Contents

Course Number: 0007111

Course Title: Information Technology Foundation

Credit: 1 **Total Credit Hours:** 16

Students: Undergraduate students Major in Non-Computer

Prerequisites: None

Evaluation Method: Written Exam & Course Design & Practices

Course Description:

This course is designed to be a core course for undergraduate students major in non-computer, which the aim is to let students understand the concepts of information technology, the basic computer theory and computational thinking of solving problems. Through studying the course, the students are expected to have primary ability of using computer to catch, manage, process and share information. The course includes the concepts of information and information processing, the foundation of computer hardware and the algorithm of computer program, the primary technology of database, multimedia, network, and information security. Simultaneously, combining case study with practicum, the course can improve the students' ability of using computer to deal with information, trains them to think with computational thinking, and improve their ability of solving practical problems using computer technology.

Recommended Textbooks/References:

1. Wang Quanmin. Practical Course of Computer. China Railway Publishing House. 2011
2. Gong Peizeng. Fundamentals of Computers. Higher Education Press. 2011
3. Feng Boqin. Fundamentals of Computers-Experiment Instructor. TsingHua University Press. 2009
4. Chen Jianguo. Information Technology Foundation. China Science and Technology Press. 2012

Course Number: 0004291

Course Title: Microcontroller Technology

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

Students: Non-computer-majored undergraduate students of science and technology

Prerequisites: Digital Circuit or Electronic Technology

Evaluation Method: Written Exam

Course Description:

This is a curriculum on theories and technologies non-computer-majored undergraduate students of science and technology applied MCU (Microcontroller Unit) to real-time measuring-controlling system. It is the third level course in the basic computer courses. The students are expected to understand the basic concepts, principles, primary technologies and development methods. The main topic include: the basic knowledge of microcomputer system; inner structures and operating principles of MCS-51 MCU; instruction system; assembly language programming; internal parallel ports; interrupt system; counters/timers; serial communication interface; analog-to-digital and digital-to-analog conversion technology; commonly used peripheral equipment interface; developing the students' project practical ability by richer engineering examples analysis according to different specialties. Finally, the theories and methods learnt in class are consolidated and applied, and the development process of an actual MCU application system is learnt through some experiments.

Recommended Textbooks/References:

1. ZHANG Yingxin, etc. MCU Primary Tutorial-Microcontroller Foundation (2nd Edition). Beijing: Beihang University Press. 2006
2. ZHANG Yigang, PENG Xiyuan. Principle and Interface Technology of MCU. Beijing: Posts & Telecom Press. 2008
3. HU Hancai. Principle and Interface Technology of MCU. Beijing: Tsinghua University Press. 2002
4. ZHOU Xinghua. Taught You How to Learn Microcontroller (2nd Edition). Beijing: Beihang University Press. 2007
5. ZHOU Mingde. Principle and Technology of MCU. Beijing: Posts & Telecom Press. 2008

Course Number: 0000847

Course Title: Computer Network Technology

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

Students: Non-computer professional science undergraduate

Prerequisites: Computer Culture Foundation

Evaluation Method: Written Exam

Course Description:

The course will a preliminary understanding of computer network for the students from non-computer majors according to the induction of network knowledge, such as the basic concepts of computer network, the topological structure of computer network, the network data communication and the concepts of network protocol and architecture. Furthermore, the practical ability of students and their comprehension of Internet and Local Area Network will be improved with a series of practical activities, such as producing cable, installing the network operating system, configuring network protocol, ftp server and http server. Finally, this course will introduce the common network failures and the corresponding treatment, and then students will understand how do the network virus and hacker to disrupt the normal operation of network and how to guard against the threat by studying the fundamentals of network security, network security policy and firewall. This course will make students not only master the basic knowledge of computer network but also improve the practical ability.

Recommended Textbooks/References:

1. Xuwan Tao. Computer Networks and Practical Tutorials. Tsinghua University Press. 2007
2. Shilai Ma. Practical Technology of the Computer Network Tutorial. Tsinghua University Press. 2007
3. Gongyi Wu. Computer Network. Tsinghua University Press. 2007

Course Number: 0000999

Course Title: Computer Network and Application

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

Students: Undergraduate of Non-computer Professional Arts or Science and Arts

Prerequisites: Computer Culture Foundation

Evaluation Method: Written Exam

Course Description:

By learning the basic concepts, classification, network topology, network protocol and network architecture, the non-computer science students to have an initial awareness and understanding of computer network. Furthermore, the practical ability of students and their comprehension of Internet and Local Area Network will be improved with a series of practical activities, such as producing cable, configuring TCP/IP protocol, WWW server, FTP server, DNS server and making static pages. Finally students will understand the network virus and hacker how to disrupt the normal operation of network and how to guard against the threat by studying the fundamentals of network security, network security policy and firewall. This course will make students not only master the basic knowledge of computer network but also improve the practical ability.

Recommended Textbooks/References:

1. Xuwan Tao. Computer Networks and Practical Tutorials. Tsinghua University Press. 2007
2. Shilai Ma. Practical Technology of the Computer Network Tutorial. Tsinghua University Press. 2007
3. Gongyi Wu. Computer Network. Tsinghua University Press. 2007

Course Number: 0004367

Course Title: Embedded Technology

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

Students: Non-computer Professional Science and Engineering Majors

Prerequisites: C language programming, Principle of Microcomputer or Microcontroller

Evaluation Method: Curriculum Design

Course Description:

Embedded Technology is a course, which is the third level of the education of basic computer .It studied by non-computer professional college students (science and engineering). Embedded system is the fusion of the technology of computer software and hardware, mechanics of communication, the technology of semiconductor micro-electronics, referring to the system's requirements of practical application. It serves as a part of the application system, in the special environment, optimizes and tailors the software and hardware. This course is based on the hardware platform of ARM architecture microprocessor, teaching the customization of the Windows CE embedded operating system and the development of applications and drivers.

After completing this course, students will understand the basic concepts of embedded systems, its methods and processes of development. They will be familiar with the structure of the ARM architecture microprocessors and the basic principles of the Windows CE embedded operating system. Based on the hardware platform and application requirements, students are not only customizing and optimizing the Windows CE operating system, but also writing applications by themselves.

Recommended Textbooks/References:

1. Douglas Boling. Translated by Zongsheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009
2. Yao Lingtian, ed. Proficient in MFC Programming, Posts and Telecom Press. 2006
3. Du Chunlei, ed. The ARM Architecture and Programming, Tsinghua University Press. 2003
4. Wang Bing, etc. ed. Windows CE Embedded High-level Programming and Its Examples Explain, China Waterpower Press. 2008

5. Li Dawei, ed. Windows CE Engineering Practice is Fully Resolved, China Electric Power Press. 2008
6. Zhou Jianshe, ed. Windows CE Device Driver and BSP Development Guide, China Electric Power Press. 2009
7. Zhang Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Publishing House of Electronics Industry. 2006

Course Number: 0004289

Course Title: Microcomputer Organization Principle

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

Students: Undergraduate students major in Science or Engineer (Except Computer)

Prerequisites: Digital Circuit or Electronic Technology

Evaluation Method: Written Exam

Course Description:

Microcomputer Organization Principle is a second level course of the computer fundamental teaching courses for undergraduates who study science and engineering but are not major in computer science. It focuses on the X86 architecture's CPU, describes the basic composition principles of computer system and introduces the methods of Assembly Language programming design. Through the study of the course, the students can master the structure and basic working principles of microcomputer components (including microprocessors, memory, the I/O interface and system bus), and grasp the functionality, format, addressing modes of X86 instruction set and its assembly language program design methods. Finally, the students could be able to do programming with Assembly Language and operate the I/O interface. Based on mastering the simple design methods of micro-computer, the students should skillfully grasp the Assembly Language programming design methods, and master the development process of micro-computer application system by practice.

Recommended Textbooks/References:

1. YU Chunxuan. 80x86/Pentium Microcomputer Principle and Interface Technology. China Machine Press.2007
2. YU Chunxuan, SHI Yuanzheng, ZUO Guoyu. 80x86/Pentium Microcomputer Principle and Interface Technology—Exercise Answer and Experimental Guidance. China Machine Press.2008
3. ZHOU Mingde. Principles and Applications of Microcomputer System (Fifth Edition). Tsinghua University Press.2007
4. MA Yide, ZHANG Zaifeng, XU Guangzhu, DU Guifang. Principles and Applications of Microcomputer (Third Edition). Higher Education Press.2004

Course Number: 0004285

Course Title: ACCESS Database Technology

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

Students: Undergraduate students of liberal arts of non-computer major

Prerequisites: None

Evaluation Method: Written Exam

Course Description:

Database concept and Relational database principle are introduced in this course. The students are expected to understand the basic concepts, theories, methods and techniques of ACCESS database technology, and improve their development skills by using ACCESS database management system. Topics included are: 1. the concepts of database, data model, relational normative, E-R chart design; 2. establishment of tables: define primary key, setup attribute of fields, establish index, setup relationship of tables and referential integrity; 3. query: establish choice query, parameter query, cross table query, action query and SQL query; 4. form: establish form, adjust the layout and format, use form to manipulate data, sort and sift of data; 5. report: establish report and label, report grouping and calculation, report preview and print. 6. Macro and module, encryption.

Recommended Textbooks/References:

1. Yuejiang Cai. ACCESS Database Technology and Application. China Railway Publishing House. 2, 2011
2. Zhen Chen, Jifeng Chen. ACCESS Database Technology and Application. Tsinghua University Press. 3, 2011
3. Ning He, Wenbin Huang, Jianqiang Xiong. Database Technology Application. China Machine Press. 6, 2007

Course Number: 0007429

Course Title: AutoCAD (Introduction to Computer-Aided Design)

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

Students: Undergraduate students major in non computer science

Prerequisites: None

Evaluation Method: Computer Exam

Course Description:

Auto CAD is the most popular software in the area of computer aided design (CAD), which is expensively used in fields of machinery, construction, home furnishing, textile and other industries at home and abroad. The students are expected to understand the basic concepts, theories, methods and techniques of Auto CAD. This course includes the concepts related to CAD, the characteristics of CAD developments, and main functions of the CAD user interface and interface setting are introduced. It also includes the drawing settings, display control and query, two-dimensional graphics drawing and text editing, graphic editing and filling technology, block processing, attributes and management, dimensioning, graphical input and output are involved too in this course. The basic methods including the drawing and editing of 3 dimensional solid models, the drawing of 3D surface models and the rendering models are discussed. In final, the 2D graphs generated by 3D model and its printing are introduced. In this course, the students' practical ability will be improved by the combination of case study with practicum.

Recommended Textbooks/References:

1. Shuangcai Zhang. Chinese Practical course of AutoCAD2006. Publishing House of Electronics Industry. 2006
2. Lei Li and Xue Li.Chinese 3D graphic design of AutoCAD2006. Tsinghua University Press. 2005
3. Bin Wang and Jin Ma.Chinese Practical course of AutoCAD2006. Tsinghua University Press.

2006

Course Number: 0007113
Course Title: Fundamentals of C++ Programming Language
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students of Science and Engineering of non-computer major
Prerequisites: None
Evaluation Method: Written and Computer Based Exam
Course Description:
This course is designed to be a core course for science and engineering undergraduate students majored in non-computer. Its objective is to let students understand the fundamental characters of computational logic, and be proficient in solving practical problems using object-oriented programming technique. This course mainly introduces the basic procedures to solve a problem using programs, concepts related to program design, basic idea of object-oriented programming, as well as fundamental ideas and skills of writing and debugging C++ programs. Combining case study with practicum, this course provides a broad knowledge of program design and corresponding language functions for students to improve their ability of dealing with the practical problems with a good programming habit, all of which are prerequisites for continuing study of higher level courses.
Recommended Textbooks/References:
1. Shanshan Wang, Lie Zang, Zhihang Zhang. C++ Programming Language. China Machine Press.2011
2. Li Zheng, Huining Liu, Weimeng. C++ Programming Language. China Machine Press, 2003
3. Airu Zhou, Weijian Lin. Fundamentals of C++ Programming Language. Publishing House of Electronics Industry.2006

Course Number: 0007112
Course Title: Fundamentals of C Programming Language
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students of Science and Engineering of non-computer major
Prerequisites: None
Evaluation Method: Written and Computer Based Exam
Course Description:
This course is designed to be a core course for science and engineering undergraduate students of non-computer major, which the aim is to let students understand the fundamental characters of computational logic and be proficient in solving practical problems using computer programs. This course mainly includes the basic procedures to solve a problem using programs, concepts related to program design, basic method of structured program formulation, as well as fundamental ideas and skills of writing and debugging C programs. Combining case study with practicum, this course provides a broad knowledge of program design and corresponding language functions for students to improve their ability of dealing with the practical problems with a good programming habit, all of which are prerequisites for continuing study of higher level courses.

Recommended Textbooks/References:

1. Qinming He, Hui Yan. C Programming Language. Higher Education Press.2008
2. Husheng Liao, Naiwen Ye, Jun Zhou. C Programming Language Practicum. Posts and Telecom Press. 2010
3. Haoqiang Tan. C Programming Language. Tsinghua University Press. 2008

Course Number: 0007480

Course Title: SQL Server Database Technology

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

Students: Undergraduate students of Science and Engineering of Non-computer major

Prerequisites: None

Evaluation Method: Written Exam

Course Description:

In this course, the basic concepts of database, the basic methods for design and implementation of application system of database by SQL Server are introduced, which hope the students to understand the basic concepts, theories, methods and application techniques of database. The aim of the course is to train the students' ability of practical operation. This course includes, the basic topics the concepts of database, the Entity-Relationship model, data flow diagram (DFD),data dictionary(DD), physical design and functional design of database, storage structure and file structure, and operation and maintenance of the database. In Chapter 4, the constraint of data integrality is analyzed. Chapter 4 and chapter 5 give the languages including data definition Language (DDL), data manipulation language (DML), data controlling language (DCL). In course, we also discuss the storage procedure (SP), trigger, process controlling and definition of functions, transaction, concurrency control, and failure and recovery of database. In final, the technology of access to the database is introduced.

Recommended Textbooks/References:

1. Chao Shao, Bin Zhang, and Qiaorong Zhang. Practical Course of Database: SQL Server 2008. Tsinghua University Press. 8, 2009 (1st Edition)
2. Shixuan Sa and Shan Wang. An Introduction to Database System (4th Edition). Higher Education Press. 5, 2006

Course Number: 0004283

Course Title: Visual Basic Programming

Credit: 3 Total Credit Hours: 48

Students: Undergraduate students of Non-computer major

Prerequisites: None

Evaluation Method: Written Exam and Course Design

Course Description:

This course is designed to be an introduction course of computer programming design for undergraduate students of non-computer major, which the aim is to let student understand the fundamental characters of computational logic and be proficient in solving practical problems using computer programs. This course mainly includes the basic concept of VB programming, the

control structure of program, common controller in VB, procedure, menu, multi windows, general dialog-box data files and database application. The course will help students to construct the concept of object-orient, understand the characters of visualization and event-driven, master the basic methods and algorithms of programming with advanced programming language. By the study of this course, the students are expected to grasp the ability of developing program with windows style using VB, which are prerequisites for developing windows application software.

Recommended Textbooks/References:

1. Haisheng Zhu, Chao Ren.Visual Basic Programming. China Railway Press. 2011
2. Peizeng Gong, Zhiqiang Yang, Weimin Lu. Visual Basic Programming (third Edition). Higher Education Press.2007
3. Bingwen Liu. Visual Basic Programming(fourth Edition). TsingHua University Press.2009

Course Number: 0007484

Course Title: Animation Design and 3DS MAX

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

Students: Undergraduate students major in non-computer

Prerequisites: None

Evaluation Method: Assignment and Course Design

Course Description:

The animation technology is widely used in the areas of the special effects of film and television, television advertising and column packing, appearance of buildings and roaming of animation, production of animation, and preparation of game, etc. As the most popular PC 3D animation software in present, 3DS MAX is powerful and easy to use. Through the studying of this course, students can know the generation and application of three-dimensional animation, learn the basic operation of 3DS MAX, and master the technique of preparation of 3D animation by using 3DS MAX. According to the animation process, the students are expected to design the titles of film and television and television advertising by using 3DS MAX, which lays a necessary foundation of the design and production of animation for future study. The topics include the modeling of three dimensional animation, lighting and camera, key frame animation, curve editor of animation, material animation, particle system and the fundament of dynamic animation.

Recommended Textbooks/References:

1. Guohua Peng and Hongjuan Chen. Making Techniques of 3D Animation by Using 3ds MAX: The Animation. Publishing House of Electronics Industry. 2010
2. Peak Technology. 150 Classical Examples of Animation and Special Effect Design by Using 3ds Max. Beijing: China Youth Press. 2009

Course Number: 0007483

Course Title: Fundamentals of Multimedia Technology

Credit: 2 **Total Credit hours:** 32

Students: Undergraduate students of Non-computer major

Prerequisites: None

Evaluation Method: Written Exam and Practical operation

Course Description:

Multimedia technology is the technology of which integrates the text, images, graphs, sound, animation and video by computer, builds the logic relation and provides interaction between human and computer. The course includes the basic concepts related to multimedia and various kinds of technologies, including the digital audio, digital image and digital video processing, animation techniques, multimedia storage, and network multimedia technology. In addition, it involves the multimedia programming and the development of application system. The course can make students know the integral characteristic of multimedia and improve their understanding of computer technology so that they obtain the fun of design of multimedia applications.

Furthermore, it can improve the students' ability of integral practice for applications and meets the needs of the community.

Recommended Textbooks/References:

1. Qing Yang and Shiyu Zheng. Multimedia Technology and Application Course. Tsinghua University Press. 3,2009
2. Jian Li and Yinli Zhang. Applications of Multimedia Cases. Peking University Press. 1, 2009.
3. Yu Ago and Ming Lu. Applications of Multimedia Technology in Experiment and Practice. Tsinghua University Press. 9, 2009

Course Number: 0007485

Course Title: 2-D Graphic Design & Photoshop

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

Students: University students major in Non-computer science

Prerequisites: None

Evaluation Method: Course Design

Course introduction:

In this course, the basic concepts of plane media and their applications are introduced, and then the concepts related to the image processing are introduced. Moreover, the characteristics and techniques of 2-dimensional (2D) graphic design are analyzed. Finally, how to process image by Photoshop software is discussed. For this course, the students are expected to master the basic 2D graphic design and process the images by using the Photoshop software. The course includes the fundament of 2D graphic design and the applications of Photoshop software. For the former, the context involves the definition and characteristics of media, the basic concepts of digital images, the important parameters which influence one images, the image modes and file formats; the later focus on the application of Photoshop software, includes the use of tools provided in Photoshop software and the setting of their attributes, the selection methods and skills of cutout, the functions and application of layers, the image adjustment and display, the decoration of graphics, the functions of channels and paths, and the use of filter. During class, a number of examples are employed so that the students can understand the basic techniques of image processing by Photoshop software.

Recommended Textbooks/References

1. Adobe Company of American, translated by Guozhong Yuan, et al., Chinese Classical Course of Adobe Photoshop CS2. Posts & Telecom Press. 2, 2006

Course Number: 0007482

Course Title: Software Engineering Foundation

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

Students: Undergraduate students of Science and Engineering of Non-computer major

Prerequisites: Advanced Programming Language

Evaluation Method: Course Design and Presentation

Course Description:

The course is designed to be an elective course for science and engineering undergraduate students of non-computer major, which the aim is to let students understand the concepts of software engineering, and develop software project according to the development theory and basic principle of software engineering. The course mainly includes the concept of software engineering, the procedure of software, the management of software engineering, the analysis of software requirement, the design of software, test of software, software publish and maintenance. The students will be divided into several development teams, and will be required to implement the project according to the development specification of software engineering. Combining the study of examples with the practical programs, the course provides a broad knowledge of basic concept and technology of software engineering for students to improve their ability of developing with the technology and method of software engineering, all of which are prerequisites for continuing study of software development.

Recommended Textbooks/References:

1. Fei Hu, Junsheng Wu. Software Engineering Foundation. Higher Education Press. 2008
2. Quanfan Zhang. Software Engineering Foundation. TsingHua University Press. 2009
3. National Standards of Computer Software Engineering. Chinese Standard Press. 2009

Course Number: 0007486

Course Title: Network Programming Foundation

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

Students: Undergraduate students of Science and Engineering of non-computer major

Prerequisites: Courses of Programming Languages

Evaluation Method: Written Exam and Course Design

Course Description:

This course is designed to be a core course for science and engineering undergraduate students of non-computer major, which the aim is to introduce the foundation of network programming, especially Web programming design, and to improve students' ability of programming and thinking of computation. The students are expected to understand the basic characteristics and implemental methods of the developing of Web application systems, and be proficient in building dynamic web pages using web language. The basic topics include: the concepts of network programming, the architecture of Web system, HTML language, CSS style sheet, JavaScript, the operating mechanism and basic grammar of JSP, and JSP-based web database programming. Combining knowledge of client and server technology with practicum, students are expected to master the web programming technology and develop web system using it. Combining case study with practicum, the course provides students with a broad knowledge of programming design and corresponding language functions, and strengthens their ability to deal with practical problems, all of which are prerequisites for continuing study of higher level courses.

Recommended Textbooks/References:

1. Yuehua Fan. Basics of Web technology (second Edition). Tsinghua University Press.2009

Course Number: 0005044

Course Title: Oral English-1

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

Students: Students major in Computer Science and Technology (Experimental Class)

Prerequisites: None

Evaluation Method: Classroom Communication and Practice

Course Description:

This course briefly encourages students to improve their English, especially oral English skills. This course is designed to help students improve their oral English skills. Areas of study on this course include speaking and listening and it starts from daily life to academic/research. The course includes listening and speaking training on scenes of everyday life and academic exchanges. Curriculum content including audio, video, live chat and other forms gradually enhance the ability of students to communicate in English.

Recommended Textbooks/References:

None

Course Number: 0005047

Course Title: Oral English-2

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

Students: Students major in Computer Science and Technology (Experimental Class)

Prerequisites: None

Evaluation Method: Classroom Communication and Practice

Course Description:

This course briefly encourages students to improve their English, especially oral English skills. This course is designed to help students improve their oral English skills. Areas of study on this course include speaking and listening and it starts from daily life to academic/research. The course includes listening and speaking training on scenes of everyday life and academic exchanges. Curriculum content including audio, video, live chat and other forms gradually enhance the ability of students to communicate in English.

Recommended Textbooks/References:

None

Course Number: 0004752

Course Title: High Level Language Programming Ⅲ

Credit: 4 **Total Credit Hours:** 64

Prerequisites: None

Evaluation Method: The final score is composed of written examination, course design and

homework by a certain percentage.

Students: Undergraduate students major in Computer Science and Technology, Information Security and The Internet of things.

Course Description:

This curriculum is a required course for Undergraduate students who are major in computer science and technology, information security and internet of things engineering profession. This is the student's first curriculum for learning high language programming. It is a follow-up courses to learn the necessary foundation courses. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C language programming. So that students can use the C language to give a simple solution to the problem, and establish the preliminary calculation mode of thinking. Teachers should focus on teaching the students understand the methods of structured programming, training students to write and debug programs, developing good coding habits, stimulating students' great interests in learning Programm Design. The curriculum emphasizes the ability of the students.

Recommended Textbooks/References:

1. LIAO Husheng, YE Naiwen, ZHOU Jun.C Language Programming Case Tutorial (Second Edition). Posts and Telecom Press. 2010.9.
2. LI Wenxin. Programming guidance and online practice. Tsinghua University Press.2007.7.
3. Brian W.Kernighan,Dennis M.Ritchie. C Programming language (English) (Second Edition). Mechanical Industry Press. 2006.8.
4. P.J.Deitel, H.M.Deitel. C University Tutorial (Fifth Edition) (English). Publishing House of Electronics Industry. 2010.5

Course Number: 0007370

Course Title: Set Theory and Graph Theory

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

Students: Students major in Computer Science and Technology and Information Security

Prerequisites: Linear Algebra

Evaluation Method: Written Exam

Course Description:

This is a mathematical subject discussing about discrete data structure, such as set theory, binary relations, function and graph theory. This subject tries to make the students understanding the relationship between the discrete mathematics and the subject of computer science and technology or computer application technology. These methods discussed in this subject not only make the necessary theoretical preparation for the subsequent courses, but also get students gradually enhance the transformation abilities of concept and method of how to implement scientific theories-technology-the concept of productive forces, and develops students' creative and mathematical reasoning abilities. The basic concepts, theory, methods and techniques are required for students. The basic topics include: basic concepts of set, basic operations of the set; binary relation, equivalence relation and partition, partial ordered set and Hasse diagram; functions, composite functions and inverse functions; connected graphs, Dijkstra's algorithm; Eulerian graphs, Hamiltonian graphs, trees, bipartite graphs, plane graphs.

Recommended Textbooks/References:

1. SHAO Xuecai. Discrete Mathematics. Beijing: Publishing House of Electronics Industry.

2009
2. SHAO Xuecai, YE Xiuming. Discrete Mathematics. Beijing: China Machine Press.1998
3. IC.L.Liu(LIU Zhenghong translation). The basic of discrete mathematics. Beijing: Posts and Telecom Press. 1982
4. ZUO Xiaoling etal. Discrete Mathematics. Shanghai: Shanghai Science and Technology Literature Press. 1982
5. FANG Shichang. Discrete Mathematics. Xi'an: Northwest Institute of Telecommunication Engineering Press. 1985
6. GENG Suyun etal. Discrete Mathematics. Beijing: Beijing University Press. 1987
7. BEMARD Kolman, ROBERT C. Busby, SHARON Ross. Discrete Mathematical Strutures. Beijing: Tsinghua University Press. 1997
8. J.A.Bolldy, U.S.R.Murty(WU Wangming eatl translation). Graph Theory with Applicaitons. Beijing: Science Press. 1987

Course Number: 0007388

Course Title: Data Structures and Algorithms

Credit: 4 **Total Credit Hours:** 64

Students: Undergraduate students major in Computer

Prerequisites: Advanced Programming Language, Discrete Mathematics

Evaluation Method: Written Exam

Course Description:

Data structures and algorithms is the discipline which faces to the non-numerical treatment problem. The main purpose is to develop the students' professional ability of computational thinking, systems analysis and design, algorithm design and analysis, program design and implementation. The main content involves the basic data structures, sorting, indexing, retrieval and advanced data structures. From the point of view of the logical structure, the subject introduces a variety of basic data structure, such as the linear table, string, binary tree, the tree and map. From the perspective of the algorithm, it introduces the various types of sorting, retrieval and indexing algorithm. From the application point of view, it introduces some of the more complex data structures and algorithm analysis techniques. Through this course, students should master the basic concepts of data structures and algorithms, the basic methods of rational organization of data, efficient data processing algorithms, and have the ability to choose the appropriate data structure and algorithms when they are faced to the practical problems.

Recommended Textbooks/References:

1. Zhang Ming,Wang Tengjiao, Zhao Haiyan. Data Structure and Algorithm. Beijing. Higher Education Press. 2008.6.
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press, 1997.4.
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.
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of

Electronics Industry. 2003.10.

Course Number: 0005686
Course Title: Digital Logic I
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Written Exam
Course Description:
"Digital Logic" is a specialized basic course. Based on introducing of the basic theory of digital logic, HDL (Hardware Description Language), the analysis and design of the combinational logic circuits and the synchronous sequential logic circuits, the following ability are expected which are mastering the concept and model of basic digital circuits, correctly using the logical tools and methods, and having the good ability of circuit design and analysis, mastering the modeling method based on HDL for the modern digital electronic system. The basic knowledge about digital logic, such as concepts, theories, methodologies, technologies and skills is expected. The main topics in the course include: 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.
This course has a stronger practical character, closely combining with "digital logical experiment" which a course is arranged the term with the same the former.
Recommended Textbooks/References:

1. JIA Xibin, WANG Xiujuan, WEI Jianhua, The basis of digital logic and Verilog hardware description language. Beijing: Tsinghua University Press. 2012
2. PENG Jianchao. Logic analysis and design of digital circuits. Beijing: Beijing University of Technology Press. 2007
3. BAO Jiayuan, MAO Wenlin. Digital Logic (second edition), Beijing: Higher Education Press. 2002
4. John F. Wakerly, Digital Design Principles and Practices（Fourth Edition）,Prentice Hall Inc.2005

Course Number: 0004842
Course Title: C++ Language Programming
Credit: 1 **Total Credit Hours:** 16
Students: Undergraduate students major in Computer Science and Technology
Prerequisites: High Language Programming Ⅲ
Evaluation Method: The final score is composed of written examination, course design and homework, with proportion of 5:3:2.
Course Description:

This curriculum is a basic compulsory course for the undergraduate of major in computer science and technology. And it is also a self-study course. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C++ language programming. So that students can use the C++ language to give a simple solution to the problem, and apply the idea of object-oriented programming. And let students master the basic program debug techniques and form the habit of standard programming. The courses is done through self-sdudy, group learning, looking for information, programming exercises. The curriculum emphasizes students' autonomous learning ability and comprehensive abilities, including students to complete the task the planning, self-control, perseverance of learning, discovery and problem-solving ability, summarized the capacity and ability to find information, seek help capacity and capacity-building of unity and cooperation.

Recommended Textbooks/References:

1. ZHENG Li, DONG Yuan, HE Jiangzhou. C++ Language Programming (Fourth Edition). Tsinghua University Press. 2010
2. Stanley B.Lippman.C++Primer (Fourth Edition). Posts and Telecom Press. 2008

Course Number: 0007374

Course Title: Principles of Computer Organization

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Digital Logic

Evaluation Method: Written Exam

Course Description:

In this course, the students are expected to understand the computer organization and principle of each function component, establish the entire machine concept, learn computer system design and its related technologies, and master the assembler language instruction system function, format, addressing mode, etc. The basic topics include: the hierarchy of the computer system hardware or software and the key performance indicators; fixed point and floating point data representation; the addition, subtraction, multiplication, division for the fixed point and floating-point data; ALU basic structure; Intel8086 hardware structure, addressing techniques, Intel8086 addressing mode, Intel8086 commonly used instructions; Intel8086 assembly language data and operator, Intel8086 assembly language pseudo instructions; The general structure of the central processor, the instruction process, the micro-operation control signal and the combinational logic control component design; Level 3 storage system, memory classification, DRAM dynamic refresh mode, the expansion of the main memory; the basic function and composition of input/output system, program interrupt mode, DMA mode, channel and IOP control mode.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press. 2009
2. Feng Yuanzhen. Principles of Computer Organization and Assembler Language Programming. Publishing House of Electronics Industry.1999
3. David A.Patterson,John L.Hennessy. Computer Organization and Design. China Machine Press. 2010

Course Number: 0007361

Course Title: Algebra and Logic

Credit: 2.5 **Total Credit Hours:** 45

Students: Undergraduate students major in Computer

Prerequisites: Linear algebra, Set and Graph Theory

Evaluation Method: Written Exam

Course Description:

Discrete Mathematics, discussing about discrete data structure, is one of the most important mathematical courses for students major in computer. Algebra, Propositional Logic and Predicate Logic are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of algebra and logic and the related problem solving methods, through which their creative and mathematical reasoning abilities will be improved. The basic topics include: the concepts of algebra and logic. isomorphism; semigroups, monoids; groups, Abelian groups, cyclic groups, finite groups, permutation groups; subgroups, cosets and Lagrange's theorem; rings, commutative rings, rings with identity, rings no zero factor, integral rings, fields; lattices, bounded lattices, complemented lattices, distributive lattices, Boolean algebras; propositions, connectives, well-formed formulas (wff); propositional equivalences, the replacement rule, full disjunctive normal forms and full conjunctive normal forms; rules of inference; predicates, quantifiers; prenex normal forms; inference rules in predicate calculus.

