelectric sensor; the principle, measurement and application of piezoelectric sensor, the principle, measurement and application of electric heating sensor etc. The difficulties of teaching contents are measurements and applications of sensors.

Recommended Textbooks/References:

1．Dai Zhuo. Principles and Application of Sensors. Beijing University of Technology Press.2010.10

2． Zhang Zhiyong. Principles and Applications of Modern Sensors. Electronic Industry Press, 2014.1

3． Written by Michael J. McGrath, Cliodhna Ní Scanaill, translated by Hu Ning, Wang Jun and Wang Ping. Sensor Technologies: Healthcare Wellness and Environmental Applications. China Machine Press, 2018.7

4． Dong Chunli. Sensor and Detection Technology (2nd Edition). China Machine Press, 2016.6

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 Seminars

课程类型：自主课程

学分： 1.0 **总学时：**16

面向对象：物联网工程专业本科生

先修课程：无

考核形式： 考勤+学生做报告+班级研讨+学生研究型作业

撰写人：王茜

课程简介：（250-300 字）

新生研讨课对于帮助学生适应大学环境，培养基本学术技能具有重要意义。课程要求学生在掌握基本计算机专业知识外，通过教师的引导与学生的充分参与和交流，启发学生的研究和探索兴趣，提升学生发现问题、提出问题、解决问题的意识和能力。课程以小班研讨的形式，由多个课堂组成，多以探索、讨论和研讨为导向、强调师生互动和学生自主学习，对同学们在掌握知识、开拓视野、合作精神、批判思考、交流表达、写作技能等诸多方面进行整体上的培养与训练。计算机专业知识包括物联网工程专业的培养目标、课程体系和教学模式、多种物联网技术的发展历程与趋势、中国物联网发展前景与优势等。

0009394 Freshman Seminars

Course Number: 0009394

Course Title: Freshman Seminars

Course Type: Independent course

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

Students: Internet of things Engineering

Prerequisites: No prerequisite

Evaluation Method: Course participation +reports+discussion+research assignments

Writer: Qian Wang

Course Description:

The freshman seminar course is crucial for helping students adapt to the university environment and cultivate fundamental academic skills. Beyond acquiring basic knowledge in computer science, the course demands extensive student participation and communication, stimulated by the guidance of instructors, to inspire students' research and exploration interests. It enhances students' awareness and abilities to identify, articulate, and solve problems. Conducted in small-group discussions and consisting of multiple sessions, the course is exploratory, discussion-oriented, and emphasizes teacher-student interaction and autonomous learning by students. It aims to holistically nurture and train students in various areas, including knowledge acquisition, broadening perspectives, teamwork, critical thinking, communication, and writing skills. The computer science knowledge covered includes the educational objectives, curriculum structure, and teaching modes of the IoT engineering major, as well as the developmental history and trends of various IoT technologies, etc.

0007398 物联网工程实践课设

课程编码：0007398

课程名称：物联网工程实践课设

英文名称：Internet of Things Engineering Practice Courses

课程类型：实践环节必修课

学分： 2.0 **总学时：** 60

面向对象：物联网工程专业本科生

先修课程：物联网导论、RFID 技术、无线传感网、传感器技术

考核形式： 平时成绩+实验+答辩

撰写人：张佳玥

课程简介：（250-300 字）

物联网工程实践课设是信息学部为物联网工程专业本科生开设的实践环节必修课。本课程的除要求学生掌握物联网相关基本概念、原理外，还有物联网系统设计与构建的经典架构和方法，继物联网导论、RFID 技术、无线传感网等课程后，再从系统级上加深对物联网的架构及关键技术的再认识，提升程序设计与实现、算法设计与分析、物联网系统 3 大专业基本能力，强调学生实际技能、创新能力和综合能力的培养。物联网框架包括：物联网体系结构，包括感知层、网络层、应用层，方法包括：物联网系统的设计、部署、调试、管理及应用，综合运用所学知识，从社会需求出发，综合考虑健康、安全、文化及可持续发展等因素构建物联网系统。

推荐教材或主要参考书：

[1] 梁永生，物联网技术与应用，机械工业出版社，2020 年 1 月

[2] 张飞舟，杨东凯，物联网应用与解决方案（第 2 版），电子工业出版社，2019 年 6 月

[3] Samuel Greengard，The Internet of Things，MIT Press，2018 年 1 月

0007398 Internet of Things Engineering Practice Courses

Course Number: 0007398

Course Title: Internet of Things Engineering Practice Courses

Course Type: Required Practical Course

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

Students: Undergraduate students majoring in Internet of Things

Prerequisites: Introduction to IoT， RFID Technology, Wireless Sensor Network , Sensor Technology

Evaluation Method: Course Participation + Lab Projects + Presentation

Writer： Jiayue Zhang

Course Description:

