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Course Number: 0000112

Course Title: Circuit Analysis Fundamentals Ⅲ

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

Students: Undergraduate students Major in Applied Physics

Prerequisites: Advanced Mathematics, College Physics

Evaluation Method: Written Exam

Course Description:

Through this course, students should be able to master the application of the basic concepts, methods and laws of circuit analysis. It can let students establish a response model for the general circuit model and give an exact physical interpretation of the numerical results obtained. This course would improve self-learning and problem-analyzing ability of students. It lays the necessary foundation for further study of the follow-up courses of electronic information.

Basic Content: analysis of resistive circuit; dynamic circuit analysis; sinusoidal steady-state analysis.

Recommended Textbooks/References:

1. QIU Guanyuan, LUO Xianjue, Circuit (fifth edition). Higher Education Press, 2006.5 (2008 reprint).
2. J. David Irwin. Basic Engineering Circuit Analysis (seventh edition). John Wiley & Sons, Inc., 2002.

Course Number: 0000209

Course Title: Analog Electronic Technology Ⅱ

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

Students: Undergraduate students Major in Applied Physics

Prerequisites: Advanced Mathematics, College Physics, Circuit Analysis Fundamentals, EDA Technology

Evaluation Method: Written Exam

Course Description:

The students are expected to master basic performances of electronic devices, test methods, basic principles and basic analysis methods of the typical circuits which include the composition of the general electronic equipment, the high-performance analog integrated circuits, and the feedback amplification circuits through which the good foundation will be based for the analogy electronic science.

(The basic design principles and basic applications of the basic arithmetic circuit, the signal generator circuit, the signal processing circuit and DC voltage regulator circuit will be studied in experiments of this course.)

Recommended Textbooks/References:

1. HUA Chengying.The Basic of Analog Electronic Techniques (fifth Edition). Higher Education Press, 2007
2. KANG Huaguang The Basic of Electronic Techniques (the Part of Analog) (fourth Edition). Higher Education Press,1999
3. XIE Jiakui Electronic Circuit (the Part of Linear) (fourth Edition). Higher Education Press, 1999
4. GAO Wenhua the Basic of Electronic Circuit. Higher Education Press, 1997

5. ZHANG Fengyan the Basic of Electronic Circuit (High-performance Analog Circuits with Current Touch Technology). Higher Education Press, 1995
6. A.S.Sedra, K.C.Smith. Microelectronic Circuits (fourth Edition). Oxford University Press, 1998
7. J.Millman, A.Grabel.Microelectronics (second Edition). McGraw-Hill Inc., 1988

Course Number: 0000123
Course Title: Digital Electronic Technology
Credit: 4.0 **Total Credit Hours:** 64
Students: Undergraduate students Major in Applied Physics
Prerequisites: Circuit Analysis Fundamentals
Evaluation Method: Written Exam
Course Description:
This course is a fundamental course for undergraduate students majored in Applied Physics. It is closely related to practical applications. The student who has finished the course should be able to grasp the basic concepts, methodologies and skills in the field of digital electronic technology. The objectives of this course are to cultivate the students' abilities of analysis, design, synthesis and innovation in this field, to grasp Multiuse simulation software and its application technique, to understand the fundamental theory and applications of programmable logic devices, and get to know the idea and basic method of hardware design implemented by hardware description languages, and finally to lay good foundation for the subsequent professional courses.
Recommended Textbooks/References:
1. JIANG Jie, MA Zhicheng. Digital Electronic Technique Fundamentals. Beijing University of Technology Press, 2009
2. JIANG Jie. Learning Guild to Digital Electronic Technique Fundamentals. Beijing University of Technology Press, 2010
3. YAN Shi. Digital Electronic Technique Fundamentals (5th Edition). Higher Education Press, 2006

Course Number: 0007396
Course Title: Wireless Communications
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Computer Application
Prerequisites: Signals and Systems, Digital Signal Processing, Communication Principles, Digital Communications, Principles of Communication Circuits, Digital Fundamentals, Probability and Stochastic Processes
Evaluation Method: Written Exam
Course Description:
Through explanation, analysis and discussion of the principle of the wireless communications to students develop the students' abilities of analyzing and designing. The students are required to grasp the basic concepts, theories, methods and techniques. The contents include the common wireless communication systems, their respective advantages and complements with each other,

the basic characteristics, and analysis and modeling methods of the channel, based on wireless propagation characteristics. The wireless link enhanced technologies, such as channel coding technology, interleave, modulation and their performance analysis and configuration in the wireless channel, combination of the three methods base on coding modulation principle, the principle and performance advantages of the adaptive coding modulation based on wireless channel changes, the diversity principle and the sending-receiving technology base on the independent characteristics of the channel. high-performance transmission technology, such as the performance analysis of MIMO, space-time code, recoding and multiplexing technology, the technology principle and the problems of OFDM, the principles of CDMA and so on.

Recommended Textbooks/References:

1. Andrea Goldsmith Written, YANG Hongwen Translated. Wireless Communications. Posts and Telecommunications Press, 2007.6
2. Theodore S.Rappaport Written, CAI Tao Translated. Wireless Communications Principles and Practice (first Edition). Publishing House of Electronics Industry, 1999

Course Number: 0000106

Course Title: Electrotechnics Ⅰ

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

Students: Undergraduate students of the College of Mechanical Engineering and Applied Electronic Technology, the College of Architecture and Civil Engineering, the College of Environmental and Energy Engineering, the College of Materials Science and Engineering

Prerequisites: Advanced Mathematics, College Physics

Evaluation Method: Written Exam

Course Description:

This course is a basic course for undergraduate students major in non-electronic and non-electrical. The students are expected to grasp the basic concepts, theories, methods, and the basic techniques of electrotechnics, which would lay a foundation for further studying and related work of students. The main topics include: circuit analysis, magnetic circuit analysis, transformer principles and features, three-phase electric motors, contactor control of electric motors, and basic knowledge of electrical measurement and how to safely use electricity. And the circuit analysis include: basic circuit elements; Kirchhoff's law; superposition theorem; The venin's and Norton's theorems; resistive circuit analysis; transient analysis of first-and second-order circuit; AC circuit analysis (pharos method, impedance computing, etc.); harmonic analysis; three-phase circuit; non-sinusoidal periodic circuit analysis; magnetic path analysis.

Recommended Textbooks/References:

1. QIN Zenghuang. Electrotechnics Volume one (seventh Edition). Higher Education Press, 2009.5
2. QIU Guanyuan, LUO Xianjue. Circuit (fifth Edition). Higher Education Press, 2006.5
3. SHI Yikai. Electrotechnics I, (second Edition). Science Press, 2008.8

Course Number: 0000107
Course Title: Electrotechnics Ⅱ
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students of the College of Architecture and Civil Engineering, the College of Environmental and Energy Engineering, the College of Life Science and Bioengineering
Prerequisites: Advanced Mathematics, College Physics
Evaluation Method: Written Exam
Course Description:
This course is a basic course for the undergraduate students major in non-electronic and non-electrical. The students are expected to get the basic concepts, theories, methods, and the basic techniques of electrotechnics. This course consists of lectures and experiments. The basic topics include: circuit analysis, basic knowledge of electrical measurement and how to use electricity safely. The circuit analysis include: basic circuit elements; Kirchhoff's law; superposition theorem; The venin's and Norton's theorems; resistive circuit analysis; transient analysis of first- and second-order circuit; AC circuit analysis (pharos method, impedance computing, etc.); harmonic analysis; three-phase circuit; non-sinusoidal periodic circuit analysis. The experiments include three hardware experiments and one EDA experiment with Multiuse.
Recommended Textbooks/References:
1. QIN Zenghuang. Electrotechnics Volume one (seventh Edition). Higher Education Press, 2009.5
2. QIU Guanyuan, LUO Xianjue. Circuit (fifth Edition). Higher Education Press, 2006.5
3. SHI Yikai. Electrotechnics I, (second Edition). Science Press, 2008.8

Course Number: 0001900
Course Title: Electronic Technology Ⅳ
Credit: 3.5 **Total Credit Hours:** 56
Students: Undergraduate students of the College of Materials Science and Engineering, the College of Architecture and Civil Engineering, the College of Environmental and Energy Engineering, the College of Life Science and Bio-engineering
Prerequisites: Advanced Mathematics, College Physics, Electrotechnics
Evaluation Method: Written Exam
Course Description:
The course is the subject basic course for the undergraduate of non-electric major. The students are expected to get the basic theories, concepts, methods, and the basic techniques of electronic technology, and understand the application and development of electronic technology, and for students to lay the foundation for the future studying and the related work. The basic topics include: the analog electronics and the digital electronics. The analog electronics include: diode, transistor, common emitter resistance capacity coupled amplifier, common collector amplifier and Multi-stage amplifier circuit, differential amplifier circuit, the basic analysis method and the design of simple circuits for integrated operational amplifier, the concepts of feedback and the effects of the negative feedback on the performance of the amplifier, integrated voltage comparator, oscillator, the rectifier, filter circuit and series regulator circuit of DC Power Supply. Digital electronics include: the methods of analysis and simplification of logic circuits with

Logical algebra or Karnaugh map, the basic gate circuits, the internal structure and the characteristics of TTL gate circuit, the methods of analysis and synthesis for combinational logic circuit, encoder, decoder, monitor, the working principle of logic functions and applications of R-S, J-K and D triggers, register, counter, the analysis and design of integrated counter.

Recommended Textbooks/References:

1. QIN Zenghuang. Electrical Engineering Volume Two (seventh Edition). Higher Education Press, 2009
2. YANG Fusheng. Electronic Technology (Electrical Engineering II). Higher Education Press, 1989
3. WANG Hongming. Electrical Engineering and Electronic Technology Volume Two. Tsinghua University Press, 2000
4. YAO Haibin. Electronic Technology (Electrical Engineering II). Higher Education Press, 1999
5. HUA Chengying, TONG Shibai. Fundamentals of Analog Electronics (fourth Edition). Higher Education Press, 2006
6. YAN Shi. Fundamentals of Digital Electronics (fifth Edition). Higher Education Press, 2006

Course Number: 0001901

Course Title: Electronic Technology Ⅴ

Credit: 5 **Total Credit Hours:** 80

Students: Undergraduate students of the College of Environmental and Energy Engineering (Automotive, Refrigeration)

Prerequisites: Advanced Mathematics, College Physics, Electrotechnics

Evaluation Method: Written Exam

Course Description:

The course is the subject basic course for the undergraduate of non-electric major. The students are expected to get the basic theories, concepts, methods, and the basic techniques of electronic technology, and understand the application and development of electronic technology, and for students to lay the foundation for the future studying and the related work. The basic topics include: the analog electronics and the digital electronics. The analog electronics include: diode, transistor, FET, common emitter resistance capacity coupled amplifier, common collector amplifier and Multi-stage amplifier circuit, FET amplifier circuit, differential amplifier circuit, the basic analysis method and the design of simple circuits for integrated operational amplifier, the concepts of feedback and the effects of the negative feedback on the performance of the amplifier, integrated voltage comparator, thruster, oscillator, the rectifier, filter circuit and series regulator circuit of DC Power Supply. Digital electronics include: the methods of analysis and simplification of logic circuits with Logical algebra or Karnaugh map, the basic gate circuits, the internal structure and the characteristics of TTL gate circuit, the methods of analysis and synthesis for combinational logic circuit, encoder, decoder, monitor, the working principle of logic functions and applications of R-S, J-K and D triggers, register, counter, the analysis and design of integrated counter.

Recommended Textbooks/References:

1. QIN Zenghuang. Electrical Engineering Volume Two (seventh Edition). Higher Education Press, 2009.

2. YANG Fusheng. Electronic Technology (Electrical Engineering II). Higher Education Press, 1989.
3. WANG Hongming. Electrical Engineering and Electronic Technology Volume two. Tsinghua University Press, 2000.
4. YAO Haibin. Electronic Technology (Electrical Engineering II). Higher Education Press, 1999
5. HUA Chengying, TONG Shibai. Fundamentals of Analog Electronics (fourth Edition). Higher Education Press, 2006.
6. YAN Shi. Fundamentals of Digital Electronics (fifth Edition). Higher Education Press, 2006.

Course Number: 0002357
Course Title: Circuit and Electronic Technology
Credit: 4 **Total Credit Hours:** 64
Students: Undergraduate students Major in Computer Science and Internet of Things
Prerequisites: College Physics, Advanced Mathematics
Evaluation Method: Written Exam
Course Description:
This course is a basic Electronic Technology course for the student of the department of computer science. The students are expected to grasp the basic principle and analysis methods of circuit and electronic technology, through which the ability of analysis of circuit is improved. Application of Electronic Technology, development profile, electronic circuit analysis, and design methods will be studied in this course, which can improve the ability of circuits and electronics design and solve practical problems, the spirit of innovative, and the skills of thinking and analyze. This course will base for the study of the computer science technology. (The basic design principles and applications of the basic arithmetic circuit, the signal generator circuit, the signal processing circuit and DC voltage regulator circuit will be studied in the experiment of this course).
Recommended Textbooks/References:
1. WANG Wenhui Circuits and Electronics (Third Edition).Publishing House of Electronics Industry. 2006.
2. HUA Chengying The Basic of Analog Electronic Techniques (Fifth Edition). Higher Education Press, 2007
3. KANG Huaguang The Basic of Electronic Techniques (the Part of Analog) (Fourth Edition). Higher Education Press,1999
4. QIU Guan Yuan Circuits (Fifth Edition). Higher Education Press,1999
5. HUANG Shenglan The Basic of Circuits. Peking University Press,1997
6. A.S.Sedra, K.C.Smith. Microelectronic Circuits (Fourth Edition). Oxford University Press, 1998.
7. CHARLES K.Alexander, Matthew N.O.Sadiku Fundamentals of Electric Circuits McGraw-Hill Education, 2004.

Course Number: 0007392
Course Title: Fundamentals of Communication Networks
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Telecommunications and Computer engineering
Prerequisites: Signals and Systems, Principle of Communication Systems, and Principle of Computers
Evaluation Method: Written Exam
Course Description:
Fundamentals of communication networks are the required course for electronic information-majors students. Communication networked systems are at the core of a wide range of human activity, including health, business, science, engineering and social interaction. Communication networks are extremely complex systems consisting of many components whose operation depends on many processes. To understand networks it is essential that students be exposed to the big picture of networks that allows them to see how the various parts of the network fit into one whole. This course attempts to provide a balanced view of all important elements of communication networking. The course describes many of the most popular analytical techniques for design and analysis of communication networks, with an emphasis on performance issues such as delay, blocking, and multiple address techniques. Specific contents include the basic and intermediate theory of queuing systems, the fundamental concepts of communication network architecture, and data link control protocols.
Recommended Textbooks/References:
1. LI Jiandong, SHENG Min. Fundamentals of Communication Networks (second Edition). Higher Education Press, 2011
2. ZHOU Jiongpan. Theoretical Foundation of Communication Networks (revised Edition). People's Posts and Telecommunications Press, 2009
3. BRUCE Hajek, Communication Network Analysis, 2006

Course Number: 0007070
Course Title: The Basic Practical Training of Electrical and Electronic
Credit: 1 **Total Credit Hours:** 30
Students: Undergraduate students Major in Non-Electronic and Non-Electrical
Prerequisites: Electrotechnics, Electronic Technology
Evaluation Method: Capacity of practical operation
Course Description:
Through the study of theory and hands-on practice, this course aims to give students a basic understanding of electrical and electronic knowledge and master the basic skills involved in the safety use of electricity, electrical basis training, the identification and measurement of commonly used electronic components, familiar with electronic welding process basic knowledge of principles and practical understanding of the electronic production process, to master the printed circuit board production process and production processes, to design, welding, electronic circuit debugging some difficulty, the final assembly and welding of a formal electronic products. Let students to understand and master the world's most advanced electrical and electronic foundation preliminary, make students have a comprehensive practical ability to cultivate students' awareness of engineering and careful, self-confident spirit, and lay a good foundation for students' follow-up

courses.

Recommended Textbooks/References:

1. LIU Hong, Yang Xudong. Guide book of Electronic Technical Practice
2. LI Hongru. The basic of Electronic Technical. Tsinghua University Press, 2009

Course Number: 0001212

Course Title: Electronic Technical Practice

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

Students: Undergraduate students Major in Applied Physics

Prerequisites: Circuit Analysis Fundamentals III, Digital Electronic Technology, Analog Electronic Technology

Evaluation Method: Capacity of practical operation

Course Description:

In this course students would contact with the electrical and electronic knowledge, and master the basic skills of electronics process technology. It is including the identification and measurement of the safety use of electricity, electrical basis training, commonly used in electronic components; familiar with electronic welding process basic knowledge of principles and practical; understanding of the electronic production process, mastering the printed circuit board production process and production processes, and design, welding, electronic circuit debugging some difficulty, the final assembly and welding of a formal electronic products. Let students to understand and master the world's most advanced electrical and electronic foundation preliminary, and make students have a comprehensive practical ability to cultivate students' awareness of engineering and careful, self-confident spirit, and lay a good foundation for students' follow-up courses.

Recommended Textbooks/References:

1. LIU Hong, Yang Xudong .Guide book of Electronic Technical Practice
2. LI Hongru, The basic of Electronic Technical ,Tsinghua University Press, 2009

Course Number: 0002385

Course Title: The Circuit and Electronic Technology Experiment

Credit: 2 **Total Credit Hours:** 48

Students: Undergraduate students Major in Computer Science

Prerequisites: The Circuit and Electronic Technology

Evaluation Method: Practical Operation Examination

Course Description:

This course is an independently running experimental course, with the corresponding theory course "The Circuit and Electronic Technology" in the same semester. This experiment course includes two parts. The first part is the experiments about circuit analysis. The second part is experiments about analog electronics technology. The main contents include: the security knowledge of electrical equipment, using electrical instrument, circuit parameters measurement, classical circuit analysis experiment, using electronic instrument, circuit boards welding and classical electronic technology experiment. Part of the experiment used EDA platform.

The objectives of the course are to enable the students to verify the theory knowledge, to study the experiment knowledge, to train operation ability, to cultivate precise science style and get practical experiences.

Recommended Textbooks/References:

1. The Circuit and Electronic Technology Eperiment.Experimental Instruction Manual, 2012.8

Course Number: 0007073

Course Title: Freshmen Seminar Course—Automation Theory and Technology

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

Students: Undergraduate students Major in Automation

Prerequisites: None

Evaluation Method: Course Final Report

Course Description:

This course mainly introduces the nature, characteristics, effects and status of Automation. Automation principles and basic techniques as well as training objectives and teaching contents are introduced. The specific contents are the concept and brief history of Automation, the type and composition of the automatic control system, the basic control methods and application areas and development prospects. The training goal and quality requirements of professionals, professional teaching arrangements as well as learning principles and methods are also included. Guide professionally the freshmen majoring in Automation so that they would have a preliminary understanding and experience of the major. Emphasize the educational significance of the process in exploration and research through the interactive teaching. Giving the students a comprehensive training on learning, exploring the unknown, broadening the horizons, collaborating research, critical thinking, communicating and expressing. Let the students laying a strong foundation for a higher level of learning and researching.