Recommended Textbooks/References:

1. SHAO Xuecai. Discrete Mathematics, Publishing House of Electronics Industry. 2009
2. SHAO Xuecai, YE Xiuming. Discrete Mathematics, China Machine Press. 2011
3. BEMARD Kolman, ROBERT C. Busby, SHARON Cutler Ross. Discrete Mathematical Structures, Higher Education Press. 2006

Course Number: 0004855

Course Title: Assembly Language Programming

Credit: 1 **Total Credit Hours:** 16

Students: Undergraduate students major in Computer Science and Technology, IoT Engineering

Prerequisites: Principles of Computer Organization

Evaluation Method: Practice Test

Course Description:

In this course, the students are expected to understand Intel8086 assembly language instruction system function, format and addressing mode based on the basic concept and master Intel8086 assembly language programming, through the self-teaching and teacher's guidance. The basic topic include: the branch program basic structure, using the comparison/test method to implement branch program design, using branch table structure to realize branch program design; The basic structure of loop program, the control method of loop program, counting control method, the condition control method, multiple loop program design; Procedure design method, parameter transfer method, the program design method of using registers to transfer parameters, the program design method of using the address table to transfer parameters, the program design method of using the stack to pass parameters, nested and recursion procedure design method; DOS function subroutine calls, BIOS function subroutine calls; Assembly language program development and testing.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press.2009
2. Shen Meiming,Wen Dongchan. IBM-PC Assembler Language Programming (second Edition). Tsinghua University Press.2001
3. Pu Yanping, Zhou Wei. Assembler Language Programming Tutorial (second Edition). Tsinghua University Press.2007

Course Number: 0007358

Course Title: Principle of Operating System

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

Students: Undergraduate student major in Computer Science and Technology, Information Security

Prerequisites: Computer Theory, Assembly Language, Data Structure and Algorithm

Evaluation Method: Written Exam

Course Description:

This course is an important course for computer science and technology, information security and relative specialties. The aim of this course is to make students understand the basic theory, concepts and various management techniques of operating system, and cultivate their ability to analyze and design the system software. Detail knowledge include: operating system concept, history, dual model, system call, process, the states of process, process control block, IPC, thread, process scheduling, scheduling algorithm, critical resource and critical section, hardware solution to synchronization, semaphore, classical IPC problems, process communication, monitor, deadlock, relocation, contiguous memory allocation, paging memory management, segmentation memory management, virtual memory, demand paging, page allocation and replacement, demand segmentation, file and file system, logical structure, access control method, directory structure, directory implementation, storage allocation, I/O structure, I/O device, I/O control method, buffer, device independence, SPOOLing, device driver, disk structure and scheduling.

Recommended Textbooks/References:

1. Abraham Silberschatz, Peter Bear Galvin, Greg Gagn. Operating System Concept: Java Implementation. Higher Education Press. 2010
2. Tanenbaum.A.S. Modern Operating System.(3rd Edition). Mechanical industry publishing house. 2009
3. Fei Xianglin, Luo Bin, Sun Zhongxiu. Operating System Tutorials (4th Edition). Higher Education Press. 2008
4. William Stallings. Operating Systems Essentials and Design Theory (6th Edition). Mechanical industry publishing. 2010.

Course Number: 0000345

Course Title: Database System Principles

Credit: 3 Total Credit Hours: 48

Students: Undergraduate student of Computer Science and Technology

Prerequisites: Discrete Mathematics, Data Structure and algorithm, Operation System**.**

Evaluation Method: Written Examination

Course Description:

Database System Principles is a foundation courses set up for undergraduate of computer and related professional. The focus of the course is on the principles of data management technology. Particular emphasis is placed on the Relational Model and Relational Algebra, Normalization, Data Dependency, Database modeling method, E-R model, Structured Query Language, Transaction and Concurrence Control. Throughout the course student will gain an understanding of the issues involved in the basic idea for data management and the theory of database construction,the use and development of relational databases, and develop practical expertise in Structured Query Language and the application of the database design techniques Entity-Relationship Modeling and normalization. The course includes a variety of practices about the database design and programming. By doing these practices, students will be equipped with skills of establishing a relational database with some popular DBMS, such as SQL Server, Oracle or My SQL.

Recommended Textbooks/References:

1. Jeffrey D.Ullman, Jennifer Widom, A First Course In Database Systems.Translated by Lihua Yue, YuChang Gong. Published by China Machine Press. 2009.1
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan Database Systems Concepts Fifth Edition.Translated by DongQing Yang, XouLi Ma, ShiWei Tang. Published by China Machine Press. 2008.3.
3. JianZhong Li, Shan Wang. Principle of Database System. Electronic Industry Press. 2007.5.

Course Number: 0005684

Course Title: Computer Network

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Principles of Computer Organization, Principles of Operating Systems, Principles of Data Communications

Evaluation Method: Written Exam

Course Description:

The introduction, the physical layer, the data link layer, the medium access control sublayer, the network layer, the transport layer, and the application layer are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of computer network to act as a basis of the continuing courses. The basic topics include: uses of computer networks, network hardware, network software, reference models, and network standardization; switching and transmission media; data link layer design issues, elementary data link protocols, sliding window protocols, and example data link protocols; the channel allocation problem, multiple access protocols, Ethernet, wireless LANs, and data link layer switching; network layer design issues, routing algorithms, congestion control algorithms, quality of service, and the network layer in the Internet; the transport service, elements of transport protocols, the internet transport protocols, and the internet transport protocols; the domain name system, electronic mail, and the world wide web.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum. Computer Network, 4th Edition. Tsinghua University Press. 2004.
2. Xie Xiren. Computer Network, 5th Edition. Publishing House of Electronics Industry. 2008.

Course Number: 0006408
Course Title: Microcomputer Interface Techniques
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer
Prerequisites: Digital logic, Principle of Computer Organization
Evaluation Method: Written Exam
Course Description:
This course introduces the outside I/O interfaces in the X86 micro-computer system. Let students master the microprocessor chips and the common I/O interface chip (the structure, function, timing and application), establish the integrated concept of micro-computer, understand I/O interface circuit in the microcomputer system, get the preliminary ability to design, develop the I/O interface circuit, and lay the foundation for the following other hardware courses. The content includes: microprocessor and computer system introduction, 8086 microprocessor and 32-bit Intel microprocessor, I/O interface; Commonly used the I/O interface chips including: programmable parallel interface chip 8255A, interrupt system and programmable interrupt controller 8259A, programmable timer/timer 8253, serial communication and programmable interface chip 8251A, programmed DMA controller 8237A, Digital-Analog and Analog-Digital conversion; Bus technology.
Recommended Textbooks/References:
1. DAI Mei'e etc. Micro-computer technology and application. (4th Edition), Tsinghua university Press. 2008.2
2. YANG Juyi. Micro-computer principle and Interface techniques. Tsinghua University Press. 2010.1
3. WU Xiuqing. Micro-computer principle and Interface techniques (3rd Edition), University of Science and Technology of China Press. 2004.12
4. QIAN Xiaojie. Micro-computer principle and Interface techniques, China Machine Press. 2004.10
5. Barry B. Brey. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro Processor Architecture, Programming, and Interfacing(6th Edition), Prentice Hall. 2002.8

Course Number: 0005688
Course Title: Principles of Compiling
Credit: 3.5 **Total Credit Hours:** 56
Students: Undergraduate students major in Computer Science and Technology
Prerequisites: Advanced Programming Language, Data Structures and Algorithms
Evaluation Method: Written Exam
Course Description:
"The principles and techniques of compiler writing are so pervasive that the ideas found in this

book will be used many times in the career of a computer scientist." said by Alfred V.Aho, the famous computer scientist. Compiler is the basis of modern electronic digital computer running, which relates to a more appropriate and abstract data transformation (both abstract and practical), and is the perfect embodiment of the automatic computing.

In addition to related basic concepts and theories, the typical ideas and methods of basic problem-solving will be more deeply explored, which promote students the level of computer problem solving comprehensively, and experience the pleasure of achieving the automatic computing. The knowledge point includes the grammar description of language, lexical analysis (scanning), syntax analysis (parsing), semantic analysis, intermediate code generation and so on. The main methods are: top-down, bottom-up, stepwise refinement, recursive solving, goal-driven, problem analysis, the abstraction and formal description of the problem, algorithms design and implementation, system building, modeling and other methods.

Recommended Textbooks/References:

1. JIANG Zongli, JIANG Shouxu. Principles of Compiling. Higher Education Press.2010
2. Alfred Aho, Ravi Sethi, Jeffrey D. Ullman. Compilers: Principles, Techniques, and Tools. The People's Posts and Telecommunications Press.2002
3. LV Yingzhi.etc. Principles of Compiling. Tsinghua University Press.2005
4. JIANG Zongli, JIANG Shouxu. Theory of Formal Languages and Automata (second Edition). Tsinghua University Press.2007

Course Number: 0004868

Course Title: Introduction of Software Engineering

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

Students: Undergraduate students major in Computer Science and Internet of Things

Prerequisites: Advanced Programming Language, Data Structure and Algorithm, Database

Evaluation Method: Written Exam

Course Description:

Software Engineering is one of the core courses for Computer Science and Internet of Things majors of high level institutes and universities. It focuses on how to use the theory of computer science, mathematics and management during the development of software, and borrows the principles and approaches of traditional engineering for improving the quality of software and decreasing the price of development. Through the learning of this course, the students should know about the development process of software engineering, and master the knowledge required as a software engineer. The course includes the concepts, technologies and approaches of software engineering, and how to use those technologies and approaches for designing and developing high quality software and managing software project. After this course, the students will have abilities for designing and developing real software system, and make strong foundation for practice and theory of software engineering.

Recommended Textbooks/References:

1. Zheng Renjie, Ma Suxia, Yin Renkun. The introduction of Software Engineering. Mechanical Industry Press. 2010.
2. Shari Lawrence Pfleeger, Joanne M.Atlee. Software Engineering Theory and Practice (the 4th edition). Prentice Hall. 2009.
3. Ian Sommerville. Software Engineering 9. Addison-Wesley. 2010

Course Number: 0005682

Course Title: Object-Oriented Programming

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students major in Computer

Prerequisites: High Language Programming

Evaluation Method: Written Exam

Course Description:

The basic idea of object-oriented programming and the basic programming approach are introduced in this course. Students can understand the basic process of Object-Oriented software development, grasp the basic technology of object-oriented programming, and learn to programming by Java. Detailed knowledge including characteristics of Object-Oriented: abstraction, encapsulation, inheritance, polymorphism and their implement of Java language. Java language: grammar, cross-platform, single inheritance, interface, package, Java class libraries. Exception: concept, types, Java exception handling mechanism, a self-defined exception. Graphical User Interface: Java Graphics, Swing components, layout managers, GUI Graphical –User-Interface design. Event handling mechanism. Input and output streams and files. Object-Oriented software development process: the life cycle, Object-Oriented software development process. Gerenic programming and the collection class.

Recommended Textbooks/References:

1. Ye Naiwen. Object Oriented Programming. Tsinghua University Press.2004
2. Geng XiANGyi, Zhang Yeping. Object Oriented Programming of Java, Tsinghua University Press.2010
3. Wu.C. Thomas. An Introduction To Object-Oriented Programming With Java, publisher: McGraw-Hill College.2008
4. Y .D. Liang. Introduction to Java Programming-Comprehensive Version (6th Edition). Prentice Hall. 2008.3

Course Number: 0003483

Course Title: Introduction to Artificial Intelligence

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

Students: Undergraduate students major in Computer Science

Prerequisites: Set and Graph Theory, Algebra and Logic, Data Structure, C Programming Language

Evaluation Method: Written Exam

Course Description:

Artificial Intelligence (AI) is one branch of computer science. It is a subject focus on modeling human's intelligence with computer. Except for computer science, it also relates to neurophysiology, psychology, linguistics and other subjects. With years' development, basic principle and method has been formed for AI. Research for knowledge represented by symbols is its' main characteristic, and heuristic reasoning is always adopted. This course is one of optional courses for undergraduates majored in computer science and technology. It is foundation for high education and other special subject related with AI.

This course includes two blocks, knowledge representation and search method, through which to teach general principle and main technology. In addition, introduction to frontier research such as

advanced search, machine learning and data mining is used to reveal new development and application for students.

Recommended Textbooks/References:

1. Ma Shaoping, Zhu Xiaoyan. Artificial Intelligence (in Chinese). Tsinghua University Press. 2004.
2. Lin Raorui, Ma Shaoping. Introduction to Artificial Intelligence (in Chinese). Tsinghua University Press. 1989.
3. Lu Ruqian. Artificial Intelligence (first volume, second volume, in Chinese). Science Press. 1996.

Course Number: 0000627

Course Title: Computer Architecture

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

Students: Undergraduate students major in Computer

Prerequisites: Principles of Computer Organization

Evaluation Method: Written Exam

Course Description:

Computer Architecture course is the Basic elective course which plays a very important role to develop students' abstract thinking ability and top-down, systems analysis and problem-solving abilities. Through this course, students will master the basic concepts of computer system structure and learn to use algorithms, hardware, and software to comprehensively survey, analyze and design computer system architecture from the view of high-rise buildings; cultivate students to analyze, assess and design a computer system on the view of cost performance ratio. It enables students to grasp the main design ideas and skills of contemporary rapid development of RISC technology; understand the advanced technology and design ideas of the structure of today's computer systems: including multi-core technology, MIPS and parallelism, scalability, programmability etc.

Through this course, students will be able to combine software and hardware knowledge of "Computer Principles", "assembly language programming" and "operating system" thus, establish the full concept of the computer system.

Recommended Textbooks/References:

1. Fang Juan. Computer Architecture, Tsinghua University press. 2011.03.
2. Li Xuegan.Computer Architecture, XiDian University press. 2011.11
3. David A. Patterson, John L. Hennessy. Morgan Kaufmann. 2007.8

Course Number: 0000626

Course Title: Computer Graphics

Credit: 2.5 Total Credit Hours: 40

Students: Undergraduate students major in Computer

Prerequisites: Calculus, Data structure, Programming language

Evaluation Method: Written Exam

Course Description:

Computer Graphics is a basic course for the undergraduate education with major in Computer science. As the fundamental of the human machine interactivity and other computer based technologies, computer graphics has wild applications in information management system, control system, scientific computation and virtual reality, etc. The students are expected to study and understand the basic graphics generating algorithms, graphics transformations and clipping methods, graphics rending techniques and other essential principles. Through learning these contents, the students will well know the hardware and software components of the graphics system, and have the ability to design and develop graphic interface for different applications and skillfully use software with graphics interface. The course is very important for cultivating both researchers and engineers.

Recommended Textbooks/References:

1. SUN Zhengxin. Computer graphics course, China Machine Press. 2006
2. WANG Ruchuan, HUANG Haiping. Computer graphics course, Post & Telecom Press. 2009
3. SUN Jiaguang, HU Shimin. Fundamental of computer graphics, Tsinghua University Press. 2005
4. James D.Foley. Computer graphics: principles and practice, China Machine Press. 2001

Course Number: 0004886

Course Title: Law about Information Security

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

Students: major in Information Security and major in Science and Technology of Computer

Prerequisites: Thought Morals Tutelage and Legal Foundation

Evaluation Method: Written Exam

Course Description:

The object to offer this course is not only the demand of the discipline of information security itself but also the demand of completing students' knowledge structure. In addition, after studying this course, students can constraint their actions. In this course, students are expected to systematically obtain a wide range of the law about information security. This course requires a solid understanding of the law about information security, a good career moral and the ability of solving related issues, environmental, economical and social. It includes the concept of crime, the type of crime, computer crime, the rights about domain name, privacy, reputation and network virtual property, electronic evidence, the Intellectual Property Law, the law about software intellectual property, electronic contract, electronic message, electronic signature, the legal validity of electronic message, the law about electronic signature.

Recommended Textbooks/References:

1. Mai Yonghao, Yuan Xiangzhu, Feng Huamin, Tu Hang. Law about information security (Second Edition) Wuhan: Wuhan University Press. 2008

Course Number: 0007383

Course Title: Introduction to Human-Computer Interaction

Credits: 2 **Class Hours:** 32

Prerequisites: Advanced Programming Language, Data Structure and Algorithms

Candidates: Students majoring in Computer Science or Electrical Engineering
Examinations: Projects and open-book examination
Course Description:
This course provides a broad introduction to human-computer interaction via the essence of this course —"interactive pattern, interactive style, gathering requirement and the principle of design". Thus, the purpose of this course is to improving the innovation ability and synthesis of knowledge for students. The topics of this course include: overview of human-computer interaction, interaction, interaction environment, iterative design, and cognitive model, the moral risk of society-organization, language model, situation-event analysis, crowds, user support, and evaluation. The course will also discuss recent development of human-computer interaction.
Recommended Textbooks/References:
1. S. Heim, "The resonant Interface: HCI foundations for interaction design," Publishing House of Electronics Industry.2008
2. Recent reports, conferences and journal papers on human-computer interaction
3. L. Cai, S. Fang, P. Zhou and Q. Zhang, "Human-computer interaction" Publishing House of Electronics Industry.2006

Course Number: 0005698
Course Title: Software Quality Management and Testing
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer
Prerequisites: High Language Programming, Data Structures and Algorithms, Database Systems Principles
Evaluation Method: Paper
Course Description:
Software quality management, software testing techniques, and some typical cases are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of software quality management and software testing. The basic topics include: the content of software quality management, the factors influencing software quality, the principle of software quality assurance, and the metrics model of software quality; the definition, objective, process, and principle of software testing; black box testing and white box testing; the principle of software automation testing, and the classification and choice of automated software testing tools; software testing process includes unit testing, integrated testing, and system testing; software testing plan, testing report, and testing management.
Recommended Textbooks/References:
1. ZHU Shaomin. Software Testing. Posts & Telecom Press. 2009
2. CAI Jianpin. Experiment Instruction Tutorial on Software Testing, Tsinghua University Press. 2009
3. Ron Patton. Software Testing (2nd Edition). China Machine Press. 2006

Course Number: 0005696
Course Title: Software Architecture

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

Prerequisites: Introduction of Software Engineering

Evaluation Method: Non-Written Exam

Students: Undergraduate students major in Computer Science

Course Description:

This course is advanced one for students who have foundation of software engineering. Software Architecture is booming field of software engineering. As the development of software engineering, the theory and technology of software architecture develop rapidly and change more and more mature. Through the learning of this course, the students will know about not only the basic principles, methods and practice of modern software architecture, but also the new progress of research and application of software architecture. By combining the basic theory with application, students will master the concepts, knowledge and design methods of software architecture, and improve the ability of organizing and analyzing software from software architecture view, and can design and implement new system.

Recommended Textbooks/References:

1. Tan Zheng, Xing Jiankuan, Zheng Xiang. Software Architecture (Second Edition). Tsinghua University Press.2008
2. M.Shaw, D.Garlan. Software Architecture: Perspectives on an Emerging Discipline. Prentice Hall PTR. 2004
3. Zhang Yousheng. Software Architecture (Second Edition). Tsinghua University Press. 2006
4. Niu Zhendong. Software Architecture. Tsinghua University Press. 2007

Course Number:0007378

Course Title: Agile Software Development

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Object-oriented Programming Language, Data Structure and Algorithms

Evaluation Method: Course Assignment

Course Description:

Agile Software Development is the course of undergraduate students of Computer Science and Technology, and the compulsory course for the undergraduate students of Software Engineering. This course require students can understand the basic concepts and principles of agile software development methods, master the method of agile software design related patterns and UML-related contents. All course contents are necessary foundations for students to solve practical development problems faced in software development. And through abundant cases training and leaning, students will have the abilities to use agile software development method for software developing and designing. The specific contents of this course includes: Overview of Agile and Extreme Programming concepts, Planning, Testing and Refactoring, UML basis, Agile design and principles, Project cases study.

Recommended Textbooks/References:

1. Robert C. Martin. Agile Software Development Principles, Pattern, and Practices, Tsinghua University Press, Sep.2003
2. Robert C. Martin. Agile Principles, Pattern, and Practices in C#, Tsinghua University Press. Dec.2003

3. Alistair Cockburn. Agile Software Development, China Machine Press, Jan.2008

Course Number: 0004847
Course Title: Foundation for Web Development Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students, major in Computer Science
Prerequisites: Data Structure, Object-oriented technology, Java Programming
Evaluation Method: No written-test
Course Description:
This course introduces the basics of WEB development, including HTML, CSS, Javascript, and the JSP, servlet and Ajax technology. Through this course, students can understand the knowledge of Web system development, master using XML and the JavaScript language to develop Web system, understand the basic principles of Web services and AJAX technologies, and able to master the use of the popular web framework. The course laid the necessary foundation for students solve practical problems in Web development and learning of distributed computing, and other professional courses.
Through training the students with the case study teaching and learning, the course enables students with the abilities of writing and debugging Web applications, and able to solve the practical problems in web development.
Recommended Textbooks/References:
1. Hao xinwei. Web Technology Introduction (second edition), Tsinghua University Press.2009.4

Course Number: 0004875
Course Title: Network Programming
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer Science and Technology
Prerequisites: Object-oriented Programming Language, Data Structure and Algorithms
Evaluation Method: Course Assignment
Course Description: Network Programming is the course of undergraduate students of Computer Science and Technology, and it is the compulsory course of the undergraduate students of Distributed Software. This course requires students to understand the basic concepts in network programming, to master the basic method for developing Web applications using Java language, and to understand the basic principles of the three-tier Web application architecture. All course contents are necessary foundations for students to solve practical problems on web development and to study other professional course in distributed computing. And through abundant case studies learning and training, students will have the abilities to write and debug Web applications to solve practical problems. The specific contents of this course include: An overview of the network programming, Socket programming basis, Servlet and JSP programming basis, Web services infrastructure, and EJB programming basis.
Recommended Textbooks/References:
1. Hao Yulong.Java EE Programming Techniques, Tsinghua University Press. June 2008

Course Number: 0004853

Course Title: Introduction to Distributed Systems

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

Students: Undergraduate student major in Computer Science and Technology, Internet of Things Engineering

Prerequisites: Principle of Operating System, Computer Network

Evaluation Method: Written Exam

Course Description:

This course is an important course for computer science and technology and Internet of things engineering. Nowadays, lots of system is established in a wide geographically, it need high level of fault tolerance, performance and security. When two processes do not work in the same address space, the design of application will face lots of challenge. This course covers the design and implementation of distributed system, main topics are: distributed shared memory, distributed object structure, time, directory and naming problem, distributed file system, authentication and security, distributed process scheduling, distributed protocol and communication.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum.Distributed Systems, Principles and Paradigms,Tsinghua University Press. 2004
2. George Coulouris, Jean Dollimor.Distributed System Concepts and Design,Mechanical industry publishing. 2004
3. Hagit Attiya, Jennifer Weleh. Distributed Computing, Publishing House of electronics industry 2006

Course Number: 0000334

Course Title: Parallel Computing

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

Students: Undergraduate students major in Computer Science

Prerequisites: High Language Programming

Evaluation Method: Final Exam and Practical Assignments

Course Description:

Nowadays, high performance computing technology already is widely applied in various fields. Whether using high-performance cluster, or personal computer, we can take advantage of parallel computing methods to improve efficiency of the applications. Parallel computing course aims to introduce parallel computing needs, a variety of parallel computing models and parallel computing application development platform, as well as commonly used in parallel computing processing technology. Cultivate the students' abilities of parallel computational thinking and parallel programming.

The main content of the course include: the development of high performance computing and the status quo; the basic concepts of parallel computing; common parallel computing models: Shared-memory multi-processors/multi-cores and Distributed-memory multi-computers; the performance evaluation of a variety of parallel computing models; typical parallel development tools, such as MPI based on distributed memory, OpenMP based on shared memory and OpenCL based on GPU; and some major parallel processing technology.

Recommended Textbooks/References:

1. Peter S. Pacheco. An Introduction to Parallel Programming, China Machine Press. 2011
2. Li Jianjiang et al. Parallel Computing and Programming Fundamentals, Tsinghua University Press. 2011
3. Ananth Grama et al. Introduction to Parallel Computing (Second Edition), China Machine Press. 2003

Course Number: 0004846

Course Title: TCP/IP Analysis and Application

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Network

Evaluation Method: Written Exam

Course Description:

The TCP/IP protocols from the bottom up are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of TCP/IP to act as a basis of the continuing courses. The basic topics include: introduction,link layer, Internet protocol, routing protocols, address resolution protocol, Internet control message protocol, ping program, traceroute program, user datagram protocol, broadcasting and multicasting, Internet group management protocol, transmission control protocol, file transfer protocol, domain name system, telnet protocol, simple mail transfer protocol, post office protocol 3, hypertext transfer protocol, and simple network management protocol.

Recommended Textbooks/References:

1. W. Richard Stevens. TCP/IP Illustrated Volume 1: The Protocols. China Machine Press. 2004.5
2. Douglas E. Comer. Internetworking with TCP/IP Volume I: Principles, Protocols, and Architectures, 5th Edition. Publishing House of Electronics Industry. 2009.7

Course Number: 0004865

Course Title: Embedded System Architecture

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

Students: Undergraduate students major in Computer Science and Technology (including the experimental class)

Prerequisites: Principles of Computer Organization, Computer Interface Technology, Operating System, Windows Programming Techniques

Evaluation Method: Curriculum Design

Course Description:

The course of Embedded System Architecture is a professional limited selected course for the students whose major is computer science and technology and the study direction is system architecture. It is the first door to embedded system and undertakes the task of students' comprehensive ability about the hardware and software. This course requires the students have very strong capabilities in engineering, technical and practical aspects. Therefore, it must give sufficient attention to practical teaching while the theoretical teaching.

Through this course, students can master the basic concepts of embedded system development methods and processes. By explaining the processor architecture of the Intel Atom series and the ARM, students will understand the application of CISC and RISC microprocessors in embedded field. They will familiar with the use of Atom and ARM hardware experimental platform and the basic principles, concepts of embedded operating systems. As a result, the students will be able to customize the Windows Embedded operating system, add the driver components and write the application code.

Recommended Textbooks/References:

1. Douglas Boling. Translated by He Zongsheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009
2. YAO Lingtian, ed. Proficient in MFC programming, Posts and Telecom Press. 2006
3. DU Chunlei, ed. The ARM architecture and programming, Tsinghua University Press. 2003
4. WANG Bing, etc. ed. Windows CE Embedded high-Level Programming and Its Examples Explain, China Water Power Press. 2008
5. JIANG Bo. The practical of Windows Embedded CE 6.0 Application Design,China Machine Press.2009
6. ZHANG Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Publishing House of Electronics Industry. 2006

Course Number: 0007364

Course Title: Multi-core Computing

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Principles of Computer Organization and Computer Architecture

Evaluation Method: Written Exam

Course Description:

"Multi-core Computing" course is a professional limited selection course. This course is further improved on the basis of the "Principles of Computer Organization", "Computer Architecture" and ultra LSI, combined with the operating system, compiler theory, programming methods and other interdisciplinary subjects, introducing the multi-core programming and the corresponding development of multi-core theory in the architecture area. the main line of this course is multi-core architecture, the status of the multi-core chips, multi-core system software, multi-core compiler optimization and multi-core programming methods, expounding the basic theories, ideas and methods of today's multi-core system, and strive to enable students to understand the architecture of the world's cutting-edge technology so as to lay the foundation to the program design of multi-core architecture.

Recommended Textbooks/References:

1. Zhou Weiming. Multi-core Computing and Programming Design, Huazhong University of Science and Technology Press. 2009.3
2. Shameem Akhter, Jason Robers. Multi-core Programming Design technology, Publishing House of Electronics industry. 2007.10

Course Number:0007369

Course Title: Cluster Computing

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer architecture, Principle of Operating System, Computer Network

Evaluation Method: Written Exam, Practical Assignment

Course Description:

Fundamental Concepts and essential technologies of Cluster Computing are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of Cluster Computing and the related problem solving methods, through which their analyzing, reasoning and engineering practice abilities will be improved. The basic topics include: concepts of cluster computing, characteristics and classifications of cluster computing, hierarchical architecture of cluster computing, computing units in cluster computing, storage units in cluster computing, networking units in cluster computing, high availability in cluster middleware, single system image in cluster middleware, job management in cluster middleware, cluster applications, construction and management of Linux cluster system. Form of teaching in this course includes lecture and practice.

Recommended Textbooks/References:

1. Rajkumar Buyya.High Performance Cluster Computing: Architectures and Systems,(Vol. 1), Prentice Hall. 2001
2. Karl Kopper. Linux Enterprise Cluster: Build a Highly Available Cluster with Commodity Hardware and Free Software, No Starch Press. 2007
3. Junfeng Gao. High Performance Linux Server In Action: Maintainance, Optimization and Application, China Machine Press. 2012
4. Alex Vernios. Linux Cluster Architecture, Sams. 2003
5. Guoliang Chen, Junmin Wu, Feng Zhang. Parallel Computer Architecture, High Education Press. 2002

Course Number: 0005685

Course Title: Digital Image Processing

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

Students: Undergraduate students major in Computer Science

Prerequisites: Calculus, Linear algebra

Evaluation Method: Written Exam

Course Description:

Digital image processing is focused on how to improve quality of digital images, understand image content, and compress images. Digital image processing has important applications in a variety of domains, such as consumer electronics, human-computer interface, robotics, military and medicine. The students will be required to understand the basic knowledge and techniques of digital image processing, and master the skills of implementing basic digital image processing algorithms. Topics covered are: image digitization, image representation, image histogram, components of image processing systems; continuous and discrete Fourier transformation, convolution, discrete consine transformation; histogram enhancement, image smoothen, image sharpen; image segmentation; mathematical morphology; edge detection, Hough transformation;

shape and texture features; image coding.

Recommended Textbooks/References:

1. R.C.Gonzalez et al. Digital Image Processing (third edition). China Electronic Industry Publishing House. 2011.
2. Zhang Yujing. Image Processing and Analysis (in Chinese). Tsinghua University Press. 2005.