The IoT Engineering Practice Course is a compulsory practical course offered by the Faculty of Information Technology for undergraduate students majoring in IoT Engineering. In addition to requiring students to grasp the basic concepts and principles of IoT, this course also covers the classic architectures and methodologies for designing and constructing IoT systems. Building upon courses such as Introduction to IoT, RFID Technology, and Wireless Sensor Networks, this course deepens students' understanding of the architecture and key technologies of IoT at the system level, enhancing their abilities in program design and implementation, algorithm design and analysis, and the fundamental capabilities of IoT systems. Emphasis is placed on cultivating students' practical skills, innovation capabilities, and comprehensive abilities. The IoT architecture includes the perception layer, network layer, and application layer. The methodologies encompass the design, deployment, debugging, management, and application of IoT systems. Sudents are expected to construct IoT systems by integrating acquired knowledge and considering social needs as well as factors such as health, safety, culture, and sustainable development.

Recommended Textbooks/References:

1. Liang Yongsheng, IoT Technology and Applications, Machinery Industry Press, January 2020.
2. Zhang Feizhou, Yang Dongkai, IoT Applications and Solutions (2nd edition), Electronic Industry Press, June 2019.
3. Samuel Greengard，The Internet of Things，MIT Press，January 2018

0008207 数字信号处理技术与应用

课程编码：0008207

课程名称：数字信号处理技术与应用

英文名称： Digital Signal Processing Technology and Application

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：高等数学（工），线性代数（工），概率论与数理统计（工）

考核形式： 平时成绩+考试

撰写人：王秀娟

课程简介：（250-300 字）

数字信号处理技术与应用课程计算机学院为物联网工程专业本科生开设的一门专业选修课。本课程的目标是学生建立“数字信号处理”的基本概念，掌握数字信号处理的基本分析方法、分析工具以及技术应用，培养学生在实际应用中分析问题、解决问题的能力。课程的主要内容包括时域离散信号及时域离散系统的时域分析方法，频域分析方法以及时域离散系统的设计方法，信号的抽样重建、典型数字序列及其表示、序列运算，离散系统表示、离散系统特性分析，序列的傅里叶变换、离散傅里叶变换、快速傅里叶变换算法，z 变换等。

教学内容重点：时域离散信号及时域离散系统的时域分析方法，频域分析方法以及时域离散系统的设计方法，离散系统表示、离散系统特性分析，序列的傅里叶变换、离散傅里叶变换、快速傅里叶变换算法。

教学内容的难点：离散系统特性分析；离散傅里叶变换、快速傅里叶变换算法；z变换

推荐教材或主要参考书：

[1] （美）Dimitris，G.，Manolakis（迪米特里，G.，马诺莱克斯）著，艾渤等译，实用数字信号处理，电子工业出版社，2018.06

[2] （美）John G.Proakis，Dimitris G.Manolakis 著，方艳梅，刘永清等译，数字信号处理－－原理、算法与应用（第四版），电子工业出版社，2014.08

[3]（美）B.A.谢诺依(B.A.Shenoi) 著；白文乐,王月海,胡越译， 数字信号处理与滤波器设计，机械工业出版社，2018.04

[4] 胡广书，数字信号处理， 清华大学出版社，2003 年 8 月

0008207 Digital Signal Processing Technology and Application

Course Number: 0008207

Course Title: Digital Signal Processing Technology and Application

Course Type: Major Elective Courses

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

Students: Undergraduate students majoring in Internet of Things

Prerequisites: Advanced Mathematics, Linear Algebra, Probability theory and mathematical statistics

Evaluation Method: Course participation + written exams

Writer： Wang Xiujuan

Course Description:

Digital signal processing technology and application is one of the major elective courses for undergraduate students major in Internet of Things. The main target of this course is to clarify the basic concept of "digital signal processing", the basic analysis methods, analysis tools and technology application of DSP. This course is focus on cultivating students' ability in practical applications to analyze and solve problems. The teaching contents are mainly covered by the following aspects: time-domain and frequency-domain analyzing methods of discrete signal and time domain discrete system, design method of time domain discrete systems, signal sampling and reconstruction, typical digital sequences and their representations, operations of sequences, discrete system representation, analysis of discrete systems, Fourier transform, Discrete Fourier Transform, Fast Fourier Transform algorithm and Z transform, etc. The difficulties of teaching contents are described as followings: analysis of discrete systems, Discrete Fourier Transform, Fast Fourier Transform algorithm and Z transform.