Recommended Textbooks/References: None

Course Number: 0007073

Course Title: Freshmen Seminar Course

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering

Prerequisites: Calculus, University Physics

Evaluation Method: Project Report

Course Description:

This course is an introduction course for freshmen major in related majors. First, it provides a general scan and explanation to the courses and subjects provided for specific major. Second, it demonstrates the contribution and importance to economy of the Electronic Information and Communication Engineering related fields, aiming to raise interests of students. Furthermore, the professors from each specific branch of this department give introduction seminars about different specialty research fields to deepen students' understanding. And visiting the professors' research labs, experimental centers and famous corporations are a good addition to enhance apperception of

the major.
Recommended Textbooks/References: None

Course Number: 0007073
Course Title: Freshmen Seminar Course
Credit: 1 **Total Credit Hours:** 16
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: General Physics
Evaluation Method: Report
Course Description:
The course is an introduction and guideline to the Electronic Science and Technology. The purpose of the course is for students: (1) to acquire an overall understanding of the curriculum system; (2) to realize the status and application prospect of the major in national economy; (3) to get to know different subjects from the introduction lessons by professors; (4) to deep understanding of the major through visiting the experimental labs, famous corporations, and etc.
Recommended Textbooks/References: None

Course Number: 0000111
Course Title: Circuit Analysis Fundamentals
Credit: 5 **Total Credit Hours:** 80
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering, Electronic Science and Technology, Automation, and Biological Engineering etc.
Prerequisites: Advanced Mathematics, College Physics
Evaluation Method: Written Exam, Experimental Practice, Regular Grade
Course Description:
This course is a compulsory basic course for undergraduate students majored in Electronic Engineering, Communication Engineering, Electronic Science and Technology, Automation, Control Engineering, and Biological Engineering. The students are expected to grasp the basic concepts, laws and thermos, methods, and techniques of circuit theory. And through the experiments in this course, the ability of operation, testing and scientific experiments would be trained. This course would lay the necessary foundation for students to study follow-up courses, such as, Analog Electronic technology, Digital Electronic technology, Signal and Systems, High-frequency Electronic Circuits, etc., and some professional courses. It will also lay foundation for students to practice “sustainable development” in their work.
The main topics have: basic circuit elements; Kirchhoff’s law; superposition theorem; The venin’s and Norton’s theorems; resistive circuits analysis included equivalent transform, loop and nodal analysis method; transient analysis of first-order and second-order dynamic circuits; AC steady-state analysis included pharos method, impedance computing, harmonic and frequency analysis; three-phase circuit and non-sinusoidal periodic circuit analysis; two-port networks analysis and non-linear resistive circuit analysis.
Recommended Textbooks/References:

1. Qiu GuanYuan, Luo XianJue, Circuit (fifth edition). Higher Education Press, 2006.5 (2008 reprint)
2. J. David Irwin. Basic Engineering Circuit Analysis (seventh edition). John Wiley & Sons, Inc. 2002

Course Number: 0000116
Course Title: Fundamentals of Computer Software
Credit: 3.5 **Total Credit Hours:** 56
Students: Undergraduate students Major in Electronics Information Engineering, Communication Engineering, Electronic Science and Technology, Automation
Prerequisites: Fundamentals of C Language Program Design
Evaluation Method: Written Exam
Course Description:
With the expansion of computer applications and development, technical personnel of non-computer major are required to know the necessary computer software technology to improve the level of computer application, to use computer technology to solve specific issues in the professional work. This course, Fundamentals of Computer Software, is a compulsory course for undergraduate students, who are in electrical related and non-computer major. This course includes three basic topics: data structures, software engineering and operating system. After learning this course, the students will understand and master the basic data structures and corresponding algorithm in programming. The students will master basic concepts and functions of the operating system. In addition, the students will understand how the software and hardware resources control management and organize the workflow of the computer system. The students will also learn the idea of development the software application in a view of software engineering, with familiar the development environment and tools. To strengthen the students' programming capacity to analyze problems and problem-solving skills in the computer software field, this course will lay the necessary foundation for the future software development.
Recommended Textbooks/References:
1. LI Shufen. Fundamentals of Computer Software. China Machine Press, 2009

Course Number: 0004622
Course Title: Data Structures and Algorithms
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Electronics Information Engineering ((Experimental Class)
Prerequisites: Fundamentals of C Language Program Design
Evaluation Method: Written Exam
Course Description:
Solving any problems by computer needs data representation and data processing. These two parts are the basic contents of the course Data Structures and Algorithms. It is a basic required course for Electronic Information Engineering undergraduates (Experimental class).It is the theoretical basis of the computer program design. The content and the technical methods discussed in this

course are foundation both on the further study of the related courses and the development of the software engineering. This course introduces data structure and the preliminary algorithm analysis. Through the study of this course, firstly, students can understand and master the basic concept and some related algorithms of data structure (including logical structure and physical structure). Secondly, students can organize data reasonably, storage and process data effectively. Thirdly, students can design and evaluate the algorithms correctly. This course will lay the necessary foundation for the future software development.

Recommended Textbooks/References:

1. YAN Weimin, CHEN Wenbo. Data Structures and Algorithms (second Edition). Tsinghua University Press, 2011
2. YAN Weimin, WU Weimin. Data Structures(C Language Edition). Tsinghua University Press, 2007

Course Number: 0004333

Course Title: Analog Electronic Technology

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering, Electronic Science and Technology, Automation, and Biological Engineering etc.

Prerequisites: Advanced Mathematics, College Physics, Circuits Analysis Fundamentals, EDA Technology

Evaluation Method: Written Exam

Course Description:

This content of this mainly includes the knowledge of the basic principle, the basic analysis methods and the basic application technology about the electronic devices, the analog electronics circuit, the analog integrated circuits, and the feedback amplification circuit. The students are expected to master the basic performance of electronic devices and test methods and the basic principle and basic analytical method of the typical circuits which includes the composition of the general electronic equipment, the high-performance analog integrated circuits, the feedback amplification circuits, through which the good foundation will be based for the analogy elections electronic science.(The basic design principles and basic applications of the basic arithmetic circuit , the signal generator circuit , the signal processing circuit and DC voltage regulator circuit will be studied in the experiment of this course)

Recommended Textbooks/References:

1. HUA Chengying, The Basic of Analog Electronic Techniques (fifth Edition) 2007. Higher Education Press
2. KANG Huaguang, The Basic of Electronic Techniques (the Part of Analog) (Fourth Edition) 1999. Higher Education Press
3. XIE Jiakui, Electronic Circuit (the Part of Linear) (fourth Edition) 1999. Higher Education Press
4. GAO Wenhua, The Basic of Electronic Circuit 1997. Higher Education Press
5. ZHANG Fengyan, The Basic of Electronic Circuit (High-performance Analog Circuits with Current Touch Technology) 1995. Higher Education Press
6. A.S.Sedra, K.C.Smith. Microelectronic Circuits (fourth Edition). Oxford University Press,

1998
7. J.Millman, A.Grabel.Microelectronics (Second Edition).McGraw-Hill Inc., 1988

Course Number: 0000123
Course Title: Digital Electronic Technology
Credit: 4.0 **Total Credit Hours:** 64
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering, Electronic Science and Technology, Automation, and Biological Engineering etc.
Prerequisites: Circuit Analysis Fundamentals
Evaluation Method: Written Exam
Course Description:
This course is a foundation course for undergraduate students majored in Electronic Engineering, Communication Engineering, Electronic Science & Technology, Automation, and Biological Engineering. It is closely related to practical applications. The student who has finished the course should be able to grasp the basic concepts, methodologies and skills in the field of digital electronic technology. The objectives of this course are to cultivate the students' abilities of analysis, design, synthesis and innovation in this field, to grasp Multiuse simulation software and its application technique, to understand the fundamental theory and applications of programmable logic devices, and get to know the idea and basic method of hardware design implemented by hardware description languages, and finally to lay good foundation for the subsequent professional courses.
Recommended Textbooks/References:
1. JIANG Jie, MA Zhicheng. Digital Electronic Technique Fundamentals. Beijing University of Technology Press, 2009
2. JIANG Jie. Learning Guild to Digital Electronic Technique Fundamentals. Beijing University of Technology Press, 2010
3. YAN Shi. Digital Electronic Technique Fundamentals (5th Edition). Higher Education Press, 2006

Course Number: 0001995
Course Title: Computer Principles and Applications I
Credit: 4 **Total Credit Hours:** 64
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering, electronic Science and Technology, Automation
Prerequisites: Digital Electronics, Analog Electronics, C Programming
Evaluation Method: Written Exam
Course Description:
This course is a fundermental course for the undergraduates with electrical related majors. It is an introductory course for the undergraduates to learn and master the knowledge of computer hardware as well as assembler language design. The students will master the related knowledge of computer principles by means of learning the computer internal structure and working principles.

The corresponding topics include the basic principles and components of computer, the structure and working principles of the microprocessor, the instruction set, the assembler language design, the memory and its interface circuit design, the concept of computer interface, data transmission, and some simple intelligent interface circuit design and software programming.

Recommended Textbooks/References:

1. YU Chunxuan, 80X86/Pentium Microcomputer Principle and Interface Technology (Second Edition). Machinery Industry Press, 2009
2. ZHANG Pandeng, KONG Xiaohong. Microcomputer Principle and Interface Technology. Electronic Industry Press, 2011

Course Number: 0001996

Course Title: Single-chip Microcomputer Principles and Interface Technique

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

Students: Undergraduate Students Major in Automation

Prerequisites: Microcomputer Principle, Digital Electronic Technology, Analog Electronic Technology

Evaluation Method: Written Exam

Course Description:

Single-chip microcomputer (SCM) principles and interface technique is a disciplinary compulsory course for the students majoring in automatic control and other relational professions. It's a course focusing on application and has fine practice and synthetic performance. Single-chip microcomputer principle and interface technique is always used in the design of measuring and control systems. Single-chip microcomputer principle and interface technique is a professional skill for students majoring in electric information and automation to study well.

This course introduces SCM hardware basic structure, the principle of all kinds of inside function units, instruction repertoire, and the design of different hardware interface used often. By studying this course, students have the skill to solve actual engineering problems using knowledge. The end-all of this course is to let students study a method that is using 80C51 as the background of studying and utilization, aiming at the different application requirement, students can select the most suitable SCM, design, install and debug interface circuits and application programs. Simultaneously, lay the foundation for learning other new courses and actual works.

Recommended Textbooks:

1. HU Hancai. Single-chip Microcomputer Principle and Interface Technique (Third version). Tsinghua University Press, 2010.5

References:

1. LI Xiaolin. Single-chip Microcomputer and Interface Technique (Secondary version), Electric Industry Press, 2011.2
2. ZHANG Yigang. Single-chip Microcomputer Principle and Interface Technique, Posts & Telecom Press, 2008.11
3. HU Jian. Single-chip Microcomputer Principle and Interface Technique, Engineering Industry Press, 2008.4
4. LI Chaoqing. Single-chip Microcomputer Principle and Interface Technique (Third version), Beihang University Press, 2005.10

Course Number: 0000109
Course Title: Power Electronics
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate Students Major in Automation
Prerequisites: Circuit Analysis, Analog Electronics, Digital Electronics, Electric Machine And Motor Driving
Evaluation Method: Close-book Examination
Course Description:
The Power Electronics studies the electric energy conversion and its control by use of different power electronic devices, circuit topologies and control methods. It is not only applied to the static power conversion device for electric energy transportation widely, but also to the speed regulation of all kinds of motors in industrial production, the output energy control of the power supplies and so on. The Power Electronics focus on the basic structure and principle of those power electronic devices, their main parameters, application features, as well as their driving circuits and protection methods will be explained in detail. Moreover some important basic converter circuits, such as DC to DC, DC to AC, AC to AC, AC to DC converters, including their principle and features, the current and voltage wave analysis, the load influence on circuit running, as well as the essential design and calculation of the converter circuits. After learning this subject the students should have an acquaintance with some important full-controlled power electronic devices and their features and applications, and be familiar with the structure and principle of the basic power converter circuits and their control methods. They should get the basic theories of power electronic technique, and gain mastery of the basic analysis methods and the skills.
Recommended Textbooks/References:
1. WANG Zaoan, Huang Jun.Power Electronics. Machinery Industry Press, 5th Edition, 2009.5
2. ZHAO Liangbing. Modern Power Electronics. Tsinghua University Press, 1995.5

Course Number: 0004930
Course Title: Automatic Measurement and Instrument
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Automation
Prerequisites: Circuit theory, analog electronic technology, digital electronic technology, mathematical statistics
Evaluation Method: Written Exam
Course Description:
With the rapid development of information technology, information acquisition and processing has become the key technology in the field. At the same time detection technology is the essential component of process control, motion control and closed loop control of other types, and is involved in all sectors of automation. Therefore, automatic detection and instrument course is an important professional basic course in the major of automation.
The main contents of the course include information acquisition, transformation, processing, transmission, display, and automatic instrumentation. The students can not only understand the principles of separate sensors, but also can be familiar with a complete detection system made from sensors and other components.
Through this course, students will master the composition of the detection system and its

performance index, the method of error analysis, the principles and measuring circuits of various sensors, and the application of four types of detection instruments.

Recommended Textbooks/References:

1. LIANG Sen, Automatic Detection Technology and Application. Mechanical Industry Press, 2006.10
2. ZHANG Hongjian, Automatic Detection Technology and Device. Chemical Industry Press, 2004-7
3. FAN Shangchun, Sensor Technology and Applications. Beihang University Press, 2004-8
4. ZHANG Guozhong, Detection Technology, China Metrology Publishing House, 1997-6

Course Number: 0000131

Course Title: Automatic Control Theory

Credit: 4.5 **Total Credit Hours:** 72

Students: Undergraduate Students Major in Automation

Prerequisites: Integral Transformation & Functions of Complex Variables, Principles of Electric Circuits, Signals and System

Evaluation Method: Written Exam

Course Description:

The course is a basic required course of information and control discipline. The students are expected to understand the basic concepts, theories, methods of automatic control according to the society's demand for automation technology. They are expected to master the basic principles of feedback control and the analytical method of automatic control systems. On this basis, the students can carry out the compensation and design of control systems. And then, the students are expected to solve the practical problem using the principles of automatic control and to establish the foundations for follow-up courses. The basic topics include: the models of control systems, time-domain, complex-domain and frequency-domain analytical method of automatic control systems, the design of controller and compensator, nonlinear system and distributed control system.

Recommended Textbooks/References:

1. SUN Liang. Automatic Control Theory (3rd Edition). Beijing: Higher Education Press, 2011
2. HU Shousong. The Principles of Automatic Control (5th Edition). Beijing: Science Press, 2011
3. Richard C. Dorf , Robert H.Bishop. Morden Control System (8th Edition). Beijing: Higher Education Press, 2008.

Course Number: 0000108

Course Title: Electric Machine Principle and Electric Drive

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

Students: Undergraduate students Major in Automation, Electronics Information Engineering Experimental Class

Prerequisites: Electric Circuit; Power Electronics

Evaluation Method: Written Exam

Course Description:

Electric machine principle and electric drive are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of electric machine and transformer and electric drive, which will improve their practical ability. The basic contents include: electric drive dynamics, load characteristic; DC motor structure, operation principle, magnetic circuit, armature reaction, excitation modes, torque and power relationship, mechanical characteristic; motoring and braking operation of separated excitation DC motor; transformer structure, operation principle, pharos diagram, equivalent circuit, parameter measurement; electromotive force and magnetic motive force of AC motor winding; operation principle of induction motor; starting, braking and speed regulation method of induction motor; electrically excited synchronous motor, permanent magnet synchronous motor, brushless DC motor; motor selection method.

Recommended Textbooks/References:

1. LI Fahai. Electric Machine Principle and Electric Drive. Tsinghua University Press, 2005
2. A.E.Fitzgerald. Electric Machinery. Tsinghua University Press, 2003

Course Number: 0000129

Course Title: Elementary Linear System Theory

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

Students: Undergraduate students Major in Automation, Electronics Information Engineering Experimental Class

Prerequisites: High Mathematics, Linear Algebra, Principle of Automatic Control

Evaluation Method: Written Exam

Course Description:

"Elementary Linear System Theory" is a basic course for the students majoring in automatic control, as well as another key course following the course "Principle of Automatic Control". It is based on the linear state-space model, and expounds some basic analysis approaches and control design ideas of controlled systems. It is a base for studying further courses in control theory. The course takes continuous time time-invariant linear systems as the research object, and studies the approaches and ideas of system analysis and control design based on state-space model. The contents include the following knowledge: modeling and standardization of state-space model, system analysis (state trajectory analysis, controllability and operability, stability analysis based Yaupon function), and system control design (pole placement, stabilization, optimization) and state observer design.

Recommended Textbooks/References:

1. SUN Liang, YU Jianjun, GONG Daoxiong, Elementary Linear System Theory. Beijing University Technology Press, 2006
2. LIU Bao, Tang Wansheng, Modern Control Theory. Mechanical Industry Press, 2006
3. R.L. Williams and D.A. Lawrence, Linear State-Space Control Systems. John Wiley & Sons, 2007
4. W.J. Rugh, Linear System Theory (2ed). Prentice-Hail, Inc., 1996
5. XUE, Dingyu, Chen, YangQuan, and Atherton, Derek P., Linear Feedback Control: Analysis and Design with MATLAB.SIAM, 2007

Course Number: 0007263
Course Title: Electromagnetic Field and Electromagnetic Wave
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Electronic Information Engineering, Experimental Class and Communication Engineering
Prerequisites: University Physics
Evaluation Method: Written Exam
Course Description:
This course is a basic course required for undergraduate students major in Electronic Information Engineering and Communication Engineering. Based on University Physics, principles, theories, disciplines, analytical methods and the engineering applications of electromagnetic field and electromagnetic wave are introduced in this course. The students are expected to understand the physical nature, the basic disciplines and the analytical methods of the electromagnetic field and electromagnetic wave, and have the techniques to solve the related problem, through which their analysis and problem-solving abilities in electromagnetism will improve. The foundation will be laid for the following courses such as Microwave Technology, Principles of Communication Circuit, and RF Circuit Design.
Recommended Textbooks/References:
1. XIE Chufang, RAO Kejin. Electromagnetic Field and Electromagnetic Wave (fourth Edition). Higher Education Press, 2006-1
2. LIN Zhiyuan, YANG Quanrang, SHA Yujun. Engineering Fundamentals of electromagnetic field. Higher Education Press, 1983-6
3. ZHOU Jianhua, YOU Baiqiang. Engineering Electromagnetic Fundamentals. Mechanical Industry Press, 2006-9

Course Number: 0001997
Course Title: Digital Signal Processing Ⅱ
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Electronic Information Engineering, Experimental Class and Communication Engineering
Prerequisites: Signals and Systems, Higher Mathematics, Complex Function
Evaluation Method: Written Exam
Course Description:
Digital signal processing (DSP) is a professional foundation mandatory course for the majors of electronic information and communication engineering, control science and engineering. The course is about the principles of discrete time signal and system and researches of basic signal processing theories, technologies and applications. The course topics mainly includes: basic theories and methods of discrete time signal and system analysis, DFT, FFT, structures and design of IIR and FIR digital filters, etc.
DSP is a course with abundant which aims at the integration of theories and engineering applications. Through this course, students will gain a basic insight into the connotation and essence of signal processing. In the meantime, the course provides a good foundation for the further study of the courses like digital communication, pattern recognition, image processing, and random digital signal processing and time-frequency analysis.