Course Number: 0005693

Course Title: Multimedia Technology

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Language Program Design, Data Structure and Algorithm, Computer Architecture, Computer Graphics

Evaluation Method: Written Exam

Course Description:

Through the detailed discussion of the application of many subject in multimedia technology, students are guided to have a disciplinary level understanding of the ability to integrate multimedia technology, which will enhance their understanding and knowledge of computer technology and give students an opportunity having the fun of designing multimedia applications. The students are supposed to understand the basic concepts, theories, methods, and techniques of multimedia technology. The main contents include: fundamentals of multimedia technology; multimedia equipment; aesthetic foundation; multimedia data compression; Compact Disc-Interactive system (CD-I); digital image processing; animation technique and principle; digital audio processing; interactive multimedia technology; multimedia integration technology; multimedia application system development.

Recommended Textbooks/References:

1. Li Xiangsheng. Multimedia Information Processing Technology. Higher Education Press. 2010
2. Ze-Nian Li, Mark S.Drew. Fundamentals of Multimedia. China Machine Press. 2004

Course Number: 0001084

Course Title: Digital Signal Processing

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Advanced Mathematics, Linear Algebra, Probability and Statistics;

Evaluation Method: Written Exam

Course Description:

Digital signal processing appears and enjoys rapid development with development of computer science and information technology, which leads to a particular subject. The applications of Digital Signal Processing involve a wide variety of fields: communication, multimedia, mechanical manufacture, biomedical engineering. Digital Signal Processing manipulates signals with digital forms by a wide variety of ways such as sampling, transform, analysis, filter, estimation enhancement, compression and reorganization using computer /special equipments.

This aims at obtaining useful information and being available for applications. Many subjects such as mathematics, communication control and computer are fundamentals of Digital Signal Processing, and the achievements of it permeate through the above subjects.

The task of this course includes: firmly grasping the fundamental principles and methods of discrete time signals and system analysis, deepening understanding Fourier transform, being able to using fast Fourier transform algorithm to solve the signal analysis problem and understanding design principles and implement methods for digital filters

Recommended Textbooks/References:

1. Hu Guangshu. Introduction to Digital Signal Processing. Tsinghua University Press, Jan. 2008
2. Hu Guangshu. Digital Signal Processing. Tsinghua University Press, Aug.2003
3. J.Sanjit K. Mitra, (translated by Sun Hong and Yu Xiangyu). Digital Signal Processing-Computing Based Methods. China Machine Press, Jan. 2006
4. John G. Proakis and Dimitris G. Manolakis (translated by Fang Yangmei and liu Yongqing). Digital Signal Processing. China Machine Press, Jun. 2007

Course Number: 0005683

Course Title: Pattern Recognition

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Mathematics, Linear Algebra, Probability and Statistics

Evaluation Method: Algorithm Design and Implementation

Course Description:

This course systemically introduces the classic algorithms in pattern recognition, with focus on statistical pattern recognition, including statistical decision-making theory, i.e., Bayesian decision making theory based on posterior probabilities and based on risk; Bayesian Classifier under multivariate Gaussian distribution; the probability density function estimation; discriminant analysis; *k*-NN algorithm; clustering scheme as well as feature extraction and selection method, etc. Besides the fundamental principles in statistical pattern recognition, the course also incorporates their typical applications in order to make the students better understand and learn the obscure theories of pattern recognition and gain the ability to design and implement certain classifiers. This course will be expected to improve the students' logical and abstract thoughts simultaneously.

Recommended Textbooks/References:

1. Zhang Xuegong. Pattern Recognition (3rd Edition). Tsinghua University Press. 2010
2. Richard. O. Duda, Peter E. Hart, David G. Stork. Pattern Classification (2nd Edition). China Machine Press. 2004
3. S.Theodoridis, K Koutroumbas. Pattern Recogntion(4th Edition). China Machine Press. 2009

Course Number: 0007391

Course Title: Design and Analysis of Algorithms

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

Students: Undergraduate students major in Computer Science and Technology, Information

Security and Internet of Things engineering

Prerequisites: Advanced Programming Language, Discrete Mathematics, Data Structures and Algorithms

Evaluation Method: Written Exam

Course Description:

Design and analysis of algorithm is one of the core problems in computer science. It is also an important undergraduate course in computer science, information security and Internet of Things. The content is some study of the non-numerical computing algorithms in computer and its related fields. Studying by this course, students will master the common methods of algorithm design and implementation (mainly including Divide and Conquer, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking algorithm), so as to solve more complex practical problems in the field of computer science and engineering applications in the future. In addition, basic introduction in analyzing and estimating time and space complexity of the algorithms, though not as the focus of this course, are also discussed.

Recommended Textbooks/References:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. Introduction to Algorithms (Third Edition). The MIT Press. 2009
2. Wang Xiaodong. The Design and Analysis of Computer Algorithms (second Edition). Electronics Industry Press. 2004
3. Udi Manber. Introduction to Algorithms: A Creative Approach. Addison Wesley Longman. 2010
4. Anany Levitin. Introduction to the Design and Analysis of Algorithms. Tsinghua University Press. 2005

Course Number: 0004873

Course Title: Grid Computing

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Networks

Evaluation Method: Submit a Grid System

Course Description:

Grid computing is an elective course which makes undergraduate students major in computer understanding the direction of the current distributed computing and distributed systems frontiers. This course will give students a comprehensive, basic understanding for the concepts of grid computing, grid system architecture, and enable students to master grid programming process and basic technology. Practice section allows students to build a real grid system using grid programming methods introduced in this course. The main topics include: background and needs of the grid, distributed computing, XML, Web services, grid architecture, the WSRF specification, the basic steps of the grid programming, writing services with multiple resources, grid notification mechanism, the operation provider, writing secure grid services, and overview of grid research.

Recommended Textbooks/References:

1. Ian Foster. Grid Computing, Publishing House of Electronics Industry.2004.10

Course Number: 0004893

Course Title: Introduction to Semantic Web

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

Students: Undergraduate students major in Internet of Things Engineering

Prerequisites: Discrete Mathematics, Computer Network

Evaluation Method: Written Examination, Experimental Results

Course Description:

The Semantic Web is the expansion and extension of the current World Wide Web, is proposed by the World Wide Web inventor Tim Berbers-Lee, in 2000 the concept of next-generation of Internet. Goal of Semantic Web is to provide information on the Internet a computer-readable semantics, the data definitions and links contribute to the information and knowledge discovery, automated processing, integration and reuse. As a subject elective course, the purpose of this course is to further broaden students' knowledge, a new direction in the development of network technology will be introduced to students. Content of this course consist metadata, resource description framework (RDF), RDF Schema, Ontology and web Ontology language (OWL) modeling. Experimental design is proposed as using Protégé to create an OWL file that involves the special properties and restrictions.

Recommended Textbooks/References:

1. CHEN Xiaoping. Introduction to the Semantic Web, China Machine Press. 2008
2. SONG Wei, ZHANG Ming. A Concise Course of Semantic Web, Higher Education Press. 2004
3. Grigoris Antoniou, Frank van Harmelen. A Semantic Web Primer (2nd Edition), the MIT Press. 2008

Course Number: 0000631

Course Title: Digital System Design

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

Students: Undergraduate students major in Computer

Prerequisites: Digital Logic, Microcomputer Principle

Evaluation Method: Written Exam, Practical Assignment, Labs

Course Description:

"Digital System Design" is a practical method class. Through courses, training students' ability to the digital system design on large-scale programmable integrated circuit (FPGA). Requires students to understand the basic engineering approach in the typical electronic design automation (EDA)—design, synthesis, simulation and debugging, etc., have complete control of a hardware description language. Mainly covers are: present and future of digital system design method; various modeling methods based on Verilog hardware description language (HDL); electronic design automation (EDA) process; digital system design examples and common means. Experiment, with an emphasis on digital system design of man-machine interface, On EDA experiment platform, to completion of shake, reuse, hand shake, dynamic display elements, and thus complete a digital clock design.

Recommended Textbooks/References:

1. WANG Jinming.Verilog-HDL programming tutorial, Beijing: Posts & Telecom Press. 2004
2. ZHANG Youzhi .Programmable logic device PLD principle and application, Beijing: China

Railway Publishing House. 1996
3. LIU Bo .Proficient in Verilog-HDL language programming, Beijing: Publishing House of Electronics Industry. 2007

Course Number: 0002359
Course Title: Principle of Data Communication
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer Science and Technology
Prerequisites: Principle of Computer Organization
Evaluation Method: Written Exam
Course Description:
This course simply explains the basic concepts of data communication, basic knowledge, data transmission technology and some applications, to lay the foundation for the next courses. The basic concept of data communication include several basic models, the composition and classification of data communication system, data communications network topology, etc.; Data communication foundation includes information, data and signal definition, data transmission, the influence factors on the quality of the transmission and the distortion of the form and signal code form; Data transmission channel including channel capacity calculation, the cable channel and wireless channel introduction; Data transmission technology includes baseband transmission, frequency band transmission, synchronous control technology, channel access, data exchange, error control; Communication hardware include networking equipment and communication interface; Applications include broadband data communication, multimedia data communication.
Recommended Textbooks/References:
1. CHEN Qimei, LI bo, AN mingwei, LI jia. Modern Data Communication. (third Edition). Nanjing University Press. 2008.2
2. YANG Xinqiang, CHEN Guoyou. Data Communication and Computer Network. (third Edition). Publishing House of Electronics Industry. 2007.7
3. William A.Shay, GAO Chuanshan. Understanding Data Communications and Networks. (third Edition). China Machine Press. 2005.1

Course Number: 0004858
Course Title: Principles and Technology of Computer Control
Credit: 2 **Total Credit Hours:** 32 (including experiments 6)
Students: Undergraduate students major in Computer
Prerequisites: Digital Logic, Principles of Computer Components, Computer Interface
Evaluation Method: Written Examination and Practice
Course Description:
This program is a professional selective course which design for undergraduate students major in Computer Science and Technology. Through the studying of this program, students can establish the basic concepts of computer control, understand the component principles of computer control system, familiar with the dynamic analysis method of computer control, master the synthesis design method of computer control system, possess the initial capacity of developing a computer

control system, and lay foundation for control system design in the field of computer control technique. The specification of the knowledge including: summary of computer control system; the basic theory of automatic control system; process channel and data acquisition system; digital process control technology, the digital PID control algorithm.

Recommended Textbooks/References:

1. Jiang Xinyi,etc. Computer Control Technology, Beijing: Tsinghua University Press. 2007.
2. Yu Haisheng,etc. Microcomputer Control Technology (The 2nd Edition), Beijing: Tsinghua University Press. 2009.
3. Pan Xinmin,etc. Microcomputer Control Technology (The 2nd Edition), Beijing: Publishing House of Electronics Industry. 2011.
4. Chen Binghe, Principles and Application of Computer Control, Beijing: Beihang University Press. 2008.

Course Number:0004882

Course Title: Online Game Development

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

Students: Undergraduate of Computer Science and Technology

Prerequisites: C++ programming, Network Programming, Database Principle

Evaluation Method: Project, Written Examination

Course Description:

This course is delivered to undergraduate of computer professional, which will help them to develop knowledge and skills in the technological aspects of online games programming. The focus of the course is on the principles of online games technology and games programming, emphasizing well-founded technical principles in the development of games system components. Particular emphasis is placed on the techniques used for the development of online games, which is explained through the analysis of some of the popular online game instances. Throughout the course you will gain a broad understanding of game system's architecture, asynchronous communication model, multi-thread technology and an in-depth understanding of the developing technology of game servers, game client in VC environment. The course includes a variety of simulation development practice. By these practice, students can master the design method of online interactive entertainment software, and relative popular development tools, such as DirecPlay.

Recommended Textbooks/References:

1. Wei Ru, Hao Dong. Online Game Programming. China Machine Press. 2009.6.
2. Todd Barron.Multi-player Game Design.Translated by XiangYong Zeng,Peng Lu. China Machine Press. 2005.6.
3. SiYi Ye.Game Design. China Railway Press. 2005.12.

Course Number: 0004848

Course Title: Windows Programming Fundamentals

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

Students: Undergraduate students major in Computer Science and Technology and Information

Security

Prerequisites: High Language Programming, C++ Language Programming

Evaluation Method: The final score is composed of written examination and course design, with proportion of 6:4.

Course Description:

This curriculum is a basic compulsory course for the undergraduate of major in computer science and technology. And it is also a self-study course. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C++ language programming. So that students can use the C++ language to give a simple solution to the problem, and apply the idea of object-oriented programming. And let students master the basic program debug techniques and form the habit of standard programming. The courses is done through self-sdudy, group learning, looking for information, programming exercises. The curriculum emphasizes students' autonomous learning ability and comprehensive abilities, including students to complete the task the planning, self-control, perseverance of learning, discovery and problem-solving ability, summarized the capacity and ability to find information, seek helpcapacity and capacity-building of unity and cooperation. Knowledge points include: Windows Programming Overview, Win32 programs running, Message Mapping, Menu, Toolbar, Statusbar, Dialog, CDC, Serialization and Data Access. The curriculum emphasizes students' autonomous learning ability and comprehensive abilities.

Recommended Textbooks/References:

1. REN Zhe.MFC Windows Application design. Tsinghua University Press. 2004, 1.
2. SUN Xin.VC++ In-depth details. Publishing House of Electronics Industry. 2006, 6.
3. Jeff Prosise. MFC Windows programming（Second Edition）（English）. Tsinghua University Press.2007
4. Microsoft Corporation. MFC and Windows Programming (Second Edition)(English photocopy version), Peking University Press. September 2000.

Course Number:0007350

Course Title: Linux Operating System

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

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

Prerequisites: Principle of Operating System

Evaluation Method: Written Exam

Course Description:

Organization, design idea and implementation mechanism of Linux operating system are introduced in this course. The students are expected to understand the basic concepts, theories, methods and techniques of Linux operating system, and to set up the related problem solving methods on the level of system software, through which their analysis, design and implementation abilities about the system software will be improved. The basic topics include: the feature of Linux, the source code organization structure of Linux, the boot process of Linux; the process management and process schedule; the interrupt and timer mechanism; system call; virtual memory and physics memory; virtual file system and file system's register, install and uninstall;Ext2 file system; device catalog and driver program; modules.

Recommended Textbooks/References:

1. REN Zhe. Computer Operating System Basics -based on Linux/i386. Beijing: Tsinghua University Press.2008
2. JIANG Jing, XU Zhiwei. Principle—Technology and Programming of Operating System. Beijing: China Machine Press. 2004
3. MAO Decao, HU Ximing. Analysis of Linux Kernel Source code. Hangzhou: Zhejiang University Press. 2006
4. HE Qin, WANG Hongtao. Linux 2.6 Kernel Standard Book. Beijing: Posts&Telecom Press. 2008
5. Robert Love. Linux Kernel Development (3th Edition). Beijing: China Machine Press.2011
6. Greg Kroah Hartman. Linux Kernel in a Nutshell. Nanjing: SouthEastern University Press. 2007

Course Number: 0004872
Course Title: Advanced Database Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students of Computer Science and Technology
Prerequisites: Database System principle, Data Structure and Algorithm, Operation System, Computer Network
Evaluation Method: Paper
Course Description:
Advanced Database Technology introduces the new technologies and the development direction of the databases. The content delivered by this course Include: distributed databases, object-relational database, object-oriented databases, temporal databases, mobile databases, real-time database, active databases, data warehouse and data mining. Throughout the course the student will gain a broad understanding of the new technologies and theories about the database applied in different fields, and an initial foundation for the future to conduct related research or engage in related works.
Recommended Textbooks/References:
1. XingSheng Xie. Advanced Database System and Application TsingHua University Press.2010.1.
2. Zhaoyuan Li. New development of Database Technology, TsingHua University Press.2007.10.
3. Yong Tang, XiaoPing Ye, Na Tang, Yongjie Ji. Advanced Database Technology,Higher Education Press. 2005.1.
4. PeiYing Shao, JunGang Xu, Wenjie Wang. Fundamentals of Database System Advanced.Post and Telecom Press. 2008.1.

Course Number: 0003484
Course Title: Introduction to Data Mining
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer, Information Security and Internet of Things
Prerequisites: Discrete Mathematics, Data Structures and Algorithms, Database Systems

Principles

Evaluation Method: Written Examination

Course Description:

Data mining is concerned with the extraction of novel knowledge from large amounts of data. Data mining is a broad area that integrates techniques from several fields including machine learning, statistics, pattern recognition, artificial intelligence, and database systems, for the analysis of large volumes of data. This course introduces and studies the concepts, issues, tasks and techniques of data mining. Topics include data preparation and feature selection, association rules, classification, clustering, evaluation and validation, scalability, spatial and sequence mining, and data mining applications. The course is suitable for undergraduate senior students and graduate students.

Recommended Textbooks/References:

1. Pangning Tan. Michael Steinbach, Vipin Kumar. Introduction to Data Mining, The People Post and Telecommunications Press. 2006
2. Jiawei Han, Micheline Kamber. Data Mining: Concept and Technology(2nd Edition), Machinery Industry Press.2006

Course Number: 0004884

Course Title: Technology of Next Generation Internet

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Network

Evaluation Method: Written Exam

Course Description:

The shape of IPv6, IPv6 addressing, IPv6 extension headers, IPv6 authentication and security, IPv6 transition strategies, and applications are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of Next Generation Internet to act as a basis of the continuing courses. The basic topics include: why upgrade the Internet protocol, a brief introduction to TCP/IP internetworking, IPv4 limitations and shortcomings, the transition to IPv6, the shape of IPv6, IPv6 addressing, IPv6 Extension Headers, IPv6 routing, IPv6 authentication and security, related next generation protocols, auto-configuration and mobile IP, IPv6 transition strategies, IPv6 solutions, IPv6 configuration, and the design of IPv6 test bed.

Recommended Textbooks/References:

1. Joseph Davies. Understanding IPv6, Second Edition. Tsinghua University Press. 2009
2. Pete Ldshin. IPv6 Clearly Explained. China Machine Press. 2000

Course Number: 000635

Course Title: Natural Language Processing

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

Students: Undergraduate students major in Computer Science

Prerequisites: Probability and Statistics, Algorithms and Data Structures

Evaluation Method: Experimental Reports

Course Description:

Natural Language Processing is a specialized direction course for undergraduate students major in Computer Science. Content of this course involves the processing of natural language, especially the foundational theory, methodologies and application for the Chinese information processing. Objectives of this course consist to make student understand of the basic process of Chinese information processing, in order to establish the theoretical basis of the field, to master the method of analysis and solve problem, understanding of the latest progress and development trend of Chinese information processing, and lay the foundation for engaging in research in this area for future development.

Recommended Textbooks/References:

1. Miao Duoqian, Wei Zhihua. Principles and Applications of Chinese Text Information Processing. Beijing: Tsinghua University Press.2007.
2. Daniel Jurafsky, James H. Martin. Speech and Language Processing. Prentice Hall, US. 2000.
3. Chengqing ZONG. Statistical Natural Language Processing, Tsinghua University Press, Beijing. 2008.

Course Number: 0003485

Course Title: Digital Identification and Authentication System

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

Students: Undergraduate students major in Information Security and Computer

Prerequisites: Information and Coding Theory, Cryptography

Evaluation Method: Written Exam

Course Description:

Through this course, major technologies and basic principles of Digital Identification and Authentication System are introduced to the students. So the students can basically understand the technologies of digital signature, PKI, CA authentication, IBE and biometric authentication. More over, the students can also devise, implement and analyze practical digital identification and authentication system. Students must master basic concepts and basic theories of digital identification and authentication system. Details include: identification, authentication, data integrity authentication, symmetric key and asymmetric key algorithm etc. Further, students can master some classical protocols of digital identification and authentication. Details include: one way authentication protocol, two-way authentication protocol, three-way authentication protocol, group authentication, key agreement and distribution protocol etc. Last, students must master major architecture of digital identification and authentication. Details include: authentication architecture based on symmetric key (Kerberos) , authentication architecture based on public key certificate, authentication architecture based on IBE etc.

Recommended Textbooks/References:

1. Cai Yongquan, Zhou Yihua, Jiang Nan, Yang Yuguang. Digital Identification and Authentication. Beijing: Beihang University Press.2011.
2. Protocols for Authentication and Key Establishment, Colin Boyd. Anish Mathuria, Springer Press. 2003
3. Mechanics of User Identification and Authentication, Dobromir Todorov, Auerbach Publications. 2007

Course Number: 0007378

Course Title: Video/Image Compression and Processing Techniques

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

Students: Undergraduate students major in Computer

Prerequisites: Probability Theory and Mathematical Statistics, Data Structure and Algorithm, Advanced Programming Language

Evaluation Method: Written Exam

Course Description:

Video and image coding and processing techniques are essential applications of information theory. They are widely used in the applications such as DVD/blue disc playing, high definition video streaming and p2p streaming. This course studies the video/image information evaluation, transmission, exchange and storage based on mathematic analysis. This course incudes the basis of the information theory, the coding theory and video/image compression techniques. This course will help students to understand the basic theories of video/image coding and techniques to analyze the video sequences. And students will be able to solve the problems of video/image coding systems. The content of this course includes the concept of information, the evaluation of information, source coding, channel coding, image compression and video compression.

Recommended Textbooks/References:

1. Yao Wang, Jörn Ostermann, Yaqin Zhang.Video Processing and Communications, Prentice Hall. 2001.
2. Wen gao, Debing Zhao, Siwei Ma. Digital Video Compression Techniques, Science Press. 2010.

Course Number: 0007348

Course Title: 3D Game Development Technology

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

Students: Undergraduate students major in Computer

Prerequisites: High Level Programming Language, Advanced Mathematics

Evaluation Method: Written Exam

Course Description:

Along with the popularity of personal computer and Internet, more and more people choose to entertain and receive education by computer games. The industry of computer games has been a sunrise industry all over the world. However, computer game developers and designers are insufficient for a long time. According to the above situation, this course is offered for all the undergraduate students majoring in computer science and technology.

This course will focus on 3D technology. Some basic theories and related techniques in 3D game development are included in the course to help students analyze and research the designing and developing methods of popular 3D game engine. Through this course, students will obtain the knowledge of 3D game software developing techniques, and improve the ability of programming and creativity. In the experiment part, students can understand the process of 3D game software development, which is an essential requirement for them in the future to work in related industries

Recommended Textbooks/References:

1. Andre Lamothe, Li Guangrui, Chen Wuze. Advanced Skills of 3D Game Programming, Post and Telecom Press. 2005.6. 1st edition.

2. Scott Jacobs, Xiang Zhouzhen, Tao Shaowu. Game Programming Gems (1st Edition), Post and Telecom Press. 2011.7

Course Number: 0004879

Course Title: Principles & Technique of Network Management

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Networks

Evaluation Method: Written Exam

Course Description:

This course introduces the computer network management concepts, models, architecture and standardization, and focus on network management protocols SNMPv1/v2/v3 in the Internet. This course requires students to grasp the basic principles and basic concepts of network management, but also to master a variety of network management specific technology. The main topics include: the basic concepts of network management, the basic function of network management, network management model, abstract syntax notation one(ASN.1),basic encoding rules(BER), structure of management information(SMI), management information base(MIB), operations of SNMPv1/v2, protocol data unit, the community-based security mechanisms, the architecture, message format and security of the SNMPv3.

Recommended Textbooks/References:

1. Wang Yong. Computer Network Management Tutorial, Tsinghua University Press. 2010.3
2. Yang Jiahai. Principles & Technique of Network Management, Tsinghua University Press. 2010.3
3. Wu Mengjun. Proficient in SNMP, Posts and Telecom Press. 2010.7
4. Li Mingjiang. SNMP simple network management protocol, Publishing House of Electronics Industry. 2007.5

Course Number: 0004866

Course Title: Embedded Application Development Technology

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

Students: Undergraduate students major in Computer Science and Technology（including the experimental class）

Prerequisites: Microcomputer Interface technology, Windows Programming Techniques, Embedded System Architecture

Evaluation Method: Curriculum Design

Course Description:

Embedded Application Development Technology is a specialized optional course in the field of computer science and technology. It is one of the professional curriculums to reflect the students' comprehensive ability**.** This course will further talk about the high-level Windows Embedded Compact development techniques based on the course of Embedded System Architecture.

Through this course, Students will learn more about the embedded system development methods and processes, master the underlying with the Boot Loader development technology for the

embedded operating system of Windows Embedded Compact, and the driver model of Windows Embedded Compact, implementation and development process, custom methods for the Windows Embedded Compact Shell. At the same time, grasp the embedded sync technology and intelligent devices' mobile database programming techniques. Lay a solid foundation for the independent development of an embedded system

Recommended Textbooks/References:

1. Douglas Boling. Translated by He Zongheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009
2. LI Dawei, ed. Windows CE Engineering Practice is Fully Resolved, China Electric Power Press. 2008
3. YAO Lingtian, ed. Proficient in MFC Programming, Posts and Telecom Press. 2006
4. ZHOU Jianshe, ed. Windows CE Device Driver and BSP Development Guide, China Electric Power Press. 2009
5. WANG Bing, etc. ed. Windows CE Embedded High-Level Programming and its Examples Explain, China WaterPower Press. 2008
6. ZHANG Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Publishing House of Electronics Industry. 2006

Course Number: 0002367

Course Title: Advanced Micro-computer System

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Principles of Computer Organization

Evaluation Method: Written Exam

Course Description:

High-grade microcomputer system is a professional selective course for undergraduate majoring in Computer Science and Technology. It allows students to have a targeted comprehensive and in-depth understanding and learning of the theory and technology of High-grade microcomputer system on the basis of "computer theory" and so on. Through this course, students can learn about the history of the development of a microcomputer system, the technical characteristics and innovative points of various stages; grasp the structure of the 32-bit computer systems and their corresponding technology; know about multi-core and corresponding technology of its 64-bit processor; grasp computer's structural features, as well as the mechanism of motherboards and other components. Through this course, students can have a better understanding of the mainstream technology and the corresponding development trend of the computer system so as to have corresponding technology for future work and learning.

Recommended Textbooks/References:

1. Mao Guojun, Fang Juan. Advanced Micro-computer Principle and Technology, Tsinghua University Press. 2009.4

Course Number: 0004867

Course Title: Software Reuse Technology

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

Students: Undergraduate students major in Computer

Prerequisites: Object Oriented Programming, Software Engineering

Evaluation Method: Written Exam

Course Description:

Improve software product quality and production efficiency is an important issue that has always faced with the development of the software industry. As to avoid duplication work and improve software quality, software reuse is proposed. It aims that the development of software products is no longer a "scratch" mode, but full use of the assets accumulated in the past software development, such as source code, design, requirements specification and test cases. In order to achieve the largest degree of reuse about the software development process, the topics of this course including: the concept of software reuse, software reuse-oriented software design and development of theory, methods and techniques; management techniques of software reuse, including: domain engineering, the field of reusable components analysis, production and management; assembly system based on reusable components. Then students can master the basic development method and the design method of reusable software.

Recommended Textbooks/References:

1. Edited by Donald J. Reifer. Translated by Sun Yanchun, Ma Liang. Practicing of Software Reuse, Mechanical Industry Press. 2005.3
2. Yang Fuqing, Mei Hong. Requirements Modeling Based on Reuse, Tsinghua University Press.2008.11
3. Yang Fuqing, Mei Hong. Design and Implementation of Component-Based Software, Tsinghua University Press. 2008.11
4. Yang Fuqing,Mei Hong. Software Assets and Process Management Based on Resue, Tsinghua University Press. 2008.11

Course Number: 0000622

Course Title: Advanced Operating System

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

Students: Undergraduate student major in Computer Science and Technology

Prerequisites: Principle of Operating System, Computer Network

Evaluation Method: Written Exam

Course Description:

This course is an important course for computer science and technology. Because of the increasing of performance price ratio and the development to high speed network, managing the distributed resource in web environment is becoming a big problem. This course is a course after principle of operating system. It pays more attention on critical problems in multiprocessor web environment: the application of spin locks in distributed system, different implementation of spin locks and their performance; the difficulties in concurrent programming and its solution, different implementation of shared memory and its effect on performance, various problems met in the distributed system and the solution, the hardware implementation and software implementation of transaction memory, security problem and hot topics of operating system.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum. Distributed System Principles and Paradigms, Tsinghua University

Press. 2004

2. Tanenbaum.A.S. Modern Operating System.(3rd Edition). Mechanical Industry Press.2009

Course Number: 0002768

Course Title: Electronic Commerce (E-Commerce)

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Program Design as well as Related Subjects

Evaluation Method: Written Exam

Course Description:

The object of the course is to guide the students to solve the technical problems based on the knowledge and understanding of the e-commerce concept and principle. This course is as specialty selective course. The main task of the course is to guide the students to have a basic and full scale understanding and information of e-commerce. The contents include the e-commerce frame, model and principle, e-commerce security technology and e-payment, e-commerce logistical, e-commerce system design method, how to establish e-commerce system through the simulating and practice. The comprehensive ability and capability of e-commerce of the students will be enhanced after the course.

Recommended Textbooks/References:

1. HUANG Jinghua and others. Electronic Commerce Courses. Beijing: Tsinghua University Press. 2010
2. TAN Zheng and others. Electronic Commerce Basic. Beijing: Science Press. 2007
3. XU Tianyu. Electronic Commerce System Planning and Design. Beijing: Tsinghua University Press. 2010

Course Number: 0004891

Course Title: Virtual Reality and Its Application

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Graphics, Advanced Mathematics

Evaluation Method: Written Exam

Course Description:

As a new technology, virtual reality technology is developed based on computer graphic. It's a real-time expression of the world in human feeling and it is simulated by computer. Sometimes this technology is referred to as virtual environment. Its prominent features are interactivity, immersion and imagination. As an optional course in the major of computer science and technology, the objective of this course is to familiarize students with development overview, hardware components, key technologies and applications in typical fields. Students will master how to design and develop virtual reality systems. This course plays an important role in the training of research and application talents. The basic topics include: the introduction of virtual reality technology; hardware equipment about virtual reality system; computing architectures; relevant technologies and software; VR programming and so on.

Recommended Textbooks/References:

1. HU Xiaoqiang. Virtual Reality Technology. Beijing University of Posts and Telecommunications Press. 2005
2. WEI Yingmei. Virtual Reality Technology (second Edition). Electronics Industry Press. 2005
3. ZHANG Maojun. Virtual Reality System. Science Press. 2001

Course Number: 0004857

Course Title: Defense of Computer Virus

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

Students: Undergraduate students major in information Security

Prerequisites: Computer network, Computer System Architecture, Network Security Protocol

Evaluation Method: Open Book Exam

Course Description:

Virus theory, experiments and their analysis description models are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of computer virus theory and experiments and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: introduction of computer virus, the analysis of computer virus architecture, network attack methods, anti-virus theory and experiments.