Recommended Textbooks/References:

1. Written by Dimitris，G.，Manolakis，Tanslated by Ai Bo et al., Practical Signal Processing, *Electronic Industry Press*, 2018.6
2. Written by John G.Proakis，Dimitris G. Manolakis，Tanslated by Fang Yanmei, Liu Yongqing et al., Digital Signal Processing-- Principles, Algorithms and Applications (Fourth Edition), *Electronic Industry Press*, 2014.8
3. Written by B.A. Shenoi, translated by Bai Wenle, Wang Yuehai and Hu Yue, Digital Signal Processing and Filter design, *China Machine Press*, 2018.4
4. Hu Guangshu, Digital Signal Processing, *Tsinghua University Press*, 2003.8

0008196+物联网感知技术课设

课程编码：0008196

课程名称：物联网感知技术课设

英文名称：Course Design of Internet of Things Perception Technology

课程类型：专业选修课

学分： 2 **总学时：** 60

面向对象：物联网工程类本科生

先修课程：高级语言程序设计, 操作系统

考核形式： 考察

撰写人：陈军成

课程简介：（250-300 字）

物联网感知技术课设是计算机学院为物联网专业本科生开设的一门实践选修课程，本课程的任务是以物联网专业的理论为基础，培养学生面向具体工程分析问题、解决问题的能力。教学内容重点包括：了解相关物联网传感器的基本原理（包括数学原理和物理原理）；掌握 python 语言以及常用的开发板（树莓派）的开发方法；设计并实现一套相关的物联网系统。教学内容的难点在于：如何综合利用已有计算机相关基础课知识（程序设计语言、操作系统、数据库、计算机网络等），分析、设计并实现一套基本可用的物联网感知系统。

推荐教材或主要参考书：

[1] NTT,DATA 集团等，图解物联网，人民邮电出版社，2017-04-01

0008196 + Course Design of Internet of Things Perception Technology

Course Number: 0008196

Course Title: Course Design of Internet of Things Perception Technology

Course Type: major elective course

Credit: 2 **Total Credit Hours: 60**

Students: Undergraduate students majoring in Internet of Things

Prerequisites: Programming, Operation System

Evaluation Method: experimental examination

Writer： Juncheng Chen

Course Description:

The course of Internet of Things Perception Technology is a practical elective course offered by the School of Computer Science for undergraduate students majoring in the Internet of Things. The task of this course is to cultivate students' ability to analyze and solve specific engineering problems based on the theory of the Internet of Things major. The focus of the teaching content includes: understanding the basic principles of relevant IoT sensors (including mathematical and physical principles); Mastering the Python language and the development methods of commonly used development boards (Raspberry Pi); Design and implement a relevant IoT system. The difficulty of teaching content lies in how to comprehensively utilize the existing knowledge of computer related basic courses (programming languages, operating systems, databases, computer networks, etc.), analyze, design, and implement a basic and usable IoT perception system.

Recommended Textbooks/References:

NTT,DATA etc. Illustrated Internet of Things，Posts & Telecom press，2017-04-01

0008184 毕业设计（论文）

课程编码：0008184

课程名称：毕业设计（论文）

英文名称： Graduation Project（Thesis）

课程类型：实践环节必修课

学分： 8.0 **总学时：** 480

面向对象：物联网工程专业本科生

先修课程：物联网技术导论（双语），计算机组成原理，数据结构与算法，代数与逻辑，操作系统原理，计算机系统结构 II，数据库原理，RFID 技术，计算机网络，嵌入式系统与技术，无线传感器网络，物联网工程实践课设

考核形式：指导教师评价+评阅人评价+答辩小组评价

撰写人：王秀娟

课程简介：（250-300 字）

毕业设计（论文）是实现物联网工程专业培养目标、造就合格人才的一个重要的实践性教学环节。本环节的目标是进一步深化与拓宽学生的知识面，培养学生综合运用所学的基础理论、专业知识和基本技能，提高分析与解决实际问题的能力；使学生得到物联网工程师所必需的基本训练和从事科学研究工作的初步能力。其主要内容包括：学生通过选题、资料阅读、外文文献翻译、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，经历解决复杂工程问题的分析、求解和总结过程，培养学生创新精神和实践能力，支持培养目标的达成。

推荐教材或主要参考书：

[1] 指导教师安排

0008184 Graduation Project（Thesis）

Course Number: 0008184

Course Title: Graduation Project（Thesis）

Course Type: Compulsory Practice

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

Students: Undergraduate students majoring in Internet of Things Engineering

Prerequisites: Introduction to Internet of Things Technology (Bilingual), Computer Composition Principle, Data Structure and Algorithm, Algebra and Logic, Operating System Principle, Computer System Structure, Database Principle, RFID Technology, Computer Network, Embedded System and Technology，Wireless Sensor Network, Internet of Things Engineering Practice

Evaluation Method: Instructor evaluation + reviewer evaluation + defense group evaluation

Writer： Wang Xiujuan

Course Description:

The graduation project (thesis) is an important practical link for achieving the training objectives of the Internet of Things engineering specialty and cultivating qualified talents. The goal of this section is to further deepen and broaden students' knowledge, cultivate their ability to comprehensively apply the basic theories, professional knowledge as well as basic skills they have learned to analyze and solve practical problems. Therefore, students can achieve the necessary basic training and initial abilities to engage in scientific research as IoT engineers. The main content includes: students participate in the process of selecting topics, reading materials, translating foreign literature, selecting and using development environments and tools, formulating research, design, and development plans, writing opening reports, writing graduation theses, and participating in defense, etc, which include analyzing, solving, and summarizing complex engineering problems and cultivating students' innovative spirit and practical ability, so as to support the achievement of training goals of the major.