Recommended Textbooks/References:

1. HU Guangshu. An Introduction to Digital Signal Processing. Tsinghua University Press, 2005
2. Sanjit K. Mitra, McGraw-Hill Companies Inc. Digital Signal Processing – A Computer-based Approach (Third Edition). Tsinghua University Press, 2006
3. MEN Aidong, SU Fei. Digital Signal Processing. Science Press, 2005
4. DING Yumei. Digital Signal Processing. Xidian University Press, 2006

Course Number: 0004639

Course Title: Introduction to Random Signal Analysis

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

Students: Undergraduate students Major in Electronic Information Engineering, Experimental Class and Communication Engineering

Prerequisites: Signals and Systems, Complex Variables and Integral Transforms, Probability and Statistics (Engineering)

Evaluation Method: Written Exam

Course Description:

Random signal analysis is a professional foundation mandatory course for undergraduates with majors of electronic and information engineering, communication engineering and automation. The course introduces to students the basic concepts of random signal analysis and processing, theories and analysis methods. The course topics mainly include: random processes and their statistical properties, the digital features and spectral properties of the random processes, the relationship between power spectrum and correlation function, etc.

Random signal analysis is a course with abundant theoretical and practical values, which aims at the integration of theories and engineering applications. Through this course, students will gain a basic insight into the connotation and essence of random signal processing. Furthermore, the course provides a good foundation for the further study other courses like principles of communication system and the follow-up engagement in the statistical signal processing research.

Recommended Textbooks/References:

1. ZHAO Shuqing, ZHENG Wei. Introduction to Random Signal Analysis. Harbin Institute of Technology Press, 2002.
2. ZHU Hua, Huang Huining. Introduction to Random Signal Analysis. Beijing Institute of Technology Press, 1995
3. LUO Pengfei, ZHANG Wenming. Introduction to Random Signal Analysis. National University of Defense Technology Press, 2000
4. HUA Siyun. Random Processes. Southeast University Press, 1998

Course Number: 0001654

Course Title: Principles of Communication Systems

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

Students: Undergraduate students Major in Electronic Information Engineering and Communication Engineering

Prerequisites: Signals and Systems, Communication Electronic Circuits

Evaluation Method: Written Exam

Course Description:

This course focuses on the basic principles and performance analysis of different communication systems including analog communication and digital communication. Lectures take emphasis on the basic concepts and practical applications to introduce the characteristics of the various technologies. The difficulty of mathematical derivation is taken into account in this course. From the system point of view, this course introduces the basic principles of the communication systems, system structure, characteristics and applications, aiming to enable students to grasp the basis of communication theory and improve analysis and design capability of communication systems.

Recommended Textbooks/References:

1. FAN Changxin, CAO Lina, The Principles of Communication (sixth Edition), National Defence Industry Press, 2011.
2. ZHOU Jiongpan, PANG Qinhua, The Principles of Communication, Beijing University of Posts and Telecommunications Press, 2002.

Course Number: 0001654

Course Title: Principles of Communication Systems

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

Students: Undergraduate students Major in Electronics Information Engineering Experimental Class.

Prerequisites: Signals and Systems, Communication Electronic Circuits, Probability and Statistics, Introduction to Random Signal Analysis

Evaluation Method: Written Exam

Course Description:

This course is one of compulsory courses for the undergraduate students major in Electronic and Information Engineering (Experimental class). The fundamentals and components of the communication systems are introduced and the performance analysis of the communication systems is demonstrated in the course as well both in analog communication and digital communication. It takes emphasis on the basic concepts and the practical essential mathematic analysis and derivation. It introduces the fundamentals, components, features and applications of different communication systems in a systematic way. Students will learn knowledge, experience and skill in analyzing and designing communication systems. It is a solid foundation for students to engage in research on communication.

Recommended Textbooks/References:

1. FAN Changxin, et al., Principles of Communications (sixth Edition). National Defense Industry Press, 2006
2. WANG Bingjun, et al., Principles of Modern Communication Systems. Tianjin University Press, 2002

Course Number: 0004186

Course Title: Signals and Systems I

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering,
Prerequisites: Calculus, Fundamentals of Circuit Analysis
Evaluation Method: Written Exam
Course Description:
Signals and Systems I is a fundamental course for undergraduates of electrical related majors. The curriculum topics mainly include continuous/discrete time signal analysis methods, time domain analysis of continuous system and discrete system; the spectrum domain analysis of continuous system, complex frequency domain analysis of continuous system, and the z domain analysis of discrete system etc. The course will introduce the zero-state response, zero-input response of continuous system and discrete system, the unit impulse response and step response of continuous system and discrete system, convolution, convolution theorem and calculation method. And the course will demonstrate the Fourier transform, Laplace transform and inverse Laplace transform, Z transform and inverse Z transform. Through teaching of this course, the course is aiming to make students to grasp and application the basic concepts, basic principles and basic analysis method of signal and system analysis. With emphasis on engineering practice and application, the course will cultivate students' ability to solve problems and enhance the students' creative ability.
Recommended Textbooks/References:
1. ZHENG Junli. Signals and Systems (second Edition). Tsinghua University Press, 2004.
2. ZHANG Yanhua, LIU Pengyu. Signals and Systems. Machinery Industry Press, 2012.
3. WU Dazheng, etc. Signal and Linear System Analysis. Higher Education Press, 2002.
4. LIU Shutang. Signals and Systems (second Edition). Xi'an Jiao Tong University Press, 2009.

Course Number: 0007264
Course Title: Communication Electronic Circuits
Credit: 2.5 **Total Credit Hours:** 56
Students: Undergraduate students Major in Electronic Information Engineering, Experimental Class and Communication Engineering
Prerequisites: Electromagnetism Field and Electromagnetism Wave, Fundamentals of Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology, Signals and Systems.
Evaluation Method: Written Exam
Course Description:
Communication Electronic Circuits also called for High Frequency Circuits, mainly focus on the communication and broadcasting circuits and their principles. Amplifying circuits for small signals, power amplifying circuits for high frequency signals, noise in the circuits, analysis methodologies for non-linear circuits, oscillator circuits, AM modulation and demodulation, FM/PM modulation and demodulation, frequency mixing, feedback control circuits and some communication and broadcasting system are discussed and analyzed in this course.
This course is the connection between basic theories and applicable engineering designing. Both fundamental theories of high frequency circuits and engineering issues and concerns, composition of communication system and signal transition and circuit diagram discussion and analysis, integrated circuits and discrete element circuits are to be considered in this course.
Recommended Textbooks/References:
1. SUN Jingqi, Cao Xiaoqiu. Principles and Applications of Communication and Broadcasting

Circuits. Beijing University of Technology Press, 2003.
2. DONG Zaiwang, XIAOf Huating. Principles of Communication Circuits, Higher Education Press, 2002.
3. XIE Jiakui, YI Yueqing. Electronic Circuits, Higher Educatin Press, 2005.

Course Number: 0004057
Course Title: Principles of Semiconductor Devices IV
Credit: 3.5 **Total Credit Hours:** 56
Students: Undergraduate students Major in Electronics Science and Technology
Prerequisites: Semiconductor physics, Fabrication process of microelectronic devices
Evaluation Method: Written Exam
Course Description:
The course is an introduction to the fundamental concepts and applications of PN junction, bipolar junction transistors and field effect transistors. The course will provides students with the foundation for the design of discrete semiconductor devices and research of integrated circuits, and pave the way for students to study other semiconductor devices and circuits by themselves. The topics include: basic concepts, structures and fabrication processes of bipolar junction transistors and different field effect transistors, DC characteristics (i.e. input-output characteristics, current gain, etc.); frequency characteristics, switching characteristics of BJT, MOSFET, JFET and MESFET. The focus is on the DC and frequency characteristics. The teaching difficulties are the parameters of high frequency characteristics, high current effect, short channel effect, and switching process.
Recommended Textbooks/References:
1. CAO Peidong et al., The foundation of microelectronics(Theory of BJT and FET). Publishing House of electronics Industry, 2001
2. CHEN xingbi et al., Theory and design of transisitor. Publishing House of electronics Industry, 2006
3. DONALD A. Neamen, Semiconductor Physics and Devices (3rd Edition). Publishing House of electronics Industry, 2003
4. LIU shulin et al., Phyiscs of semiconductor devices. Publishing House of electronics Industry, 2006
5. ROBERT F Pierret, Advanced Semiconductor Fundamentals Publishing House of electronics Industry, 2004
6. RICHARD S. Muller, Device Electronics for Integrated Circuits(3rd Edition). Publishing House of electronics Industry, 2004
7. SIMON M. Sze, Semiconductor Devices: Physics and Technology (2rd Edition). Suzhou University Press, 2002

Course Number: 0004056
Course Title: Semiconductor Physics II
Credit: 3.5 **Total Credit Hours:** 56
Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: General Physics, Thermodynamics and Statistics Physics, Solid-state Physics.
Evaluation Method: Written Exam
Course Description:
The course is a major fundamental course for the Electronic Science and Technology. It will discuss the unique properties of semiconductors and provide the theoretical foundation for information processing unit. The topics include: introduction of energy band theory; motion of carriers (i.e. electrons and holes); concentration of carriers in N type, P type and intrinsic semiconductors; effect of doping and temperature on carrier concentrations, mobility and bulk resistivity; carrier diffusion, generation, recombination, drifting and the developed I-V theory for PN junction; control mechanism of the concentration of surface carriers by gate voltage in a MOS structure. The students are expected to comprehend the physics of semiconductors, understand the fundamental theory and application of semiconductor devices, and establish foudation for the follow-up major courses, such as semiconductor device physics and integrated circuit.
Recommended Textbooks/References:

1. Enke Liu, Bingsheng Zhu, Jinsheng Luo. Semiconductor Physics. National Defence Industry Press,1994 4th Edition.
2. ZU Yigu, Lilin Tian, Liwen Fu. Semiconductor Physics. Electronic Industry Press, 1995.
3. S.M. Sze, Kwok K. Physics of Semiconductor Devices.Third Edition, Wiley-Interscience, 2007.

Course Number: 0000516
Course Title: Theory of Electromagnetic Field
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Advanced Mathematics, General Physics, Mathematical Equation
Evaluation Method: Written Exam
Course Description:
The course will give the fundamental concepts and methods of electromagnetic field to lay theory foundation for the follow-up major courses (e.g. Semiconductor physics, Solid state physics, Theory of semiconductor devices, etc.). The purpose is for students to develop the ability to study the abstract and complex theories and to solve physical problems using mathematical methods. The topics include: vector analysis and field theory; basic experimental law of electromagnetic field, including Coulomb's Law, Ampere Law and Faraday Law of electromagnetic induction; displacement current hypothesis; Maxell's equations; basic law of electrostatic field, constant electric field, and constant magnetic field; basic solution of static field; basic theory of time-varying electromagnetic field; basic theory of time harmonic electromagnetic field.
Recommended Textbooks/References:

1. XIE Chufang, Rao Kejin, Electromagnetic field and electromagnetic wave (fourth Edition). Higher education Press, 2006
2. ZHOU Xingsan Basic course of electromagnetic filed . Higher education Press, 1988
3. WANG Weimin Theory of electromagnetic filed Huazhong University of Science and Technology Press 1993

Course Number: 0000519
Course Title: Solid State Physics
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Statistical Physics, Quantum Mechanics
Evaluation Method: Written Exam
Course Description:
The course is an introduction to the structure of solids and interaction between the component particles, which are related with the material properties and applications. The purpose of the course is for students to comprehend the basic law, basic concepts and special methods in solid state physics. The students are expected to grasp the research methods combining theory and practice, and establish the physical model to solve practical problems. The topics include: crystal structure, lattice vibration, energy band theory, electrons motion in electric field, free charge theory, and crystal defects.
Recommended Textbooks/References:
1. HANG Kun. Solid States Physics. Higher Education Press, 1985
2. FANG Junxing. Solid States Physics. Shanghai Science and Technology Press, 1980
3. LU Shiji, Basics for Solid States Physics. Beijing University press, 1990

Course Number: 0002006
Course Title: Integrated Circuit Analysis and Design Ⅲ
Credit: 4 **Total Credit Hours:** 64
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Analog Circuits, Pulse and Digital Circuits, Semiconductor Technology, Semiconductor Devices and Principles
Evaluation Method: Written Exam
Course Description:
"Integrated circuit analysis and design Ⅲ" is a compulsory course for undergraduate students major in Electronic Science and Technology. The purpose of the cause is for students to gain insight of new technologies, new devices and new circuits of VLSI, understand the new development in the field of VLSI, and grasp the basic methods and techniques of IC design. The course focuses on the CMOS process, with the unit characteristic and working principle of the circuit as the starting point. The students are expected to comprehend the large-scale IC and VLSI design, and grasp the process and methods of layout design.
Recommended Textbooks/References:
1. GAN Xuewen, etal. Integrated Circuit Principle and Design. Beijing University Press, 2006
2. SUN Xiaozi. The Basis of ASIC Design. Xi'an University of Electronic Science and Technology Press, 2003
3. GAN Xuewen. Digital CMOS VLSI Analysis and Design Basis. Beijing University Press, 2002

Course Number: 0002004
Course Title: Quantum Mechanics Ⅲ
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Advanced Mathematics, General Physics
Evaluation Method: Examination
Course Description:
"Quantum mechanics III" is a major fundamental course for Electronic Science and Technology. It provides the foundation for follow-up courses, including Solid state physics, Semiconductor physics, etc. The course introduces the basic concepts and principles of quantum mechanics. The topics include: the blackbody radiation, photoelectric effect, and Bohr hydrogen atom spectrum; the De Broglie hypothesis; the wave function and its statistical interpretation, the uncertainty principle and the principle of superposition of states; the Schrodinger equation, the steady state and steady state Schrodinger equation, one dimensional infinite potential well, the linear harmonic oscillator, the potential barrier, and the hydrogen atom; the mechanical quantity operator, angular momentum and angular momentum operator; the perturbation theory, non degenerate stationary state perturbation, degenerate stationary state perturbation, and time-dependent perturbation; the spin and spin angular momentum, spin and identical particles, identical particle system and identical particle wave function, basic properties of identical particles, symmetric and ant symmetric wave function, and the Pauli exclusion principle.
Recommended Textbooks/References:
1. ZHOU Shixun, Quantum Mechanics Tutorial, second Edition, Higher Education Press, 2009.
2. ZENG Jinyan, Introduction of Quantum Mechanics, Peking University Press, 2011.

Course Number: 0000525
Course Title: Statistical Physics
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: General Physics, Advanced Mathematics
Evaluation Method: Written Exam
Course Description:
"Statistical physics" is a major fundamental course for the undergraduate students major in Electronic Science and Technology. The purpose of the course is for students to learn the basic theory of thermodynamics, thermodynamic properties of homogeneous substance, basic concepts and methods for statistical physics, Boltzmann statistics and applications of classical particles, and Bose statistic and Fermi statistics of quantum particles. The students are expected to apply these theories to solve the typical problems, improve the theoretical learning ability, and establish the theory foundation for the follow-up major courses (such as Solid State Physics, Semiconductor Physics, Semiconductor device theory, etc).
Recommended Textbooks/References:
1. WANG Zhicheng. Thermodynamics Statistical Physics. Higher Education Press, 2008
2. WANG Zhuxi. Stats Physics Introduction. Higher Education Press, 1965
3. LI Wei. Thermodynamics and Statistical Physics. Beijing Institute of Technology Press, 1989
4. LIN Zonghan. Thermodynamics and Statistical Physics. Peking University Press, 2009

5. SU Rujian. Statistical Physics. Fudan University Press, 1990

Course Number: 0007265
Course Title: Fundamentals of Communication Networks
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students Major in Electronics Information Engineering Experimental Class and Communication Engineering
Prerequisites: Signals and Systems, Principle of Communication Systems, and Computer Principles and Applications
Evaluation Method: Written Exam
Course Description:
This course, Fundamentals of communication networks, is a required course for electronic information related majors students. Communication network systems are at the key issures of a wide range of human activity, including health, business, science, engineering and social interaction. Communication networks are extremely complex systems consisting of many components operating depends on processes. To understand networks, it is essential that students are exposed to the extended view of networks that allows them to see how the various parts of the network fit into one. This course attempts to provide a balanced view of all important elements of communication networking. The course demonstrates the most popular analytical techniques for design and analysis of communication networks, with an emphasis on performance issues such as delay, blocking, and multiple address techniques. Specific topics include: the basic and intermediate theory of queuing systems, the fundamental concepts of communication network architecture, and data link control protocols.
Recommended Textbooks/References:
1. LI Jiandong, SHENG Min. Fundamentals of Communication Networks (second Edition). Higher Education Press, 2011
2. ZHOU Jiongpan. Theoretical Foundation of Communication Networks (revised Edition). People's Posts and Telecommunications Press, 2009
3. Bruce Hajek, Communication Network Analysis, 2006.
4. WANG Haitao. Communication Networks—Fundamental Concepts and Key Architectures (second Edition), Tsinghua University Press, 2005

Course Number: 0004181
Course Title: Practical Training of Program Design
Credit: 1 **Total Credit Hours:** 30
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Electronic Science and Technology and Automation
Prerequisites: Fundamentals of C Language Program Design
Evaluation Method: Practical Exam
Course Description:
Practical Training of Program Design is an important course for undergraduates in communications and electronic related major. The purpose of this practical training is to enable

students to understand advanced principles of the C language program design, including the design of the structure, files operation, and visualization programming and to master the complete process of program design engineering, including problem analysis, algorithm design, compile, debug and report writing. Students will complete the practical projects in the practical training sessions and improve the practical ability of the program design.