Recommended Textbooks/References:

1. LAI Yingxu, ZHONG Wei. Theory and Experiments of Computer Virus. Tsinghua University Press. 2011
2. FU Jianming, PENG Guojun. Analysis of Computer Virus. Wuhan University Press. 2011

Course Number: 0004852

Course Title: Firewall Technology

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

Students: Undergraduate students major in Information Security or Computer

Prerequisites: Computer Network Fundamentals

Evaluation Method: Written Exam

Course Description:

The students are expected to understand the basic concepts, theories, methods, and techniques of Firewall Technology and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: the concepts, deploy, function, policies of Firewall, basic approaches and limitations of firewall, packet filtering, circuit proxy, and application proxy, Firewall architecture, bastion host Principles and Technologies, the DMZ principle, the screening router, the dual homed gateway, the screened gateway, the screened subnet, and the "belt-and-suspenders" firewall, Firewall design and configuration examples, Firewall management and testing.

Recommended Textbooks/References:

1. Wes Noonan (Author), Ido Dubrawsky. Firewall Fundamentals. Cisco Press. June. 2006
2. V. V. Preetham. Internet Security and Firewalls (Networking). Tsinghua University Press,

June. 2004
3. Keith E.Strassberg, Richard J.Gondek, Gary Rollie. Firewalls: The Complete Reference. China Machine Press, March. 2003

Course Number: 0003477
Course Title: Network Security Detection and Defense Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students majoring in Computer Science
Prerequisites: Operating System and Computer Network
Evaluation Method: Course Design and Practice
Course Description:
This course is designed to be an elective course for undergraduate students of computer major, which the aim is to let students understand the basic method of intrusion detection and defense technology. The students are expected to know about the research status at home and aboard and development trend about intrusion detection, to master the basic concept and theory of intrusion detection and some technologies such as sniffer, port scan, with which students can use to defend the threaten such as DDoS, ARP, and other common attacks in network. The basic topics include: the introduction of intrusion detection, the basic method of intrusion, the concept of intrusion detection system, IDS technology based on host, IDS technology based on network, the evaluation standards for IDS, the development trend of IDS, the management of IDS and the defense method of IDS.
Recommended Textbooks/References:
1. HU Changzhen. Theory and Technology of Network Intrusion Detection (second Edition), Beijing Institute of Technology Press. 2010
2. CAO Yuanda. Intrusion Detection Technology, Posts and Telecom Press. 2008
3. DU Ye, ZHANG Dawei, FAN Yanfang. Network Attack and Defense Technology, Wuhan University Press. 2008
4. LI Junmin. Network Security and Hacker Attack Technology, Electronic Industry Press. 2011

Course Number: 0005697
Course Title: Software Project Management
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer
Prerequisites: An Introduction to Software Engineering
Evaluation Method: Written Exam
Course Description:
This course is a professional course for students which have software engineering background. In the relatively mature age of software development technology, management in software industry plays more and more important role. But it leads to the main reason for the failure of many software developments. Software project management is interdiscipline of the software engineering and project management. Abstract characteristics of software products make software project management more difficult than the general project management. As a software

engineering course, this course has broadened students' professional caliber, and training the compound talents role.

Software project management is to make the project in accordance with predetermined cost, schedule, quality finished smoothly and to manage cost, personnel, schedule, quality, risk analysis activities. Through this course, students understand the basic knowledge of software project management, master how to develop the software project plan, cost, schedule, quality, personnel, risk analysis, management and tracking in order to according to the predetermined cost, schedule, quality. The students will use what they learn the basic knowledge of project management software in actual software project practice. Training students have basic abilities with comprehensive use of the theory and technology to discovery, analysis and solve engineering problems.

Recommended Textbooks/References:

1. Kathy Schwalbe. IT Project Management (Sixth Edition).China Machine Press. 2011
2. Han Wanjiang, Jiang LiXin. Software Project Management Case (second Edition). China Machine Press. 2009
3. Tan Zheng et al. Software Project Management. Tsinghua University Press. 2009

Course Number: 0007371

Course Title: Computer Vision

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

Students: Undergraduate students major in Computer Science

Prerequisites: Calculus, Linear algebra, Probability theory

Evaluation Method: Written Exam

Course Description:

The ultimate goal of computer vision is to enable computers with vision capabilities, like human being and animals. Tasks included are automatic reconstruction of 3D scenes, and automatic understanding of image and video content. Computer vision has important applications in a variety of domains, such as consumer electronics, human-computer interface, robotics, manufacturing and military. The students will be required to understand the basic knowledge and techniques of computer vision, and master the basic skills of implementing computer vision algorithms. Topics covered are: camera model, camera calibration; image filtering, edge detection, texture; k-means clustering segmentation, Gaussian mixture model and EM algorithm, mean-shift segmentation, normalized cut and graph cut; structure from motion; interest point detection and description, optical flow; introduction to classifiers: Bayes classifier, SVM, artificial neural network, Adaboost; object detection; category recognition; simultaneous scene segmentation and recognition; activity recognition; recognition from depth images.

Recommended Textbooks/References:

1. Rick Szeliski. Computer Vision: Algorithms and Applications, Springer Press. 2011. http://szeliski.org/Book/
2. David Forsyth, Jean Ponce. Computer Vision: A Modern Approach (2nd edition), Prentice Hall. 2011
3. Linda Shapiro, George Stockman, Computer Vision, Prentice Hall. 2001

Course Number: 0004880

Course Title: Network Planning & Designing

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

Students: Undergraduate students major in computer Science and Technology

Prerequisites: Computer Networks

Evaluation Method: Project Design and Presentation, Experiment and Practice

Course Description:

This course is a major elective courses available for undergraduate students of computer science and technology and related specialty. The student will learn the fundamental aspects of network planning and design, including the process, method and technology. The course covers aspects of the network that are strategic to designers, including project management of network engineering, comprehensive wiring system, LAN and system integration, network routing technology and system integration, server cluster and backup, security design, network test and analysis. In addition, this course provides some typical cases of campus network system integration, network interconnection and network storage and data backup. With a project and practical perspective, it aims to prepare students to pursue careers of network planning and design.

Recommended Textbooks/References:

1. WANG Xianglin. Design and Application of Network Engineering (first Edition). Tsinghua University Press. 2011
2. YANG Wei, WANG Yun. Network Engineering Design and System Integration (second Edition). Posts & Telecom Press. 2010
3. ZHANG Wei, WANG Neng, YU Liyang, LU Gang. Computer Network Engineering (second Edition). Tsinghua University Press. 2010
4. YU Liyang, ZHANG Wei, QIANG Zhicheng. Experiment Guide of Computer Network Engineering (second Edition). Tsinghua University Press. 2008

Course Number: 0007354

Course Title: Design Technique Based on SOPC

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

Students: Undergraduate students major in Computer

Prerequisites: Microcomputer Principle, Digital System Design, Microcomputer Interface

Evaluation Method: Written Exam, Practical Assignment, Labs

Course Description:

SOPC design technique is a specialized selective course. This course takes Quartus II which is one of the typical EDA tools as an illustration in order to enable students to have a better grasp of SOPC Builder, design embedded system based on Nios II soft-core, master method of high-level IP reuse, learn independently the design technology of IP core and the method of engineering realization. This course is also able to enhance students' systematic design ability effectively and application programming capability based on HAL by the engineering process of IDE, embedded logic analyzer and hard copy. Thus, students should need to understand the process of SOPC embedded system design based on large-scale programmable integrated circuits, and master SOPC embedded system design about basic knowledge, such as concepts, theories, methods, technologies and skills.

This course has a stronger practical character, covering 12 credit hours of in-class experiments.

Recommended Textbooks/References:

1. LI Lanying. Nios II embedded soft-core SOPC design principles and applications, Beijing: Beihang University Press. 2006
2. CAI Weigang. Nios II software architecture analysis. Shanxi: Xi'an University of Electronic Science and Technology Press. 2007
3. ZHOU Ligong. SOPC embedded systems basic tutorial. Beijing: Beihang University Press. 2006
4. XU Guanghui. FPGA embedded development and application, Beijing: Electronic Industry Press. 2006

Course Number: 0007365

Course Title: Practice for High Level Language Programming

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

Students: Undergraduate students major in Computer Science and Technology, Information Security.

Prerequisites: High Language Programming Ⅲ

Evaluation Method: The final score is composed of coding, report writing and Oral Examination by a certain percentage.

Course Description:

The teaching objective of this curriculum is to make the students developing the abilities to use what they learn from high language programming courses to solve practical problems. Teachers should focus on training students' rigorous work attitude, understanding the methods of structured programming, developing their good programming habits. So that students can master the main method of structured programming. Learning through this curriculum, students should be able to understand the basic development process of structured programming, master basic skills in compiling and debugging programs written in C language. The curriculum emphasizes the ability of the students. For students in the experimental classes, It should focus on training their spirit of innovation and fully exploiting their innovative potentials.

The curriculum requires students to analyze, design, compile, debug, and test programs written in C language as well as write a practice report according to requirements.

Recommended Textbooks/References:

1. LIAO Husheng, YE Naiwen, ZHOU Jun.C Language Programming Case Tutorial (Second Edition). Posts and Telecom Press. 2010.9
2. LI Wenxin. Programming Guidance and Online Practice. Tsinghua University Press.2007.7
3. Brian W.Kernighan,Dennis M.Ritchie. C Programming Language (English) (Second Edition). Mechanical Industry Press.2006.8
4. P.J.Deitel,H.M.Deitel. C University Tutorial (Fifth Edition) (English). Electronics Industry Press.2010.5

Course Number: 0007384

Course Title: Cognitive Practice

Credit: 1 **Total Credit Hours:** 30

Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Attendance (50%) and Report (50%)
Course Description:
Cognitive practice aims to enhance students' awareness of professional visit with a professional enterprise, inter-school exchanges, seminars with experts in the field, so that students understand learning the relationship between the content of the actual work in related fields with the school of professional related fields of development trends and 'state-of-art', as well as students' future employment situation.
Cognitive practice includes three parts:
Enterprises and universities visiting parts: all visiting will provide students with a preliminary understanding of the relationship between enterprises and their majors; understand the College in the professional direction of the main research activities and results; as well as their counterparts in the universities' teaching.
Teacher Seminars parts: the combined activities of the first part of the teacher to explain related to knowledge and technology, as well as with the university is about learning courses or practice.
The teacher-student discussion sections: head teachers and counselors held a discussion with the students to complete the learn transition from high school to university smoothly.
Recommended Textbooks/References:
None

Course Number: 0002380
Course Title: Experiments in Digital Logic
Credit: 0.5 **Total Credit Hours:** 12
Students: Undergraduate students major in Computer
Prerequisites: Digital Logic
Evaluation Method: Experiment
Course Description:
Experiments in Digital Logic is a basic professional course for the undergraduate students who major in Computer. It is very practical. Through studying this course, the students can strengthen, deepen and broaden the learning of Digital Logic. The students are expected to understand the design flow and design the logic circuit based on Quartus II software and programmable logic device. They are expected to learn the top-down design method. They are also expected to learn how to analyze, design, and debug the circuit and how to exclude the faults of circuit. This course can improve the patient and serious research style during the whole experiments and develop the practice ability and the quality of unity and cooperation. At the same time, the course can encourage innovation, through the design and comprehensive experimental projects, their abilities solving problems will be improved. It also can lay a good foundation for the following professional course and the digital system design work which they will engage in after graduate from their university.
Recommended Textbooks/References:
1. ZHANG Lirong. An Experiment Course in Digital Logic Based on Quartus II. Tsinghua University Press. 2009

Course Number: 0007376

Course Title: The Experiments in Computer Organization Principle

Credit: 0.5 **Total Credit Hours:** 12

Students: Undergraduate students major in Computer

Prerequisites: Digital Logic

Evaluation Method: Experiments

Course Description:

The Experiments in Computer Organization Principle is a major practical course for Undergraduate students major in Computer. The students are expected to understand the basic concepts, theories, methods, and techniques of the related theory courses, apply the knowledge to solve practice problems and to finish actual design. Through finishing the experiments in components of the computer, they will master the organization principle and work principle of components of the computer, strengthen and expand the contents of Computer Organization Principle, train the ability of hardware design and prepare for the study of the following professional courses. The experiments are completed by using the popular EDA design technique and based on programmable FPGA platform. The basic experiments include: design and implementation of register, design and implementation of arithmetic logic unit, design and implementation of memory, the data transfer between register, arithmetic logic unit and memory through the bus.

Recommended Textbooks/References:

1. ZHANG Liyan. An Experiment Course in Computer Organization Principle.

Course Number: 0007375

Course Title: Principles of Computer Organization Project

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

Students: Undergraduate students major in Computer

Prerequisites: Principles of Computer Organization

Evaluation Method: Practical Assignment and Project Report

Course Description:

Principles of Computer Organization Project is a practical course which is established for students to practice computer design after the course of principles of computer organization is opened up. The purpose of this course is to design, realize and debug a simple model machine based on EDA platform. At first, all computer components are designed and implemented, and then the control unit is realized which ensures all parts cooperate to complete the instruction function in accordance with the current instruction requirement, and finally the waveform simulation or hardware download validation is implemented. The students can understand preferably the knowledge about computer organization which are taught in class, set up the concept of the entire computer, deepen our understanding of the computer concept of “time and space”. And at the same time the students can learn how to design, implement, test the entire computer system, improve the ability to analyze and solve problems, lay a solid foundation for improving the students’ computer hardware practical capability.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press. 2009

2. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Practice Tutorial of Computer Organization Principle –Based on EDA Platform. Beijing Aerospace University Press. 2006

Course Number: 0002761

Course Title: The Curriculum Design for Data Structure

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Programming Language, Discrete Mathematics

Evaluation Method: Machine Test

Course Description:

The design practice for the data structure course is a comprehensive teaching practice process. Its purpose is to allow students to apply their 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. 2008.6
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press. 1997.4
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
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of Electronics Industry. 2003.10

Course Number: 0002383

Course Title: Computer Network Experiments

Credit: 0.5 **Total Credit Hours:** 12

Students: Undergraduate students major in Computer Science

Prerequisites: Computer Network

Evaluation Method: Experiment

Course Description:

Computer Network Experiment course is a computer professional course. It is not only a

theoretical course, but also a practical course. Students must go through strict training of practice to really grasp and understand the basic theory, protocols and algorithms of computer network, eventually the theory teaching and practice working together closely.

Computer Network Experiment is an important part of learning computer network technology. It can consolidate and deepen the teaching content, improve the students' working ability, cultivate students' independent thinking, comprehensive analysis and problem-solving skills, improve engineering practical ability of students, lay the foundation for learning follow-up courses and engaged in the practice of technical work.

The network experiment teaching takes the student as a main studying body, gives full play to student's imagination and the creativity, and encourages open-minded students choose the other network projects using the laboratory the environment. The teaching will follow the network development step positively, update the content constantly and play an active role in training student's innovation ability.

Recommended Textbooks/References:

1. Gao Xueyuan, Zhengxin. The Experiments Instructor of Computer Network. Printing Service Center of Beijing University of Technology. September 2011

Course Number: 0002384

Course Title: The Experiments in Microcomputer Interface

Credit: 0.5 **Total Credit Hours:** 12

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

Prerequisites: Computer Principles and Assembly Language, Microcomputer Peripheral Technology

Evaluation Method: Experiment

Course Description:

This is an experimental course, which combines hardware with software and links theory to practice. The theories of microcomputer interface technology can be applied and practiced in these experiments. During performing these experiments, the students can verify the theories, deepen their understanding of the theoretical knowledge, and learn the way to analyze and solve a simple engineering problem. So the students' abilities in operation and thinking can improve as far as possible. The course arrangement is connected closely with theory teaching. The contents consist of three aspects. The first content is the basic method of application interface chips which are used usually and already taught in theoretical course. These chips include parallel input/output interface chip (8255A), counter/timer chip (8253), interrupt controller (8259A), serial communication chip (8251A), etc. On this basis, some integrated applications of multiple chips are arranged. Finally, a special subject is required that is to apply what they've learnt to solve a practical problem in order to make the students acquire some engineering practice methods.

Recommended Textbooks/References:

1. HAN Deqiang, WANG Zongxia. The Experiments Instructor of Microcomputer Interface.

Course Number: 0007372

Course Title: Course Design of Computer Network

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Network

Evaluation Method: Experiments

Course Description:

After theoretical study of computer network course, this course makes the student to be familiar with the use of the network router and exchanger, interconnection method of TCP/IP networks, equipment and working principles of service software of the Internet, and the basic technologies of design and implementation for the network stations.

This course is composed of general design solution, design of function modules, operations of network equipment and application programming to implement the solution, and also conclusion report of the course design.

Through this course design, we aim at promoting the abilities of problem analyzing, problem solving, and also the integrated application of the students.

Recommended Textbooks/References:

1. Wang Yong, Course Design of Computer Network, Tsinghua University Press. 2009

Course Number: 0007385

Course Title: Software Engineering Project

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

Prerequisites: Programming Language, Data Structure and Algorithm, Introduction of Software Engineering

Evaluation Method: Project Defense

Students: Computer Science major

Course Description:

The aim of this course includes:

Through the preparation and outline of this practice course, the student will review, master and apply the software development methods and knowledge learned from software engineering course. Particularly, the design and develop process of software project, structure technology, rapid prototype method and object-oriented method.

Provide practice chance for student not only to cooperate with team in the development of bigger project, but also to apply the knowledge learned from multiple courses.

Through attending a project team development, the student will know about the importance of project management, team cooperation, and document preparation, oral and written presentation.

Through the project, the student will know about the importance of software tool and environment. Particularly, to master one or two newer tools or technologies.

Recommended Textbooks/References:

1. Yang Hongli, Chen Yao, Fu Lihua Su Hang editor. Instruction for Software Engineering Project, Version .3. 2012
2. Zheng Renjie, Ma Suxia, Yin Renkun. The introduction of Software Engineering. Mechanical Industry Press. 2010

Course Number: 0006187

Course Title: Experimental Basis of Computer Networks

Credit: 1 **Total Credit Hours:** 24

Students: Undergraduate students majoring in Information Security and Computer

Prerequisites: Introduction to Computer Network

Evaluation Method: Classroom Exam

Course Description:

Networking related Basic Methods and Technologies are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of networking, through which their abilities of applying the theoretical knowledge to the reality will be improved. The basic topics include: the access and configuration of the routers and switches; wiring harness of the Unshielded Twisted Pair; VLAN configurations; planning and cabling networking; static routing protocols configuration; dynamic routing protocols configuration of the RIP/EIGRP/OSPF; standard and extended access control configuration.

Course Number:000 7366

Course Title: Work Practice

Credit: 4 **Total Credit Hours:** 120

Students: Undergraduates in Computer Science (include Experiment class) and Internet of Things Engineering

Prerequisites: None

Evaluation Method: Include the attitude that students work in the enterprise, the accomplishment that student achieve and other results from oral examination etc. Results are mainly generated by the supervisors and managers in the enterprises, while the results will be in the hundred mark system.

Course Description:

The work practice will normally take place in the 7^{th} semester, and last for 4 weeks. In case of student have already mastered most of the professional knowledge and in term of have some practical ability, opportunities will be created by the school and enterprises for the work internship. Students will participate in the project or research, resolve the issues in the practical applications, a deeper understanding of work practice so that students corporate culture, familiar with the possible future work environment, and to develop independent ability to solve practical problems and teamwork.

College arranges for students to enterprises, to discuss by the enterprise (or school) to determine the content of student work internships, given the demands, the disciplinary requirements and the assessment methods.

Students to obtain results of work practice need to meet the requirements of the workload, difficulty and discipline of practice sessions.

Recommended Textbooks/References:

None

Course Number: 0005687

Course Title: Graduation Project (Thesis)

Credit: 16 **Total Credit Hours:** 480

Students: Undergraduates in Computer Science (include Experiment class) and Internet of Things Engineering, major in Information Security

Prerequisites: All courses that in the three majors above

Evaluation Method: With the supervision, based on the selected project title, follow the requirements to complete the project and dissertation, finally pass the oral examination.

Course Description:

Graduation Project (Thesis) is the last important step of the undergraduate cultivation, it is the process that students deepening the knowledge and experiences, it is a summary of students' research and experiment; it is also a comprehensive evaluation of students' creative thinking, the overall quality and practical ability. It is an important basis of the argument of graduation and degree qualifications; also it is the important content that measures the educational quality and efficiency.

From the Graduation Project (Thesis), not only make the students understand the related knowledge and skills, but also the learning and research methods that can be applied in the practical applications. Graduation project given by the supervisors, students will complete independence from access to information, to complete the design and implementation, writing of the related graduation project report design processes.

Recommended Textbooks/References:

Depend on the title of the Project.

Course Number: 0002556

Course Title: Design of System Software Project

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

Students: Undergraduate students major in Computer Science and Technology and Information Security

Prerequisites: Principle of Operating System

Evaluation Method: Demonstration, Presentation and Design Documents

Course Description:

The aim of this project is to further deepen students' understanding about the design idea and implementation mechanism about OS, and to cultivate their ability to analyze, make design and program on the level of system software. Three optional modules are included in it. The first module requires students to analyze OS source code of Linux operating system and select one of the following tasks: Linux boot process, Linux memory management, Linux process control, Linux timer and process schedule, Linux process communication. The second optional module requires students to implement related OS algorithm including process schedule, memory management, disk schedule. The third module requires students to develop several kernel modules for Pintos system. Pintos is an incomplete operating system and some major modules are missing, or there is merely a simple implementation version. This module requires students to design and implement one of the following modules for Pintos including process schedule based on process priority, system call and user's program's execution, virtual memory system, File system.

Recommended Textbooks/References:

1. Guide of Design of System Software Project. Electronic Materials. 2012

2. MAO Decao, HU Ximing. Analysis of Linux Kernel Source code. Hangzhou: Zhejiang University Press. 2006
3. FEI Xianglin, LI Min, YE Baoliu. Reference Book of Theory of Formal Languages and Automata (second Edition). Tsinghua University Press. 2007
4. PANG Liping, ZHENG Ran.Principle of Operating System and Linux Experiments. China Machine Press. 2011

Course Number: 0007347

Course Title: 3D Scene Modeling and Remote Interaction Project

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Programming Language, Computer Graphics, multimedia technology

Evaluation Method: Project Report

Course Description:

The curriculum on 3D Scene Modeling and Remote Interaction Project aims to make students grasp the current web-based 3D virtual reality technology. It also fosters and improve students' comprehensive knowledge and skills on the integration of Web professional development, 3D scene modeling, and Multimedia technology. The project helps students to learn the virtual reality modeling language (VRML), HTML, and Java Applet and Java language, and use the languages to develop a Web page containing a 3D virtual indoor or outdoor scene, the map display, and remote interaction with 3D scene. The main techniques can be divided into three aspects: (1) 3D scene modeling technology: 3D modeling node, geometry transform node, event and routing, texture mapping; (2) Web Page Design: Html language; (3) Remote Interaction with 3D Scene: Java Applet technology and Java language.

Recommended Textbooks/References:

1. Zhang Defeng, Zhou Ling. VRML Virtual Reality Applitaton Technology. Publishing House of Electronics Industry.2010
2. Wang Zhida. VRML virtual reality web design. Tsinghua University Press.2006
3. Zhang Wujun, Tian Hai, Yin Xuri. VRML Virtual Reality Technology Basis and Practical Tutorial. Press of Metallurgy Industry.2008

Course Number: 0007380

Course Title: The Curriculum Design of Embedded System Technology

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

Students: Undergraduate students major in Computer

Prerequisites: Embedded System Architecture, Embedded System Application Development technology, Embedded Technology Engineering Approach, Embedded System Development Technology

Evaluation Method: Project Design

Course Description:

The curriculum design of embedded system technology is a comprehensive test to the students' computer software and hardware ability. It lets the students personally involved in the

development of a practical computer application system while according to the theory course.

Embedded system technology course is designed to examine the students' comprehensive ability. Students can freely make the proposition by themselves based on the courses of basic course, Embedded system architecture, Embedded system application development technology, Embedded technology engineering approach, and Embedded system development technology. While the teachers will check the project's degree of difficulty and the quality of workload. Accordingly, it will fully play the students' learning initiative, innovation ability and team spirit. At the same time, it will regulate the establishment of the engineering documents.

In the software and hardware environment provided by the experimental center, students can design their own projects combined with pre-order courses (must be conformed by teacher). It is encouraged to make multiple platforms design and use the content of earlier theory course as much as possible.

Recommended Textbooks/References:

1. Douglas Boling. Translated by He Zongsheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009
2. YAO Lingtian, ed. Proficient in MFC programming, Posts and Telecom Press. 2006
3. ZHANG Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Electronics Industry Press. 2006
4. ZHOU Jianshe, ed. Windows CE device driver and BSP development guide, China Electric Power Press. 2009

Course Number: 0004752

Course Title: High Level Language Programming

Credit: 4 **Total Credit Hours:** 64

Students: Undergraduate students major in Computer Science and Technology, Information Security and The Internet of things.

Prerequisites: None

Evaluation Method: The final score is composed of written examination, course design and homework by a certain percentage.

Course Description:

This curriculum is a required course for Undergraduate students who are major in computer science and technology, information security and internet of things engineering profession. This is the student's first curriculum for learning high language programming. It is a follow-up courses to learn the necessary foundation courses. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C language programming. So that students can use the C language to give a simple solution to the problem, and establish the preliminary calculation mode of thinking. Teachers should focus on teaching the students understand the methods of structured programming, training students to write and debug programs, developing good coding habits, stimulating students' great interests in learning Programm Design. The curriculum emphasizes the ability of the students.

Recommended Textbooks/References:

1. LIAO Husheng, YE Naiwen, ZHOU Jun.C Language Programming Case Tutorial (Second Edition). Posts and Telecom Press.2010.9
2. LI Wenxin. Programming Guidance and Online Practice. Tsinghua University Press. 2007.7

3. Brian W.Kernighan, Dennis M.Ritchie. C Programming language (English) (Second Edition). Mechanical Industry Press. 2006.8
4. P.J.Deitel, H.M.Deitel. C University Tutorial (Fifth Edition)(English).Electronics Industry Press. 2010.5

Course Number:0006186
Course Title: Introduction to Computer Networks
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students majoring in Information Security and other related major
Prerequisites:
Evaluation Method: Written Exam
Course Description:
This course is a compulsory course. As the first specialized course for students in the information security major, it plays an important role. It not only emphasizes the basic principles and concepts of computer networks, but also introduces new computer network technology. The students can learn the basic principles and technology during the course. After learning the course, they will have a good basis to learn the subsequent courses, such as "Routing and Switching Technology", "Network Design" and "Network Security Detection and Defense Technology". This course is based on a top-down approach. First, it introduces the architecture of the Internet. Then it describes the details of TCP/IP model from application layer to network access layer. Finally, it describes how to plan and configure networks. In a word, this course is very important for students' network ability education.
Recommended Textbooks/References:
1. Rick McDonald, Antoon W. Rufi Network Fundamentals: CCNA Exploration Companion Guide. Cisco system Press.
2. Mark A. Dye, Rick McDonald, Antoon W. Rufi. Network Fundamentals: CCNA Exploration Companion Guide (Chinese version). Posts & Telecom Press. 2009
3. Xie Xiren. Computer network (fifth edition), Publishing House of Electronics Industry. 2008

Course Number: 0007388
Course Title: Data Structures and Algorithms
Credit: 4 **Total Credit Hours:** 64
Students: Undergraduate students major in Computer
Prerequisites: Advanced Programming Language, Discrete Mathematics
Evaluation Method: Written Exam
Course Description:
Data structures and algorithms is the discipline which faces to the non-numerical treatment problem. The main purpose is to develop the students' professional ability of computational thinking, systems analysis and design, algorithm design and analysis, program design and implementation. The main content involves the basic data structures, sorting, indexing, retrieval and advanced data structures. From the point of view of the logical structure, the subject introduces a variety of basic data structure, such as the linear table, string, binary tree, the tree and

map. From the perspective of the algorithm, it introduces the various types of sorting, retrieval and indexing algorithm. From the application point of view, it introduces some of the more complex data structures and algorithm analysis techniques. Through this course, students should master the basic concepts of data structures and algorithms, the basic methods of rational organization of data, efficient data processing algorithms, and have the ability to choose the appropriate data structure and algorithms when they are faced to the practical problems.

Recommended Textbooks/References:

1. Zhang Ming,Wang Tengjiao, Zhao Haiyan. Data Structure and Algorithm. Beijing. Higher Education Press. 2008.6
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press, 1997.4
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
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of Electronics Industry. 2003.10

Course Number: 0007370

Course Title: Set Theory and Graph Theory

Credit: 2.5 **Total Credit Hours:** 45

Students: Students major in Computer Science and Technology and Information Security

Prerequisites: Linear algebra

Evaluation Method: Written Exam

Course Description:

This is a mathematical subject discussing about discrete data structure, such as set theory, binary relations, function and graph theory. This subject tries to make the students understanding the relationship between the discrete mathematics and the subject of computer science and technology or computer application technology. These methods discussed in this subject not only make the necessary theoretical preparation for the subsequent courses, but also get students gradually enhance the transformation abilities of concept and method of how to implement scientific theories-technology-the concept of productive forces, and develops students' creative and mathematical reasoning abilities. The basic concepts, theory, methods and techniques are required for students. The basic topics include: basic concepts of set, basic operations of the set; binary relation, equivalence relation and partition, partial ordered set and Hasse diagram; functions, composite functions and inverse functions; connected graphs, Dijkstra's algorithm; Eulerian graphs, Hamiltonian graphs, trees, bipartite graphs, plane graphs.