Recommended Textbooks/References:

1. To be arranged by instructors.

0007366+工作实习

课程编码：0007366

课程名称：工作实习

英文名称：Work Practice

课程类型：实践环节必修课程

学分： 4.0 **总学时：** 120

面向对象：物联网工程专业本科生

先修课程：无

考核形式： 平时成绩+答辩成绩

撰写人：陆帅冰

课程简介：（250-300 字）

工作实习是信息学部计算科学与技术系为物联网工程专业本科生开设的实践环节必修课程。本课程的任务是培养建设、应用、维护和管理物联网系统所需要的系统规划设计、应用开发、产品制造、系统集成等方面的综合性高级工程技术人才。教学内容重点：通过实习，使学生可以将基础理论知识的学习与社会实践相结合，为学生提供了一个认识自己、考察自己职业适应性的机会，同时有利于激发学生的再学习欲望。教学内容的难点：通过企业实际现场的工作，锻炼学生的动手能力，培养学生运用专业知识分析和解决实际问题的能力。

推荐教材或主要参考书：

[1] 王强，物联网软件架构设计与实现，北京大学出版社，2022 年 08 月

[2] 连志安， 物联网嵌入式开发实战，清华大学出版社，2021 年 4 月

0007366 + Work Practice

Course Number: 0007366

Course Title: Work Practice

Course Type: Practical compulsory courses

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

Students: Undergraduate students majoring in Internet of things Engineering

Prerequisites: not have

Evaluation Method: Course participation + graduation reply

Writer：Shuaibing Lu

Course Description:

Work Practice is one of the practical compulsory courses for undergraduate students Major in Internet of things Engineering. The main target of this course is to train comprehensive senior engineering and technical talents in system planning and design, application development, product manufacturing, system integration, and other aspects required for the design, application, maintenance, and management of IoT systems. This course is focused on combining the learning of basic theoretical knowledge with social practice for students and giving them the opportunity to understand themselves and evaluate their professional adaptability while fostering their desire for further learning. The teaching contents are mainly covered by the following aspects: basic theoretical knowledge and system design and implementation. The difficulties of teaching contents are described as followings: on-site work in companies trains students' practical skills and cultivates their ability to analyze and solve practical problems using specialized knowledge.

Recommended Textbooks/References:

1. Wang Qiang, Design and Implementation of IoT Software Architecture, Peking University Press, 2022-08.
2. Lian Zhian, Practical Development of IoT Embedded Systems, Tsinghua University Press, 2021-04.

0007380+嵌入式技术课设

课程编码：0007380

课程名称：嵌入式技术课设

英文名称：Embedded Technology Project

课程类型：实践环节选修课

学分： 2.0 **总学时：** 60

面向对象：物联网工程专业本科生

先修课程：嵌入式系统与技术

考核形式：平时成绩+课设任务正确性检查成绩+课程设计报告

撰写人：朱文军

课程简介：（250-300 字）

嵌入式技术课设是信息学部为物联网工程专业本科生开设的一门实践环节选修课。本课程的任务是引导学生在系统级上认识嵌入式系统，理解并掌握嵌入式系统软硬件开发技术，培养学生系统及工程设计能力。学生可以根据教师提供的一些范例，自行选题，使学生将理论课上学到的嵌入式系统开发相关知识融会贯通，建立起嵌入式系统概念，并加深对嵌入式系统开发过程的理解，提高分析问题和解决问题的能力，为提高学生的硬件动手实践能力打下坚实的基础。教学内容重点：基于 ARM 平台和嵌入式 Linux 开发技术完成一个小型嵌入式系统的设计、封装和调试。教学内容的难点：嵌入式系统的设计和调试。

推荐教材或主要参考书：

俞建新，王健，宋健建，嵌入式系统基础教程（第 2 版），机械工业出版社，2015 年 1 月

0007380 + Embedded Technology Project

Course Number: 0007380

Course Title: Embedded Technology Project

Course Type: Practical elective course

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

Students: Undergraduate students majoring in Internet of things Engineering

Prerequisites: Embedded System and Technology

Evaluation Method: Course participation + Task correctness check grade + Course design report