Recommended Textbooks/References:

1. YAN Hui. Practical training on C Language Program Design. Higher Education Press,2010
2. HE Xinming, YAN Hui. C Language Program Design. Higher Education Press, 2010

Course Number: 0004594

Course Title: The Electronic Technology Experiments -1

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Electronic Science and Technology, Automation and Biological Engineering, etc.

Prerequisites: Digital Electronic Technology, Analog Electronic Technology

Evaluation Method: Practical Operation Examination

Course Description:

This course is an independently running experimental course, with the corresponding theory course "Digital Electronic Technology" and "Analog Electronic Technology" in the same semester. This course includes three aspects: The first is knowledge of electronic technology experiment. The second is usage of electronic instruments. The third is basic experiments about digital and analog Electronic Technology. The experimental basis knowledge include: The safety of experiment, the rules of experiment, knowledge about electronic components, circuit board welding and the experiments of experience. Electronic equipments including: Experimental box, MultiMate, DC power supply, Oscilloscope and Signal generator, etc. Digital and Analog experiments including: Single pipe amplifiers, negative feedback amplifier, operational amplifier applications, the combinational logic circuit and sequential logic circuit, etc.

The objectives of this course is that through the process of learning knowledge and completing the experiments, students will improve the ability to operate, develop precise science style and get experiences of the electronic experiment.

Recommended Textbooks/References:

1. Electronic Technology Experiment I-1. Experimental Instruction Manual .2012.8

Course Number: 0004625

Course Title: The Electronic Technology Experiments -2

Credit: 2.5 **Total Credit Hours:** 60

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Electronic Science and Technology, Automation and Biological Engineering, etc.

Prerequisites: Digital Electronics Technology, Analog Electronic Technology, Electronic Technology Experiment-1

Evaluation Method: Written Exam, Practical Operation Examination

Course Description:

This course is an independently running experimental course, which is a subsequent courses of "The Electronic Technology Experiment I-1".This course includes three parts: first is the EDA experiment, using EDA platform to complete a digital circuit experiment and a analog circuit experiment respectively. The aim of second experiments is to finish a comprehensive design based on digital circuit. The third is to achieve a comprehensive design based on analog circuit. In the experiment of EDA, first of all, the students need to learn EDA software, and then finished the software simulation and hardware to download and debugging on FPGA. In the digital and analog comprehensive design part, the students need to complete information search, plan selection, hardware assembling, debugging test, etc and submit design report in the end.

The objectives of the course are to enable students to familiar with electronic design automation (EDA) methods and to master methods of electronic module design.

Recommended Textbooks/References:

1. Electronic technology experiment I-2. Experimental Instruction Manual, 2012.8

Course Number: 0007488

Course Title: Electronic Engineering Training Ⅰ-1

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering and Automation

Prerequisites: Circuit Analysis Fundamentals, Signals and Systems, Analog Electronics, Modern Electronic Measuring Technology and Instruments

Evaluation Method: Design Results, Design Report,Written Test

Course Description:

"Electronic Engineering Training" is a compulsory practice undergraduate course for students of Electronic Information Engineering, Communication Engineering, Automation and other majors. The course is based on a small electronic system design, which enables the students to understand the general process of product development, the basic method in product design and the accumulation of the preliminary practical work experience. It is like a bridge to convert participants from engineering students to the role of the actual engineers.

"Electronic Engineering Training-1" is the first part of the course. The students will learn how to collect data in the early stage of product design, how to give design proposal, how to design the modular of the product, how to draw the design drawings and how to design of printed circuit board. In this course student will finish the each parts of the circuit and products design till to the implementation of the module. Through each stages of learning, it enables the students to master each unit circuit and realization of a circuit system, separate debug and improve the ability to detect the circuit failure investigation and improve the circuit assembly and welding level.

Recommended Textbooks/References:

1. SUN Xiaozi, Deng Jianguo. Electronic Design Guide. Higher Education Press,.2006
2. GAO Youtang, Zhai Tiansong. Electronic Design and Practice Guide. Electronic Industry Press, 2007

Course Number: 0007489
Course Title: Electronic Engineering Training Ⅰ-2
Credit: 2.5 **Total Credit Hours: 75**
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Electronic Science and Technology and Automation
Prerequisites: Electronic Engineering Training-1, Digital Electronic Technology, Computer Principle and Interface, Microcontroller applications, C Language Programming Foundation, Principles of Automatic Control
Evaluation Method: Design Results , Design Report, Practical Operation Examination
Course Description:
"Electronic Engineering Training-2" is the second part of the Electronic Engineering Training courses. The students will learn how to conduct several circuit modules coordinated circuit system design, how to evaluate the stages results a multi-module circuit system, how to solve system-level fault diagnosis and troubleshooting,. Finally the students will complete the joint observation and debugging and connection of the whole circuit system consisting of multiple circuit modules and software program modules. Through the stages of learning, it will reach the goal of the curriculum to enable students to understand the general process of product development, to master the basic methods of product design, and the accumulation of the preliminary practical work experience.
The focus instruction of this stage is the circuit module outcome assessment and system-level fault diagnosis and elimination, which is also the key to enhance the students' ability. These two processes provide students greater room for improvement in theory, actual analysis, observation and judgment ability. At meanwhile, it plays an important role in the formation of rigorous engineering science literacy for students.
Recommended Textbooks/References:
1. SUN Xiaozi, Deng Jianguo. Electronic Design Guide. Higher Education Press, 2006
2. GAO Youtang, Zhai Tiansong. Electronic Design and Practice Guide. Electronic Industry Press, 2007

Course Number: 0001208
Course Title: Electronic Engineering Training Ⅰ-3
Credit: 2 **Total Credit Hours:** 60
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering
Prerequisites: Electronic Engineering Training-1, Electronic Engineering Training-2, Telecommunication Circuit Principle, FPGA Application
Evaluation Method: Design Results , Design Report , Oral Examination
Course Description:
"Electronic engineering training-3" is the third part of the electronic engineering training courses. The first two stages are to strengthen the learning process, which is teacher-led curriculum content and process, plus the entire counseling. The third stage is the self-learning process. Students will finish independently circuit design and implementation work of the entire system without teachers' help. "Electronic engineering training-3" course provides more than nine design topics, which is connecting to the previous work in content. The design directions include feature

additions, performance upgrades, program updates, wired and wireless communications capacity expansion.

"Electronic Engineering Design-3" enables the students to improve the independently design and implementation ability of a small product development tasks. The students will gradually accumulate more analysis, problem-solving experience. This stage of learning is a quasi-work experience for undergraduate student at school, which will become a "catalyst" conversion for students from engineering students to actual engineer roles.

Recommended Textbooks/References:

1. XU Yongmao, WEI Qingfu. Fieldbus Technology and Applications. Electronic Industry Press, 2007
2. SU Changzan, Zou Diangui. Infrared and Ultrasonic Remote Control. People's Posts and Telecommunications Press, 1999
3. GAO Youtang, Zhai Tiansong. Introduction to ZigBee Wireless Network Technology and Application Beighang University Press, 2007
4. PAN Song, Huang Jiye. EDA Technology and the VHDL. Beijing: Tsinghua University Press, 2005

Course Number: 0002023

Course Title: Senior Project

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

Students: Undergraduate students Major in Automation

Prerequisites: Courses Completed

Evaluation Method: Thesis Defense

Course Description:

Senior Project is an important link for the undergraduate education. The project help students to have a comprehensive knowledge and understanding of the whole process of engineering project design and science research, and to further improve the ability of analysis and solving problem in engineering design, scientific research. The students are expected to complete a professional project associated to Automation independently under the guidance of teachers. There are several types of projects such as engineering design, experimental study and software engineering. The tasks of each type include project determination (thesis proposal), information material collection, material sorting and material summarizing, solution determination, project implementation, estimation and report. The main training targets are comprehensively cultivating students' abilities and literacy of social responsibility, team consciousness, rigorous work style, scientific attitude, system method of design, induction, sorting and analysis, and so on. It will lay a good foundation for future students' work and study.

Recommended Textbooks/References: None

Course Number: 0002023

Course Title: Senior Project

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental

Class. Communication Engineering
Prerequisites: Fundamentals of Circuit Analysis, Analog Electronic Technology, Digital Electronic Technology, Signals and Systems, Digital Signal Processing, Principles of Communication Systems
Evaluation Method: Thesis, Oral Report and Reply
Course Description:
Senior Project is an important phase for the undergraduate education. The students are expected to complete a professional project associated to electronic science and technology independently, under the guidance of teachers. The tasks include: project determination and thesis proposal, information material collection, material sorting and material summarizing, solution determination, project implementation, estimation and report. The main training objects are comprehensively cultivating student abilities and literacy of social responsibility Such as team consciousness, rigorous work style, scientific attitude, system method of design, induction, sorting and analysis, and so on. It will lay a good foundation for future student work and study.
Recommended Textbooks/References: None

Course Number: 0002023
Course Title: Senior Project
Credit: 16 **Total Credit Hours:** 480
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Semiconductor Physics, Principle of Semiconductor Devices, Circuit Analysis, Analogue Electronics, Digital Electronics
Evaluation Method: Thesis, Oral Report and Reply
Course Description:
The Graduation Project is important for the undergraduate education. The students are expected to complete a project associated with the electronic science and technology independently (such as microelectronic devices, circuits and systems, etc.) under the supervision of professors. The tasks include: project proposal, literature review, data collection and organization, project implementation, evaluation and report. The students will develop comprehensively in social responsibility, team spirit, work attitude, design and implementation, thesis writing, and etc.
Recommended Textbooks/References: None

Course Number: 0007260
Course Title: Cognitive practice
Credit: 1 **Total Credit Hours:** 30
Students: Undergraduate students Major in Automation
Prerequisites: None
Evaluation Method: Paper and Oral Reports
Course Description:
Cognitive practice aims to increase the students' perceptual knowledge about automation before they learn their professional courses. This practice should let the students to be familiar with the design, maintenance, application of control systems involved in automation, let them have an

intuitive, comprehensive professional concepts, can help them to understand the concepts, processes and principles in the follow-up courses, and train their professional interest and cognition. Through this practice, the students should have a general concept of the development of automation technology, the requirements of modern enterprises and institutions for automation talents, and have a good understanding of the properties, knowledge structures and skills of their specialty. The practice let the students know the development trend, status in society, professional orientation and employment orientation, give them a perceptual knowledge of subsequent courses, and provide them with a preliminary consideration for their future employment intentions.

Recommended Textbooks/References: None

Course Number: 0007260

Course Title: Cognitive Practice

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class

Prerequisites:

Evaluation Method: Comprehensive Evaluation

Course Description:

Cognitive Practice course is for students to complete a period of one week's practice sessions in off campus practice bases. Its purpose is to enable students to conduct a preliminary understanding of the electronic information engineering industry background, business of the enterprise operation and management in electronic information industry. The students are supposed to understand the electronic information product design methods and specifications, by acquiring a certain amount of expertise, allowing students to participate in the real business in part of the actual electronic products. The topics include the local design, debugging and testing, processing and etc. After this practice, the students will have a deeper understanding of the characteristics of the professional and lay a certain foundation for further study of specialized courses.

Recommended Textbooks/References:

1. Practice Handbook of Each Training Site

Course Number: 0007260

Course Title: Cognitive Practice

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: None

Evaluation Method: Paper and Oral Reports

Course Description:

The cognitive practice is a practice-based process for students to understand the major of electronic science and technology. It consists of cognitive training and enterprise visiting. The cognitive training is given by senior engineers in terms of the state of industry and future development, and the talents demanded from industry. The famous corporations in semiconductor devices and ICs design and fabrication will be visited. The students are expected to know the

required professional knowledge and technical ability from electronic industries, the culture, management and organization of enterprises. Their social responsibility, professional morality and international view will be improved.

Recommended Textbooks/References: None

Course Number: 0007260

Course Title: Cognitive Practice

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

Students: Undergraduate students Major in Communication Engineering,

Prerequisites:

Evaluation Method: Comprehensive Evaluation

Course Description:

Cognitive Practice course is the students complete a period of one week's practice sessions in off campus practice bases. Its purpose is to enable students to conduct a preliminary understanding of the telecommunication engineering industry background, business of the enterprise operation and management of electronic information industry. The students should understand the telecommunication system composition, construction and specifications, by acquiring a certain amount of expertise, allowing students to participate in the real business in part of the actual electronic products. It may include the configuration design, maintenance, debugging and testing, processing and etc. After this practice, the students will have a deeper understanding of the characteristics of the professional and lay a certain foundation for further study of specialized courses.

Recommended Textbooks/References:

1. Practice Handbook of Each Training Site

Course Number: 0007256

Course Title: Professional Practice

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

Students: Undergraduate students Major in Automation

Prerequisites: Circuit Analysis, Analogue Electronics, Digital Electronics, Automatic Control Theory, Microcomputer Principle and Application

Evaluation Method: Paper and Oral Report

Course Description:

The practice helps the students to proof, consolidate and enrich their professional knowledge, gradually be familiar with the highest level and importance of engineering application of automation and control, have an experience in production organization and production process in modern enterprises, and increase their knowledge. Train students to learn and consolidate professional knowledge, cultivating professional interest and professional skills, and improve their ability to solve practical problems, understand professional knowledge structure, and help students to learn specialized courses associated with automation control system. Train students to have good work habits, ways of thinking in the modern enterprise, and a quality requisite to automation talents in modern enterprise, cultivate students to strengthen the students' engineering awareness,

engineering quality, and lay a foundation for engineering ability training. The period of practice is four weeks.

Recommended Textbooks/References: None

Course Number: 0007256

Course Title: Professional Practice

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class.

Prerequisites: None

Evaluation Method: Comprehensive Evaluation

Course Description:

Professional Practice is one of the important practical courses for undergraduates in Electronic and Information Engineering major. Professional Practice purpose is to enable students to understand and grasp the actual production of the typical electronic systems and product design, and manufacturing characteristics through practice so that students can practice after the establishment of electronic system design and manufacturing concepts. The students will involve into the design process, the principle research and application of electronic product, corporation organization and management. The object of this practice is to train students to integrate theory with practice, analyze problems and solve the problem with the survey research skills. This course will lay the foundation for subsequent courses and graduate design.

Recommended Textbooks/References:

1. Practice Handbook of Each Training Site

Course Number: 0007256

Course Title: Professional Practice

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Circuit Analysis, Analogue Electronics, Digital Electronics

Evaluation Method: Paper and Oral Report

Course Description:

The professional practice will involve students to work at the forefront of the enterprise, getting familiar with different production steps including the design, development, fabrication, test, and etc. The professional practice is intended to cultivate the engineering practice ability, innovation ability, team cooperation ability, and professional morality for students based on projects in real engineering environment. The tasks include circuit design and test, semiconductor devices design, technique support and management. The students are requested to comply strictly with the rules and regulations of enterprises during professional practice. The period of practice will last for four weeks.

Recommended Textbooks/References: None

Course Number: 0007256
Course Title: Professional Practice
Credit: 4 **Total Credit Hours:** 120
Students: Undergraduate students Major in Communication Engineering
Prerequisites:
Evaluation Method: Comprehensive Evaluation
Course Description:
Professional Practice is one of the important practical courses for undergraduates in Communication Engineering major. Professional Practice purpose is to enable students to understand and grasp the actual production of the typical telecommunication systems and product design, and manufacturing characteristics through practice so that students can practice after the establishment of telecommunication system design and manufacturing concepts. The students will involve into the design process, the principle and application of electronic products, corporation organization and management knowledge. The object of this practice is to train students to integrate theory with practice, analyze problems and solve the problem with the survey research skills. This course will lay the foundation for subsequent courses and graduate design.
Recommended Textbooks/References:
1. Practice Handbook of Each Training Site

Course Number: 0001205
Course Title: Electrical Engineering Experiment
Credit: 1 **Total Credit Hours:** 24
Students: Undergraduate students Major in Automation
Prerequisites: Electric Circuit; Power Electronics
Evaluation Method: Actual Operation
Course Description:
The students are expected to understand the basic concepts, theories, methods, and techniques of electric machine and transformer and electric drive, and improve their practical ability. The basic contents include: start and speed regulating method of separately exited dc motor; operating characteristic about separately exited dc motor about speed, torque and efficiency characteristic; inherent characteristic and artificial characteristic about armature voltage change, excitation current change and series resistance in armature loop; ratio measurement of three phase transformer; no-load test and short circuit test of transformer; rat trap type three-phase asynchronous motor performance test in multiple start-up control modes including direct, star/triangle and autotransformer start-ups; starting and adjusting speed about wound-rotor induction motors by connecting resistors in series to rotor circuits; variable frequency speed regulation and resistance braking about three-phase asynchronous motor.
Recommended Textbooks/References:
1. LI Fahai. Electric Machine Principle and Electric Drive. Tsinghua University Press, 2005

Course Number: 0005808
Course Title: Detection Technology Experiment
Credit: 1 **Total Credit Hours:** 24
Students: Undergraduate students Major in Automation
Prerequisites: Circuit Theory, Analog Electronic Technology, Digital Electronic Technology, Mathematical Statistics
Evaluation Method: Real Practice
Course Description:
With the rapid development of information technology, information acquisition and processing has become the key technology in the field. At the same time detection technology is the essential component of process control, motion control and closed loop control of other types and is involved all sectors of automation.
Detection Technology Experiment will make students firmly grasp the composition, principle, performance indicators and evaluation methods of detection systems.
Recommended Textbooks/References:
1. Teaching & Research Section of Detection & Process Control, Detection Technology Experiment Guide Book, Beijing University of Technology, 2011 August
2. LIANG Sen, Automatic Detection Technology and Application. Mechanical Industry Press, 2006.10
3. ZHANG Hongjian, Automatic Detection Technology and Device. Chemical Industry Press, 2004.7
4. FAN Shangchun, Sensor Technology and Applications. Beihang University Press, 2004.8
5. ZHANG Guozhong, Detection Technology. China Metrology Publishing House, 1997.6

Course Number: 0007259
Course Title: Control System Design and Implementation
Credit: 1.5 **Total Credit Hours:** 36 hours
Students: Undergraduate students Major in Automation
Prerequisites: Complex Variable Functions, Integral Transform, Circuit Principle, Signal and System
Evaluation Method: Comprehensive (Report , Process Evaluation and Manipulate)
Course Description:
Control System Design and Implementation is the compulsory experimental course of college student major in information control. It is the comprehensive experimental part after learning Control Principle. Its significance lies in consolidated and enhanced the learning of Control Principle and makes students understanding and manipulating it through practice processes. Course select case teaching and modular experimental training complete the teaching purpose. Through the case teaching, let student learn the principle of control theory; and with modular experimental training, cultivating students' ability of solving practical problems. The main content of this course includes: the modeling method of physical objects, analysis method of control system characters, the design and manipulate of system controller and the design and realize some simple control systems.
Recommended Textbooks/References:
1. QIAO Junfei et al. Control Engineering Introduction. (at editor)

Course Number: 0004341
Course Title: Specialty Practice Training
Credit: 2.5 **Total Credit Hours:** 75
Students: Undergraduate students Major in Automation
Prerequisites: Modern Electrical Control Technology; Process Control; Detection Technique; Advanced Programming Language (C); Automatic Control Theory
Evaluation Method: Live Demo, Report, Defense
Course Description:
The Course Project is a part of Practices and is given when students have completed the basic course, Major Requirements courses and most of professional courses.The purpose is to cultivate students' ability to use theoretical knowledge to solve practical engineering problems, and to lay the foundation for undergraduate thesis. The Course Project includes four optional projects: electrical control and PLC, the ARM embedded system design, programming design, and instrument and intelligent instrument design. Each student selects one of the four. In the project of electrical control and PLC design Panasonic or Siemens series PLC and configuration software's are used. According to the requirements of a project theme, students will design, program and debug a control system. This enables students to master the configuration design method and debugging knowledge; in the project of embedded system design ARM embedded processor is used. Students will design hardware platform of an embedded control system, write a driver for the controller, control law programs and computer monitoring programs using C language, and finally complete an embedded control system. Programming design project is designed to further understand the C language, C++ language programming, structured language for database such as SQL Server, familiar with programming skills using these language in character processing, graphics, human-computer interaction, data structure, storage and application of communication and some other practical aspects. In the project of instrument and intelligent instrument design students will realize a temperature control system through designing and debugging independently.
Recommended Textbooks/References:

Course Number: 0004945
Course Title: Curricula Project of Specialty
Credit: 2 **Total Credit Hours:** 60
Students: Undergraduate students Major in Electronics Information Engineering Experimental Class.
Prerequisites: Major Foundation Courses
Evaluation Method: Design, Operation Exam and Result
Course Description:
This course is an advancing course for the communication circuit and system design. This course enables students to master the frequency adjusting, digital modulation and demodulation circuits, broadband high-frequency power amplifier and frequency combination electronic circuit design, application and development. The students are expected to master the theory and designing of AM, FM, single chip transmitter and receiving system in the curriculum. In this course the students will choose independently project, perform their design, and in accordance with the performance indicators in the opening report, the students will finish the selected topic development and

systems debugging. Through making hardware simulation and hardware circuit design, component selection, circuit installation, software programming and debugging and system testing, this course enables students to deepen their understanding of the basic theory, basic knowledge of communication circuits. At the same time, by taking the hardware circuit design and debugging skills training on small system, students will analyze the application of communication circuit unit but also telecommunication electronic system.