Recommended Textbooks/References:

1. SHAO Xuecai. Discrete Mathematics. Beijing: Publishing House of Electronics Industry. 2009
2. SHAO Xuecai,YE Xiuming. Discrete Mathematics. Beijing: China Machine Press.1998
3. IC.L.Liu(LIU Zhenghong translation). The Basic of Discrete Mathematics. Beijing: Posts and Telecom Press. 1982

4. ZUO Xiaoling etal. Discrete Mathematics. Shanghai: Shanghai Science and Technology Literature Press. 1982
5. FANG Shichang. Discrete Mathematics. Xi'an: Northwest Institute of Telecommunication Engineering Press. 1985
6. GENG Suyun etal. Discrete Mathematics. Beijing: Beijing University Press. 1987
7. BEMARD Kolman, ROBERT C. Busby, SHARON Ross. Discrete Mathematical Strutures. Beijing: Tsinghua University Press. 1997
8. J.A.Bolldy, U.S.R.Murty(WU Wangming translation). Graph Theory with Applicaitons. Beijing: Science Press. 1987

Course Number: 0005686
Course Title: Digital Logic
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Written Exam
Course Description:
"Digital Logic" is a specialized basic course. Based on introducing of the basic theory of digital logic, HDL (Hardware Description Language), the analysis and design of the combinational logic circuits and the synchronous sequential logic circuits, the following ability are expected which are mastering the concept and model of basic digital circuits, correctly using the logical tools and methods, and having the good ability of circuit design and analysis, mastering the modeling method based on HDL for the modern digital electronic system. The basic knowledge about digital logic, such as concepts, theories, methodologies, technologies and skills is expected. The main topics in the course include: 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.
This course has a stronger practical character, closely combining with "digital logical experiment" which a course is arranged the term with the same the former.
Recommended Textbooks/References:
1. JIA Xibin, WANG Xiujuan, WEI Jianhua. The Basis of Digital Logic and Verilog Hardware Description Language. Beijing: Tsinghua University Press.2012
2. PENG Jianchao. Logic Analysis and Design of Digital Circuits. Beijing: Beijing University of Technology Press.2007
3. BAO Jiayuan. MAO Wenlin. Digital Logic (second edition), Beijing: Higher Education Press. 2002
4. John F. Wakerly. Digital Design Principles and Practices(Fourth Edition), Prentice Hall Inc. 2005

Course Number: 0004860

Course Title: Principles of Computer Organization and Assembler Language II

Credit: 4 **Total Credit Hours:** 64

Students: Undergraduate students major in Information Security

Prerequisites: Digital Logic

Evaluation Method: Practical Assignment and Written Exam

Course Description:

In this course, the students are expected to understand the computer organization and principle of each function component, establish the entire machine concept, learn computer system design and its related technologies, master the assembler language instruction system function, format, addressing mode, and program the assembler language by learning all kinds of assembler language program design structures, etc. The basic topics include: the hierarchy of the computer system hardware or software and the key performance indicators; fixed point and floating point data representation; the addition, subtraction, multiplication, division for the fixed point and floating-point data; Intel8086 hardware structure, Intel8086 addressing mode, Intel8086 commonly used instructions; Intel8086 assembly language data and operator, Intel8086 assembly language pseudo instructions, Intel8086 assembly language programming; The general structure of the central processor, the instruction process, the micro-operation control signal and the combinational logic control component design; Level 3 storage system, DRAM dynamic refresh mode, the expansion of the main memory; the basic function and composition of input/output system, program interrupt mode, DMA mode, channel and IOP control mode.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press. 2009
2. Feng Yuanzhen. Principles of Computer Organization and Assembler Language Programming. Publishing House of Electronics Industry. 1999
3. David A.Patterson,John L.Hennessy. Computer Organization and Design. China Machine Press. 2010

Course Number: 0007400

Course Title: Mathematic Foundations of Information Security

Credit: 2 **Total Credit Hours:** 36

Students: Major in Information Security

Prerequisites: Liner Algebra, Discrete Mathematics

Evaluation Method: Written Exam

Course Description:

In this course, students are expected to learn a wide range of basic concepts and theories of mathematics as well as how to apply mathematics into other aspects of information security. This course requires a solid understanding of basic concepts, basic theory, and basic method of mathematics related to information security. It includes concepts of integer division and congruence, solving algorithms of congruence equation (or equations), concepts of primitive root and index, and two hard problems and some basic theories of cryptography algorithms.

Recommended Textbooks/References:

1. Pan Chengdong and Pan Chengbiao, Elementary Number theory, Peking University Press. 1992

2. Wu Pinsan, Modern algebra, Renmin Education Press. 1983
3. Chen Gongliang, Mathematic Foundations of Information Security, Tsinghua University Press. 2004

Course Number: 0005217
Course Title: C++ Programming Language
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students major in Information Security
Prerequisites: C Programming Language
Evaluation Method: Written Exam
Course Description:
This course mainly includes the concept of object oriented and the programming design, to train the ability of programming and to master the knowledge of the language as the goal. Through the analysis, design, coding and testing, let students understand object oriented programming principles, features and methods, learn how to use C++ write object-oriented programming to solve real problems, and learn to use the debugging tools for debugging program. The students are expected to understand the difference between object oriented and process oriented, to master class, object, abstraction, encapsulation, inheritance, polymorphism and how to use it, learn to use operator overloading, template, generic and file, master the C++ new features, and can skillfully use C + + to programming. This course has a lot of programming exercise, which can made the ability of analyze the question, solves the question and programming skills improved.
Recommended Textbooks/References:
1. Harvery M.Deitel. Small C++ How to Program (5th Edition), Electronic Industry Press. 2006
2. Zheng Li, Li Ning. C++ primer, Posts and Telecom Press. 2010
3. Bruce Eckel, Chuck Allison. Thinking in C++, China Machine Press. 2011

Course Number: 0000345
Course Title: Database System Principles
Credit: 3 Total Credit Hours: 48
Students: Undergraduate student of Computer Science and Technology
Prerequisites: Discrete Mathematics, Data Structure and algorithm, Operation System**.**
Evaluation Method: Written Examination
Course Description:
Database System Principles is a foundation course set up for undergraduate of computer and related professional. The focus of the course is on the principles of data management technology. Particular emphasis is placed on the Relational Model and Relational Algebra, Normalization, Data Dependency, Database modeling method, E-R model, Structured Query Language, Transaction and Concurrence Control. Throughout the course student will gain an understanding of the issues involved in the basic idea for data management and the theory of database construction, the use and development of relational databases, and develop practical expertise in Structured Query Language and the application of the database design techniques Entity-Relationship Modeling and normalization. The course includes a variety of practices about

the database design and programming. By doing these practices, students will be equipped with skills of establishing a relational database with some popular DBMS, such as SQL Server, Oracle or My SQL.

Recommended Textbooks/References:

1. Jeffrey D.Ullman, Jennifer Widom. A First Course In Database Systems.Translated by Lihua Yue, YuChang Gong. Published by China Machine Press.2009.1.
2. Abraham Silberschatz, Henry F.Korth. S.Sudarshan Database Systems Concepts Fifth Edition.Translated by DongQing Yang, XouLi Ma, ShiWei Tang. Published by China Machine Press.2008.3.
3. JianZhong Li, Shan Wang. Principle of Database System. Electronic Industry Press.2007.5.

Course Number: 0003487

Course Title: Information Security Architecture

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

Students: Undergraduate students major in Information Security

Prerequisites: Information Theory, Cryptography

Evaluation Method: Written Exam

Course Description:

This course aims to explain the information security issues in the aspect of developing a secure information system by discussing design of security architecture, supporting technology, new product development, management, assessment, and case studies. Students are required to demonstrate understanding of the basic ideas, theories, methods, technology and other key issues concerning the development of asecure information system on the whole. Through doing case study exercises, students who successfully complete this course will be able to improve their abilities to design, analyze and solve the general problems in the area of information security. The basic topics of the course include 1) history of the information security, 2) principles for security architecture design of information system; 3) key technology and products in physical security, system security, network security, and application security; 4) Information security management systems; 5) benchmark of security assessment; 6) case studies and case design.

Recommended Textbooks/References:

1. ZHANG Jianbiao, etal. Information Security Architecture. Beijing: Beijing University of Technology Press.2011.9
2. FENG Dengguo, etal. Information Security Architecture. Beijing: Tsinghua University Press. 2008.9
3. SHENG Changxiang, etal. Introduction to Information Security, Beijing: Electronics IndustryPress.2009.12
4. National Security Agency. Information AssuranceTechnical Framework (release 3.0), Beijing: China-soft Electronic Press. 2002.4

Course Number: 0004889

Course Title: Information and Coding Theory

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

Students: Undergraduate students major in Information Security and other related professionals

Prerequisites: Advanced Algebra, Advanced Mathematics, Discrete Mathematics, Probability Theory

Evaluation Method: Written Exam

Course Description:

Information theory has very wide range in information security, cryptography, cryptography system for encoding and decoding algorithms design such as the evaluation of safety, passwords, algorithms, information security model is based on information theory. Information theory and coding theory are important technical foundation of information security undergraduate courses. In addition to the knowledge on the subject of information security professionals is important outside, some basic methods of problem solving, deal with the problem of thought is also very important and widely used in some new areas of research. Through this course of study, students on information theory and coding theory has a more comprehensive and system understanding, grasp the basic concepts of information theory and coding theory, analysis of basic theory and basic methods, including statistical measurement of information, sources, content channel, source coding, channel coding, to engage in study and application of information science to lay a solid foundation.

Recommended Textbooks/References:

1. JIANG Nan, WANG Jian. Information Theory and Coding Theory. Tsinghua University Press. 2010

Course Number: 0007358

Course Title: Principle of Operating System

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

Students: Undergraduate student major in Computer Science and Technology, Information Security

Prerequisites: Computer Theory, Assembly Language, Data Structure and Algorithm

Evaluation Method: Written Exam

Course Description:

This course is an important course for computer science and technology, information security and relative specialties. The aim of this course is to make students understand the basic theory, concepts and various management techniques of operating system, and cultivate their ability to analyze and design the system software. Detail knowledge include: operating system concept, history, dual model, system call, process, the states of process, process control block, IPC, thread, process scheduling, scheduling algorithm, critical resource and critical section, hardware solution to synchronization, semaphore, classical IPC problems, process communication, monitor, deadlock, relocation, contiguous memory allocation, paging memory management, segmentation memory management, virtual memory, demand paging, page allocation and replacement, demand segmentation, file and file system, logical structure, access control method, directory structure, directory implementation, storage allocation, I/O structure, I/O device, I/O control method, buffer, device independence, SPOOLing, device driver, disk structure and scheduling.

Recommended Textbooks/References:

1. Abraham Silberschatz, Peter Bear Galvin, Greg Gagn. Operating System Concept: Java Implementation. Higher Education Press.2010

2. Tanenbaum.A.S. Modern Operating System(3rd Edition). Mechanical Industry Press.2009
3. Fei Xianglin, Luo Bin, Sun Zhongxiu. Operating System Tutorials (4th Edition). Higher Education Press. 2008
4. William Stallings. Operating Systems Essentials and Design Theory (6th Edition). Mechanical Industry Press.2010.

Course Number: 0004864
Course Title: Cryptography
Credit: 2.5 **Total Credit Hours:** 40
Students: Major in Information Security
Prerequisites: Mathematics about Information Security
Evaluation Method: Written Exam
Course Description:
In this course, students are expected to systematically obtain a wide range of basic theory and methods of cryptography as well as how to apply cryptography into other aspects of information security. This course requires a solid understanding of basic concepts, basic theory, basic method and basic technology of related discipline. It includes single-key encryption algorithm(DES, IDEA), dual-key encryption algorithm(RSA, ECC), basic rule of key management, threshold key management, theory of identifying the integrity of the message, characters of hash function, FIPS standard, MD5 algorithm, principle of digital signature, basic digital signature algorithm, multiple digital signature algorithm, digital signature standard, mutual authentication theory and algorithm, Kerberos authentication protocol, X. 509 authentication protocol.
Recommended Textbooks/References:
1. Cai Yongquan. Network Security. Beijing: Beihang University press. 2006
2. Zhang Jie. Applied Cryptography Tsinghua University Press. 2007

Course Number: 0004859
Course Title: Computer Architecture
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer
Prerequisites: Principles of Computer Organization
Evaluation Method: Written Exam
Course Description:
"Computer Architecture" course is the Basic elective course which plays a very important role to develop students' abstract thinking ability and top-down, systems analysis and problem-solving abilities. Through this course, students will master the basic concepts of computer system structure and learn to use algorithms, hardware, and software to comprehensively survey, analyze and design computer system architecture from the view of high-rise buildings; cultivate students to analyze, assess and design a computer system on the view of cost performance ratio. It enables students to grasp the main design ideas and skills of contemporary rapid development of RISC technology; understand the advanced technology and design ideas of the structure of today's computer systems: including multi-core technology, MIPS and parallelism, scalability,

programmability etc.

Through this course, students will be able to combine software and hardware knowledge of "Computer Principles", "assembly language programming" and "operating system" thus, establish the full concept of the computer system.

Recommended Textbooks/References:

1. Fang Juan. Computer Architecture, Tsinghua University press. 2011.03
2. Li Xuegan. Computer Architecture, XiDian University press. 2011.11
3. David A. Patterson, John L. Hennessy. Morgan Kaufmann. 2007.8

Course Number: 0006188

Course Title: Routing and Switching Technology

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students majoring in Information Security and Computer Science

Prerequisites: Computer Network Foundation Course

Evaluation Method: Written Exam

Course Description:

Routing and switching is the core technology of computer network interconnection nowadays, mastering routing and switching technology is what a student of the information security major should have the basic professional qualities of. The "Routing and Switching technology" course is a specialized direction course of the information security major. The courses content consists of two parts of routing and switching: Routing, includes the router working principle, routing protocols, routing design, router configuration and basic troubleshooting knowledge and skills; switching, is the switch working principle, designing and configuring of virtual local area network, the principle of and the Spanning Tree Protocol. Studying this course, students can use routers and switches for network interconnection planning, design, configuration and management capabilities.

In teaching, this course uses a lot of web-based E-learning and E-Doing teaching methods. Students can be authorized to access the Website: http://cisco.netacad.net and the course site http://cisc.bjut.edu.cn, they will obtain a large number of teaching resources and participate in online tests and exams. In practice training, students need finish classroom experimental projects, in addition to, they can use a high-performance simulation software, Packet Tracer, to preview the experiment and simulation in extracurricular.

Recommended Textbooks/References:

1. Liu Jing, Lai Yingxu, Li Jian, Yang Shengzhi. Routing and Switching Technology. Tsinghua University Press. 2012
2. Graziani,R. Jihnson, A. Routing Protocols and ConceptsCCNA Exploration Guide. Post & Telecom Press. 2009
3. Wayne Lewis.Ph.D. LAN Switching and WirelessCCNA Exploration Guide. Post & Telecom Press. 2009
4. Todd Lammle. CCNA: Cisco Certified Network Associate Study Guide Sixth Edition. Publishing House Of Electronics Industry

Course Number: 0004874

Course Title: Network Security and Defense

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

Students: Undergraduate students majoring in Information Security

Prerequisites: Computer networks, Computer System Architecture

Evaluation Method: Open Book Exam

Course Description:

Network security experiments and their analysis description models are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of computer virus theory and experiments and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: a experimental guide for network security and defense, the design network security, and data disaster recovery and backup.

Recommended Textbooks/References:

1. CUI Baojiang. The experimental guide for network security and defense. BUPT University Press.
2. LAI Yingxu, ZHONG Wei. Theory and Experiments of Computer Virus. Tsinghua University Press. 2011
3. MERIKE Kaeo. Designing network security. Posts & Telecom Press. 2005
4. Wu Shizhong. Framework for information system security test. USTC University Press. 2006

Course Number: 0004881

Course Title: Network Design

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

Students: Undergraduate students majoring in Information Security and Computer Science

Prerequisites: Computer Network, Routing and Switching

Evaluation Method: Oral Exam

Course Description:

The students are expected to get basic requirement of network design from information system. They will learn how to get technique target, technique plan and implement procedure according to industrial standard. A group of students will complete a target for promoting organizing ability. The goal is get from other groups for advancing competitive ability. The basic topics include: the concepts and topological graph of Intranet, method of network design and network management, network plan of moderate and large Intranet, through which their abstraction and modeling abilities will be improved.

Recommended Textbooks/References:

1. CCDA Self-Study: Designing for Cisco Internetwork Solutions, Cisco Press. 2007
2. LAI Yingxu, ZHONG Wei. Computer Virus and defense technique, Tsinghua University Press. 2011
3. Merike Kaeo. Network Security Design, Posts & Telecom Press. 2005
4. WU Shizhong. Theory and Implement of Information Security Testing, USTC University Press. 2006

Course Number: 0004850

Course Title: Network Security Protocols

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

Students: Undergraduate students majoring in Information Security and Computer Science

Prerequisites: computer network foundation course, Routing and Switching Technology

Evaluation Method: Written Exam

Course Description:

Students can learn more about the security protocols and standards in the course. The course content is systematic introduction to the network layer, transport layer and application layer security protocols, including IPsec, SSL / TLS is the PGP, SSH, introducing a public key infrastructure (PKI) and virtual private network (VPN) technology. Students learn all kinds of security protocols and technology in the network, they can master the basic concepts and basic techniques of network security, and different environments and businesses require flexible use of different network security technology to protect the controllability and availability of the network, ensuring information confidentiality and integrity, but also providing strong support from many aspects for the follow-up practice and graduation design. Training practice enhances the students' perceptual on the IP layer, transport layer and application layer security protocols; analyzing problems ability, problem solving skills and linking theory and practicing ability will be trained, students will have self-innovation capability, as well as rigorous experimental attitude and the division of collaborative team spirit.

Recommended Textbooks/References:

1. Lai Yingxu, Yang Zhen, Liu Jing. Network Security Protocols. Tsinghua University Press. 2012
2. CraltonR.Davis. IPSec: Securing VPNs. Tsinghua University Press. 2000
3. Eric Rescorla. SSL and TLS Designing and Building Secure Systems. China Electric Power Press. 2002
4. TCP/IP Network Security. Science Press. 2003
5. William R.Cheswick. Network Security Essentials: Application and Standards. Tsinghua University Press. 2002

Course Number: 0004886

Course Title: Law about Information Security

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

Students: Major in Information Security and major in Science and Technology of Computer

Prerequisites: Thought Morals Tutelage and Legal Foundation

Evaluation Method: Written Exam

Course Description:

The object to offer this course is not only the demand of the discipline of information security itself but also the demand of completing students' knowledge structure. In addition, after studying this course, students can constraint their actions. In this course, students are expected to systematically obtain a wide range of the law about information security. This course requires a solid understanding of the law about information security, a good career moral and the ability of solving related issues, environmental, economical and social. It includes the concept of crime, the type of crime, computer crime, the rights about domain name, privacy, reputation and network

virtual property, electronic evidence, the Intellectual Property Law, the law about software intellectual property, electronic contract, electronic message, electronic signature, the legal validity of electronic message, the law about electronic signature.

Recommended Textbooks/References:

1. Mai Yonghao, Yuan Xiangzhu, Feng Huamin, Tu Hang. Law about Information Security (Second Edition) Wuhan: Wuhan University Press. 2008

Course Number: 0007379

Course Title: Basis of Content Security

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

Students: Undergraduate students major in Information Security

Prerequisites: Introduction to Computer Network

Evaluation Method: Written Exam

Course Description:

This course is a selection course. It plays an important role for educating students of information security major. It introduces the concepts, basis theory and main technology of content security. The students can learn network information capture method, text information extraction method and text processing method, text/image filtering and public feeling monitoring, watermark and copyright protection techniques and etc. It also introduces the new research results of content security. In a word, this course is very important for students' content security products designing and development ability.

Recommended Textbooks/References:

1. Li Jianhua. Information Content Security Management and Application. China Machine Press. 2010 July.
2. Ning Jiajun. Information Content Security. Guizhou Science Technology Press.2004 May.
3. Huang Xiaobin. Network Information Filtering Theory and Application. Beijing Library of Publishing House. 2005 July.

Course Number: 0007368

Course Title: Principle of Firmware

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students major in Information Security

Prerequisites: Advanced Programming Language III, Principle of Computer and Assembler II, Operating System Ⅳ

Evaluation Method: Without Test

Course Description:

Being the first software carried out by computer system at post stage, the firmware BIOS is responsible for initializing the hardware and booting the operating system. Therefore the BIOS is considered as a very important part of computer system and indispensable to research on information security.

The students are expected to understand the roles of firmware, architecture of firmware, basic concept of UEFI, architecture of UEFI and the responsibilities of main parts of UEFI. Through the

study of the course, the students can understand the working mechanism of computer on mainboard level, find out the whole concepts of firmware, grasp the method of developing BIOS. The main topics include: the concepts and structure of legacy BIOS and UEFI, the architecture and driver model of UEFI, PEI(Pre-EFI Initialization), DXE(Driver Execution Environment), security of plateform, the method of developing UEFI.

Recommended Textbooks/References:

1. Vincent Zimmer.Beyond BIOS: Developing with the Unified Extensible Firmware(second edition). Intel press. 2010
2. Unified Extensible Firmware Interface Specification. 2011.4

Course Number: 0004923

Course Title: Information Hiding

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

Students: Undergraduate students major in Information Security and other related professionals

Prerequisites: Image Processing or Signal Processing

Evaluation Method: Written Exam

Course Description:

Information hiding is the primary method of covert communication and intellectual property protection, research and application of being widely. Information hiding is different from traditional cryptography technology main research how to secret hidden in a secret information in the other publicly available information, and then by public transport to delivery of confidential information. Possible monitoring or unlawful interception, it is difficult to determine whether confidential information from public information exists, it is difficult to intercept confidential information, to ensure the security of confidential information. Extensive application of multimedia technology, for the development of information hiding technology provides a much wider area. Through this course of study, students on information hiding theory has a more comprehensive and system understanding, grasp the basic concept of information hiding, basic theory and methods, to engage in study and application of information science to lay a solid foundation.

Recommended Textbooks/References:

1. WANG Lina, ZHANG Huanguo. Information Hiding Technology and Application. Wuhan University Press. 2003

Course Number: 0007391

Course Title: Design and Analysis of Algorithms

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

Students: Undergraduate students major in Computer Science and Technology, Information Security and Internet of Things engineering

Prerequisites: Advanced Programming Language, Discrete Mathematics, Data Structures and Algorithms

Evaluation Method: Written Exam

Course Description:

Design and analysis of algorithm is one of the core problems in computer science. It is also an important undergraduate course in computer science, information security and Internet of Things. The content is some study of the non-numerical computing algorithms in computer and its related fields. Studying by this course, students will master the common methods of algorithm design and implementation (mainly including Divide and Conquer, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking algorithm), so as to solve more complex practical problems in the field of computer science and engineering applications in the future. In addition, basic introduction in analyzing and estimating time and space complexity of the algorithms, though not as the focus of this course, are also discussed.

Recommended Textbooks/References:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. Introduction to Algorithms (Third Edition). The MIT Press. 2009
2. Wang Xiaodong. The Design and Analysis of Computer Algorithms (second Edition). Electronics Industry Press. 2004
3. Udi Manber. Introduction to Algorithms: A Creative Approach. Addison Wesley Longman. 2010
4. Anany Levitin. Introduction to the Design and Analysis of Algorithms. Tsinghua University Press. 2005

Course Number: 0003485

Course Title: Digital Identification and Authentication System

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

Students: Undergraduate students major in Information Security and Computer

Prerequisites: Information and Coding Theory, Cryptography

Evaluation Method: Written Exam

Course Description:

Through this course, major technologies and basic principles of Digital Identification and Authentication System are introduced to the students. So the students can basically understand the technologies of digital signature, PKI, CA authentication, IBE and biometric authentication. More over, the students can also devise, implement and analyze practical digital identification and authentication system. Students must master basic concepts and basic theories of digital identification and authentication system. Details include: identification, authentication, data integrity authentication, symmetric key and asymmetric key algorithm etc. Further, students can master some classical protocols of digital identification and authentication. Details include: one way authentication protocol, two-way authentication protocol, three-way authentication protocol, group authentication, key agreement and distribution protocol etc. Last, students must master major architecture of digital identification and authentication. Details include: authentication architecture based on symmetric key (Kerberos), authentication architecture based on public key certificate, authentication architecture based on IBE etc.

Recommended Textbooks/References:

1. Cai Yongquan, Zhou Yihua, Jiang Nan, Yang Yuguang. Digital Identification and Authentication. Beijing: Beihang University Press. 2011.
2. Colin Boyd. Anish Mathuria, Protocols for Authentication and Key Establishment, Springer Press. 2003
3. Dobromir Todorov, Mechanics of User Identification and Authentication, Auerbach

Publications. 2007

Course Number: 0007356
Course Title: Operating System Security
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer and Information Security
Prerequisites: Operating System Principle
Evaluation Method: Written Exam
Course Description:
The operating system security is the basis of the upper layer application software running high reliability and information integrity, confidentiality. The security operating system evolution, mechanisms, and design are introduced by lectures in this course. The lectures basic topics include: the four progress process of the research on secure operation systems into foundation period, cookbook period, multi-policy period and dynamic-policy period; operation systems security mechanisms including dentity and authentication, access control, encryption mechanisms, auditing; secure operating system design principles, development methods, development process and its case study. Two experiments on the Linux system security are done by the students in this course, through which their understanding on the secure operating system relevant theoretical knowledge and their abilities to solve the problem of operating system security will be improved. The experiment basic topics include: building the Linux operating system security framework; assessment and analysis of the Linux system security issues by nessus vulnerability scanning software.
Recommended Textbooks/References:
1. JIA Chunfu, ZHENG Peng. Operating System Security. Beijing: Wuhan University Press. December 2006
2. QIN Sihan, LIU Wenqing, LIU Haifeng. Introduction to Operating System Security. Science Press. January 2003
3. LIU Kelong, FENG Chengguo, SHI Wengchang. Secure Operating System Principle and Technology. Science Press. July 2004
4. SHI Wengchang, LIANG Chaohui. Information System Security Introduction. Publishing House of Electronics Industry. March 2009

Course Number: 0004885
Course Title: Information Security Standard
Credit: 1 **Total Credit Hours:** 16
Students: Undergraduate students major in Information Security
Prerequisites: No Prerequisite
Evaluation Method: Written Exam
Course Description:
Typical home and abroad core information security standards, such as security requirements class, security construction and implementation class, security assessment class, security management class, are introduced in this course. The students are expected to understand the basic knowledge

and methods, through which their macro-control abilities will be improved. To have a basic understanding of the overall information security, this course requires students to grasp the background of the development of standards, related terms, the core content, relationship to the international and domestic field of information security, Specific knowledge, including basic concepts: Organization for Standardization, standardized meaning, international standards framework; fundamental concepts of classified protection: Connotation, the policy system, the standard system; core methods of classified protection: classification, design, implementation, evaluation, measurement, check; requirements of classified protection: physical, network, host, application, data, management.

Recommended Textbooks/References:

1. CHEN Zhongwen. Information Security Standards and Laws (second Edition). Wuhan University Press. 2011

Course Number: 0004863

Course Title: Introduction of Trusted Computing

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

Students: Undergraduate students major in Computer

Prerequisites: Cryptography, Computer Fundamentals, Operating System

Evaluation Method: Assessment Assignments

Course Description:

Introduce the concepts of trusted computing, the development status of trusted computing technology and standards, programming with trusted computing. The students are expected to understand the role of trusted computing in information security, know the basic design and program method of trusted computing. The basic topics include: the history and the target of trusted computing, trusted computing's basic concepts, related knowledge about trusted computing(include cryptology and computer architecture); TCG's trusted computing standard(TPM, TSS, TNC, etc.), TPM emulator environment building, TSS programming, the application instance of TCG trusted computing; the concepts of active trusted computing mechanism, introduce of Chinese trusted computing standard, Linux IMA mechanism, and the trusted computing mechanism in Operating system.

Recommended Textbooks/References:

1. Zou Deqing, Qiang Weizhong, Jin Hai. The Principles and Applications of Trusted Computing, Science Press. 2011
2. Zhang Huanguo, Zhao bo, etc. Trusted Computing, WuHan University Press. 2011
3. Feng Dengguo, Xu zhen, Zhang Liwu. Trusted Computing Platforms: Design and Applications, Tsinghua University Press. 2006
4. Shen Changxiang,.Information security, Electronic Industry Press. 2009
5. Trusted Computing Group, TCG Architecture Overview Version 1.4, 2007.8 http://www.trustedcomputinggroup.org
6. Trusted Computing Group, TCG Software Stack(TSS) Specification Version 1.2 2006.1 http://www.trustedcomputinggroup.org

Course Number: 0004892

Course Title: Application System Security

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

Students: Undergraduate students majoring in Information Security

Prerequisites: Database Security

Evaluation Method: Without Test

Course Description:

The course mainly introduces the security risks faced by the computer application system, the technics and methods relative with application system, including the technic of data storage and storage security, security solutions of application systems, and the implement of security solutions. Through the study of the course, the students can understand the key problem of designing security solutions of application systems, acquire the ability of observing security problem from the view of whole system.

Recommended Textbooks/References:

1. Christopher Steel, Ramesh Nagappan. Security Schema. Mechanical Industry Press. 2006
2. Zhou Jingli, Yu Shengsheng. The Principal and Technic of Network Storage. Tsinghua University Press. 2005

Course Number: 0004883

Course Title: The Security Technology of Wireless Networks

Credit: 1 **Total Credit Hours:** 16

Students: Undergraduate students majoring in Information Security and other related professionals

Prerequisites: Cryptography

Evaluation Method: Written Exam

Course Description:

Wireless networks can be divided into wireless LANs and mobile communication networks. Regardless of which wireless networks, they have high mobility, flexibility and scalability. The properties bring great convenience for people. However at the same time, special nature of the network of electromagnetic waves in an open, data processing and application of more and more businesses, also led to a wired network security is not an issue. Security issues have become a major obstacle to the application of wireless network technology and universal.

This course is a selected undergraduate course for information security professional. Through this course of study, students on the wireless network and security have a more comprehensive understanding, grasp classification and basic principles of the various categories of wireless network and wireless security in a network environment, to adapt to evolving in the future work and life lay the foundations of wireless networking applications.

Recommended Textbooks/References:

1. JIANG Nan, WANG Jian. Mobile Network Security Technology and Application. Electronics Industry Press. 2004

Course Number: 0004852

Course Title: Firewall Technology

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

Students: Undergraduate students majoring in Information Security or Computer Science

Prerequisites: Computer Network Fundamentals

Evaluation Method: Written Exam

Course Description:

The students are expected to understand the basic concepts, theories, methods, and techniques of Firewall Technology and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: the concepts, deployment, function, and policies of Firewalls, basic approaches and limitations of firewalls, packet filtering, circuit proxy, and application proxy, Firewall architecture, bastion host Principles and Technologies, the DMZ principle, the screening router, the dual homed gateway, the screened gateway, the screened subnet, and the "belt-and-suspenders" firewall, Firewall design and configuration examples, Firewall management and testing.

Recommended Textbooks/References:

1. Wes Noonan (Author), I do Dubrawsky. Firewall Fundamentals. Cisco Press. June, 2006.
2. V. V. Preetham. Internet Security and Firewalls (Networking). Tsinghua University Press. June, 2004.
3. Keith E.Strassberg, Richard J.Gondek, Gary Rollie. Firewalls:The Complete Reference. China Machine Press. March, 2003.

Course Number: 0004857

Course Title: Defense of Computer Viruses

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

Students: Undergraduate students majoring in Information Security

Prerequisites: Computer networks, Computer System Architecture, Network Security Protocol

Evaluation Method: Open Book Exam

Course Description:

Virus theory, experiments and their analysis description models are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of computer virus theory and experiments and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: introduction to computer viruses, the analysis of computer virus architecture, network attack methods, anti-virus theory and experiments.

Recommended Textbooks/References:

1. LAI Yingxu, ZHONG Wei. Theory and Experiments of Computer Virus. Tsinghua University Press. 2011
2. FU Jianming, PENG Guojun. Analysis of Computer Virus. Wuhan University Press. 2011

Course Number: 0004848

Course Title: Windows Programming Fundamentals

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

Students: Undergraduate students major in Computer Science and Technology and Information Security

Prerequisites: High Language Programming, C++ Language Programming（Z）

Evaluation Method: The final score is composed of written examination and course design, with proportion of 6:4.