Writer：Zhu Wenjun

Course Description:

Embedded technology project is one of the practical elective courses for undergraduate students Major in internet of things engineering. The main target of this course is to guide students to know embedded systems at the system level, understand and master the software and hardware development technology of embedded systems, and cultivate students' ability of system and engineering design. This course is focus on enabling students to choose their own topic based on some examples provided by the teacher and integrate the relevant knowledge of embedded system development learned in theoretical classes, establish the concept of embedded systems, deepen their understanding of the embedded system development process, improve their ability to analyze and solve problems, and lay a solid foundation for improving students' hardware hands-on practical skills. The teaching contents are mainly covered by the following aspects: design, package and debug a small embedded system based on ARM platform and embedded Linux development technology. The difficulties of teaching contents are described as followings: design and debugging of a small embedded system.

Recommended Textbooks/References:

Yu jianxin, Wang jian, Song jianjian, Fundamentals of Embedded Systems (Second Edition), China Machine Press, 01-2015.

0004046+嵌入式系统与技术

课程编码：0004046

课程名称：嵌入式系统与技术

英文名称：Embedded System and Technology

课程类型：学科基础必修课

学分： 2.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：高级语言程序设计，计算机组成原理，操作系统原理

考核形式：平时成绩+考试

撰写人：朱文军

课程简介：（250-300 字）

嵌入式系统与技术是信息学部为物联网工程专业本科生开设的一门学科基础必修课。本课程的任务是使学生掌握 ARM 体系结构、ARM 指令集以及在 ARM 体系下的嵌入式编程方法，培养学生基于 ARM 的硬件开发平台，并在此平台下开展硬件编程与硬件接口实验的能力，为学生进行嵌入式系统软硬件设计和开发打下良好的基础。教学内容重点：嵌入式系统概述、嵌入式系统设计流程、交叉编译思想、ARM 体系结构、ARM 指令系统特点、ARM 汇编语言程序设计方法、混合程序编程设计方法。教学内容的难点：交叉编译思想、ARM 汇编语言程序设计方法、混合程序编程设计方法。

推荐教材或主要参考书：

俞建新，王健，宋健建，嵌入式系统基础教程（第 2 版），机械工业出版社，2015 年 1 月

0004046 + Embedded System and Technology

Course Number: 0004046

Course Title: Embedded System and Technology

Course Type: Compulsory course

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

Students: Undergraduate students majoring in Internet of things Engineering

Prerequisites: High-level Language Programming, Principles of Computer Organization, Principles of Operating System

Evaluation Method: Course participation + written exams

Writer：Zhu Wenjun

Course Description:

Embedded system and technology is one of the compulsory courses for undergraduate students Major in internet of things engineering. The main target of this course is to make students master the ARM architecture, ARM instruction set and the ARM embedded programming method. This course is focus on cultivating students' ability to implement the hardware interface experiment based on ARM hardware development platform, and laying a solid foundation for the students to design and develop the embedded system hardware and software.The teaching contents are mainly covered by the following aspects: overview of embedded system, design process of embedded system, thought of cross-compilation, ARM architecture, characteristics of ARM instruction system, programming method of ARM assembly language, programming method of hybrid program. The difficulties of teaching contents are described as followings: thought of cross-compilation, programming method of ARM assembly language, programming method of hybrid program.

Recommended Textbooks/References:

Yu jianxin, Wang jian, Song jianjian, Fundamentals of Embedded Systems (Second Edition), *China Machine Press*, 01-2015.

0010710 学科前沿课程

课程编码：0010710

课程名称：学科前沿课程

英文名称：Frontier course

课程类型：自主课程

学分： 1.0 **总学时：** 16

面向对象：物联网工程专业本科生

先修课程：物联网工程专业相关专业课

考核形式：平时成绩+撰写小论文+PPT 汇报形式

撰写人： 方娟

课程简介：（250-300 字）

本课程是为物联网工程专业本科生开设的一门自主课程。本课程将促使学生了解物联网领域的前沿知识，掌握最新的研究动态，采用围绕理论前沿、技术前沿和应用前沿等内容设置多个专题并采用讲座的形式，让学生尽可能多地接触物联网新技术，保持对学术前沿动态的密切关注。通过对物联网前沿技术的了解和学习，有效地提高学生对本专业前沿理论和技术发展动态的认识，使学生快速掌握当前本行业内急需的专业技能，满足社会对技术人才的需求。

推荐教材或主要参考书：

无。

0010710 Frontier course

Course Number: 0010710

Course Title: Frontier course

Course Type: Independent course

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

Students: Undergraduate students majoring in Internet of things Engineering

Prerequisites: Internet of things engineering related professional courses

Evaluation Method: Course participation + writing essay + PPT report form

Writer: Juan Fang

Course Description:

This course is an independent course for undergraduates majoring in Internet of things. This course will enable students to understand the frontier knowledge in the field of Internet of things, master the latest research trends, set up a number of topics around the theoretical frontier, technology frontier and application frontier, and adopt the form of lectures, so that students can contact with the new technologies of Internet of things as much as possible, and keep close attention to the academic frontier dynamics. Through the understanding and learning of the Internet of things cutting-edge technology, it can effectively improve the students' understanding of the frontier theory and technology development trends of the major, so that students can quickly master the professional skills urgently needed in the industry, and meet the needs of the society for technical talents.