Recommended Textbooks/References:

1. XU Xiaoping. Electronic and Information Engineering and Communications Professional Curricula Project Tutorial. Beijing University of Technology Press, 2010
2. WANG Songwu. Electronics Innovation, Design and Application. Defense Publishing House. 2010
3. MEI Kai Xiang. Telecommunication Theory and System Experiments, Design and Application. Beijing Normal University Press, 2009

Course Number: 0004342

Course Title: Curricula Project of Communication Circuits II

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

Students: Undergraduate students Major in Electronics Information Engineering,

Prerequisites: Analog Electronics, Communication Theory

Evaluation Method: Design, Actual Operation and Result

Course Description:

This course is an advancing course for the telecommunication circuit and system design. This course enables students to master the digital modulation and demodulation circuits, broadband high-frequency power amplifier and high-frequency electronic circuit design, application and development. The students are expected to master the theory and designing of AM, FM transmitter and receiving system in the curriculum. In this course the students will choose independently project, perform their design, and in accordance with the performance indicators in opening report. The students will finish the selected topic development and systems debugging. Through making small receiver, launch system hardware circuit design, component selection, circuit installation and debugging and system testing, this course enables students to deepen their understanding of the basic theory, basic knowledge of communication circuits. At the same time, by taking the hardware circuit design and debugging skills training, students will analyze the application of communication circuit unit but also a typical receiver and the capacity of the transmission system.

Recommended Textbooks/References:

1. XU Xiaoping. Telecommunication Circuit Course Design Guidance. Beijing University of Technology Press, 2007
2. ZHAO Shufan. Telecommunication Electronic Circuit Experiments and Curriculum Design. Tsinghua University Press, 2009
3. MEI Kai Xiang. Telecommunication Theory and system experiments. Design and Application. Beijing Normal University Press, 2009

Course Number: 0004626
Course Title: Engineering Application Training of Signal Processing
Credit: 2.5 **Total Credit Hours:** 60
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class
Prerequisites: Signal and System, Digital Signal Processing
Evaluation Method: Written Report
Course Description:
By means of teaching signal and system research tools, methods and object, this training course enables students to master the application and development direction of the course content. It focuses on the hands-on training to improve ability and to deepen the understanding of the theoretical knowledge engineering applications. In the aspect of research tools, this course is based in C and C++ language programming training, which to enable students to have an experience to know a way to master a variety of signals and systems. Including standardization, correctness test, imitation and play to build utility functions, the teacher will teach the students research methods, such as how to use a single way to solve a variety of problems, and to solve the major issue by cutting into small pieces and to make the small issues to expand larger. The objects of study include speech signal processing, image signal processing, and mechanical signal processing and special systems design.
Recommended Textbooks/References:
1. ZHANG Yanhua, Yaolin Quan, Guo Wei. Digital Signal Processing. Machinery Industry Press, 2005
2. XU Limin, Shu Jun, Xie Youzhong. Based on the MATLAB Signal Systems Experimental Tutorial. Tsinghua University Press, 2010

Course Number: 0004148
Course Title: Communication Circuits and Systems Experiment
Credit: 1.5 **Total Credit Hours:** 36
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering
Prerequisites: Communication Electronic Circuits, Signals and Systems
Evaluation Method: Report and Operation Exam of each exercise
Course Description:
This course is a comprehensive experimental course for Communication Engineering, Electronic and Information Engineering students. Based on the communication circuit theory, telecommunication systems theory and lock-in techniques, the course is a theory extension of the curriculum. The content includes labs in telecommunication theory experiment, in the telecommunication circuit, high-frequency electronic circuit and telecommunication system experiments and developmental course. Through the course, the students are expected to further deep the understanding and awareness of the communication circuit, a communication system and be familiar with the use and operation of the experimental system and the experimental apparatus.
The students will also learn the theory and design methods by taking labs on circuit oscillation, mixing input, the amplitude and angle modulation and demodulation circuit, PAM, PCM, CVSD, FSK, PSK, and other digital modulation and demodulation the experimental task.

Recommended Textbooks/References:

1. XU Xiaoping. Telecommunication Circuit and System Experiments Tutorial. Beijing University of Technology Press, 2010
2. ZHU Changping, High-frequency Electronic Circuit Tutorial. Machinery Industry Press, 2009
3. SHEN Baosuo. Modern Telecommunication Theory Experiment Tutorial. Nankai University Press, 2010

Course Number: 0007262

Course Title: Engineering Application Training of Communication Systems

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

Students: Undergraduate students Major in Communication Engineering

Course Description:

Engineering Application Training of Communication Systems is a required practice course for undergraduate students in communication engineering major. The training provides abundant popular analytical techniques and issues for design and analysis in communication systems. The training is divided into two parts, basic signal processing and special training phase. Its contents cover convolution, Fourier transform, filter design, and noisy signal analysis, and etc. Through this training, the students are expected to understand the basic concepts, theories, methods, and techniques of signal processing, by their understanding of the basic theories. The ability of comprehensive using of the knowledge and serious practice and well foundation for the future in communications, electronics technology work will be improved and enhanced.

Recommended Textbooks/References:

1.Lecture Notes

Course Number: 0003286

Course Title: Curricula Project of Modern Communication

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

Students: Undergraduate students Major in Communication Engineering

Prerequisites: C Language, Moonachie and Embedded System

Evaluation Method: Report, Operation and Oral Examination

Course Description:

Curriculum project of modern communication is based on the embedded system hardware and software. Development platform the specific design of the communication module is expend the theoretical knowledge to solve practical engineering problems. This course enhances communications engineering expertise and design capabilities, which is in such practice mode: Task-driven, Practice, Summary, and Practice again.

This practice course is a comprehensive curriculum, which involves electronics, computers and many other expertises. It is comprehensive and strong ability requirement. Concentrating through the architecture of the ARM7 core processor S3C44B0 practical exercises, the tasks include data transmission and communication module design Such as IC synchronous serial module design, the RS-232 asynchronous serial communication design, GPRS wireless communication transmission module development and application, and etc.

Recommended Textbooks/References:

1. MA Weihua. The Principles and Applications of Embedded Systems. Beijing University of Posts and Telecommunications Publishing House, 2006
2. Samsung Corp. of S3C44B0X User's Manual 2010
3. ARM Corp. the ARM Instruction the Set-ARM University in the Program - V1.0. 2010
4. Own Teaching Tutorials (Electronic Version).2010

Course Number: 0004349

Course Title: Practice for Semiconductor Process II

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Microelectronic Process

Evaluation Method: Practice Report and Manipulation Examination

Course Description:

The course will provide students with knowledge of fabrication process and testing procedure of semiconductor devices. The students are expected to understand the device fundamentals and relationships between process conditions, structure parameters and device characteristics through fabrication of diode and bipolar transistors, analyze problems occurred during the practice, and give report at the end of the work. The tasks include safety operation and basic operation procedure of semiconductor fabrication processes, simulation of diffusion processes, test of bipolar process and wafer.

Recommended Textbooks/References:

1. Semiconductor Process Instructions, 2012.
2. Campbell Stephen A., The Science and Engineering of Microelectronic Fabrication. Publishing House of Electronics Industry, 2005.
3. HUANG Hanxiao, Principles of semiconductor technology. National Defence Industrial Press, 1980.

Course Number: 0007253

Course Title: Semiconductor Device Laboratory

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Microelectronic technology

Evaluation Method: Experiment

Course Description:

"Semiconductor devices laboratory" is a major compulsory course for undergraduate students major in electronic science and technology. The course will provide students with a training program of core practice. The purpose of the course is for students to understand the basic theory of semiconductor physics and the correlated working mechanism of measurement systems, improve the skills of data acquisition, error analysis and report writing, lay foundation for the course of integrated circuits and other follow-up major courses.

Recommended Textbooks/References:

1. Experiment guide book of electronic science and technology, Beijing University of Technology Press
2. CAO Peidong, Microelectronics technology. Publishing house of Electronics Industry, 2001.

Course Number: 0007254
Course Title: Semiconductor Physics Laboratory
Credit: 1.0 **Total Credit Hours:** 24
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Semiconductor physics
Evaluation Method: Experiment
Course Description:
"Semiconductor physics laboratory" is a major compulsory course for undergraduate students major in electronic science and technology. The course will provide students with a training program of core practice. The purpose of the course is for students to understand the basic theory of semiconductor physics and the correlated working mechanism of measurement systems, improve the skills of data acquisition, error analysis and report writing, lay foundation for the course of integrated circuits and other follow-up major courses.
Recommended Textbooks/References:
1. Experiment Guide Book of Electronic Science and Technology, Beijing University of Technology Press
2. LIU Enke, Semiconductor physics, National Defense Industry Press, 2008.

Course Number: 0007255
Course Title: Semi-custom ASIC Design
Credit: 1.5 **Total Credit Hours:** 45
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Basis of Circuit Analysis Ⅱ, Analog Electronics Technique, Digital Electronic Technique
Evaluation Method: Practice Exam
Course Description:
The course is an introduction of the whole process of FPGA design, from programming based on design requirements to realizing the hardware function, in the form of design examples. The purpose is for students to establish the idea of system design and complete design task in accordance with the design process, master the EDA technology and improve the ability of creation and innovation, discover and solve problems in experiments, and etc. The topics include: FPGA design methods and processes, hardware description language; timing design methods and software and hardware platform; independent design experiment, and etc.
Recommended Textbooks/References:
1. ZHOU Runjing, TU Ya, ZHANG Limin. Design Example of FPGA/CPLD Digital System Based on Quartus Ⅱ. Publishing House of Electronics industry, 2007
2. GE Xin. Science and Technology. Modern SOPC Technology Innovation Tutorial

Course Number: 0007257
Course Title: Power Transistor Design
Credit: 1 **Total Credit Hours**: 30
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Semiconductive Theory, Electronic Materials and Devices
Evaluation Method: Project Report
Course Description:
The course includes the concept design of high-frequency and high power transistor, detail design, sample design, theoretical calculation, and design report. The students are expected to establish philosophy based on system design and process design, understand the basic concepts, theories, methods, and techniques of formal languages, automata, and the related problem solving methods, and edit layout emulate process using L-EDIT. The design parameters（f；p0；Kp；Vcc；η）and device parameters will be understood, and the design scheme bill be submitted. The detail design includes: longitudinal and transverse parameter design; layout design; package design; test condition; and checking computations.
Recommended Textbooks/References:
1. SONG Nanxin. Theory of Transistor.Beijing：National Defence Industry Press, 2000
2. CAO Peidong. Theory of Microelectronics. Beijing：Publishing House of Electronics Industry. 2007
3. XIE Hongyun. Practice of Semiconductor Process. 2009

Course Number: 0007258
Course Title: Integrated Circuit Layout Design
Credit: 1.5 **Total Credit Hours:** 45
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Semiconductor Physics, Microelectronics Process, Analog Electronics Technique, Digital Electronic Technique
Evaluation Method: Practice Exam
Course Description:
The main purpose of the course is for students to master the integrated circuit top-down design process, from system requirement to circuit design to layout design and to the last layout verification, which requires the students to be familiar with integrated circuit manufacturing technology and master the EDA design and verification methods. The course includes: integrated circuit layout design method and process; N-Well CMOS manufacturing process, standard library units design, and an independently designed circuit layout used in the units of the standard library. The students are expected to grasp the layout design methods of integrated circuit, use the EDA design tools skillfully, complete a circuit layout design and simulation based on the standard CMOS process.
Recommended Textbooks/References:
1. Christopher Saint, Judy Saint. IC Layout Basics-A Practical Guide. Tsinghua University Press, 2005
2. Christopher Saint, Judy Saint. IC Mask Design-Essential Layout Techniques. Tsinghua University Press, 2005

Course Number: 0007261
Course Title: Digital Integrated Circuit Design
Credit: 1.5 **Total Credit Hours:** 45
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Microelectronics Process, Digital Electronic Technique, Semi-Custom ASIC Design
Evaluation Method: Practice Exam
Course Description:
The course will provide students with the digital IC design methods and processes. The purpose is for students to master methods of system integration design and HDL programming based on the IC manufacturing technology, hardware description language and advanced digital integrated circuit design software. The students are expected to complete a digital integrated circuit design project using Synopsys tools. The work includes the selection of subject, analysis, module division, HDL (hardware description language) design, function simulation, logic synthesis, physical synthesis, and etc.
Recommended Textbooks/References:
1. ZOU Xuecheng, et al. VLSI Design Method and Project Implementation. Science Press, 2007
2. HAN Yan, Han Xiaoxia, Ding Koubao. Integrated circuit design CAD/EDA tools practical course. China Machine Press, 2010
3. Erik Brunvand. Digital VLSI Chip Design with Cadence and Synopsys CAD Tools. China Electronic Press, 2009

Course Number: 0000786
Course Title: Elements of Information Theory
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students Major in Electronic Information Engineering, Experimental Class and Communication Engineering
Prerequisites: linear algebra**,** probability theory and stochastic processes
Evaluation Method: Written Exam
Course Description:
"Elements of information theory" is an important theoretical and specialized basic course in electronics, information, computer and other professional. The course purpose and tasks are to let students understand the basic concepts, the basic principle of the Shannon information theory and the application of the information theory in the field of communication and information engineering. The main contents include: the measure of information, sources and the information measure, channel and the channel capacity, lossless source coding, noisy channel coding and limit distortion source coding.
Recommended Textbooks/References:
1. ZHOU Yinqing. Elements of Information Theory (third Edition). Beijing University of Aeronautics and Astronautics Press, 2006
2. DAI Shanrong. Information Theory and Coding Base. Mechanical Industry Press, 2008
3. LV Feng, WANG Hong and LIU Haochun. Information Theory and Coding. Posts and Telecom Press, 2010.

Course Number: 0007268
Course Title: Wireless communications
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students Major in Electronics Information Engineering Experimental Class and Communication Engineering
Prerequisites: Signals and Systems, Digital Signal Processing, Communication Principles, Digital Communications, Principles of Communication Circuits, Digital Fundamentals, Probability and Stochastic Processes
Evaluation Method: Written Exam
Course Description:
Through explanation, this course is to have analysis and discussion of the principle of the wireless communications to students, and to develop the students' abilities of analyzing and designing. The students are required to grasp the basic concepts, theories, methods and techniques. The contents include the common wireless communication systems, their respective advantages and complements with each other, the basic characteristics, analysis and modeling methods of the channel, based on wireless propagation characteristics, the wireless link enhanced technologies, such as channel coding technology, interleave, modulation and their performance analysis and configuration in the wireless channel, combination of the three methods base on coding modulation principle, the principle and performance advantages of the adaptive coding modulation based on wireless channel changes, the diversity principle and the sending-receiving technology base on the independent characteristics of the channel. high-performance transmission technology, such as the performance analysis of MIMO, space-time code, recoding and multiplexing technology, the technology principle and the problems of OFDM, the principles of CDMA and so on.
Recommended Textbooks/References:
1. Andrea Goldsmith written, YANG Hongwen translated. Wireless Communications. Posts and Telecommunications Press, 2007.6.
2. Theodore S.Rappaport written, CAI Tao translated. Wireless Communications Principles and Practice (first Edition).Publishing House of Electronics Industry, 1999.

Course Number: 0003281
Course Title: The Essential Guide to Signal Processing
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering
Prerequisites: Information Theory, Random Signal Analysis, Digital Signal Processing
Evaluation Method: Written Exam or Reports
Course Description:
The course is optional for senior students in the majors of the electronic information engineering and communication engineering. The students are expected to learn the recent progress in modern information technology and information processing after completing the correlated curriculum, such as signals and systems, information theory and random signal analysis. The basic topics include: neural networks and its application, time-frequency analysis, wavelet transform and its applications, and Chaos, etc. Basic concepts, principles and application are introduced in each

topic, which lays a solid foundation for students engaged in signal processing.

Recommended Textbooks/References:

1. The recent research report and review papers.
2. Self-designed teaching material.

Course Number: 0004954

Course Title: Microwave Technology

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

Students: Undergraduate students Major in Electronics Information Engineering, Communication Engineering

Prerequisites: Electromagnetic Field and Electromagnetic Wave

Evaluation Method: Written Exam

Course Description:

This course is professional elective one for the electronic information engineering students. The course is based on principle of the basic theory and technology, striving to highlight the application and practice of microwave technology, and to improve the practical ability of students. The task of the course is to enable students to master the basic concepts, basic theories and basic analysis methods for microwave technology, and to cultivate students' ability to analyze and solve problems, and to lay a good foundation for researching and engineering design job in RF and microwave in the future. The students are expected to understand and master the basic principle, basic technology and typical application system of microwave technique deeply. The specific content of the course includes: the uniform transmission line theory, regular metallic waveguides, plane transmission lines, microwave network foundation, microwave devices.