Course Description:

This curriculum is a basic compulsory course for the undergraduate of major in computer science and technology. And it is also a self-study course. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C++ language programming. So that students can use the C++ language to give a simple solution to the problem, and apply the idea of object-oriented programming. And let students master the basic program debug techniques and form the habit of standard programming.The courses is done through self-sdudy, group learning, looking for information, programming exercises. The curriculum emphasizes students' autonomous learning ability and comprehensive abilities, including students to complete the task the planning, self-control, perseverance of learning, discovery and problem-solving ability, summarized the capacity and ability to find information, seek helpcapacity and capacity-building of unity and cooperation. Knowledge points include: Windows Programming Overview, Win32 programs running, Message Mapping, Menu, Toolbar, Statusbar, Dialog, CDC, Serialization and Data Access. The curriculum emphasizes students' autonomous learning ability and comprehensive abilities.

Recommended Textbooks/References:

1. REN Zhe.MFC Windows Application Design. Tsinghua University Press. 2004.1
2. SUN Xin.VC++ In-depth Details. Electronics Industry Press. 2006.6
3. Jeff Prosise. MFC Windows Programming (Second Edition) (English). Tsinghua University Press. 2007
4. Microsoft Corporation. MFC and Windows Programming (Second Edition) (English photocopy version), Peking University Press. September 2000

Course Number: 0000631

Course Title: Digital System Design

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

Students: Undergraduate students majors in Computer

Prerequisites: Digital Logic, Microcomputer Principle

Evaluation Method: Written Exam, Practical Assignment, Labs

Course Description:

Digital System Design is a practical method class. Through courses, training students' ability to the digital system design on large-scale programmable integrated circuit (FPGA). Requires students to understand the basic engineering approach in the typical electronic design automation (EDA)—design, synthesis, simulation and debugging, etc., have complete control of a hardware description language. Mainly covers are: present and future of digital system design method; various modeling methods based on Verilog hardware description language (HDL) ; electronic design automation (EDA) process; digital system design examples and common means. Experiment, with an emphasis on digital system design of man-machine interface, On EDA experiment platform, to completion of shake, reuse, hand shake, dynamic display elements, and

thus complete a digital clock design.

Recommended Textbooks/References:

1. WANG Jinming. Verilog-HDL Programming Tutorial, Beijing: Posts & Telecom Press. 2004
2. ZHANG Youzhi. Programmable Logic Device PLD Principle and Application, Beijing: China Railway Press. 1996
3. LIU Bo. Proficient in Verilog-HDL language programming, Beijing: Electronics Industry Press. 2007

Course Number: 0007386

Course Title: Introduction of Software Engineering

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

Prerequisites: Advanced Programming Language, Data Structure and Algorithm, Database

Evaluation Method: Non-Written Exam

Students: Undergraduate students major in Information Safety

Course Description:

Software Engineering is one of the core courses for information safety major of high level institutes and universities. It focuses on how to use the theory of computer science, mathematics and management during the development of software, and borrows the principles and approaches of traditional engineering for improving the quality of software and decreasing the price of development. Through the learning of this course, the students should know about the development process of software engineering, and master the knowledge required as a software engineer. The course includes the concepts, technologies and approaches of software engineering, and how to use those technologies and approaches for designing and developing high quality software and managing software project. After this course, the students will have abilities for designing and developing real software system, and make strong foundation for practice and theory of software engineering.

Recommended Textbooks/References:

1. Zheng Renjie, Ma Suxia, Yin Renkun. The Introduction of Software Engineering. Mechanical Industry Press. 2010
2. Shari Lawrence Pfleeger, Joanne M.Atlee. Software Engineering Theory and Practice (the 4th edition). Prentice Hall. 2009
3. Ian Sommerville. Software Engineering 9. Addison-Wesley. 2010

Course Number: 0005685

Course Title: Digital Image Processing

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

Students: Undergraduate students major in Computer Science

Prerequisites: Calculus, Linear algebra

Evaluation Method: Written Exam

Course Description:

Digital image processing is focused on how to improve quality of digital images, understand image content, and compress images. Digital image processing has important applications in a

variety of domains, such as consumer electronics, human-computer interface, robotics, military and medicine. The students will be required to understand the basic knowledge and techniques of digital image processing, and master the skills of implementing basic digital image processing algorithms. Topics covered are: image digitization, image representation, image histogram, components of image processing systems; continuous and discrete Fourier transformation, convolution, discrete consine transformation; histogram enhancement, image smoothen, image sharpen; image segmentation; mathematical morphology; edge detection, Hough transformation; shape and texture features; image coding.

Recommended Textbooks/References:

1. R.C.Gonzalez et al. Digital Image Processing (third edition). China Electronic Industry Publishing House. 2011
2. Zhang Yujing. Image Processing and Analysis (in Chinese). Tsinghua University Press. 2005

Course Number: 0007399

Course Title: Performance and Security Testing on Information System

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

Students: Undergraduate students majoring in Information Security and Computer Science

Prerequisites: Introduction to Computer Network, Experiments on Basis of Computer Networks, Routing And Switching Technology

Evaluation Method: Written Exam

Course Description:

Performance and security testing on the networks and software are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of information system testing, through which their abilities of applying the theoretical knowledge to the reality will be improved. The basic topics include: the current performance and security testing methods and tools on the networks and the software; network performance testing concepts and methods; network layer performance testing, factors and related documentations; routing protocol testing methods. Testing methods on the transport, session, presentation and application layer; testing methods on the common network protocols. QoS testing concepts and methods; security oriented testing concepts and methods; firewall and intrusion detection; software testing methods.

Recommended Textbooks/References:

1. LIN Chuan, SHI Xiaoqiu, HU Bo etc. Network Performance Testing and Analysis. Higher Education Press. 2009
2. SU Sixi. Communications Network Performance Analysis. Beijing University of Posts and Telecommunications Press. 2006

Course Number: 0005698

Course Title: Software Quality Management and Testing

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

Students: Undergraduate students major in Computer

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

Evaluation Method: Paper

Course Description:

Software quality management, software testing techniques, and some typical cases are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of software quality management and software testing. The basic topics include: the content of software quality management, the factors influencing software quality, the principle of software quality assurance, and the metrics model of software quality; the definition, objective, process, and principle of software testing; black box testing and white box testing; the principle of software automation testing, and the classification and choice of automated software testing tools; software testing process includes unit testing, integrated testing, and system testing; software testing plan, testing report, and testing management.

Recommended Textbooks/References:

1. ZHU Shaomin. Software Testing. Posts & Telecom Press. 2009
2. CAI Jianpin. Experiment Instruction Tutorial on Software Testing, Tsinghua University Press. 2009
3. Ron Patton. Software Testing (2nd Edition). China Machine Press. 2006

Course Number: 0004871

Course Title: Database Security

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

Students: Undergraduate students majoring in Information Security

Prerequisites: Principal of Database

Evaluation Method: Without Test

Course Description:

With the development of information technology, people become increasingly dependent on IT. Meanwhile, information security issues become increasingly serious. The database system is the core part of information storage and processing and the database security occupies a key position in the entire information security architecture. Therefore it is one of the most pressing challenges to solving database security.

Through the study of the course, the students are expected to understand the main security problem of database, the technic of improving database security, evaluation criteria of database security, and security features of classic DBMS. The main topics includes: concepts of database security, security model, multi-security database, inference analysis, covert channel analysis, design and implement of security database.

Recommended Textbooks/References:

1. Zhang min, Xu zhen. Database Security. Science Press.2005

Course Number: 0003484

Course Title: Introduction to Data Mining

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

Students: Undergraduate students major in Computer, Information Security and Internet of things

Prerequisites: Discrete Mathematics, Data Structures and Algorithms, Database Systems Principles

Evaluation Method: Written Examination

Course Description:

Data mining is concerned with the extraction of novel knowledge from large amounts of data. Data mining is a broad area that integrates techniques from several fields including machine learning, statistics, pattern recognition, artificial intelligence, and database systems, for the analysis of large volumes of data. This course introduces and studies the concepts, issues, tasks and techniques of data mining. Topics include data preparation and feature selection, association rules, classification, clustering, evaluation and validation, scalability, spatial and sequence mining, and data mining applications. The course is suitable for undergraduate senior students and graduate students.

Recommended Textbooks/References:

1. Pangning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining, The People Post and Telecommunications Press, 2006
2. Jiawei Han, Micheline Kamber. Data Mining: Concept and Technology(2nd Edition), Machinery Industry Press, 2006

Course Number: 0005683

Course Title: Pattern Recognition

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Mathematics, Linear Algebra, Probability and Statistics

Evaluation Method: Algorithm Design and Implementation

Course Description:

This course systemically introduces the classic algorithms in pattern recognition, with focus on statistical pattern recognition, including statistical decision-making theory, i.e., Bayesian decision making theory based on posterior probabilities and based on risk; Bayesian Classifier under multivariate Gaussian distribution; the probability density function estimation; discriminant analysis; *k*-NN algorithm; clustering scheme as well as feature extraction and selection method, etc. Besides the fundamental principles in statistical pattern recognition, the course also incorporates their typical applications in order to make the students better understand and learn the obscure theories of pattern recognition and gain the ability to design and implement certain classifiers. This course will be expected to improve the students' logical and abstract thoughts simultaneously.

Recommended Textbooks/References:

1. Zhang Xuegong. Pattern Recognition (3rd Edition). Tsinghua University Press. 2010
2. Richard. O. Duda, Peter E. Hart, David G. Stork. Pattern Classification (2nd Edition). China Machine Press. 2004
3. S.Theodoridis, K Koutroumbas. Pattern Recogntion (4th Edition). China Machine Press. 2009

Course Number: 0007402

Course Title: Mobile Internet Application Security

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

Students: Undergraduate students majoring in Information Security and Computer Science
Prerequisites: Computer Networks, Routing and Switching, Security Protocols
Evaluation Method: Written Exam
Course Description:
The students are expected to learn basic concepts of mobile terminal, architectures and key security technology. They also will know future study of mobile terminal security. The basic topics include: the introduction of mobile terminal, Windows phone 7 operation system security, Android security, IOS security, access security of mobile community network, through which their abstraction and modeling abilities will be improved.
Recommended Textbooks/References:
1. HUANG Xiaoqing. Smart Terminal Security of Mobile Internet. Publishing House of Electronics Industry.2011

Course Number: 0007365
Course Title: Practice for High Level Language Programming
Credit: 1.5 **Total Credit Hours:** 45
Prerequisites: High Language Programming Ⅲ
Evaluation Method: The final score is composed of coding, report writing and Oral Examination by a certain percentage.
Students: Undergraduate students major in Computer Science and Technology, Information Security.
Course Description:
The teaching objective of this curriculum is to make the students developing the abilities to use what they learn from high language programming courses to solve practical problems. Teachers should focus on training students' rigorous work attitude, understanding the methods of structured programming, developing their good programming habits. So that students can master the main method of structured programming. Learning through this curriculum, students should be able to understand the basic development process of structured programming, master basic skills in compiling and debugging programs written in C language. The curriculum emphasizes the ability of the students. For students in the experimental classes, It should focus on training their spirit of innovation and fully exploiting their innovative potentials.
The curriculum requires students to analyze, design, compile, debug, and test programs written in C language as well as write a practice report according to requirements.
Recommended Textbooks/References:
1. LIAO Husheng, YE Naiwen, ZHOU Jun.C Language Programming Case Tutorial (Second Edition). Posts and Telecom Press. 2010.9
2. LI Wenxin. Programming Guidance and Online Practice. Tsinghua University Press. 2007.7
3. Brian W.Kernighan,Dennis M.Ritchie. C Programming Language (English) (Second Edition). Mechanical Industry Press. 2006.8
4. P.J.Deitel,H.M.Deitel. C University Tutorial (Fifth Edition)(English). Publishing House of Electronics Industry. 2010.5

Course Number: 0007384
Course Title: Cognitive Practice
Credit: 1 **Total Credit Hours:** 30
Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Attendance (50%) and Report (50%)
Course Description:
Cognitive practice aims to enhance students' awareness of professional visit with a professional enterprise , inter-school exchanges, seminars with experts in the field, so that students understand learning the relationship between the content of the actual work in related fields with the school of professional related fields of development trends and 'state-of-art', as well as students' future employment situation.
Cognitive practice includes three parts:
Enterprises and universities visiting parts: all visiting will provide students with a preliminary understanding of the relationship between enterprises and their majors; understand the College in the professional direction of the main research activities and results; as well as their counterparts in the universities' teaching.
Teacher Seminars parts: the combined activities of the first part of the teacher to explain related to knowledge and technology, as well as with the university is about learning courses or practice.
The teacher-student discussion sections: head teachers and counselors held a discussion with the students to complete the learn transition from high school to university smoothly.
Recommended Textbooks/References:
None

Course Number: 0002380
Course Title: Experiments in Digital Logic
Credit: 0.5 **Total Credit Hours:** 12
Students: Undergraduate students major in Computer
Prerequisites: Digital Logic
Evaluation Method: Experiment
Course Description:
Experiments in Digital Logic is a basic professional course for the undergraduate students who major in Computer. It is very practical. Through studying this course, the students can strengthen, deepen and broaden the learning of Digital Logic. The students are expected to understand the design flow and design the logic circuit based on Quartus II software and programmable logic device. They are expected to learn the top-down design method. They are also expected to learn how to analyze, design, and debug the circuit and how to exclude the faults of circuit. This course can improve the patient and serious research style during the whole experiments and develop the practice ability and the quality of unity and cooperation. At the same time, the course can encourage innovation, through the design and comprehensive experimental projects, their abilities solving problems will be improved. It also can lay a good foundation for the following professional course and the digital system design work which they will engage in after graduate from their university.
Recommended Textbooks/References:

1. ZHANG Lirong. An Experiment Course in Digital Logic Based on Quartus II. Tsinghua University Press. 2009

Course Number: 0007376
Course Title: The Experiments in Computer Organization Principle
Credit: 0.5 **Total Credit Hours:** 12
Students: Undergraduate students major in Computer
Prerequisites: Digital Logic
Evaluation Method: Experiments
Course Description:
The Experiments in Computer Organization Principle is a major practical course for Undergraduate students major in Computer. The students are expected to understand the basic concepts, theories, methods, and techniques of the related theory courses, apply the knowledge to solve practice problems and to finish actual design. Through finishing the experiments in components of the computer, they will master the organization principle and work principle of components of the computer, strengthen and expand the contents of Computer Organization Principle, train the ability of hardware design and prepare for the study of the following professional courses. The experiments are completed by using the popular EDA design technique and based on programmable FPGA platform. The basic experiments include: design and implementation of register, design and implementation of arithmetic logic unit, design and implementation of memory, the data transfer between register, arithmetic logic unit and memory through the bus.
Recommended Textbooks/References:
1. ZHANG Liyan. An Experiment Course in Computer Organization Principle.

Course Number: 0002761
Course Title: The Curriculum Design for Data Structure
Credit: 2 **Total Credit Hours:** 60
Students: Undergraduate students major in Computer
Prerequisites: Advanced Programming Language, Discrete Mathematics
Evaluation Method: Machine Test
Course Description:
The design practice for the data structure course is a comprehensive teaching practice process. Its purpose is to allow students to apply their 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. 2008.6
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press. 1997.4
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
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of Electronics Industry. 2003.10

Course Number: 0006187

Course Title: Experimental Basis of Computer Networks

Credit: 1 **Total Credit Hours:** 24

Students: Undergraduate students majoring in Information Security and Computer

Prerequisites: Introduction to Computer Network

Evaluation Method: Classroom Exam

Course Description:

Networking related Basic Methods and Technologies are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of networking, through which their abilities of applying the theoretical knowledge to the reality will be improved. The basic topics include: the access and configuration of the routers and switches; wiring harness of the Unshielded Twisted Pair; VLAN configurations; planning and cabling networking; static routing protocols configuration; dynamic routing protocols configuration of the RIP/EIGRP/OSPF; standard and extended access control configuration.

Course Number: 0002556

Course Title: Design of System Software Project

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

Students: Undergraduate students major in Computer Science and Technology and Information Security

Prerequisites: Principle of Operating System

Evaluation Method: Demonstration, Presentation and Design Documents

Course Description:

The aim of this project is to further deepen students' understanding about the design idea and implementation mechanism about OS, and to cultivate their ability to analyze, make design and program on the level of system software. Three optional modules are included in it. The first module requires students to analyze OS source code of Linux operating system and select one of the following tasks: Linux boot process, Linux memory management, Linux process control,

Linux timer and process schedule, Linux process communication. The second optional module requires students to implement related OS algorithm including process schedule, memory management, disk schedule. The third module requires students to develop several kernel modules for Pintos system. Pintos is an incomplete operating system and some major modules are missing, or there is merely a simple implementation version. This module requires students to design and implement one of the following modules for Pintos including process schedule based on process priority, system call and user's program's execution, virtual memory system, File system.

Recommended Textbooks/References:

1. Guide of Design of System Software Project. Electronic Materials.2012
2. MAO Decao, HU Ximing. Analysis of Linux Kernel Source Code. Hangzhou: Zhejiang University Press.2006
3. FEI Xianglin, LI Min, YE Baoliu. Reference Book of Theory of Formal Languages and Automata (second Edition). Tsinghua University Press. 2007
4. PANG Liping, ZHENG Ran. Principle of Operating System and Linux Experiments. China Machine Press. 2011

Course Number: 0004851

Course Title: Security Protocols Design

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

Students: Undergraduate students majoring in Information Security and Computer

Prerequisites: Network Security Protocols

Evaluation Method: Written Exam

Course Description:

The security protocol course focuses on practice; a lot of knowledge requires students to integrate real-life scenes to provide understanding. The course enables students to deepen their understanding of theoretical knowledge in practice, and enhance their ability to solve practical problems. Students can understand security protocol working principles and various protocols in practical application. Through the application of various protocols to find their advantages and disadvantages, their abilities to further improve the development of various protocols will be enhanced.

This course is designed using classic security protocols and security analysis, so that students can fully understand the origin of a problem, how to put forward the question, and also how to solve the problem. By doing so the problem can be solved in order to fully grasp a set of scientific designs of security protocols. Students are able to abstract the specific, develop logical thinking skills and problem-solving skills in practice.

Recommended Textbooks/References:

1. Lai Yingxu, Yang Zhen, Liu Jing. Network Security Protocols. Tsinghua University Press. 2012
2. JazibFrahim, Omar Santos. Cisco ASA All-in-one Firewall, IPS, Anti-X and VPN Adaptive Security Appliance. Post & Telecom Press. 2010
3. David Hucaby. Cisco ASA,PIX,and FWSM Firewall Handbook. Post & Telecom Press. 2010

Course Number: 0007367
Course Title: Professional Practice
Credit: 8 **Total Credit Hours:** 8 weeks
Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Report
Course Description:
This course is the Practice Training of Information Security major. Through practicing students can further integrate knowledge, better combine theory and practice; they exercise their own ability to operate in practice.
Practice is divided into three stages: (1) practice preparation stage: the main content of this stage is the practical preparation. The main task is to mobilize students to actively participate in the practice, to define practical objectives and requirements, to determine the team members and instructor; instructor and student contact with the company to build relationships; they determine practice content and arrangement together. (2) Practice stage: This stage requires students to enter the company, Company management arranges asks to students; instructor observes and understands students' practical process, assist to take part in practice process. (3) Final stage: this stage requires students to write practice summary, to communicate within the group and group, and summarize the experience of practice and inadequate.

Course Number: 0005687
Course Title: Graduation Project (Thesis)
Credit: 16 **Total Credit Hours:** 480
Students: Undergraduates in Computer Science (include Experiment class) and Internet of Things Engineering, major in Information Security
Prerequisites: All courses that in the three majors above
Evaluation Method: With the supervision, based on the selected project title, follow the requirements to complete the project and dissertation, finally pass the oral examination.
Course Description:
Graduation Project (Thesis) is the last important step of the undergraduate cultivation, it is the process that students deepening the knowledge and experiences, it is a summary of students' research and experiment; it is also a comprehensive evaluation of students' creative thinking, the overall quality and practical ability. It is an important basis of the argument of graduation and degree qualifications; also it is the important content that measures the educational quality and efficiency.
From the Graduation Project (Thesis), not only make the students understand the related knowledge and skills, but also the learning and research methods that can be applied in the practical applications. Graduation project given by the supervisors, students will complete independence from access to information, to complete the design and implementation, writing of the related graduation project report design processes.
Recommended Textbooks/References:
References depend on the title of the Project

Course Number: 007357

Course Title: Application of Operating System Security Object

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

Students: Undergraduate students major in Computer

Prerequisites: Operating System

Evaluation Method: Non Written Exam

Course Description:

By introduction Windows operating system's security model, such as operating systems security object, users and roles, process token, strategy of access control and privilege assignment, Window Workstation, window of program. Students are required to manage the content and use of some Windows security object, such as security descriptor of file and directory, internal processing of access control, privilege setting and modifying of file and directory, and manage to get display and keyboard input information of window and prevent unauthorized access to this information. Programming for building security access to file and directory, and protect window from threat to meet the request of application.

Recommended Textbooks/References:

1. LiuTao, Li Yizhou. Program Windows Security, Beijing: China Electric Power Press. 2004
2. Keith Brown. Program Windows Security, Addison Wesley. 2000

Course Number: 007355

Course Title: Development of UEFI BIOS

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

Students: Undergraduate students major in Information Security

Prerequisites: Advanced Programming Language III, Principle of Computer and Assembler II, Operating System Ⅳ, Principal of Firmware

Evaluation Method: without test

Course Description:

Being the first software carried out by computer system at post stage, the firmware BIOS is responsible for initializing the hardware and booting the operating system. Therefore the BIOS is considered as a very important part of computer system and indispensable to research on information security.

The students are expected to grasp the basic process of developing UEFI BIOS, configuring method of developing environment, the whole structure of UEFI BIOS, customizing method of UEFI BIOS, and developing method of EFI driver and application. Through the experiment, the students can understand the working mechanism of computer on mainboard level, find out the whole concepts of firmware, and acquire the ability of developing UEFI BIOS. The course includes 5 experiments: the basis of development, the developing of driver, the developing of RAM Disk, the developing of Secure USB disk and the developing of FTP.

Recommended Textbooks/References:

1. Vincent Zimmer. Beyond BIOS: Developing with the Unified Extensible Firmware (second edition).Intel Press. 2010
2. Unified Extensible Firmware Interface Specification. 2011.4

Course Number: 0007393
Course Title: Network Security Configuration Practice
Credit: 0.5 **Total Credit Hours:** 15
Students: Undergraduate students majoring in Information Security and Computer Science
Prerequisites: Information Security Testing
Evaluation Method: Oral Exam
Course Description:
The students are expected to learn basic concepts of network testing, with which they can scan network vulnerabilities, and solve some practice network security problems. The basic topics include: theory of network security testing, how to build a testing envelopment and how to test network security using testing instruments, through which their abstraction and modeling abilities will be improved. The students should be well prepared before the tutor publishes a testing subject. A report should be submitted when the testing has been finished.

Course Number: 0007403
Course Title: Application Security Testing Practice
Credit: 0.5 **Total Credit Hours:** 15
Students: Undergraduate students majoring in Information Security and Computer
Prerequisites: Information Security Testing
Evaluation Method: Oral Exam
Course Description:
The students are expected to learn how to use the source code security test tool—Fortify. They will test security and debug a demo source code based on code test theory. The basic topics include: theory of code security testing, how to build a testing envelopment and how to test code security by using Fortify, through which their abstraction and modeling abilities will be improved. The students should be well prepared before the tutor publishes a testing subject. Before testing, students should finish coding a demo program, which they will test using Fortify. A report should be submit when the testing have finished.

Course Number: 0007373
Course Title: Principles of Computer Organization
Credit: 1.5 **Total Credit Hours:** 45
Students: Undergraduate students major in Computer
Prerequisites: Principles of Computer Organization
Evaluation Method: Practical Assignment and Project Report
Course Description:
Principles of Computer Organization Project is a practical course which is established for students to practice computer design after the course of principles of computer organization is opened up. The purpose of this course is to design, realize and debug a simple model machine based on EDA platform. At first, all computer components are designed and implemented, and then the control unit is realized which ensures all parts cooperate to complete the instruction function in accordance with the current instruction requirement, and finally the waveform simulation or

hardware download validation is implemented. The students can understand preferably the knowledge about computer organization which are taught in class, set up the concept of the entire computer, deepen our understanding of the computer concept of "time and space". And at the same time the students can learn how to design, implement, test the entire computer system, improve the ability to analyze and solve problems, lay a solid foundation for improving the students' computer hardware practical capability.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press. 2009
2. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Practice Tutorial of Computer Organization Principle –Based on EDA Platform. Beijing Aerospace University Press. 2006

Course Number: 0004752

Course Title: High Level Language Programming

Credit: 4 **Total Credit Hours:** 64

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

Prerequisites: None

Evaluation Method: The final score is composed of written examination, course design and homework by a certain percentage.

Course Description:

This curriculum is a required course for Undergraduate students who are major in computer science and technology, information security and internet of things engineering profession. This is the student's first curriculum for learning high language programming. It is a follow-up courses to learn the necessary foundation courses. The teaching objective of this curriculum is to make the students understanding and mastering the basic concept, the basic method and the basic skills of C language programming. So that students can use the C language to give a simple solution to the problem, and establish the preliminary calculation mode of thinking. Teachers should focus on teaching the students understand the methods of structured programming, training students to write and debug programs, developing good coding habits, stimulating students' great interests in learning Programm Design. The curriculum emphasizes the ability of the students.

Recommended Textbooks/References:

1. LIAO Husheng, YE Naiwen, ZHOU Jun.C Language Programming Case Tutorial (Second Edition). Posts and Telecom Press. 2010.9
2. LI Wenxin. Programming Guidance and Online Practice. Tsinghua University Press. 2007.7
3. Brian W.Kernighan,Dennis M.Ritchie. C Programming Language (English) (Second Edition). Mechanical Industry Press. 2006.8
4. P.J.Deitel,H.M.Deitel. C University Tutorial (Fifth Edition) (English). Publishing House of Electronics Industry. 2010 .5

Course Number: 0007110

Course Title: Introduction to the Internet of Things

Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in IoT Engineering
Prerequisites: No
Evaluation Method: Written Exam
Course Description:
Core technologies related to the Internet of Things, such as sensor layer technologies, network layer technologies, management service layer technologies and integrated application layer technologies. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of the IoT engineering to act as a basis of the continuing courses. The basic topics include: technologies related to sensor layer, such as automatic recognition technology and RFID, sensor technology, locating technology and intelligent information equips; technologies related to network layer, such as the Internet, wireless broadband network, wireless slow network, mobile communication network; management server layer technologies, such as database management system, large scale information storage, search engine, intelligent decision, information presentation and exchange, information security and privacy in the IoT; and examples in integrated application layer.
Recommended Textbooks/References:
1. LIU Yunhao. Introduction to Internet of Things. Tsinghua University Press.2010

Course Number: 0007388
Course Title: Data Structures and Algorithms
Credit: 4 **Total Credit Hours:** 64
Students: Undergraduate students major in Computer
Prerequisites: Advanced Programming Language, Discrete Mathematics
Evaluation Method: Written Exam
Course Description:
Data structures and algorithms is the discipline which is faced to the non-numerical treatment problem. The main purpose is to develop the students' professional ability of computational thinking, systems analysis and design, algorithm design and analysis, program design and implementation. The main content involves the basic data structures, sorting, indexing, retrieval and advanced data structures. From the point of view of the logical structure, the subject introduces a variety of basic data structure, such as the linear table, string, binary tree, the tree and map. From the perspective of the algorithm, it introduces the various types of sorting, retrieval and indexing algorithm. From the application point of view, it introduces some of the more complex data structures and algorithm analysis techniques. Through this course, students should master the basic concepts of data structures and algorithms, the basic methods of rational organization of data, efficient data processing algorithms, and have the ability to choose the appropriate data structure and algorithms when they are faced to the practical problems.
Recommended Textbooks/References:
1. Zhang Ming,Wang Tengjiao, Zhao Haiyan. Data Structure and Algorithm. Beijing. Higher Education Press. 2008.6
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press. 1997.4
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
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of Electronics Industry. 2003.10

Course Number: 0007377
Course Title: Discrete Mathematics
Credit: 4 **Total Credit Hours:** 72
Students: Undergraduate students major in Internet of Things Engineering
Prerequisites: Linear Algebra
Evaluation Method: Written Exam
Course Description:
Discrete Mathematics, discussing about discrete data structure, is one of the most important mathematical courses for students major in computer. Set, Graph Theory, Algebra and Logic are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of discrete mathematics and the related problem solving methods, through which their creative and mathematical reasoning abilities will be improved. The basic topics include: the concepts of discrete mathematics. set, basic operations of the set; binary relation, equivalence relation and partition, partial ordered set and Hasse diagram; functions, composite functions, inverse functions; connected graphs, Dijkstra's algorithm; Eulerian graphs, Hamiltonian graphs, trees, bipartite graphs, plane graphs; semigroups, monoids, groups, subgroups, cosets and Lagrange's theorem; rings, fields, lattices, Boolean algebras; propositions, connectives, well-formed formulas (wff), propositional equivalences, full disjunctive normal forms and full conjunctive normal forms; predicates, quantifiers, prenex normal forms, rules of inference.
Recommended Textbooks/References:
1. SHAO Xuecai. Discrete Mathematics, Publishing House of Electronics Industry. 2009
2. SHAO Xuecai, YE Xiuming. Discrete Mathematics, China Machine Press. 2011
3. Bemard Kolman, Robert C. Busby, Sharon Cutler Ross. Discrete Mathematical Strutures, Higher Education Press. 2006

Course Number: 0005686
Course Title: Digital Logic
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students major in Computer
Prerequisites: None
Evaluation Method: Written Exam
Course Description:
Digital Logic is a specialized basic course. Based on introducing of the basic theory of digital logic, HDL (Hardware Description Language), the analysis and design of the combinational logic circuits and the synchronous sequential logic circuits, the following ability are expected which are

mastering the concept and model of basic digital circuits, correctly using the logical tools and methods, and having the good ability of circuit design and analysis, mastering the modeling method based on HDL for the modern digital electronic system. The basic knowledge about digital logic, such as concepts, theories, methodologies, technologies and skills is expected. The main topics in the course include: 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.

This course has a stronger practical character, closely combining with "digital logical experiment" which a course is arranged the term with the same the former.