Recommended Textbooks/References:

Nothing.

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：物联网工程专业本科生

先修课程：大学英语（综合）、大学英语（高级）

考核形式：课堂表现+学生报告+班级研讨+学生研究型小论文

撰写人： 方娟

课程简介：（250-300 字）

学术论文作为研究成果表现的一种形式，是理解科学研究特点与方法的重要途径之一。学术论文写作的思路、方法及规范是当代大学生应具备的重要基本知识和技能，同时也是对物联网工程专业知识实践过程中的重要环节。本课程作为物联网工程专业的一门自主课程，主要对物联网领域和信息产业相关的科技论文及写作方法进行简要讲解，使学生充分了解国内外物联网相关领域的最新发展趋势以及科研过程的基本内容。本课程将系统地讲解学术写作的基本概念、过程及表达形式，并介绍了物联网相关研究领域的若干科技论文写作实例。通过本课程的学习，学生应掌握学术写作的基本概念、思路、方法及规范，熟悉物联网相关领域的前沿技术，为后续的学习和研究工作奠定基础。

推荐教材或主要参考书：

[1] 温迪．劳拉．贝尔彻．学术期刊论文写作必修课. 教育科学出版社，2014.11

[2] 徐有富. 学术论文写作十讲. 北京大学出版社，2019.11

[3] 周传虎. 学术论文写作与发表指南. 中国人民大学出版社，2019.10

0010663 Academic writing course

Course Number: 0010663

Course Title: Academic writing course

Course Type: Autonomous Course

Credit: 1.0 **Total Credit Hours:** 16.0

Students: Undergraduate students majoring in IoT Engerneering

Prerequisites: Comprehensive English, Advanced English

Evaluation Method: Class performance + Student report + Class seminar + Student research essay

Writer: Juan Fang

Course Description:

As a form of performance of research results, academic papers are one of the important ways to understand the characteristics and methods of scientific research. The ideas, methods, and standards of academic paper writing are important basic knowledge and skills that contemporary college students should possess, and they are also an important link in the practice of professional knowledge of the Internet of Things engineering. This course is an independent course for the Internet of Things engineering major. It mainly provides a brief explanation of scientific and technological papers and writing methods related to the Internet of Things field and the information industry, so that students can fully understand the latest development trends in the Internet of Things related fields at home and abroad and the research process Fundamental contents. This course will systematically explain the basic concepts, processes and expressions of academic writing, and introduce several scientific and technological paper writing examples in the research field of the Internet of Things. Through the study of this course, students should master the basic concepts, ideas, methods, and norms of academic writing, and be familiar with cutting-edge technologies in related fields of the Internet of Things, so as to lay the foundation for subsequent study and research.

Recommended Textbooks/References:

1. Wendy. Laura. Belcher. Compulsory course for academic journal paper writing. Education Science Press, 2014.11
2. Xu Youfu. Ten lectures on academic paper writing. Peking University Press, 2019.11
3. Zhou Chuanhu. Guidelines for writing and publishing academic papers. Renmin University of China Press, 2019.10

0008200 无线传感器网络

课程编码：0008200

课程名称：无线传感器网络

英文名称：Wireless Sensor Network

课程类型：学科基础必修课

学分：2.0　**总学时：**32

面向对象：物联网工程专业本科生

先修课程：计算机网络

考核形式：平时成绩+考试

撰写人：陈锬

课程简介：（250-300 字）

无线传感器网络是信息学部为物联网工程专业本科生开设的学科基础必修课。通过本课程的学习，要求学生掌握无线传感器网络的体系结构和网络通信技术，着重掌握无线传感器网络的通信协议，了解无线传感器网络的定位技术、数据管理和时间同步等几大支撑技术。主要教学内容包括：无线传感器网络概念、路由协议、MAC 协议、拓扑控制技术、IEEE802.15.4 和 ZigBee 协议、无线传感器网络定位技术、时间同步、数据管理、nesC 和 TinyOS 操作系统。