Recommended Textbooks/References:

1. Wang Xinwen. Microwave Technique and Antenna. Electronic industry press, 2011.
2. Liao Chengen. Basis of Microwave Technique. Technique, Xi'an Electronic and Science University Press, 1995.
3. Liu Xueguan. Microwave Technique and Antenna. Xi'an Electronic and Science University Press, 2006.

Course Number: 0002007

Course Title: Integrated Circuit Analysis and Design Ⅳ

Credit: 2 Total Credit Hours: 32

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Automation

Prerequisites: Analog Circuits, Pulse and Digital Circuits, Fundamental of Circuits Analysis

Evaluation Method: Written Exam

Course Description:

"Integrated circuit analysis and design IV" is a course for undergraduate students not major in Microelectronics. The purpose of the cause is for students to gain insight of new technologies, new devices and new circuits of VLSI, understand the new development in the field of VLSI, and grasp the basic methods and techniques of IC design. The course focuses on the CMOS process,

with the unit characteristic and working principle of the circuit as the starting point. The students are expected to comprehend the large-scale IC and VLSI design, and grasp the process and methods of layout design.

Recommended Textbooks/References:

1. GAN Xuewen, etal. Integrated Circuit Principle and Design. Beijing University Press, 2006
2. JAN M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic. Digital integrated circuits-a design perspective (2nd Edition), Tsinghua University Press, 2004
3. GAN Xuewen. Digital CMOS VLSI Analysis and Design Basis. Beijing University Press, 2002
4. ZHONG Wenyao, Zheng meizhu. HSPICE simulation and design of the CMOS circuit, science press, 2007

Course Number: 0003213

Course Title: Principles of Automatic Control Ⅱ

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class. Communication Engineering, Electronic Science and Technology

Prerequisites: Signals and Systems, Circuit Analysis, Complex function, Integral Transform, Electronic Technology

Evaluation Method: Written Examination

Course Description:

Mathematical Models of Control systems, Time Response, Frequency Response, and Compensating Method are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of automatic control principle and the related problem solving methods, through which their abstraction, modeling and engineering abilities will be improved. The basic topics include: the basic history of control theory and practice and the basic concepts of close-loop control, transfer function form of physical systems and dynamic structure diagram, characteristic analysis of control system in time-domain, the Roth stability criterion and the solving methods of steady-state error of feedback control system, characteristic analysis of control system in frequency-domain, Bode plot of typical system, SyQuest criterion and frequency characteristic of open-loop system, compensating a control system using phase-lead, phase-lag and reference model.

Recommended Textbooks/References:

1. SUN Liang. Automatic Control (the third Edition). Higher Education Press, Jun. 2011.

Course Number: 0004924

Course Title: Signal and System Ⅲ

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

Students: Undergraduate students Major in Electronic Science and Technology, Automation

Prerequisites: the higher mathematics, linear algebra, integral transform, the complex functions, fundamentals of circuit analysis

Evaluation Method: Written Exam

Course Description:

Focus on the same determined signal linear system when transmission, processes, the basic theory of basic analysis method and the engineering application. This course in signal analysis requests the student to grasp the basic theory and signal analysis methods, including: Continuous-time periodic signal Fourier series, Continuous-time no periodic signal Fourier transformation, continuous signal Laplace transforms, etc. In system analysis, demand the students master the description method of system, including: continuous system differential equation, the establishment of system of the concept and the function is calculated. In the analysis method, it mainly involves convolution integral, and the Fourier series, Fourier transformation, Laplace transform the method to solve the linear system; Linear system stability judgment, etc.

Recommended Textbooks/References:

1. ZHENG Junli, Signal and System. Higher Education Press, 2008
2. WU Dazheng. Signal and linear System Analysis. Beijing. China High Education Press, 1998
3. GUAN Zhizhong. The Signal and Linear System. Beijing. China High Education Press, 1992
4. SIMON. Hejin Signal and System. Electronic industry press, 2006

Course Number: 0004644

Course Title: Technology of Microelectronics Process

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Introduction of Microelectronics, Semiconductor Physics and Semiconductor Devices

Evaluation Method: Written Exam

Course Description:

The course is an introduction of the basic theory of fabrication process of semiconductors, common technologies, equipments and testing methods for the fabrication of chips, typical fabrication process for semiconductors, including the bipolar transistors and CMOS transistors. The students are expected to understand the basic theory of semiconductor process, including the Groove model and Flick diffusion equation, grasp the common fabrication technology including the fabrication of substrate and film, growth methods of material, doping technology, Lithography, etching and packaging methods, and get familiar with the fabrication process of bipolar transistors, COMS transistors and large scale integrated circuits.

Recommended Textbooks/References:

1. GUAN Xudong, Basic Process of Si integrated Circuit, Beijing: Peking University Publisher, 2003

Course Number: 0007269

Course Title: Professional English

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Semiconductor Physics, Principle of Semiconductor Devices, Circuit Analysis, Analogue Electronics, Digital Electronics

Evaluation Method: Written Exam

Course Description:

"Professional English" is a major elective course for the undergraduate students major in Electronic Science and Technology. The course introduces semiconductor materials, electronic devices, integrated circuits, fundamental amplifying circuits, and digital circuits in English. The students are expected to master the commonly used English vocabulary and translate conventional terms of electronic science and technology into English. The purpose is for students to improve the reading and translation ability and lay a good language foundation for future work.

Recommended Textbooks/References:

1. ZHU Yiguan, "Electronic technology professional English（Third Edition）". Publishing House of Electronics Industry, 2009.4
2. ZHANG Hong, "Microelectronic professional Englishi". Machinery Industry Press, 2010.8
3. JAN M.Rabaey et al, Digital Integrated Circuits-A design Perspective (second Edition, photocopy). Tsinghua University Press, 2003
4. DONALD A.Neamen, Semiconductor Physics and Devices-Basic Principles (Third Edition, photocopy).Tsinghua University Press, 2003
5. JAMES D. Plummer et al, Silicon VLSI Technology – Fundamentals. Practice and Modeling, Publishing House of Electronics Industry, 2003

Course Number: 0006361

Course Title: Basis and Application of Programmable Logic Device

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

Students: Undergraduate students Major in Automation

Prerequisites: Digital Circuits, Analog Circuit, Principle of Microcomputer

Evaluation Method: Written Exam

Course Description:

A programmable logic device or PLD is an electronic component used to build reconfigurable digital circuits. Unlike a logic gate, which has a fixed function, a PLD has an undefined function at the time of manufacture. Before the PLD can be used in a circuit it must be programmed, that is, reconfigured. This is a selective course for junior student majoring in automatic control. In this course basic concept, design flow, development tool, and hardware description language of FPGA will be introduced. Students are expected to finish a specific task on the development board. The basic topics include: VHDL language, basic structure of VHDL, the sequence statement, subsequent statement, finit-state-machine, data type, data object, and Quietus development environment. Design examples include: counter, lift, A/D controller, register and pulse width modulation signal generator etc. From the point of engineering practice, 12 hours experiments are designed. Combined with the typical design examples these contents are introduced systematically in this course. This could help to improve students' practical application ability.

Recommended Textbooks/References:

1. PAN Song, Hong Jiye. EDA Technology and VHDL. Tsinghua University Press, 2007
2. LI Jinghua, Du Yuyan. Programmable Logic Device and EDA Technology. Northeastern University Press, 2008.
3. WANG Zhenhong, VHDL Digitial Design and Application Practice tutorial. China Machine Press, 2007

Course Number: 0001998

Course Title: Process Control System I

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

Students: Undergraduate students Major in Electronics Information Engineering Experimental Class. Automation

Prerequisites: Principles of Automatic Control, Automatic Detection and Instrumentation

Evaluation Method: Written Exam

Course Description:

Through learning the course of process control system, students will be able to do the work of analysis, design, run and study of process control system. Students are expected to grasp the basic knowledge, to have the ability of design, installation, debugging and maintain the normal operation of process control system, and to develop their engineering practice ability and innovation capability By broadening their knowledge students can learn more about professional development trends. It will pay particular attention to the combination of advanced technology and engineering practice in order to enhance students' ability to solve practical problems.

Recommended Textbooks/References:

1. YAN Aijun, ZHANG Yating, GAO Xuejin. Process Control System. Beijing: Beijing Industrial University Press, 2010
2. FANG Kangling. Process Control System (Second Edition). Wuhan: Wuhan University of Technology Press, 2007

Course Number：0000554

Course Title: Computer Control System

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

Students: Undergraduate students Major in Electronics Information Engineering Experimental Class, Automation

Prerequisites: Interface Technique of Single-chip Microcomputer and Microcomputer, Principles of Automatic Control, Automatic Detection and Instrument, Computer Networks, Fundamentals of Software Design

Evaluation Method: Written Exam

Course Description:

This course is a major course of automation. It's a fundamental course for the undergraduates to engage into the computer control. Its purpose is to train the ability of developing, design and implementing the computer control systems. The course emphasizes both the integrity of the theoretical system and the application of the theory in practice.

This course is the combination of multi-courses, which can help the students to comprehensively utilize the knowledge of multi-courses and contact practice. By studying this course, the students can understand the fundamental principles and control technology of computer control system and their implementation method. Thus the knowledge structure of students will be more perfect, and they will have the preliminary ability to solve practical engineering problems.

Recommended Textbooks/References:

1. WANG Pu, Duan Jianmin. Computer Control System, 2002.8
2. GAO Jinyuan. Computer Control System. Higher Education Press, 2010.1

3. HE Kezhong, Li Wei. Computer Control System. Tsinghua University Press, 2000.1
4. YANG Huixian. Fieldbus Technology and Applications. Tsinghua University Press, 2000.6

Course Number: 0004931
Course Title: Motion Control System (Chinese/English)
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Electronics Information Engineering Experimental Class, Automation
Prerequisites: Control Theory Electric Machine Principle Power Electronics
Evaluation Method: Written Exam
Course Description:
The course is one of the elective courses in automation the working principles, performance analysis and engineering design of AC and DC driving system is introduced. So this is a comprehensive and practical course. The students are expected to obtain the performance analysis and design ability for the motion control system with high real-time. The basic topics include: DC driving system with single closed-loop speed control, DC driving system with double closed-loop speed &current control, AC variable-frequency driving system with constant voltage/frequency.
Recommended Textbooks/References:
1. RUAN Yi, Chen Weijun.Motion Control System. Tsinghua University Press 2006.
2. QI Hui, Yang Yuzhen. Motion Control Experiment Textbook. Tsinghua University Press 2009.
3. BOSE B.K. Modern Electronics & AC Drives. China Machine Press, 2003.

Course Number: 0000559
Course Title: Motion Control System
Credit: 3 **Total Credit Hours:** 48
Students: Undergraduate students Major in Automation
Prerequisites: Principles of Automatic Control, Electric Machinery and Electric Drives, Power Electronics Technology, Detection Technology
Evaluation Method: Written Exam
Course Description:
Motion control system is composed of the motor, driver, controller and sensor. The motor includes induction motor, permanent magnetic synchronous motor, DC brushless motor and stepping motor. The driver converts the electric power with constant voltage and frequency into one with adjustable voltage, frequency and current so as to control the torque, speed, position and acceleration of the motor. The controller commands the driver by means of digital or analogous signals based on the specified technology. The sensor transforms non-electric signals into the electric ones that are used by the controller. After learning this course, the motion control system can be designed and developed, and the mechanism can be droved to realized specified motion. The learning of motion control system focuses on the relation of fundamental theories, devices and algorithms. The fundamental theories are referred to the principles and control theories of above mentioned motors. The devices are composed of frequently used sensors, power device, micro-controller and electric components. The fundamental theory and the devices are combined

into the algorithm that makes the abstract theory concrete, scattered devices integrative and program modular.

Recommended Textbooks/References:

1. CHEN Boshi. Control Systems of Electric Drives—Motion Control Systems. China Machine Press,2010.1.1
2. RUAN Yi, CHEN Weijun. Motion Control Systems. Tsinghua University Press,2006.10

Course Number: 0004632

Course Title: Control System Simulation I

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

Students: Undergraduate students Major in Automation

Prerequisites: Control Theory; Foundational theory of linear systems

Evaluation Method: Written Exam

Course Description:

The basic concepts, theories, methods of control system simulation are introduced in this course. Besides, the skills on how to solve the problems encountered in application are shown. The students are expected to understand the basic concepts, theories, methods, and techniques of control system simulation and to analyze control systems skillfully by means of simulation technologies. The basic topics include: basis concepts of computer simulation; basis knowledge of MATLAB; mathematical models of control systems and their conversion; numerical integral simulation of continuous systems; discrete similar simulation of continuous systems; fast simulation.

Recommended Textbooks/References:

1. ZHANG Xiaohua, et al. Computer Simulation and CAD of control system. Beijing: China Machine Press, 2009
2. XIONG Guangleng, et al. Continuous System Simulation and Discrete Event System Simulation. Beijing: Tsinghua University Press, 1998
3. JIANG Min, et al. Computer Simulation of Control System. Beijing: Publishing House of Electronics Industry, 2006
4. LI Guoyong, et al. Computer Simulation and CAD of Control System. Beijing: Publishing House of Electronics Industry, 2003

Course Number: 0003283

Course Title: Embedded System

Credit: 2 **Total Credit Hours:** 40

Students: Undergraduate students Major in Automation

Prerequisites: Circuit Analysis, Analog Electronics, Digital Electronics, Microcontroller, Computer Programming

Evaluation Method: Written Exam

Course Description:

"Embedded System" is an important specialty course following the course "Circuit Analysis, Analog Electronics, Digital Electronics, Microcontroller and Computer Programming". The

knowledge which students study in these courses is used combined in Embedded System course. The course is intended for the undergraduates to master the embedded system principle and application technology, the design methods of hardware and software. The contents include the following knowledge: the basic concept of embedded system; the structure of embedded system; ARM Architecture; ARM7TDMI（-S）Instructions; the methods of developing embedded systems; LPC2000 series ARM controller; Embedded co/OS-II; Embedded system design including hardware and software based on real time operating system.

Recommended Textbooks/References:

1. Qi jun chen, Embedded System and Applications. Tongji University Press, 2011
2. LI Gong zhou, The Basic Course of ARM Embedded System. Beijing University of Aeronautics and Astronautics Press, 2009
3. Peter Marwedel. “Embeded System Design”. Science Publishing Company. 2007.1

Course Number: 0001997

Course Title: Digital Signal Processing Ⅱ

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

Students: Undergraduate students Major in Automation

Prerequisites: Signals and Systems, Engineering Mathematics, Microcomputer principles and Application

Evaluation Method: Open-book Exam

Course Description:

Digital Signal Processing (DSP) is concerned with the representation, transformation and manipulation of signals on a computer. After half a century advances, DSP has become an important field, and has penetrated a wide range of application systems, such as control engineering, pattern recognition, digital communications, medical imaging and so on. With the dramatic increase of the processing capability of signal processing microprocessors, it is the expectation that the importance and role of Digital Signal Processing Technology is to accelerate and expand.

This course introduces the basic concepts and theory of DSP. The main topics include: signal representation in time domain, sampling theorem, Fourier transform, linear time-invariant system, discrete convolution, z-transform, discrete Fourier transform, and discrete filter designing. By the end of this course, the students should be able to understand the most important principles in DSP, and able to use Mat lab programming to analyze the frequency-spectrums of discrete-time signals with DFT or FFT algorithm and design IIR or FIR digital filters. The course emphasizes the understanding and implementations of theoretical concepts, methods and algorithms.

Recommended Textbooks/References:

1. HU Guangshu. “Digital Signal Processing”. Tsinghua University Press, 2005
2. WU Zhenyang. “Digital Signal Processing”. Higher Education Press, 2004
3. ZHANG Xiaohong. “Digital Signal Processing”. Mechanical Industry Press, 2005
4. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck. “Discrete-Time Signal Processing”. Prentice-Hall Press, 1999

Course Number: 0000557
Course Title: Modern Electrical Control Technology
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students Major in Automation
Prerequisites: Circuit and Magnetic Circuit, Analog Electronics, Digital Electronics, Computer and Interface Technology, Basics of Motor and Drive
Evaluation Method: Written Exam
Course Description:
From the engineering application point of view, the logic and sequential control laws of the automatic control system are introduced, the common low-voltage electrical apparatus, typical control unit, the basic control circuits, the typical application examples analysis, and electronic appliances, programmable controller, intelligent combine apparatus and other electrical components and their control technology are taught in this course. The Course focuses on the typical control circuit analysis and design of relay contact electric control system, the basic command system and applications of programmable controller; the difficulties of the course are the designs of electrical control circuit and the applications of programmable controller. Through this course of study, to make the students master the basic knowledge of electrical control, and can reasonable analysis, design and application of electric control system properly in practice. In the end, to cultivate mainly students' ability of electrical engineering design, application and practice.
Recommended Textbooks/References:
1. DENG Zeming, CHENG Lianglun. Electrical and Programmable Logic Controller Application Technology (third edition). Beijing: Mechanical Industry Press, 2008
2. WANG Yonghua. Modern Electrical Control and PLC Technology (second edition). Beijing: Beijing University of Aeronautics and Astronautics Press,2011

Course Number: 0000813
Course Title: Principles of Intelligent Instrument and Its Applications
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation
Prerequisite: Circuit Analysis, Analog Electronics, Digital Electronics, Microcomputer Principle and Application, Single-chip Microcomputer Principles and Interface Technology, Automatic Inspecting & Measuring Technique
Evaluation Method: Written Exam
Course Description:
This is an important specialized course for students majoring automation, and it is the follow-up to Circuit Analysis, Analog Electronics, Digital Electronics, Microcomputer Principle, Single-chip Microcomputer Principle and Interface, Automatic Inspecting & Measuring Technique. All these prerequisites are integrated and applied with flexibility in this course. It gives deep introductions and descriptions on how to use microprocessors to realize intelligent instruments and automatic measure and control devices. The students need to acquire abilities in system design of intelligent instrument using software and hardware knowledge comprehensively. The course also introduces the recent developments in intelligent instrument such as Personal Instrument, VXI Instrument and Virtual Instrument.
Recommended Textbooks/References:

1. ZHAO Maotai, Principle of Intelligent Instrument and Its Applications. Publishing House of electronics industry (3rd Edition), Mar. 2009.
2. CHENG Defu, Lin Jun, Intelligent Instrumentation. Mechanical Industry Press, Apr. 2008.
3. LING Zhihao, Principle and Design Technology of Intelligent Instrument. East China University of Science and Technology, Jul. 2008.
4. XU Aijun, Principle and Design of Intelligent Measurement and Control Instrument. Beihang University Press, Sep. 2004.