Recommended Textbooks/References:

1. JIA Xibin, WANG Xiujuan, WEI Jianhua. The basis of digital logic and Verilog hardware description language. Beijing: Tsinghua University Press. 2012
2. PENG Jianchao. Logic analysis and design of digital circuits. Beijing: Beijing University of Technology Press. 2007
3. BAO Jiayuan, MAO Wenlin. Digital Logic (second edition), Beijing: Higher Education Press. 2002
4. John F. Wakerly. Digital Design Principles and Practices(Fourth Edition), Prentice Hall Inc. 2005

Course Number: 0007739

Course Title: Principles of Computer Organization

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students major in IoT Engineering

Prerequisites: Digital Logic

Evaluation Method: Written Exam

Course Description:

In this course, the students are expected to understand the computer organization and principle of each function component, establish the entire machine concept, learn computer system design and its related technologies, and master the assembler language instruction system function, format, addressing mode, etc. The basic topics include: the hierarchy of the computer system hardware or software and the key performance indicators; fixed point and floating point data representation; the addition, subtraction, multiplication, division for the fixed point and floating-point data; ALU basic structure; Intel8086 hardware structure, addressing techniques, Intel8086 addressing mode, Intel8086 commonly used instructions; Intel8086 assembly language data and operator, Intel8086 assembly language pseudo instructions; The general structure of the central processor, the instruction process, the micro-operation control signal and the combinational logic control component design; Level 3 storage system, memory classification, DRAM dynamic refresh mode, the expansion of the main memory; the basic function and composition of input/output system, program interrupt mode, DMA mode, channel and IOP control mode.

Recommended Textbooks/References:

1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler

Language. Tsinghua University Press. 2009
2. Feng Yuanzhen. Principles of Computer Organization and Assembler Language Programming. Publishing House of Electronics Industry. 1999
3. David A.Patterson,John L.Hennessy. Computer Organization and Design. China Machine Press. 2010

Course Number: 0007389

Course Title: Database System Technology

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

Students: Undergraduate of Internet of Things Engineering

Prerequisites: Discrete Mathematics, Data Structure and Algorithm, Operation System**.**

Evaluation Method: Written Examination

Course Description:

Database System Technology is a foundation courses set up for undergraduate of Internet of Things. The Content of the course includes the Relational Model and Relational Algebra, Database modeling method, E-R model, Structured Query Language, Transaction and Concurrence Control. Throughout the course students can understand the basic idea for data management and the theory of database construction. The course also includes a variety of practices about the database design and programming which will equip students with skills of establishing a relational database with some popular DBMS, such as SQL Server, Oracle or My SQL.

Recommended Textbooks/References:

1. Jeffrey D.Ullman, Jennifer Widom A First Course In Database Systems Third Edition Pearson Education.Inc. 2008
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan Database Systems Concepts Fifth Edition McGraw-Hill Companies.Inc.2006
3. Philip M.Lewis, Arthur Bernstein, Michael Kifer Databases and Transaction Processing: An Application-Oriented Approach Pearson Education. Inc. 2005

Course Number: 0007359

Course Title: Principle of Operating System

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate student major in Internet of Things Engineering

Prerequisites: Computer Theory, Assembly Language, Data Structure and Algorithm

Evaluation Method: Written Exam

Course Description:

This course is an important course for Internet of things engineering. The aim of this course is to make students understand the basic theory, concepts and various management techniques of operating system, and cultivate their ability to analyze and design the system software. Detail knowledge include: operating system concept, history, dual model, system call, process, the states of process, process control block, IPC, process scheduling, scheduling algorithm, critical resource and critical section, hardware solution to synchronization, semaphore, classical IPC problems,

process communication, deadlock, relocation, contiguous memory allocation, paging memory management, segmentation memory management, virtual memory, demand paging, page allocation and replacement, demand segmentation, file and file system, logical structure, access control method, directory structure, directory implementation, storage allocation, I/O control method, buffer, device independence, SPOOLing, device driver, disk structure and scheduling.

Recommended Textbooks/References:

1. Abraham Silberschatz, Peter Bear Galvin, Greg Gagn. Operating System Concept: Java Implementation. Higher Education Press. 2010
2. Tanenbaum.A.S. Modern Operating System. (3rd Edition). Mechanical Industry Press. 2009
3. Fei Xianglin, Luo Bin, Sun Zhongxiu. Operating System Tutorials (4th Edition). Higher Education Press. 2008
4. William Stallings. Operating Systems Essentials and Design Theory (6th Edition). Mechanical Industry Press. 2010.

Course Number: 0005684

Course Title: Computer Network

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

Students: Undergraduate students major in IoT Engineering

Prerequisites: Principles of Computer Organization, Principles of Data Communications

Evaluation Method: Written Exam

Course Description:

The introduction, the physical layer, the data link layer, the medium access control sublayer, the network layer, the transport layer, and the application layer are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of computer network to act as a basis of the continuing courses. The basic topics include: uses of computer networks, network hardware, network software, reference models, and network standardization; switching and transmission media; data link layer design issues, elementary data link protocols, sliding window protocols, and example data link protocols; the channel allocation problem, multiple access protocols, Ethernet, wireless LANs, and data link layer switching; network layer design issues, routing algorithms, congestion control algorithms, quality of service, and the network layer in the Internet; the transport service, elements of transport protocols, the internet transport protocols, and the internet transport protocols; the domain name system, electronic mail, and the world wide web.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum. Computer Network, 4th Edition. Tsinghua University Press. 2004
2. Xie Xi-ren. Computer Network, 5th Edition. Publishing House of Electronics Industry. 2008

Course Number: 0006408

Course Title: Microcomputer Interface Techniques

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

Students: Undergraduate students major in IoT Engineering

Prerequisites: Digital logic, Principle of Computer Organization

Evaluation Method: Written Exam

Course Description:

This course introduces the outside I/O interfaces in the X86 micro-computer system. Let students master the microprocessor chips and the common I/O interface chip (the structure, function, timing and application), establish the integrated concept of micro-computer, understand I/O interface circuit in the microcomputer system, get the preliminary ability to design, develop the I/O interface circuit, and lay the foundation for the following other hardware courses. The content includes: microprocessor and computer system introduction, 8086 microprocessor and 32-bit Intel microprocessor, I/O interface; Commonly used the I/O interface chips including: programmable parallel interface chip 8255A, interrupt system and programmable interrupt controller 8259A, programmable timer/timer 8253, serial communication and programmable interface chip 8251A, programmed DMA controller 8237A, Digital-Analog and Analog-Digital conversion; Bus technology.

Recommended Textbooks/References:

1. DAI Mei'e etc. Micro-computer Technology and Application. (4th Edition), Tsinghua University Press. 2008.2
2. YANG Juyi. Micro-computer Principle and Interface Techniques. Tsinghua University Press. 2010.1
3. WU Xiuqing. Micro-computer Principle and Interface Techniques (3rd Edition), University of Science and Technology of China Press. 2004.12
4. QIAN Xiaojie. Micro-computer Principle and Interface Techniques, China Machine Press. 2004.10
5. Barry B. Brey. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro Processor Architecture, Programming, and Interfacing(6th Edition), Prentice Hall.2002.8

Course Number: 0007352

Course Title: The Technique of Radio Frequency Identification

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

Students: Undergraduate students major in IoT Engineering

Prerequisites: Circuit and Electronic Technology

Evaluation Method: Written Exam

Course Description:

This course introduces the principle and application of the radio frequency identification (RFID) technology, so that students could understand the role of electronic tag, principle and the physical basis, the relevant international standards, and try to grasp development, application and solutions of RFID. The basic topics include: RFID introduction, RFID standards including ISO/IEC, EPC, etc.; RFID tags: including its function, the basic component, packaging, electronic tag and bar code, its antenna, etc.; radio frequency (RF) technology in RFID system: RF basic knowledge, reader antenna circuit, transponder telemetry antenna circuit, the inductance coupling between reader and response, power amplifier circuit, etc.; the coding and modulation in the RFID system; RFID applications in supply chain logistics management and public management.

Recommended Textbooks/References:

1. SHAN Chenggan, SHAN Yufeng, YAO Lei. RFID Principle and Application (4th Edition).

Publishing House of Electronics Industry.2008.7
2. ZHOU Xiaoguang, WANG Xiaohua. RFID Principle and Application (4th Edition). Publishing House of Electronics Industry.2006.12
3. GAO Fei, XUE Yanming, WANG Aihua, IoT Core Technology – RFID Principle and Application. Posts & Telecom Press. 2010.12
4. DONG Lihua. RFID Technology and Application. Publishing House of Electronics Industry.2008.5
5. Stephen B. Miles, Sanjay E. Sarma, John R. Williams. RFID Technology and Applications, Cambridge University Press. 2011.4

Course Number: 0007381

Course Title: Embedded System Development Technology

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

Students: Undergraduate students major in Internet of Things Engineering

Prerequisites: Principles of Computer Organization, Computer Interface Technology, Operating System, Windows Programming Techniques

Evaluation Method: Curriculum Design

Course Description:

The course of Embedded System Development Technology is basic required for the students whose major is Internet of Things engineering. It is the basis of Internet of Things and undertakes the task of training students' comprehensive ability. This course requires the students have very strong capabilities in engineering, technical and practical aspects. Therefore, it must give sufficient attention to practical teaching while the theoretical teaching.

The purpose of Embedded System course is let the students master the theory of computer science systematically, the computer's hardware & software system and application knowledge. After that, they will have certain ability with basic analysis and problem-solving skills during the practice on embedded field. Through this course, students can grasp the basic concepts of embedded system development methods and processes. They will familiar with the structure of the ARM architecture microprocessors and the basic principles, concepts of the Windows Embedded Compact operating system. As a result, the students will be able to customize the Windows Embedded operating system, add the driver components and write the application code.

Recommended Textbooks/References:

1. Samuel Phung, Translated by Zhang Dongsong, Chen Fangyuan.Professional Windows Embedded CE 6.0, Tsinghua University Press.2009
2. Douglas Boling. Translated by He Zongsheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009
3. YAO Lingtian, ed. Proficient in MFC programming, Posts and Telecom Press.2006
4. WANG Bing, etc. ed. Windows CE Embedded High-Level Programming and its Examples Explain, China Water Power Press. 2008
5. ZHOU Jianshe, ed. Windows CE Device Driver and BSP Development Guide, China Electric Power Press. 2009
6. ZHANG Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Publishing House of Electronics Industry. 2006

Course Number: 0007394

Course Title: Wireless Sensor Network

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

Students: Undergraduate Students Major in IoT Engineering

Prerequisites: Operating System

Evaluation Method: Written Exam

Course Description:

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: the concept of wireless sensor networks, architecture, features and application areas of wireless sensor network; routing protocol, energy-aware routing protocol, query-based routing protocol, geographic routing protocol, reliable routing protocol; contention-based MAC protocol, TDMA-based MAC protocol; topology control; IEEE802.15.4 protocol, ZigBee technology, sensor network nodes localization technology, time synchronization, security technology, data management, hardware platform, application system of wireless sensor network.

Recommended Textbooks/References:

1. Feng Zhao, Leonidas Guibas. Wireless Sensor Networks: An Information Processing Approach, Morgan Kaufmann Publishers. 2004. 2
2. Anna Hac.Wireless Sensor Network Designs, John Wiley & Sons, Ltd. 2003. 3
3. Sun Limin. Wireless Sensor Network. Tsinghua University Press. 2005.5

Course Number: 0007351

Course Title: M2M Technology and Application

Credit: 1 **Total Credit Hours:** 16

Students: Undergraduate students major in IoT Engineering

Prerequisites: Computer Networks

Evaluation Method: Report

Course Description:

M2M technology enables the intelligent, interactive, seamless communication among people, machines and information systems, and it is the most common form of Internet of things at this stage, and will be the basis of future of Internet of things. This course introduces the definition, system architecture, communication protocols, and business applications of M2M technology. This course focuses on training students' ability of self-learning, analyzing and solving problems. The basic topics include: definition and characteristics, system architecture, management platform of M2M; WIFI, BlutTooth, LTE, CDMA, GSM and other wireless communications technology, wireless machine management protocol(WMMP); haredware, middleware and gateway of M2M system; M2M applications area and typical applications, energy management systems, traffic management systems, trade and logistics system.

Recommended Textbooks/References:

1. Axel Glanz,Oliver Jung. Machine to Machine Communication. National Defence Industry Press. 2011.5

2. John Dexheimer. M2m: The Wireless Revolution, Texas State Technical College.2005.6

Course Number: 0005682
Course Title: Object-Oriented Programming
Credit: 3 **Total Credit Hours:** 48
Prerequisites: High Language Programming
Evaluation Method: Written Exam
Students: Undergraduate students major in Computer
Course Description:
The basic idea of object-oriented programming and the basic programming approach are introduced in this course. Students can understand the basic process of Object-Oriented software development, grasp the basic technology of object-oriented programming, and learn to programming by Java. Detailed knowledge including characteristics of Object-Oriented: abstraction, encapsulation, inheritance, polymorphism and their implement of Java language. Java language: grammar, cross-platform, single inheritance, interface, package, Java class libraries. Exception: concept, types, Java exception handling mechanism, a self-defined exception. Graphical User Interface: Java Graphics, Swing components, layout managers, GUI Graphical –User-Interface design. Event handling mechanism. Input and output streams and files. Object-Oriented software development process: the life cycle, object-oriented software development process.
Recommended Textbooks/References:
1. Ye Naiwen. Object Oriented Programming. Tsinghua University Press.2004
2. Geng XiANGyi, Zhang Yeping. Object Oriented Programming of Java, Tsinghua University Press.2010
3. Wu.C. Thomas. An Introduction To Object-Oriented Programming With Java, McGraw-Hill College.2008
4. Y.D. Liang. Introduction to Java Programming-Comprehensive Version (6th Edition) . Prentice Hall.2008.3

Course Number: 0002359
Course Title: Principle of Data Communication
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in IoT Engineering
Prerequisites: Principle of Computer Organization
Evaluation Method: Written Exam
Course Description:
This course simply explains the basic concepts of data communication, basic knowledge, data transmission technology and some applications, to lay the foundation for the next courses. The basic concept of data communication include several basic models, the composition and classification of data communication system, data communications network topology, etc.; Data communication foundation includes information, data and signal definition, data transmission, the influence factors on the quality of the transmission and the distortion of the form and signal code

form; Data transmission channel including channel capacity calculation, the cable channel and wireless channel introduction; Data transmission technology includes baseband transmission, frequency band transmission, synchronous control technology, channel access, data exchange, error control; Communication hardware include networking equipment and communication interface; Applications include broadband data communication, multimedia data communication.

Recommended Textbooks/References:

1. CHEN Qimei, LI Bo, AN mingwei, LI Jia. Modern Data Communication. (3rd Edition). Nanjing University Press. 2008.2
2. WU Lingda, YANG Bing, YANG Zheng. Computer Communication Principle and System. The National Defense Science and Technology University Press. 2008.4
3. William Starlings. Data and Computer Communications: 9th ed[M]. U.S.A: Prentice Hall. Inc. 2010.
4. John Proakis, Masoud Salehi. Digital Communications: 5th ed[M]. Publishing House of Electronics Industry. 2007.

Course Number: 0007362

Course Title: Microcontroller Principle and Technology

Credit: 3 **Total Credit Hours:** 48

Students: Undergraduate students major in Internet of Things Engineering

Prerequisites: Digital logic, Circuit and Electronics Technology

Evaluation Method: Written Exam

Course Description:

The course of Microcontroller Principle and Technology is an elective course for the students whose major is Internet of Things Engineering. It is the basic course for the wireless sensor network and the radio frequency identification technology courses. It requires the students have very strong capabilities in engineering, technical and practical aspects. Therefore, it must give sufficient attention to practical teaching while the theoretical teaching.

Through this course, students will learn the microcontroller's basic concepts and applications. Such as the MCS-51 microcontroller's internal structure and working principle, instruction set, assembler and C language programming, the internal parallel port, interrupts and timer/counter, serial communication interface, digital/analog and analog/digital converter, system expansion and typical interface circuit. Finally, it will develop the students' ability of engineering practice by study the rich cases of Testing and Controlling System.

Recommended Textbooks/References:

1. ZHANG Yigang, Peng Xiyuan. Microcontroller Principle and Interface Technology, Posts and Telecom Press.2008
2. ZHANG Junmo. MCU Intermediate Tutorial, second edition, Beihang University Press. 2006
3. HU Hancai. Microcontroller Principle and Interface Technology. Beijing: Tsinghua University Press. 2002
4. ZHOU Xinghua. Taught You How to Learn Microcontroller (2nd Edition). Beijing: Beihang University Press. 2007
5. ZHOU Mingde. Principle and Technology of MCU. Beijing: Posts & Telecom Press. 2008

Course Number: 0004859

Course Title: Computer Architecture

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

Students: Undergraduate students major in Computer

Prerequisites: Principles of Computer Organization

Evaluation Method: Written Exam

Course Description:

"Computer Architecture" course is the Basic elective course which plays a very important role to develop students' abstract thinking ability and top-down, systems analysis and problem-solving abilities. Through this course, students will master the basic concepts of computer system structure and learn to use algorithms, hardware, and software to comprehensively survey, analyze and design computer system architecture from the view of high-rise buildings; cultivate students to analyze, assess and design a computer system on the view of cost performance ratio. It enables students to grasp the main design ideas and skills of contemporary rapid development of RISC technology; understand the advanced technology and design ideas of the structure of today's computer systems: including multi-core technology, MIPS and parallelism, scalability, programmability etc.

Through this course, students will be able to combine software and hardware knowledge of "Computer Principles", "assembly language programming" and "operating system" thus, establish the full concept of the computer system.

Recommended Textbooks/References:

1. Fang Juan. Computer Architecture, Tsinghua University press. 2011.03
2. Li Xuegan. Computer Architecture, Xidian University press. 2011.11
3. David A. Patterson, John L. Hennessy. Morgan Kaufmann. 2007.8

Course Number: 0007397

Course Title: Information Security for Internet of Things

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

Students: Undergraduate students major in Internet of Things

Prerequisites: Introduction of Internet of Things

Evaluation Method: Written Exam

Course Description:

Through this course, the students are expected to master basic theories, knowledge, methods, abilities of design and maintain information security for internet of things and then a completely safety protection system for internet of things is constructed. The students must understand the basic concepts, theories, methods and technologies. The basic topics include :various security threat for internet of things, security needs for internet of things, hierarchical modal of security for internet of things, security characteristics of per layer, cryptographic technologies for internet of things, security technologies for sensor network, RFID security, security technologies for access layer, security technologies for transport layer, technologies of place protection and privacy of individual, business control and security management, middleware technologies , laws and regulations for internet of things etc.

Recommended Textbooks/References:

1. Yang Geng, Chen Wei, Cao Xiaomei. Network Security for Wireless Sensor Network. Science

Press. 2010
2. Shen Yulong, Pei Qingqi, Ma Jianfeng et al. Introduction of Network Security for Wireless Sensor Network. The People Post and Telecommunications Press. 2010
3. Tim Mather, Subra Kumaraswamy, Shahed Latif , Cloud Security and Privacy Machinery Industry Press. 2011

Course Number: 0004884
Course Title: Technology of Next Generation Internet
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in IoT Engineering
Prerequisites: Computer Network
Evaluation Method: Written Exam
Course Description:
The shape of IPv6, IPv6 addressing, IPv6 extension headers, IPv6 authentication and security, other Internet and related protocols affected by IPv6, IPv6 transition strategies, and applications are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of the IoT engineering to act as a basis of the continuing courses. The basic topics include: why upgrade the Internet protocol, a brief introduction to TCP/IP internetworking, IPv4 limitations and shortcomings, the transition to IPv6, the shape of IPv6, IPv6 addressing, IPv6 Extension Headers, IPv6 routing, IPv6 authentication and security, related next generation protocols, autoconfiguration and mobile IP, IPv6 transition strategies, IPv6 solutions, IPv6 configuration, and the design of IPv6 testbed.
Recommended Textbooks/References:
1. Joseph Davies. Understanding IPv6, Second Edition. Tsinghua University Press. 2009
2. Pete Ldshin. IPv6 Clearly Explained. China Machine Press. 2000

Course Number: 0001084
Course Title: Digital Signal Processing
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Computer Science and Technology
Prerequisites: Advanced Mathematics, Linear Algebra, probability and statistics;
Evaluation Method: Written Exam
Course Description:
Digital signal processing appears and enjoys rapid development with development of computer science and information technology, which leads to a particular subject. The applications of Digital Signal Processing involve a wide variety of fields: communication, multimedia, mechanical manufacture, biomedical engineering. Digital Signal Processing manipulates signals with digital forms by a wide variety of ways such as sampling, transform, analysis, filter, estimation enhancement, compression and reorganization using computer /special equipments. This aims at obtaining useful information and being available for applications. Many subjects such as mathematics, communication control and computer are fundamentals of Digital Signal Processing, and the achievements of it permeate through the above subjects.

The task of this course includes: firmly grasping the fundamental principles and methods of discrete time signals and system analysis, deepening understanding Fourier transform, being able to using fast Fourier transform algorithm to solve the signal analysis problem and understanding design principles and implement methods for digital filters

Recommended Textbooks/References:

1. Hu Guangshu. Introduction to Digital Signal Processing. Tsinghua University Press, Jan. 2008
2. Hu Guangshu. Digital Signal Processing. Tsinghua University Press.Aug.2003
3. J.Sanjit K. Mitra, (translated by Sun hong and Yu xiangyu). Digital Signal Processing-Computing Based Methods. China Machine Press. Jan. 2006
4. John G. Proakis, Dimitris G. Manolakis(translated by Fang Yangmei and liu Yongqing). Digital Signal Processing. China Machine Press. Jun. 2007

Course Number: 0005693

Course Title: Multimedia Technology

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Language Program Design, Data Structure and Algorithm, Computer Architecture, Computer Graphics

Evaluation Method: Written Exam

Course Description:

Through the detailed discussion of the application of many subject in multimedia technology, students are guided to have a disciplinary level understanding of the ability to integrate multimedia technology, which will enhance their understanding and knowledge of computer technology and give students an opportunity having the fun of designing multimedia applications. The students are supposed to understand the basic concepts, theories, methods, and techniques of multimedia technology. The main contents include: fundamentals of multimedia technology; multimedia equipment; aesthetic foundation; multimedia data compression; Compact Disc-Interactive system (CD-I); digital image processing; animation technique and principle; digital audio processing; interactive multimedia technology; multimedia integration technology; multimedia application system development.

Recommended Textbooks/References:

1. Li Xiangsheng. Multimedia Information Processing Technology. Higher Education Press.2010
2. Ze-Nian Li, Mark S.Drew. Fundamentals of Multimedia. China Machine Press. 2004

Course Number: 0007382

Course Title: GPS Principles and Applications

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

Students: Undergraduate students major in IoT Engineering

Prerequisites: Principle of Data Communication

Evaluation Method: Open Book Exam

Course Description:

The course introduces the background of GPS development, navigation principle of satellite, system structure and GPS signal characteristics, signal processing and the disturbance in GPS receivers, the effect on receiving signal and mitigation strategies, and introduced the combination with other sensors and network technologies, in order to let students understand the basic principle and the GPS system structure. The basic topics include: GPS overview (including GALILEO satellite system, Russian GLONASS system, and Chinese Beidou system, etc.); Satellite navigation principles (including the value ranging principle on arrival time measurement, reference coordinate system, the basic knowledge of the satellite orbit, location principle using pseudorandom noise code, signal characteristics in GPS satellite, etc.); capture, tracking and data demodulation of Satellite signal,; Interference and measurement error; The performance of independent GPS; the combination of GPS, other sensors and network.

Recommended Textbooks/References:

1. KOU Yanhong. GPS Principles and Applications (2nd Edition), Publishing House of Electronics Industry. 2007.7
2. HUANG Dingfa, XIONG Yongliang, YUAN Linguo. Global Positioning System (GPS)—Theory and Practice. Southwest Jiaotong University Press. 2007.1
3. YANG Jun, WU Qisheng. GPS Principle and Matlab simulation. XiDian University Press. 2006.10
4. WANG Huinan. GPS Navigation Principle and Application. Science Press. 2003.8
5. Elliott D. Kaplan, Christopher J. Hegarty. Understanding GPS: Principles and Applications（2nd Edition）,Artech House. 2006.7

Course Number: 0004846

Course Title: TCP/IP Analysis and Application

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

Students: Undergraduate students major in IOT Engineering

Prerequisites: Computer Network

Evaluation Method: Written Exam

Course Description:

The TCP/IP protocols from the bottom up are introduced in this course. The students are expected to have a general recognition and understand the basic concepts, theories, methods, and techniques of TCP/IP to act as a basis of the continuing courses. The basic topics include: introduction,link layer, Internet protocol, routing protocols, address resolution protocol, Internet control message protocol, ping program, trace route program, user datagram protocol, broadcasting and multicasting, Internet group management protocol, transmission control protocol, file transfer protocol, domain name system, telnet protocol, simple mail transfer protocol, post office protocol 3, hypertext transfer protocol, and simple network management protocol.

Recommended Textbooks/References:

1. W. Richard Stevens. TCP/IP Illustrated Volume 1: The Protocols. China Machine Press. 2004.5
2. Douglas E. Comer. Internetworking with TCP/IP Volume I: Principles, Protocols, and Architectures, 5th Edition. Publishing House of Electronics Industry. 2009.7

Course Number: 0003484

Course Title: Introduction to Data Mining

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

Students: Undergraduate students major in computer, Information security and Internet of things

Prerequisites: Discrete Mathematics, Data Structures and Algorithms, Database Systems Principles

Evaluation Method: Written Examination

Course Description:

Data mining is concerned with the extraction of novel knowledge from large amounts of data. Data mining is a broad area that integrates techniques from several fields including machine learning, statistics, pattern recognition, artificial intelligence, and database systems, for the analysis of large volumes of data. This course introduces and studies the concepts, issues, tasks and techniques of data mining. Topics include data preparation and feature selection, association rules, classification, clustering, evaluation and validation, scalability, spatial and sequence mining, and data mining applications. The course is suitable for undergraduate senior students and graduate students.

Recommended Textbooks/References:

1. Pangning Tan, Michael Steinbach, Vipin Kumar. Introduction to data mining. The People Post and Telecommunications Press. 2006
2. Jiawei Han, Micheline Kamber. Data Mining: Concept and Technology. Machinery Industry Press. 2006

Course Number: 0007360

Course Title: Sensor Techniques

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

Students: Undergraduate students major in IOT Engineering

Prerequisites: None

Evaluation Method: Open book Exam

Course Description:

As “sense organs” of the reality, the sensor convert all sorts of physical, chemical, or biological information into electrical signal, and make the real measured information can be expressed by the electrical signals. The way converting measured information into electrical signal is different, so that mechanism of every kind sensor is different. From the point of various sensors application, the course mainly introduced basic mechanism and characteristics, in order to make students master the basic mechanism of the sensor, and then to solve engineering problems in detail. The basic topics include: the general nature of sensor; Resistance strain type, inductive, capacitive sensor and its application; the piezoelectric, the magneto-electric type, thermoelectric, photoelectric sensor and its application; Gas sensor, wet sensor and its application; some kinds of intelligent sensor and applications.

Recommended Textbooks/References:

1. DAI Chao. Sensor Principle and Application, Beijing Institute of Technology Press. 2010.10
2. ZHOU Jiming, JIANG Shiming. Sensor Technology and Application (2nd Edition), Central South University Press. 2009.2
3. YU Chengbo, NIE Chunyan, ZHANG Jiawei. Sensor Principle and Application, Huazhong

University of Science and Technology Press. 2010.1
4. ZHAO Yan.Sensor Principle and Application, Beijing University Press.2010.3
5. Sabrie Soloman, Sensor Handbook. McGraw-Hill Professional (2nd Edition). November 4.2009

Course Number: 0007391

Course Title: Design and Analysis of Algorithms

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

Students: Undergraduate students major in Computer Science and Technology, Information Security and Internet of Things engineering

Prerequisites: Advanced Programming Language, Discrete Mathematics, Data Structures and Algorithms

Evaluation Method: Written Exam

Course Description:

Design and analysis of algorithm is one of the core problems in computer science. It is also an important undergraduate course in computer science, information security and Internet of Things. The content is some study of the non-numerical computing algorithms in computer and its related fields. Studying by this course, students will master the common methods of algorithm design and implementation (mainly including Divide and Conquer, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking algorithm), so as to solve more complex practical problems in the field of computer science and engineering applications in the future. In addition, basic introduction in analyzing and estimating time and space complexity of the algorithms, though not as the focus of this course, are also discussed.

Recommended Textbooks/References:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. Introduction to Algorithms (Third Edition). The MIT Press. 2009
2. Wang Xiaodong. The Design and Analysis of Computer Algorithms (second Edition). Electronics Industry Press. 2004
3. Udi Manber. Introduction to Algorithms: A Creative Approach. Addison Wesley Longman. 2010
4. Anany Levitin. Introduction to the Design and Analysis of Algorithms. Tsinghua University Press. 2005

Course Number: 0005685

Course Title: Digital Image Processing

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

Students: Undergraduate students major in Computer Science

Prerequisites: Calculus, Linear Algebra

Evaluation Method: Written Exam

Course Description:

Digital image processing is focused on how to improve quality of digital images, understand image content, and compress images. Digital image processing has important applications in a

variety of domains, such as consumer electronics, human-computer interface, robotics, military and medicine. The students will be required to understand the basic knowledge and techniques of digital image processing, and master the skills of implementing basic digital image processing algorithms. Topics covered are: image digitization, image representation, image histogram, components of image processing systems; continuous and discrete Fourier transformation, convolution, discrete consine transformation; histogram enhancement, image smoothen, image sharpen; image segmentation; mathematical morphology; edge detection, Hough transformation; shape and texture features; image coding.

Recommended Textbooks/References:

1. R.C.Gonzalez et al. Digital Image Processing (third edition). China Electronic Industry Publishing House. 2011.
2. Zhang Yujing. Image Processing and Analysis (in Chinese). Tsinghua University Press. 2005

Course Number: 0007387

Course Title: Video/Image Compression and Processing Techniques

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

Students: Undergraduate students major in Computer

Prerequisites: Probability Theory and Mathematical Statistics, Data Structure and Algorithm, Advanced Programming Language

Evaluation Method: Written Exam

Course Description:

Video and image coding and processing techniques are essential applications of information theory. They are widely used in the applications such as DVD/blue disc playing, high definition video streaming and p2p streaming. This course studies the video/image information evaluation, transmission, exchange and storage based on mathematic analysis. This course incudes the basis of the information theory, the coding theory and video/image compression techniques. This course will help students to understand the basic theories of video/image coding and techniques to analyze the video sequences. And students will be able to solve the problems of video/image coding systems. The content of this course includes the concept of information, the evaluation of information, source coding, channel coding, image compression and video compression.