推荐教材或主要参考书：

[1]孙利民. 无线传感器网络：理论及应用. 北京：清华大学出版社，2018 年 8 月

[2]王营冠. 无线传感器网络. 北京：电子工业出版社，2012 年 6 月

0008200 Wireless Sensor Network

Course Number: 0008200

Course Title: Wireless Sensor Network

Course Type: Basic Compulsory Course

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

Students: Undergraduate students majoring in IoT engineering

Prerequisites: Computer Networks

Evaluation Method: Course participation + written exams

Writer： Chen Tan

Course Description:

Wireless Sensor Network is one of the compulsory courses for undergraduate students majoring in IoT engineering. This course introduces key technologies of wireless sensor networks. This course requires students to master the wireless sensor network architecture and network communication technology, focusing on communication protocol for wireless sensor networks. Students should understand several major supporting technologies of wireless sensor network, such as node localization, target tracking and time synchronization. The main topics include: Concept of wireless sensor networks; Routing protocol, MAC protocol, topology control technology, IEEE802.15.4 and ZigBee protocols, wireless sensor network positioning technology, time synchronization, data management, nesC and TinyOS operating systems.

Recommended Textbooks/References:

1.Sun Limin, Wireless Sensor Network：Theory and Applications. Tsinghua University Press，2018.8

2.Wang Yingguan, Wireless Sensor Network. Publishing House of electronics industry, 2012.6

0008195 无线传感器网络实验

课程编码：0008195

课程名称：无线传感器网络实验

英文名称： Wireless Sensor Network Experiment

课程类型：实践环节必修课

学分： 1.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：无线传感器网络

考核形式：上机实验+实验报告

撰写人：陈锬

课程简介：（250-300 字）

无线传感器网络实验是信息学部为物联网工程专业本科生开设的实践环节必修课。本课程是单独为学生开设的一门以动手实践为主的课程，其目的是通过一系列无线传感器网络实验，巩固学生在无线传感器网络课程中学习的理论知识，建立无线传感器网络的整体概念，并加深对短距离通信、自组织网络、典型协议等方面的理解，使学生能够具备一定的解决实际问题的能力。本课程要求学生提前预习实验内容并规划实验过程，课后对实验进行总结并按照格式要求书写实验报告。主要实验内容包括：基于 TinyOS 的串口通信实验、温湿度和光照度采集实验、点对点通信实验、数据分发协议和汇聚协议实验、多跳路由传感器采集和传输实验。

推荐教材或主要参考书：

[1] 李外云，CC2530 与无线传感器网络操作系统 TinyOS 应用实践，北京航空航天大学出版社，2013 年 8 月

0008195 Wireless Sensor Network Experiment

Course Number: 0008195

Course Title: Wireless Sensor Network Experiment

Course Type: Practical Compulsory Course

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

Students: Undergraduate students majoring in IoT engineering

Prerequisites: Wireless Sensor Network

Evaluation Method: Course participation + report

Writer： Chen Tan

Course Description:

Experiment of Wireless Sensor Network is one of the compulsory courses for undergraduate students Major in IoT engineering. This course is a practice-based course offered separately for students, its purpose is to consolidate the theoretical knowledge which students learn in the course of wireless sensor networks through a series of wireless sensor network experiment, establish the overall concept of wireless sensor networks, and deepen the understanding of short distance wireless communication and self-organization network. This course enables students to have a certain ability to solve practical problems. This course requires students preparing experimental content and planning the process of experiments before class, summarizing the experiments and writing experiment reports after class. The main contents include: Serial communication experiment based on TinyOS, temperature, humidity, and illumination acquisition experiment, point-to-point communication experiment, data distribution protocol and aggregation protocol experiment, multi hop routing sensor acquisition and transmission experiment.

Recommended Textbooks/References:

1. Li Waiyun, CC2530 and application of TinyOS in wireless sensor network, Beihang University Press, 2013

0010691 物联网技术导论（双语）

课程编码：0010691

课程名称：物联网技术导论（双语）

英文名称：Introduction to Internet of Things

课程类型：学科基础必修课

学分： 2 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：无

考核形式： 平时成绩+考试

撰写人：陈慧杰

课程简介：

物联网技术导论（双语）是信息学部计算机学院为物联网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了解物联网技术的起源和发展、掌握物联网的概念以及主要关键技术，了解相关应用领域，提升学生对物联网工程的兴趣和认知能力，以为后续深入学习物联网相关技术奠定基础。教学内容重点：物联网的概念及体系结构、自动识别技术、定位技术、智能感知技术、移动互联网、新兴通信技术、物联网安全与隐私以及典型物联网系统案例。教学内容的难点：定位技术、智能感知技术、移动互联网、新兴通信技术、物联网安全的概念、特点及关键技术。