Course Number: 0000815
Course Title: Intelligent Control Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation
Prerequisites: control theory, Algebra
Evaluation Method: Written Exam
Course Description:
This course aims to teach the fundamentals of intelligent control techniques including Fuzzy Control and Neural Net (NN) Inverse Control. Fuzzy control focuses on an introduction to the Fuzzy Math including Fuzzy Sets and operation, fuzzy bases, fuzzy inference, justification and defuzzification. The course also presents SAM (standard additive model) Fuzzy Systems and fundamental properties. And uses several cases including robot obstacle avoiding control based SAM Fuzzy system to show how to design, simulation and implementation of Fuzzy Control System. Neural Net Inverse Control includes the basic optimization method such as gradient descent algorithm and Newton iteration method. The course provides an introduction to neural structure and learning methods including single layer Perception, adaptive linear neural network and back-propagation neural network. Several cases including car back parking control basing BP are used to show how to design, simulate and implement a NN Control System.
Recommended Textbooks/References:
1. ZHANG Naiyao,YAN Pingfan. Neural net and Fuzzy control. Tsinghua University Press, 2006
2. WANG Lixing, WANG Yingun. Fuzzy system and control. Tsinghua University Press, 2006
3. LIU Sutang, HAN Chongzhao. Adaptive Inverse Control. Xi’an Jiaotong University Press, 2000

Course Number: 0005701
Course Title: Moonachie and Embedded System I
Credit: 2.0 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering
Prerequisites: Analog Electronic Technology, Digital Electronic Technology, Microcomputer Principle and Software Foundation
Evaluation Method: Written Exam
Course Description:

Embedded systems technology is one of the rapid developments of cutting-edge technologies. With the development of Sock technologies, embedded processors are full access to 32-bits times. Embedded system products are widely used in the field of communications, aerospace, medical instruments, industrial control and information appliances, and gradually penetrated into all aspects of people's lives. This course belongs to professional courses. The main tasks of this course are to introduce today's cutting-edge technology of embedded system development, to broaden professional knowledge of the undergraduate students and make them grasp the embedded system hardware and software design methods. Furthermore, lay the foundation for complete the system design task on the embedded system development board. The most significant feature of this course is modern mainstream technology oriented.

Recommended Textbooks/References:

1. MA Weihua. Principles and Applications of Embedded System. Beijing University of Posts and Telecommunications Press, 2006.9
2. DU Chunlei. ARM Architecture and Programming. Tsinghua University Press, 2002.11
3. WANG Tianmiao. Embedded System Design and Examples of Development—Based on the ARM Microprocessor and on μC/OS- II Real-Time Operating System. Tsinghua University Press, 2002.9
4. SHAO Beibei Translate. Embedded Real-Time Operating System —μC/OS-II, 2nd Edition. Beijing University of Aeronautics and Astronautics Press, 2003.4

Course Number: 0007270

Course Title: Technology of Electromagnetic Compatibility

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

Students: Undergraduate students Major in Automation, Electronics Information Engineering, Experimental Class and Communication Engineering

Prerequisites: Analog Circuits, Digital Circuits, Circuit Analysis

Evaluation Method: Open-book Exam

Course Description:

The knowledge and skills of electromagnetic compatibility, methods of anti-interference are introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of electromagnetic compatibility. The basic topics include: the concepts of electromagnetic compatibility; source of the electromagnetic interference；transmission path of the electromagnetic interference；shielding technology；grounding techniques；isolation technology；filtering techniques; clamp technique; technology of continued flow; circuit board design of EMC; anti-interference technology of computer system.

Recommended Textbooks/References:

1. YANG Kejun, Electromagnetic Compatibility Theory and Design Technology. Posts and Telecom Press, 2004
2. LU Hongmin, Engineering Electromagnetic Compatibility. XIDIAN University Press,2003
3. BAI Tongyun, LV Xiaode, Electromagnetic Compatibility Design. Beijing University of Posts and Telecommunications Press, 2001

Course Number: 0004630

Course Title: Introduction to the New Technologies of Modern Communications Ⅰ

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering

Prerequisites: Principles of Communication Systems, Digital Signal Processing, Fundamentals of Communication Networks

Evaluation Method: Without Written Exam

Course Description:

This course is for undergraduate students major in Communications Engineering and Electronic Information Engineering in their 4th year. Based on the study of Principles of Communication Systems, Digital Signal Processing and Fundamentals of Communication Networks, the students are supposed to know more about the theories of modern communication, up-to-date communication technologies and technology developing trends. This course is mainly about new wireless, mobile and broad-band networking technologies, including WMAN, WLAN, WPAN, NGN, IOT, Cloud Computing, CR, Distributed Wireless Networks, etc. This course is to introduce and discuss about the fundamental theories, key technologies and novel systems, from which the students will benefit in their professional work afterward.

Recommended Textbooks/References:

1. Douglas Comer, Internetworking with TCP/IP Volume I 5th Edition, Prentice Hall, 2006.
2. Andreas F. Molisch, Wideband Wireless Digital Communications, Prentice Hall, 2000.
3. Gilbert Held, Data Over Wireless Networks: Bluetooth, WAP, and Wireless LANs, McGraw-Hill, 2000.
4. Teaching Materials by the Lecturer.

Course Number: 0004941

Course Title: DSP Technology and Applications Ⅰ (Chinese/English)

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Digital Signal Processing; Digital Electronics; Microcomputer Principle

Evaluation Method: Written Exam

Course Description:

DSP technology has been rapidly developing in recent 30 years. The systems based on DSP processors have flexible, programmable and widely applied advantages, so that DSP processors has become digital information computing engines which are indispensable to electronic filed. This course is a basic elective course. Firstly, the current status of DSP development is introduced. Then the connotation and DSP programming model are taught to students. Secondly, students will study the architecture of DSP processors, including core, data address generators, program sequencer and memory. This part is of difficulty and importance in the course. At last, the design method and development tools of DSP systems will be taught in order to finish some system design tasks based on DSP hardware boards. Facing the mainstream techniques and combining basic principles with hands-on are the prominent features of the course.

Recommended Textbooks/References:

1. Andrew Bateman, The DSP Handbook Algorithms, Applications and Design Techniques, China Machine Press, 2003.
2. Analog Devices Inc., ADSP-219X/2191 DSP Hardware Reference, 2002.
3. Analog Devices Inc., ADSP-219X DSP Instruction Set Reference, 2002
4. Analog Devices Inc., ADSP-21160 SHARC DSP Hardware Reference, 2002
5. Analog Devices Inc., ADSP-21160 SHARC DSP Instruction Set Reference, 2001

Course Number: 0007279

Course Title: FPGA Principle, Design and Application

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Digital Circuit

Evaluation Method: Written Exam

Course Description:

The objectives of this course are to provide students with a working knowledge required to develop digital logic system designs in Hardware Description Languages (HDLs) at behavioral, register-transfer, and structural (gate) levels; to validate and/or verify their logic system designs via automated pre/post-synthesis HDL simulation test-benches; and to then implement their final digital logic system designs to Complex Programmable Logic Devices (PLDs) and/or Field Programmable Gate Arrays (FPGAs) for final post-implementation (place and route) functional and performance simulation testing and final design and operational verification/validation. The topics of this course include: the hardware architectures of CPLD and FPGA programmable logic device; a study of VHDL Hardware Description Languages; their use in digital system design methodologies including design validation and verification via Quartos II EDA software simulation, synthesis, and implementation.

Recommended Textbooks/References:

1. PAN Song, EDA technique and VHDL. Tsinghua University Press, 2009

Course Number: 0004939

Course Title: Digital Image Processing (Chinese/English)

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Mathematics, Probability, Linear Algebra, Signal and System, Digital Signal Processing

Evaluation Method: Written Exam

Course Description:

"Digital Image Processing" is a degree course for the undergraduate student who is pursuing master degree in the specialization of Electronic Engineering or Communication Engineering. This course is designed to enable student to acquire basic concepts, theories and methods. The

content includes: 2D Fourier Transform and its properties. Image enhancement (include histogram processing, smoothing, median filtering, sharpening, Filtering; homomorphism filtering) , Image restoration (include Image degradation model, noise and its reduction, estimation of the degradation model, inverse filtering, winner filtering.), image compression (include redundancy, image processing model, variable length coding, predictive coding, JPEG standard) color image processing (color model, pseudo-color processing) and basic concepts of image reconstruction. In order to make the course more practical, the students should master the format of BMP file. They should know some basic concepts such as human visual system, the properties of human vision system. In order to make the student understand the concepts deeply, there are three experiments: Read/Write a BMP file, analysis of image frequency spectrum, and Image histogram equalization.

Recommended Textbooks/References:

1. Rafael C Gonzalez. Digital Image Processing (Third Edition). Press, 2010.
2. Ruan Qiuqi, Digital Image Processing, PHEI, 2007.
3. ZHAO Rongchun, Digital Image Processing, North-west Polytechnic University Press, 1998

Course Number: 0000522

Course Title: Digital Image Processing II

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

Students: Undergraduate students Major in Electronics Information Engineering, Communication Engineering

Prerequisites: Mathematics, Probability, Linear Algebra, Signal and System, Digital Signal Processing

Evaluation Method: Written Exam

Course Description:

“Digital Image Processing” is a course for the undergraduate student who is pursuing master degree in the specialization of Electronic Engineering or Communication Engineering. This course is designed to enable student to acquiring basic concepts, theory and methods. The main topics include: 2D Fourier Transform and its properties. Image enhancement (include histogram processing, smoothing, median filtering, sharpening, Filtering; homomorphism filtering, pseudo-color enhancement) , Image restoration (include Image degradation model, noise and its reduction, estimation of the degradation model, inverse filtering, winner filtering.), image compression (include redundancy, image processing model, variable length coding, predictive coding, JPEG standard) and basic concepts of image reconstruction. In order to make the course more practical, the student should master the format of BMP file. They should know some basic concepts such as human visual system, the properties of human vision system, In order to make the student understand the concepts deeply, there are three experiments: Read/Write a BMP file, analysis of image frequency spectrum, and Image histogram equalization.

Recommended Textbooks/References:

1. RUAN Qiuqi, “Digital Image Processing”, PHEI, 2007.
2. ZHAO Rongchun, "Digital Image Processing", North-west Polytechnic University Press, 1998.
3. Rafael C Gonzalez. Digital Image Processing (Third Edition). Press, 2010.

Course Number: 0004944

Course Title: Signal Processing Using Mat lab (Self-Learning)

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Signal & Systems, Digital Signal Processing, Fundamentals of Statistical Signal Analysis

Evaluation Method: Project Report

Course Description:

Signal Processing and its realization in Malta is an elective course for undergraduates major in electronic information engineering and communication engineering. In this course, skills in metal programming are introduced in details with the brief introduction on high efficient embedded signal processing algorithm. Through the course, students will have strong ability in solving real problems in industry.

In this course, more practice is set for students and they should learn more in practice by themselves. Though the issue given at the class, students should develop their own skills and experience for solving the problems to meet in the future.

Recommended Textbooks/References:

1. ZHANG Yanhua et al. Digital Signal Processing-Fundamentals and Application. China Machine Press, 2005
2. JAMES H. McClellan, OPPENHEIM Alan V. Computer-Based Exercises for Signal Processing Using, Publishing House of Electronics Industry Press, 2006
3. Vinay K. Ingle, John G. Proakis. Digital Signal Processing Using MATLAB. Science Press, 2003
4. The MathWorks, Inc. MATLAB--The Language of Technical Computing, Using MATLAB Version 7. (http:// www.mathworks.com)
5. The MathWorks, Inc. Signal Processing Toolbox-For Use with MATLAB, User's Guide Version 7. (http:// www.mathworks.com)
6. The MathWorks, Inc. Filter Design Toolbox-For Use with MATLAB, User's Guide Version 4.(http:// www.mathworks.com)

Course Number: 0004629

Course Title: Digital Speech Processing and Coding

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Signal and System, Digital Signal Processing and Random Signal Analysis

Evaluation Method: Written Exam

Course Description:

The basic theories or techniques on speech signal processing and speech coding at low bit rates will be introduced systematically based on speech production model in this course. The main contents of this course include: digital model for speech signal, digital analysis of speech signal（Short-time energy, zero-crossing, short-time autocorrelation function, short-time Fourier transform and its sampling rate, short-time synthesis, spectrum and cestrum analysis）, pitch

detection of speech signal（pre-processing, pitch estimation in time and frequency domain）,linear prediction analysis of speech signal (principle, solution, application and line spectrum frequency representation), vector quantization of speech signal (principle of VQ system, memory VQ and memory less VQ, VQ for LSF parameters) and code-excited linear prediction speech coding (codec model and its parameters optimizing, indexes search of the fixed codebook and adaptive codebook, quantization of excitation gain codebook, adaptive post-filtering).

Recommended Textbooks/References:

1. CHANG Chunbao. Principles of Digital Speech Coding. Publishing House of Xidian University, 2007
2. Lawrence R. Rabiner and Ronald W. Schafer. Theory and Applications of Digital Speech Processing. Publishing House of Electronics Industry, Beijing, China, 2011

Course Number: 0001979

Course Title: Multimedia Data Communication Technique

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, and Communication Engineering

Prerequisites: Digital Signal Processing

Evaluation Method: Written Exam

Course Description:

The course of Multimedia Data Communication Techniques aims to providing students with the ability of understand the fundamental in multimedia source coding, multimedia data format, data communication proposals and the corresponding new development in industry.

The course is an elective one for 3rd year or 4th year undergraduate or graduate student. To select this course, students should have the knowledge of digital signal processing, information theory and some fundamentals in digital image processing.

The grade for this course is 2.5 and will take 38 lectures with 2 experimental courses.

Recommended Textbooks/References:

1. LIN Zongfu. Fundamentals of Multimedia Techniques (third Edition). Tsinghua University Press, 2009.1
2. CAI Anni. Fundamentals of Multimedia Communication Techniques (second Edition). Electronic Industry Press, 2008.7
3. ZHANG Xiaoyan, LI Ruixin, LIU Lingxia. Multimedia Communication Technique. Beijing University of Posts and Telecommunications Press, 2009
4. Halsall,F. Mutimedia Communications. Post & Telecom Press, 2004

Course Number: 0004953

Course Title: Fiber-Optic Communication Theory (Chinese/English)

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

Students: Undergraduate students Major in Electronics Information Engineering Experimental Class, Communication Engineering

Prerequisites: Principle of communication, University Physics

Evaluation Method: Project Report

Course Description:

The course is the discipline based elective course of communication technology. It introduces the basic principle and system of fiber optical communication and makes the students understand the key technology in the modern information filed well. The main contents include: transmission theory and characters of fiber, light source and transmitter system, optical detector and receiver system, principle and amplification of optical amplifier, fiber-optic communication system and network, and WDM which is the key technology of wide bandwidth fiber-optic communication and all-optic network which is the future of fiber-optic communication.

Recommended Textbooks/References:

1. Djafar K. Mynbaev and Lowell L. Schniner.Fiber - Optic Communications Technology.Science Press, 2003
2. GU Wanyi, Huang Yongqing, CHEN Xue, etc. Fiber optic Communication. POST & TELECOM PRESS, 2006
3. GU Wanyi, Li Guoru. Fiber optic Communication system. Beijing University of Posts and Telecommunications press, 1999

Course Number: 0004951

Course Title: Modern Switching Technology I

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

Students: Undergraduate students Major in Electronics Information Engineering Experimental Class, Communication Engineering

Prerequisites: Electronic circuit, Signals and systems, Principle of communication, Principle of computer, higher mathematics, Linear algebra, Probability theory.

Evaluation Method: Written Exam

Course Description:

The Switch Technology is the core course for communication technology major students. Students should have the basic knowledge of communication technology and the ability to do operations. Teaching Objective: to know the concept of the circuit switching, the basic structure of the program switcher, the procedure of the call handling, the latest switching technology and development of the communication network; to fully prepare for the future work in production, installation, maintenance, technical support and after-sale department; to be familiar with the basic software and hardware operation of the switcher. Content: 1. The concept of telephone communication establishment, signaling, communication network, and billing; 2. The basic principles of Circuit switching; 3. The basic structure, function and control process of program-controlled switchbords; 4. New technologies of the switching field, such as packet switching, ATM switching and soft-switching.

Recommended Textbooks/References:

1. QIAN yuan, Cai yong, Ma zhiqiang, Modern Switching Technology (First Edition). Beijing University of Post$Telecommunication Press, 2009
2. LUO Guoqing, Shen Qingguo, Zhang Shuguang. Modern Switching Principle and Technology (Second Edition). The Electronics Industry Press, 2010
3. ZHANG Jirong, Qu junsuo, Yang Wujun, GUO Jun. Modern Switching Technology (Second Edition). XiDian University Press, 2004

Course Number: 0004938

Course Title: Modern Electric Measurement Technology and Instrument

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class

Prerequisites: Probability theory and mathematical statistics, Analog Electronic Technology, Digital electronic technology

Evaluation Method: Written Exam

Course Description:

The course is the discipline based elective course. It clarifies the basic measurement principle and method of main physical quantity in modern electronic measurement, and the basic theory of measurement error and the data processing, and detailed analyzed uncertainty, which are the new theories of the measurement. This course introduces the operation principles and operation methods of the common electronic measurement instrument, including measurement in time-domain, frequency-domain and data-domain, and measurement of voltage and time-frequency parameters, and instrument interface, automatic test system.

Recommended Textbooks/References:

1. JIANG Huanwen, SUN Xu. Electronic Measuremnt(Editon 3).China Metrology Publishing House, 2008.2
2. DU Yuren. Modern Electronic Measurement Technology. China Machine Press, 2009.7
3. NI Yucai. Practical evaluation of measurement uncertainty. China Metrology Publishing House, 2004.5
4. WANG Hongbao. Electronic Measuremnt. Science Press, 2005

Course Number: 0004940

Course Title: Television Principle（Chinese/English）

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class

Prerequisites: Signal and System, The Principle of Communication System, Communication Circuit

Evaluation Method: Written Exam

Course Description:

Through the description of television system's working principle, composition and working process, this course is to teach students the relevant knowledge and analysis and the methods to solve the problems, to train students' understanding, analysis and comprehensive ability of the television system. This course requires students to master the basic concept, the basic theories, basic method and the basic technology. Specific knowledge includes TV imaging principles, scanning mode, the concept of the three primary colors and color composite, camera and imaging principles, video signal code and decoding principles, black and white and color signals constitutes, synchronous pulses constitutes, scanning and synchronization principles and so on. This course also describes various monitors and working principles, CRT, LCD, PDP, LED, OLED, etc, and imaging devices working principles, including: vacuum camera tube, CCD.