Recommended Textbooks/References:

1. Yao Wang, Jörn Ostermann, Ya-Qin Zhang.Video Processing and Communications, Prentice Hall. 2001
2. Wen gao, Debing Zhao, Siwei Ma. Digital Video Compression Techniques, Science Press. 2010

Course Number: 0004868

Course Title: Introduction of Software Engineering

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

Prerequisites: Advanced Programming Language, Data Structure and Algorithm, Database

Evaluation Method: Written Exam

Students: Undergraduate students major in Computer Science and Internet of Things

Course Description:

Software Engineering is one of the core courses for Computer Science and Internet of Things majors of high level institutes and universities. It focuses on how to use the theory of computer science, mathematics and management during the development of software, and borrows the principles and approaches of traditional engineering for improving the quality of software and decreasing the price of development. Through the learning of this course, the students should know about the development process of software engineering, and master the knowledge required as a software engineer. The course includes the concepts, technologies and approaches of software engineering, and how to use those technologies and approaches for designing and developing high quality software and managing software project. After this course, the students will have abilities for designing and developing real software system, and make strong foundation for practice and theory of software engineering.

Recommended Textbooks/References:

1. Zheng Renjie, Ma Suxia, Yin Renkun. The introduction of Software Engineering. Mechanical Industry Press. 2010.
2. Shari Lawrence Pfleeger, Joanne M.Atlee. Software Engineering Theory and Practice (the 4th edition). Prentice Hall. 2009.
3. Ian Sommerville. Software Engineering 9. Addison-Wesley. 2010

Course Number: 0004844

Course Title: Linux Operating System

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

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

Prerequisites: Principle of Operating System

Evaluation Method: Written Exam

Course Description:

Organization, design idea and implementation mechanism of Linux operating system are introduced in this course. The students are expected to understand the basic concepts, theories, methods and techniques of Linux operating system, and to set up the related problem solving methods on the level of system software, through which their analysis, design and implementation abilities about the system software will be improved. The basic topics include: the feature of Linux, the source code organization structure of Linux, the boot process of Linux; the process management and process schedule; the interrupt and timer mechanism; system call; virtual memory and physics memory; virtual file system and file system's register, install and uninstall;Ext2 file system; device catalog and driver program; modules.

Recommended Textbooks/References:

1. REN Zhe. Computer Operating System Basics -based on Linux/i386. Beijing: Tsinghua University Press. 2008
2. JIANG Jing,XU Zhiwei. Principle—Technology and Programming of Operating System. Beijing: China Machine Press. 2004
3. MAO Decao, HU Ximing. Analysis of Linux Kernel Source code. Hangzhou: Zhejiang University Press.2006
4. HE Qin,WANG Hongtao. Linux 2.6 Kernel Standard Book. Beijing: Posts&Telecom

Press.2008
5. Robert Love. Linux Kernel Development (3th Edition). Beijing: China Machine Press,2011
6. Greg Kroah Hartman. Linux Kernel in a Nutshell.Nanjing: SouthEastern University Press.2007

Course Number: 0004857
Course Title: Defense of Computer Viruses
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students majoring in Information Security
Prerequisites: Computer networks, Computer System Architecture, Network Security Protocol
Evaluation Method: Open Book Exam
Course Description:
Virus theory, experiments and their analysis description models are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of computer virus theory and experiments and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: introduction to computer viruses, the analysis of computer virus architecture, network attack methods, anti-virus theory and experiments.
Recommended Textbooks/References:
1. LAI Yingxu, ZHONG Wei. Theory and Experiments of Computer Virus. Tsinghua University Press. 2011
2. FU Jianming, PENG Guojun. Analysis of Computer Virus. Wuhan University Press. 2011

Course Number: 0004852
Course Title: Firewall Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students majoring in Information Security or Computer Science
Prerequisites: Computer Network Fundamentals
Evaluation Method: Written Exam
Course Description:
The students are expected to understand the basic concepts, theories, methods, and techniques of Firewall Technology and the related problem solving methods, through which their abstraction and modeling abilities will be improved. The basic topics include: the concepts, deployment, function, and policies of Firewalls, basic approaches and limitations of firewalls, packet filtering, circuit proxy, and application proxy, Firewall architecture, bastion host Principles and Technologies, the DMZ principle, the screening router, the dual homed gateway, the screened gateway, the screened subnet, and the "belt-and-suspenders" firewall, Firewall design and configuration examples, Firewall management and testing.
Recommended Textbooks/References:
1. Wes Noonan (Author), Ido Dubrawsky. Firewall Fundamentals. Cisco Press. June.2006.
2. V. V. Preetham. Internet Security and Firewalls (Networking). Tsinghua University Press. June. 2004.

3. Keith E.Strassberg, Richard J.Gondek, Gary Rollie, Firewalls:The Complete Reference. China Machine Press. March. 2003.

Course Number: 0000631
Course Title: Digital System Design
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students majors in Computer
Prerequisites: Digital Logic, Microcomputer Principle
Evaluation Method: Written Exam, Practical Assignment , Labs
Course Description:
Digital System Design is a practical method class. Through courses, training students' ability to the digital system design on large-scale programmable integrated circuit (FPGA). Requires students to understand the basic engineering approach in the typical electronic design automation (EDA)—design, synthesis, simulation and debugging, etc., have complete control of a hardware description language. Mainly covers are: present and future of digital system design method; various modeling methods based on Verilog hardware description language (HDL) ; electronic design automation (EDA) process; digital system design examples and common means. Experiment, with an emphasis on digital system design of man-machine interface, On EDA experiment platform, to completion of shake, reuse, hand shake, dynamic display elements, and thus complete a digital clock design.
Recommended Textbooks/References:
1. WANG Jinming. Verilog-HDL Programming Tutorial, Beijing: Posts & Telecom Press. 2004
2. ZHANG Youzhi .Programmable Logic Device PLD principle and application, Beijing: China Railway Publishing House. 1996
3. LIU Bo .Proficient in Verilog-HDL Language Programming, Beijing: Publishing House of Electronics Industry. 2007

Course Number: 0007363
Course Title: Introduction of Multi-Sensor Data Fusion
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in IOT Engineering
Prerequisites: Digital Signal Processing, Probability and Statistics
Evaluation Method: Written Exam, Practical Assignment, Labs
Course Description:
The basic knowledge of data fusion conception, model and system architecture of multi-sensor system is introduced in the course. The basic topics include: representation of sensor observed data, typical method of data transformation; data alignment and normalization algorithm; understanding of theory approach of multi-sensor fusion; Bayesian theory, Kalman filter and other algorithm based parameter estimation, multi-source association and fusion decision; conception and function of sensor system management in multi-sensor fusion system , hierarchical structure, mechanical of sensor management. The following demands are expected through the learning of the course, which contains the comprehensive understanding of principle theory and technique of

multi-sensor data fusion, realization method of system engineering and performance evaluation, understanding how to employ multi-source to improving the perception ability. The course aims to cultivate the students' engineering and research quality on selecting and designing the reasonable solution on multi-sensor system recognition, decision and evaluation based on requirement backgrounds.

Recommended Textbooks/References:

1. David L.Hall and YAN Luqin translating. Handbook of Multisensor Data Fusion. Beijing: Publishing Haouse of Electronic Industry. 2008
2. HAN Congzhao, ZHU Hongyan and DUAN Zhansheng. Multi Information Fusion(second Edition). Beijing:Tsinghua University Press. 2010
3. HE You, WANG Guohong et.al. Multisensor Information Fusion and Its Application (second Edition). Beijing: Publishing Haouse of Electronic Industry. 2007
4. PENG Li. The Key Technology of Information Fusion and Its Application. Metallurgical Industry Press. 2010

Course Number: 0007405

Course Title: Intelligence Information Processing

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

Students: Undergraduate students major in Internet of Things Engineering

Prerequisites: Higher Mathematics, Probability and Statistics

Evaluation Method: Written Examination

Course Description:

Intelligence Information processing is a method that transfer the incomplete, unreliable, inaccurate, inconsistent and uncertain knowledge or information to complete, reliable, accurate, consistent and certain knowledge and information. It involves multiple areas of information science, modern signal processing theory and methods of artificial neural networks, fuzzy theory, artificial intelligence applications, and it is also an evolving discipline. As a subject elective course, the goal of this course is through this study, students can understand the basic concepts of intelligent information processing, the basic principles of intelligent information processing, the basic calculation methods to master a variety of technology integration and effective application in the future to engage in scientific lay a solid foundation for research and information processing.

Recommended Textbooks/References:

1. Yaonan WANG. Intelligence Information Processing Technologies, Higher Education Press. 2003
2. Qing He, Intelligent Information Processing, Springer-Verlag New York. 2004
3. Jun GAO. Introduction to the Intelligence Information Processing Methodologies, Chinese Machine Press. 2004
4. Shaoping MA, Xiaoyan ZHU. Artificial Intelligence, Tsinghua University Press. 2004
5. Min YAO. Computer Fuzzy Information Processing Technology, Science and Technology Document Press. 1999

Course Number: 0004853

Course Title: Introduction to Distributed Systems

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

Students: Undergraduate student major in Computer Science and Technology, Internet of Things Engineering

Prerequisites: Principle of Operating System, Computer Network

Evaluation Method: Written Exam

Course Description:

This course is an important course for computer science and technology and Internet of things engineering. Nowadays, lots of system is established in a wide are geographically, it need high level of fault tolerance, performance and security. When two processes do not work in the same address space, the design of application will face lots of challenge. This course covers the design and implementation of distributed system, main topics are: distributed shared memory, distributed object structure, time, directory and naming problem, distributed file system, authentication and security, distributed process scheduling, distributed protocol and communication.

Recommended Textbooks/References:

1. Andrew S.Tanenbaum. Distributed Systems, Principles and Paradigms,Tsinghua University Press. 2004
2. George Coulouris, Jean Dollimor. Distributed System Concepts and Design,Mechanical industry publishing. 2004
3. Hagit Attiya, Jennifer Weleh. Distributed Computing , Publishing House of electronics industry. 2006

Course Number: 0004891

Course Title: Virtual Reality and Its Application

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Graphics, Advanced Mathematics

Evaluation Method: Written Exam

Course Description:

As a new technology, virtual reality technology is developed based on computer graphic. It’s a real-time expression of the world in human feeling and it is simulated by computer. Sometimes this technology is referred to as virtual environment. Its prominent features are interactivity, immersion and imagination. As an optional course in the major of computer science and technology, the objective of this course is to familiarize students with development overview, hardware components, key technologies and applications in typical fields. Students will master how to design and develop virtual reality systems. This course plays an important role in the training of research and application talents. The basic topics include: the introduction of virtual reality technology; hardware equipment about virtual reality system; computing architectures; relevant technologies and software; VR programming and so on.

Recommended Textbooks/References:

1. HU Xiaoqiang. Virtual Reality Technology. Beijing University of Posts and Telecommunications Press. 2005
2. WEI Yingmei. Virtual Reality Technology (second Edition). Publishing House of Electronics Industry. 2005

3. ZHANG Maojun. Virtual Reality System. Science Press. 2001

Course Number: 0004893
Course Title: Introduction to Semantic Web
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in Internet of Things Engineering
Prerequisites: Discrete Mathematics, Computer Network
Evaluation Method: Written Examination, Experimental Results
Course Description:
The Semantic Web is the expansion and extension of the current World Wide Web, is proposed by the World Wide Web inventor Tim Berbers-Lee, in 2000 the concept of next-generation of Internet. Goal of Semantic Web is to provide information on the Internet a computer-readable semantics, the data definitions and links contribute to the information and knowledge discovery, automated processing, integration and reuse. As a subject elective course, the purpose of this course is to further broaden students' knowledge, a new direction in the development of network technology will be introduced to students. Content of this course consist metadata, resource description framework (RDF), RDF Schema, Ontology and web Ontology language (OWL) modeling. Experimental design is proposed as using Protégé to create an OWL file that involves the special properties and restrictions.
Recommended Textbooks/References:
1. CHEN Xiaoping.Introduction to The Semantic Web, China Machine Press. 2008
2. SONG Wei, ZHANG Ming. A Concise Course of Semantic Web, Higher Education Press. 2004
3. Grigoris Antoniou, Frank van Harmelen. A Semantic Web Primer (2nd Edition), the MIT Press. 2008

Course Number: 0007404
Course Title: Cloud Computing
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students major in IOT Engineering
Prerequisites: Computer architecture, Principle of Operating System, Computer Network
Evaluation Method: Written Exam, Practical Assignment
Course Description:
Fundamental Concepts and the essential technologies of Cloud Computing are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of Cloud Computing and the related problem solving methods, through which their analyzing, reasoning and engineering practice abilities will be improved. The basic topics include: the demand analysis of cloud computing, basic concepts and provision service hierarchy of cloud computing, virtualization support at operating system level, virtualization support at hardware level, para-virtualization technology, virtual cluster technology, Map/Reduce programming model and its runtime, distributed file system for data-intensive computing, the basic concept of SOA(service oriented architecture), the service registration and discovery in SOA, the service workflow in SOA, analysis of typical cloud computing infrastructures and cloud applications,

the construction and management of Hadoop platform, application development on Hadoop. Form of teaching in this course includes lecture and practice.

Recommended Textbooks/References:

1. Hwang, Kai, Dongarra Jack, Fox Geoffrey, C. Morgan Kaufmann, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann. 2010
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski. Cloud Computing: Principles and Paradigms, Wiley. 2011

Course Number: 0002768

Course Title: Electronic Commerce

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

Students: Undergraduate students major in Internet Engineering

Prerequisites: Program Design as well as Related Subjects

Evaluation Method: Written Exam

Course Description:

The object of the course is to guide the students to solve the technical problems based on the knowledge and understanding of the e-commerce concept and principle. This course is as specialty selective course. The main task of the course is to guide the students to have a basic and full scale understanding and information of e-commerce. The contents includes the e-commerce frame, model and principle, e-commerce security technology and e-payment, e-commerce logistical, e-commerce system design method, how to establish e-commerce system through the simulating and practice. The comprehensive ability and capability of e-commerce of the students will be enhanced after the course.

Recommended Textbooks/References:

1. (USA）Gary P.Schneider.E-Business. Beijing: China Machine Press. 2011
2. ZHENG Qin and others. Introduction to E-commerce. Beijing: Tsinghua University Press. 2009
3. HUANG Jinghua and others. Electronic Commerce Courses. Beijing: Tsinghua University Press. 2010

Course Number: 0004450

Course Title: Design Technique Based on SOPC

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

Students: Undergraduate students major in Computer

Prerequisites: Microcomputer Principle, Digital System Design, Microcomputer Interface

Evaluation Method: Written Exam, Practical Assignment, Labs

Course Description:

"SOPC Design Technique" is a specialized selective course. This course takes Quartus II which is one of the typical EDA tools as an illustration in order to enable students to have a better grasp of SOPC Builder, design embedded system based on Nios II soft-core, master method of high-level IP reuse, learn independently the design technology of IP core and the method of engineering realization. This course is also able to enhance students' systematic design ability effectively and

application programming capability based on HAL by the engineering process of IDE, embedded logic analyzer and hard copy. Thus, students should need to understand the process of SOPC embedded system design based on large-scale programmable integrated circuits, and master SOPC embedded system design about basic knowledge, such as concepts, theories, methods, technologies and skills.

This course has a stronger practical character, covering 12 credit hours of in-class experiments.

Recommended Textbooks/References:

1. LI Lanying. Nios II Embedded Soft-Core SOPC Design Principles and Applications, Beijing: BEIHANG University Press. 2006
2. CAI Weigang. Nios II Software Architecture Analysis. Shanxi: Xi'an University of Electronic Science and Technology Publishing House. 2007
3. ZHOU Ligong. SOPC Embedded Systems Basic Tutorial. Beijing: BEIHANG University Press. 2006
4. XU Guanghui. FPGA Embedded Development and Application, Beijing: Publishing House of Electronic Industry. 2006

Course Number: 0007384

Course Title: Cognitive Practice

Credit: 1 **Total Credit Hours:** 30

Students: Undergraduate students major in Computer

Prerequisites: None

Evaluation Method: Attendance (50%) and Report (50%)

Course Description:

Cognitive practice aims to enhance students' awareness of professional visit with a professional enterprise, inter-school exchanges, seminars with experts in the field, so that students understand learning the relationship between the content of the actual work in related fields with the school of professional related fields of development trends and 'state-of-art', as well as students' future employment situation.

Cognitive practice includes three parts:

Enterprises and universities visiting parts: all visiting will provide students with a preliminary understanding of the relationship between enterprises and their majors; understand the College in the professional direction of the main research activities and results; as well as their counterparts in the universities' teaching.

Teacher Seminars parts: the combined activities of the first part of the teacher to explain related to knowledge and technology, as well as with the university is about learning courses or practice.

The teacher-student discussion sections: head teachers and counselors held a discussion with the students to complete the learn transition from high school to university smoothly.

Recommended Textbooks/References:

None

Course Number: 0002380

Course Title: Experiments in Digital Logic

Credit: 0.5 **Total Credit Hours:** 12
Students: Undergraduate students major in Computer
Prerequisites: Digital Logic
Evaluation Method: Experiment
Course Description:
Experiments in Digital Logic is a basic professional course for the undergraduate students who major in Computer. It is very practical. Through studying this course, the students can strengthen, deepen and broaden the learning of Digital Logic. The students are expected to understand the design flow and design the logic circuit based on Quartus II software and programmable logic device. They are expected to learn the top-down design method. They are also expected to learn how to analyze, design, and debug the circuit and how to exclude the faults of circuit. This course can improve the patient and serious research style during the whole experiments and develop the practice ability and the quality of unity and cooperation. At the same time, the course can encourage innovation, through the design and comprehensive experimental projects, their abilities solving problems will be improved. It also can lay a good foundation for the following professional course and the digital system design work which they will engage in after graduate from their university.
Recommended Textbooks/References:
1. ZHANG Lirong. An Experiment Course in Digital Logic Based on Quartus II. Tsinghua University Press. 2009

Course Number: 0007375
Course Title: Principles of Computer Organization Project
Credit: 1.5 **Total Credit Hours:** 45
Students: Undergraduate students major in Computer
Prerequisites: Principles of Computer Organization
Evaluation Method: Practical Assignment and Project Report
Course Description:
Principles of Computer Organization Project is a practical course which is established for students to practice computer design after the course of principles of computer organization is opened up. The purpose of this course is to design, realize and debug a simple model machine based on EDA platform. At first, all computer components are designed and implemented, and then the control unit is realized which ensures all parts cooperate to complete the instruction function in accordance with the current instruction requirement, and finally the waveform simulation or hardware download validation is implemented. The students can understand preferably the knowledge about computer organization which are taught in class, set up the concept of the entire computer, deepen our understanding of the computer concept of "time and space". And at the same time the students can learn how to design, implement, test the entire computer system, improve the ability to analyze and solve problems, lay a solid foundation for improving the students' computer hardware practical capability.
Recommended Textbooks/References:
1. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Principles of Computer Organization and Assembler Language. Tsinghua University Press. 2009
2. Yi Xiaolin, Zhu Wenjun, Lu Pengcheng. Practice Tutorial of Computer Organization

Principle –Based on EDA Platform. Beijing Aerospace University Press. 2006

Course Number: 0002761

Course Title: The Curriculum Design for Data Structure

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

Students: Undergraduate students major in Computer

Prerequisites: Advanced Programming Language, Discrete Mathematics

Evaluation Method: Machine Test

Course Description:

The design practice for the data structure course is a comprehensive teaching practice process. Its purpose is to allow students to apply their 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. 2008.6.
2. Yan Weimin, Wu Weiming. Data Structure(C). Tsinghua University Press.1997.4.
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.
6. Mark Allen Weiss. Data Structures and Problem Solving Using Java. Publishing House of Electronics Industry. 2003.10.

Course Number: 0002384

Course Title: The Experiments in Microcomputer Interface

Credit: 0.5 **Total Credit Hours:** 12

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

Prerequisites: Computer Principles and Assembly Language, Microcomputer Peripheral Technology

Evaluation Method: Experiment

Course Description:

This is an experimental course, which combines hardware with software and links theory to

practice. The theories of microcomputer interface technology can be applied and practiced in these experiments. During performing these experiments, the students can verify the theories, deepen their understanding of the theoretical knowledge, and learn the way to analyze and solve a simple engineering problem. So the students' abilities in operation and thinking can improve as far as possible. The course arrangement is connected closely with theory teaching. The contents consist of three aspects. The first content is the basic method of application interface chips which are used usually and already taught in theoretical course. These chips include parallel input/output interface chip (8255A), counter/timer chip (8253), interrupt controller (8259A), serial communication chip (8251A), etc. On this basis, some integrated applications of multiple chips are arranged. Finally, a special subject is required that is to apply what they've learnt to solve a practical problem in order to make the students acquire some engineering practice methods.

Recommended Textbooks/References:

1. HAN Deqiang, WANG Zongxia. The Experiments Instructor of Microcomputer Interface.

Course Number: 0007372

Course Title: Course Design of Computer Network

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

Students: Undergraduate students major in Computer Science and Technology

Prerequisites: Computer Network

Evaluation Method: Experiments

Course Description:

After theoretical study of computer network course, this course makes the student to be familiar with the use of the network router and exchanger, interconnection method of TCP/IP networks, equipment and working principles of service software of the Internet, and the basic technologies of design and implementation for the network stations.

This course is composed of general design solution, design of function modules, operations of network equipment and application programming to implement the solution, and also conclusion report of the course design.

Through this course design, we aim at promoting the abilities of problem analyzing, problem solving, and also the integrated application of the students.

Recommended Textbooks/References:

1. Wang Yong, Course Design of Computer Network, Tsinghua University Press. 2009.

Course Number: 0007353

Course Title: Experiment of RFID Technology

Credit: 0.5 **Total Credit Hours:** 12

Students: Undergraduate students major in IoT Engineering

Prerequisites: The Technique of Radio Frequency Identification

Evaluation Method: Experiment Report

Course Description:

The course arrange RFID application experiments different frequency band respectively, in order to let students understand the actual function of RFID technology, deepen understanding coding,

modulation and demodulation technology in the different frequencies system. During the experiments, students connect hardware resources, program software and watch the phenomenon, so that they could master mechanism of radio frequency identification system. The purpose of the course is to make theories practice in the specific applications, to prompt organically combining theory with practice, and to improve professional students to use their hands and brains more. There are three design experiments (LF 125K ID card reading experiment, HF13.56M ISO14443 experiment, UHF900M ISO18000-6 experiment) and a comprehensive one.

Recommended Textbooks/References:

Experiment instruction

Course Number: 0007395

Course Title: Experiment of Wireless Sensor Network

Credit: 1 **Total Credit Hours:** 24

Students: Undergraduate students major in IOT engineering

Prerequisites: Wireless Sensor Network

Evaluation Method: Experiment

Course Description:

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: 2.4GHz wireless communication experiment, which equires students to use the single-chip microcomputer and CC2420 to realize 2.4GHz point-to-point wireless communication; the IEEE 802.15.4 protocol communication experiment, which requires students to use TinyOS to implement a point-to-point communication program based on the IEEE 802.15.4 protocol; the ZigBee protocol communication experiment., which require students to use the ZigBee sensor experiment node to implement environmental testing procedures based on ZigBee protocol.

Recommended Textbooks/References:

1. Xu Yongjun. Wireless Sensor Network Experiment Tutorial, Beijing Institute of Technology Press. 2007.8

Course Number: 0007398

Course Title: Internet of Things Engineering Practice Project

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

Students: Undergraduate students major in IOT Engineering

Prerequisites: Introduction to Internet of Things Engineering; Sensor Technology; Sensor Network; RFID Technology

Evaluation Method: Experiment

Course Description:

Internet of Things Engineering Practice Project is a course designed alone for students in Internet of Things aiming at practical study. Its purpose is to make the students understand the basic concepts of IOT and study around the structure of IOT, including the perception layer, the network layer and the application layer. Besides, students will learn how to realizes the whole framework and management of IOT based on their knowledge of building, managing and applying IOT so as to practice students to conduct the design of a system based on comprehensive utility of what they have learn. In detail, the course requires students to realize an intelligent classroom, construct an intelligent classroom information gathering and controlling network combined wireless sensor network and RFID technology. The system tends to collect some information such as lighting, confortability, real-time occupancy in the classroom and control the light and the confortability intelligently. At the same time the system should provide WEB interface for real-time state query. Besides, the system should support remote information check and control with a smart phone.

Recommended Textbooks/References:

1. Xu Yongjun. Experiment Tutorial of Internet of Things. Beijing: China Machine Press. 2011
2. Hakima Chaouchi (writer) Lin Shuisheng, Zhouliang (Translater). The Internet of Things-Connecting Objects to the Web. Beijing: National Defense Industry Press. 2011
3. Liu Haitao. Application of IOT Technology. Beijing: China Machine Press. 2011

Course Number: 0007366

Course Title: Work Practice

Credit: 4 **Total Credit Hours:** 120

Students: Undergraduates in Computer Science (include Experiment class) and Internet of Things Engineering

Prerequisites: None

Evaluation Method: Include the attitude that students work in the enterprise, the accomplishment that student achieve and other results from oral examination etc. Results are mainly generated by the supervisors and managers in the enterprises, while the results will be in the hundred mark system.

Course Description:

The work practice will normally take place in the 7^{th} semester, and last for 4 weeks. In case of student have already mastered most of the professional knowledge and in term of have some practical ability, opportunities will be created by the school and enterprises for the work internship. Students will participate in the project or research, resolve the issues in the practical applications, a deeper understanding of work practice so that students corporate culture, familiar with the possible future work environment, and to develop independent ability to solve practical problems and teamwork.

College arranges for students to enterprises, to discuss by the enterprise (or school) to determine the content of student work internships, given the demands, the disciplinary requirements and the assessment methods.

Students to obtain results of work practice need to meet the requirements of the workload, difficulty and discipline of practice sessions.

Recommended Textbooks/References:

None

Course Number: 0005687

Course Title: Graduation Project (Thesis)

Credit: 16 **Total Credit Hours:** 480

Students: Undergraduates in Computer Science (include Experiment class) and Internet of Things Engineering, major in Information Security

Prerequisites: All courses that in the three majors above

Evaluation Method: With the supervision, based on the selected project title, follow the requirements to complete the project and dissertation, finally pass the oral examination.

Course Description:

Graduation Project (Thesis) is the last important step of the undergraduate cultivation, it is the process that students deepening the knowledge and experiences, it is a summary of students' research and experiment; it is also a comprehensive evaluation of students' creative thinking, the overall quality and practical ability. It is an important basis of the argument of graduation and degree qualifications; also it is the important content that measures the educational quality and efficiency.

From the Graduation Project (Thesis), not only make the students understand the related knowledge and skills, but also the learning and research methods that can be applied in the practical applications. Graduation project given by the supervisors, students will complete independence from access to information, to complete the design and implementation, writing of the related graduation project report design processes.

Recommended Textbooks/References:

References depend on the title of the Project

Course Number: 0007380

Course Title: The Curriculum Design of Embedded System Technology

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

Students: Undergraduate students major in Computer

Prerequisites: Embedded System Architecture, Embedded System Application Development technology, Embedded Technology Engineering Approach, Embedded System Development Technology

Evaluation Method: Project Design

Course Description:

The curriculum design of embedded system technology is a comprehensive test to the students' computer software and hardware ability. It lets the students personally involved in the development of a practical computer application system while according to the theory course.

Embedded system technology course is designed to examine the students' comprehensive ability. Students can freely make the proposition by themselves based on the courses of basic course, Embedded system architecture, Embedded system application development technology, Embedded technology engineering approach, and Embedded system development technology. While the teachers will check the project's degree of difficulty and the quality of workload. Accordingly, it will fully play the students' learning initiative, innovation ability and team spirit. At the same time, it will regulate the establishment of the engineering documents.

In the software and hardware environment provided by the experimental center, students can design their own projects combined with pre-order courses(must be conformed by teacher). It is

encouraged to make multiple platforms design and use the content of earlier theory course as much as possible.

Recommended Textbooks/References:

1. Douglas Boling. Translated by He Zongsheng, etc. Windows CE 6.0 Developer's Reference, China Machine Press. 2009.
2. YAO Lingtian, ed. Proficient in MFC programming, Posts and Telecom Press. 2006.
3. ZHANG Dongquan, Tan Nanlin, Wang Xuemei, Jiao Fengchuan, ed. Windows CE Application Development and Technology, Publishing House of Electronics Industry. 2006.
4. ZHOU Jianshe, ed. Windows CE device driver and BSP development guide, China Electric Power Press. 2009.

Course Number: 0007390

Course Title: Digital Image Processing Project

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

Students: Undergraduate students major in Internet of Things

Prerequisites: Digital Image Processing, High-Level Language Program Design

Evaluation Method: The Usual Performance 30%, Curriculum Design (report and program)

Course Description:

Digital image processing has important applications in the perception and recognition for internet of things, and the correlative technology relates to data analysis, coding and transmission. Implementing the course project aims to cultivate the students to be able to solve the practical image problem for internet of things, and the students are expected to understand the basic knowledge, basic methods and the ability to program on the computer. The main components of the course project include guiding students to investigate, select a topic, design a scheme, program, write and give a presentation. The reference topics are like: the design and programming for image processing software, feature extraction of face,gestures and the region of interest for the smart security applications for the Internet of Things, image enhancement and so on.

Recommended Textbooks/References:

1. R.C.Gonzalez. Digital Image Processing (3rd Edition)(English), Beijng: Publishing House of Electronics Industry. 2010
2. R.C.Gonzalez, Ruan Qiuqi,Ruan Yuzhi etc. Digital Image Processing (3rd Edition). Beijng: Publishing House of Electronics Industry. 2010
3. Zhang Yujin. Image Engineering (1) on Image Processing. Beijing: Tsinghua University Press. 2012
4. Yang Jie. Digital Image Processing and MATLAB (2rd Edition), Beijng: Publishing House of Electronics Industry.2010
5. Qin Xiangpei, Zheng Xianzhong. MATLAB Image Processing (9th Edition). Beijng: Publishing House of Electronics Industry. 2010
6. Lin Fuzong. Guidance of Multimedia Technology Course Design and Learning(4th Edition), Beijing: Tsinghua University Press. 2009

Course Number: 0007481

Course Title: MySQL Database Technique

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

Students: Undergraduate students major in Non-Computer

Prerequisites: None

Evaluation Method: Written Exam, Course Design, Practices

Course Description:

The aim of this course is to train the students' ability of information processing using the database technique. After the course is studied, the students are expected to know the composition, structure, and work modes of database system, understand the concepts of data model and learn the basic design methods of relational database. Simultaneously, the students are expected to comprehend the functions and characteristics of Structured Query Language (SQL), understand the concepts and technique of data management and master the ability of developing database applications system by MySQL Database. The course includes the basic concepts of database, management of database and table, data query and viewing, index and restriction of data integrity, reserving procedure and trigger, database security, and design and implementation of database application system.

Recommended Textbooks/References:

1. Aqi Zheng. Practical Course of MySQL. Publishing House of Electronics Industry, 2011.