推荐教材或主要参考书：

[1] 桂小林，安健等. 物联网技术导论（第 2 版）. 清华大学出版社，2018 年 12 月

[2] 刘云浩著. 物联网导论（第 4 版）. 科学出版社，2022 年 7 月

[3] [美] 拉杰 • 卡马尔（Raj Kamal）著，李涛 卢冶 董前琨译. 物联网导论. 机械工业出版社，2020 年 1 月

0010691 Introduction to Internet of Things

Course Number: 0010691

Course Title: Introduction to Internet of Things

Course Type: Professional required course

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

Students: Undergraduate students majoring in Internet of Things Engineering

Prerequisites: No

Evaluation Method: Course participation + written exams

Writer：Huijie Chen

Course Description:

Introduction to Internet of Things (IoT) is one of the professionally required courses for undergraduate students majoring in the Internet of Things Engineering. The target of this course is to enable students to understand the origin and development of IoT technology, master the corresponding concept and key technologies, understand its application fields, enhance students' interest and cognitive ability, and lay the foundation for further in-depth study of IoT technologies. The teaching contents are mainly covered by the following aspects: the IoT concept and architecture, automatic recognition, localization, smart sensing, mobile Internet, emerging communication, security and privacy in the IoT, and classical systems. The difficulties of teaching content are described as follows: the concept, characteristics, and key technologies refer to localization, smart sensing, mobile Internet, emerging communication, and IoT security.

Recommended Textbooks/References:

1.LIN Xiaogui, AN Jian, Introduction to Internet of Things Technology (second edition), Tsinghua University Press, 12-2018

2.LIU Yunhao, Introduction to Internet of Things (fourth edition), Science Press, 7-2022

3.Raj Kamal, Introduction to Internet of Things Architecture and Design Principles, China Machine Press, 12-2019

0010692 物联网通信新技术与应用

课程编码：0010692

课程名称：物联网通信新技术与应用

英文名称：New Technologies and Applications of Internet of Things Communication

课程类型：专业选修课

学分： 2.0 **总学时：** 32

面向对象：物联网工程专业本科生

先修课程：计算机网络

考核形式：平时成绩+考试

撰写人：徐晓斌

课程简介：（250-300 字）

物联网通信新技术与应用是信息学院物联网工程专业本科生开设的专业选修课类型。本课程的任务是介绍 5G 时代服务物联网通信技术的网络体制架构，并介绍物联网长距离通信相关技术，例如 NB-IoT 技术及其应用。本课程首先讲解 5G 网络的特点，网络技术体制，网络相关技术，进而对 NB-IoT 基本概念、技术原理和协议进行介绍，最后进行应用案例开发实践，详细讲解系统设计和功能实现的过程。课程针对物联网应用性强和多学科融合的特点，采用理论学习和开发实践相结合的方式，使学生能够系统地掌握物联网通信新技术相关的基础知识、科学方法和实践技能，培养学生在本专业领域内跟踪新知识、新技术的能力和创新实践的能力。教学内容重点：5G 网络总体架构及相关新技术。教学内容的难点：基于 NB-IoT 实现物联网数据采集。

推荐教材或主要参考书：

[1] 廖建尚，巴音查汗，苏红富，物联网长距离无线通信技术应用与开发，电子工业出版社，2019 年 9 月

[2] 江林华，5G 物联网及 NB-IoT 技术详解，电子工业出版社，2018 年 3 月

0010692 New Technologies and Applications of Internet of Things Communication

Course Number: 0010692

Course Title: New Technologies and Applications of Internet of Things Communication

Course Type: Major Electives

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

Students: Undergraduate students majoring in IoT

Prerequisites: Computer Network

Evaluation Method: Course participation + written exams

Writer: Xiaobin Xu

Course Description:

New Technologies and Applications of Internet of Things Communication is one of the elective courses for undergraduate students Major in IoT. The task of this course is to introduce the network architecture of 5G era service IoT communication technology, and introduce IoT long-distance communication related technologies, such as NB-IoT technology and its applications. This course first explains the characteristics of 5G networks, network technology system, and network related technologies. Then, it introduces the basic concepts, technical principles, and protocols of NB IoT. Finally, it conducts application case development practice and explains in detail the process of system design and functional implementation. The course focuses on the strong applicability and interdisciplinary integration of the Internet of Things, adopting a combination of theoretical learning and development practice to enable students to systematically master the basic knowledge, scientific methods, and practical skills related to new technologies in IoT communication, and cultivate their ability to track new knowledge, new technologies, and innovative practices within their professional field. The teaching contents are mainly covered by the following aspects: 5G network overall architecture and related new technologies. The difficulties of teaching contents are described as followings: Implementing IoT data collection based on NB-IoT.

Recommended Textbooks/References:

1. Liao Jianshang, Bayinchahan, Su Hongfu, Application and development of Internet of things long distance wireless communication technology, Electronic Industry Press, 2019.9

2 .Jiang Linhua, 5G Internet of things and NB-IoT Technology, Electronic Industry Press, 2018.3