Recommended Textbooks/References:

1. Grob. Herndon, Basic Television & Video System, McGraw-Hill, Sixth Edition, 1999

Course Number: 0007281
Course Title: Design on Modernized Electric Circuit
Credit:：2 Total Credit Hours: 32
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class
Prerequisites: Digital electronics, Analog electronics, Microcomputer principle and interface technology
Evaluation Method: Test
Course Description:
This is an elective course for the undergraduate students major in electronic and information engineering. The purpose of this course is to let students know the situation and development trend of the electronic design, master the theory and method on the analog circuit and digital circuit design, improve the ability of electronic circuit design by means of introducing the popular design methods, design tools and design examples of the electronic circuits and systems.
Recommended Textbooks/References:
1. WANG Hui etal. Computer Aided Analysis and Design Method of Electronic Circuit. Beijing: Tsinghua University Press, 2008
2. LIU Mingzhang.The Design and Analysis of PSpice Electronic Circuit. Beijing: National Defence Industry Press,2010

Course Number: 0004955
Course Title: Mobile communications
Credit: 2.5 **Total Credit Hours:** 40
Students: Undergraduate students Major in Electronics Information Engineering Experimental Class, Communication Engineering
Prerequisites: Signals and systems, Digital signal processing, Communication Principles, Digital communications, Principles of communication circuits, Wireless Communications
Evaluation Method: Written Exam
Course Description:
Through the explanation of mobile communications, students can get comprehensive understanding of the mobile communication systems, the developments of the mobile communication systems, the formulation and development of the communication standards and the latest results. Students will have the ability to analysis and design the mobile communication systems. The contents include characteristics and basic technologies of the mobile communications, the mobile communications systems in use and their characteristics, the basic principles of mobile cellular network, the design method of the interference-limited characteristics and improving the capacity. Mobile communications networking technologies include network architecture, signaling structure and network management, and the civilian mobile communication systems currently in use, such as 2nd Generation Communication System (GSM, IS-95CDMA) and 3rd Generation Communication System (WCDMA, CDMA2000, TD-SCDMA). Different

systems have different main technologies, network interfaces, network planning and managements. This course will also explain the concept and the development process of 4th Generation Communication System for students to have comprehensive understanding of the mobile communication system.

Recommended Textbooks/References:

1. CAI Yueming. Modern Mobile Communications. China Machine Press, 2009.
2. CHUO Gang, WANG Wenbo. Theorys and Systems of Mobile Communication. Beijing University of Posts and Telecommunications Press, 2007
3. Andrea Goldsmith Written, YANG Hongwen translated. Wireless Communications. Posts and Telecommunications Press, 2007.6.
4. GUO Tiyun, WU Guoyang, LI Jiandong. Mobile Communications. Xi'an Electronic and Science University Press, 2002.

Course Number: 0001981

Course Title: Satellite Communications

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

Students: Undergraduate students Major in Communication Engineering

Prerequisites: Principle of Communication Systems, and Principle of Mobile Communications

Evaluation Method: Written Exam

Course Description:

Globalization of network and services is stimulating a new awareness about the role of satellites and related applications. Modern Earth-orbiting satellites are sophisticated machines that have transformed all aspects of human civilization from communications and navigation to defense, global monitoring, and intelligent stewardship of our planet. The basic ideas of orbital mechanics are covered, and radio wave propagation, the earth and satellite space segment, satellite access techniques, satellite services such as VSAT, are discussed. And the new and important integration strategy concerns Navigation and Communications architectures and services are discussed in this course.

Recommended Textbooks/References:

1. ZHU Lidong. Introduction to Satellite Communications. (3rd Edition). Electronics Industry Press, 2009
2. ZHANG Gengxin. Satellite Communications (3rd Edition). People's Posts and Telecommunications Press, 2002

Course Number: 0004959

Course Title: ASIC Design and Application (Self-learning)

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Digital electronic technology; Integrated circuit analysis and design

Evaluation Method: Written Exam

Course Description:

"ASIC design and application" is a major course in the area of electronic information. The

purpose of the course is for students to understand the concept of application specific integrated circuit (ASIC), master the methodology and process of the ASIC design, develop the idea of system and project, realize the latest development in the technology. The course discusses the important content of ASIC design and engineering technology based on the advanced technology and design methods. It focuses on the design, verification, synthesis and physical implementation of digital system using Virology HDL. The students are expected to develop the ability of "project design" and grasp the preliminary method and process for modern ASIC.

Recommended Textbooks/References:

1. YU Xiqing. ASIC design and practical tutorial. Zhejiang University Press, 2007
2. MICHAEL John Sebastian Smith Application specific integrated circuit Electronic Industry Press, 2007
3. SANIR Palnitkar. Verilog HDL A guide to digital design and synthesis (3rd Edition). Electronic Industry Press, 2009
4. LAI Xinquan, ASIC Design Essentials. Xidian University Press, 2008
5. HE Bin. EDA principle and Verilog implementation. Tsinghua University Press, 2010

Course Number: 0007275

Course Title: Semiconductor Theory

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Solid State Physics

Evaluation Method: Test

Course Description:

"Semiconductor Theory" is a major elective course for the undergraduate students major in Electronic science and technology. The course will discuss the properties, theories and experimental methods of semiconductors. The purpose of the course is for students to comprehend the basic concept and theory of semiconductor physics and to prepare for the follow-up major courses and future work. The topics include the crystal structure and quantum theory of solids, transport process of carriers, non-equilibrium excess carriers, properties of PN junction, heterojunction and field effect transistors.

Recommended Textbooks/References:

1. LIU Enke, Semiconductor physics. National Defense Industry Press, 2008.
2. SHENG S. Li, Semiconductor Physical Electronics. Science press, 2007.

Course Number: 0007276

Course Title: Simulation and Design of Semiconductor Devices

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Semiconductor physics, Principle of Semiconductor Devices, Microelectronic Technology

Evaluation Method: Written Exam + homework + experiments

Course Description:

"Simulation and design of semiconductor devices" is a major elective course. The course is an introduction of the applications, structure designs, simulation verifications, and layout designs of semiconductor devices. The students are expected to understand the application of common used devices, such as diodes and Misfits, and the effect of structure and fabrication process on the performance of devices, and master the software to perform process and device simulations. The topics include: 1) key parameters for diode: breakdown voltage (including field terminal structure), diode reverse recovery performance, trade-off between on-stage voltage and switching speed of diode; 2) key parameters for MOSFET: Blocking voltage, on-state resistance, trans-conductance, threshold voltage, gate charge, switching time and switching loss, cell design and simulation, layout design, and etc.

Recommended Textbooks/References:

1. B.Jayant Baliga, "Fundamentals of Power Semiconductor Devices", Springer, 2008
2. Josef Luts, Heinrich Schlangenotto, Uwe Scheuermann, Rik De Doncker, "Semiconductor Power Devices", Springer, 2011
3. Stefan Linder, "Power Semiconductors", EPFL Press, 2006
4. Avant Corporation, "Medici User's manual" Avant, 1999
5. Avant Corporation, "Tsuprem-4 User's manual" Avant, 1999
6. ISE, "Mdraw (8.0) User's manual" ISE, 2000

Course Number: 0007277

Course Title: Electronic Materials and Devices（Chinese/English）

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Advanced mathematics, General physics, Solid State Physics, Semiconductor Physics

Evaluation Method: Written exam

Course Description:

"Electronic materials and devices" is a major elective course for the Undergraduate students major in Electronic Science and Engineering. The students are expected to understand the concepts and theories of electronic materials and acquaint themselves with the functions of different electronic devices. The topics include: conductors, superconductors, semiconductors, dielectric materials (ferroelectric materials, piezoelectric materials, piezoelectric materials), magnetism materials, photo electronic materials, susceptible materials, and the related devices.

Recommended Textbooks/References:

1. S. O. Kasap, Principles of Electronic Materials and Devices (Third Edition), Tsinghua University Press, 2007
2. Y. R. Li, Z. Z. Yun, Introduction of Electronic Materials, Tsinghua University Press, 2001

Course Number: 0002009

Course Title: Power Semiconductor Devices and Applications

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Semiconductor Physics, Principle of Semiconductor Devices, Circuit Analysis, Analogue Electronics, Digital Electronics

Evaluation Method: Written Exam

Course Description:

"Power semiconductor devices and applications" is a major elective course. The purpose of the course is for students to understand the basic operation principle of power semiconductor devices and the circuits (power electronic circuits), get familiar with the methods of description, evaluation, analysis and calculation, broaden the scope of knowledge, acquire necessary common sense, and get to know different subjects. The topics include the basic principle of power semiconductor devices, conversion technology for AC/DC, AC/AC, DC/AC and DC/DC, and etc. The course will lay foundation for the field of power semiconductor or power electronics.

Recommended Textbooks/References:

1. LIU Zhigang, Power Electronics, Tsinghua University Press, June 2004 (in Chinese).
2. Benda, Power Semiconductor Devices – Theory and Applications, translated by Wu Yu et al, Chemical Industry Press, May 2005 (in Chinese).
3. HUANG Jun et al, Power Electronic Conversion Technology, 3rd ed, Mechanical Industry Press, December 2005 (in Chinese).
4. ZHANG Yigong et al, Principle and Applications of Modern Power Electronic Technology, Science Press, March 1999 (in Chinese).

Course Number: 0007278

Course Title: Fundamentals of Optoelectronics Technology (Chinese/English)

Credit: 2 **Total Credit Hours** 32

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Electromagnetic field theory, Semiconductor physics

Evaluation Method: Written Exam

Course Description:

"Fundamentals of optoelectronics technology" is an area of physics and engineering that deals with devices and systems, which are based on the interaction of light with matter and the transfer process of energy. While this area only began to grow rapidly after the discovery of the laser, optoelectronics is not equivalent to laser physics. The course will introduce the basics of optoelectronic devices, including wave nature of light, dielectric waveguides and optical fibers, waveguide-based devices, semiconductor Light Emitting Diodes (LED) and lasers, photo-detectors, and photovoltaic devices, such as solar cells, polarization and modulation of light, etc. The emphasis is placed on the basic concepts/operating principles/structures of typical optoelectronic devices, the applications in the real world (e.g. Blue-ray discs, Fiber-To-The-Home, LED lighting, etc.), and the current state of the art and the future progress of these devices or technology.

Recommended Textbooks/References:

1. S. O. Kasap, Optoelectronics and Photonics: Principles and Practices. Prentice-Hall, Inc, 2001.
2. Clifford R. Pollock, Fundamentals of Optoelectronics. Richard D. IRWIN, Inc, 1995.
3. ZHU jingping, Fundamentals of Optoelectronics Technology. Science Press, 2003.
4. YANG xiaoli, Fundamentals of Optoelectronics Technology. Beijing University of Posts and

Telecommunications Press, 2005.

Course Number: 0000767

Course Title: Computer Aided Design (CAD) for Very Large Scale Integrated Circuit (VLSI)

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Analysis and Design of VLSI, Digital Circuits, Analog Circuits

Evaluation Method: Written Exam

Course Description:

The course will provide students with a realization of the rapid development of VLSI and the importance of CAD in design of VLSI. The topics of the course include: design of custom, semi-custom, mixed style and programmable VLSI; advanced synthesis technique; logical synthesis technique; physical synthesis technique; logical simulation; circuits simulation; device and process simulation; VLSI test techniques. The course will lay a foundation for students to conduct work in VLSI.

Recommended Textbooks/References:

1. YANG Zilian, SHEN Ming. Introduction to design methodologies for VLSI (second Edition), Tsinghua University Press, 2007.
2. Wayne wolf, Modern VLSI Design Systems on Silicon (3rd Edition), Science Press, 2003.
3. XU Ning, HONG xianlong. Theory and algorithms for VLSI design. Tsinghua University Press, 2007
4. HONG Xianlong, YAN Xiaolang. Routing Theory and algorithms for VLSI. Science Press, 1998

Course Number: 0002067

Course Title: Electronic Design Automation (EDA) of Integrated Circuits

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Semiconductor Physics

Evaluation Method: Written Exam

Course Description:

The course is for students to understand the history and development of IC design, get familiar with the preliminarily software of Electronic Design Automation (EDA), and lay a good foundation for work in IC design. The topics include: the process of integrated circuit design; basic knowledge and operation of the EDA software using the operating system UNIX; logic simulation software of VHDL and Virology, circuit simulation, logic synthesis software of Design Compiler, layout design software of Soc Encounter and other EDA technologies; IC process simulation software of Tsuprem-4; special devices and integrated circuit device simulation software of Medici, and etc.

Recommended Textbooks/References:

1. Handbook of Electronic Automa, Dirk Jansen, 2005. ISBN：7-121-00925-0

2. ASIC to SOC. Farzad Nekoogar, Faranak Nekoogar, 2006.1 ISBN：7-111-17574-3
3. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic.Digtal Integrated Circuits: A Design Perspective(Second Edition). 2004.3 ISBN：7-302-07968-4

Course Number: 0004960

Course Title: System on a Chip（SOC）(Chinese/English)

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Physics of Semiconductor Devices, Analysis and Design of Integrated Circuits; Digital Circuits and Microcomputer Systems

Evaluation Method: Written Exam

Course Description:

As the development of micro-electronic technology and computer technology, the modern integrated circuit design allows the integration of a whole system on a single silicon chip, for small size and low power consumption. The course will discuss the advanced method of integrated circuit design—System on Chip (SoC). The purpose is for students to understand new requirement of integrated circuit design for SoC, methodology of SoC design and the design environment, adapt to new technology, and prepare for future work.

Recommended Textbooks/References:

1. LUO Shengqin, “Digital Integration System Chip(SOC) Design ”. Beijing Hope Publishing Company.
2. Micheal Keating, Pierre Bricuad, “Reuse Methodology Manual For System-on-a-Chip Designs Third Edition”.
3. Prakash Rashinkar, Peter Paterson, Leena Singh, “System-on-a-Chip Verification Methodology and Techniques”. Kluwer Academic Publishers.

Course Number: 0005701

Course Title: Embedded System I

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Analog Electronic Technology, Digital Electronic Technology, Microcomputer Principle, Software Basis

Evaluation Method: Written Exam

Course Description:

The course is an introduction of the architecture of ARM 32-bit processor, and the working mechanism and design methodology of modern embedded hardware and software systems. The students are expected to understand the basic concepts, theories, methods, and techniques of the related problems. The topics include: the concept of embedded systems, embedded hardware architecture, processor architecture, interfacing techniques, buses and protocols, hardware and software interrupts, embedded software programming, modeling, inter-process synchronization and embedded real-time operating systems, application of memory, interrupt controller, LCD

controller, USB, UART, I2C and SPI serial ports.

Recommended Textbooks/References:

1. MA Weihua. Principle and Design of Embedded System. Beijing University of Posts and Telecommunications Press, 2010
2. Tammy Noergaard. Embedded Systems Architecture. Posts and Telecom Press, 2008
3. NI Xuxiang, JI Chunlei. ARM Cortex-A8 Embedded System Development and Practice. China WaterPower Press, 2011

Course Number: 0007280

Course Title: Analysis and Design of RF Integrated Circuits

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Integrated Circuit, Basic Theories of Circuit Analysis, Principle of Analog Circuit, Principle of Digital Circuit

Evaluation Method: Open-book Examination

Course Description:

"Analysis and Design of RF Integrated Circuits" is a course of electronic engineering combining modern science technology and practical application. The purpose is for students to understand the structure and performance of the key function model in RFIC, master the basic concept and design methodology of RFIC, such as the application of wireless communication, transmission line analysis, Smith chart, one-port network, multi-port network, matching network, bias network, and design of RF transistor amplifier etc, and develop the ability to do scientific research and future work.

Recommended Textbooks/References:

1. Reinhold Ludwig. RFIC Design - Theory and Application. Electronic Industry Press, 2007
2. LI Zhiqun, Wang Zhigong. RFIC and system. Science Press, 2008
3. M. M. Radmanesh. RF and Microwave Electronics. Science Press, 2006
4. Richard Brown. RFIC and HMIC. Electronic Industry Press, 2006

Course Number: 0002010

Course Title: Special Device and Sensitive Device

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Semiconductor physics, Physics of Semiconductor devices

Evaluation Method: Written Exam

Course Description:

The course is an introduction of the typical special devices (photoelectrical devices and sensitive devices, etc) and the basic structure and mechanism. The students are expected to comprehend the basic concepts, theories, approaches and technologies of such devices. The topics include: the basic concepts (photoelectric effect, plasma etc.), basic structures and mechanisms of vacuum photoelectric devices, semiconductor light sensitive devices, detectors, lighting and display devices, other typical sensitive devices and electricity devices. Theoretical background knowledge

of physics, materials and mechanics will be introduced as necessary, but the emphasis of the course will be on the fabrication approaches, process analysis and design of devices.

Recommended Textbooks/References:

1. S.M. Sze, "Modern Semiconductor Device Physics". Science Publisher, 2002.
2. Peter Van Zant, "Microchip Fabrication –A Practical Guide to Semiconductor Processing ". Electronics Industry, 2004.
3. Stephen A. Campbell, "The Science and Engineering of Microelectronic Fabrication", 2rd Edition. Publishing House of Electronics Industry, 2003.

Course Number: 0002012

Course Title: Heterojunction and Optoelectronic Devices

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Quantum Mechanics, Solid State Physics, Semiconductor Physics

Evaluation Method: Written examination

Course Description:

The course is an introduction of the science and technology of semiconductors, the related forefront theory, and latest development. The main content is the physics of semiconductor heterojunction and its application in optical and super high speed microelectronics devices, including the epitaxial of heterojunction, strained layer, super lattice, quantum well, 2D electronic gas, double heterojunction transistor, the working principle of resonant tunnel device and the theory of hot electronic device, semiconductor optical transition, basic principle of stimulated radiation, operation principle and the application of quantum well semiconductor laser devices, heterojunction, light emitting diode and other optical devices. The students are expected to master the basic knowledge of heterojunction and the advantage of application in optical devices, and understand the common preparation methods, devices features and the latest development of the optical devices in the world.

Recommended Textbooks/References:

1. YU Lisheng.Semiconductor Heterojunction physics (second edition). Beijing. Science Press, 2006
2. LIU Enke, ZHU Bingsheng, LUO Jinsheng. Semiconductor Physicals (Sixth Edition). Publishing House of Electronics Industry. 2004

Course Number: 0004819

Course Title: Fundamentals of C Language Program Design I

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, Communication Engineering, Electronic Science and Technology, Automation

Prerequisites:

Evaluation Method: Written Exam

Course Description:

The Fundamentals of C Language Programming design is a basic course in the discipline of computer software and information engineering. The main task of this course is to introduce the

concepts of the C language data types, operations, sentence structure and the basic methods of program design. The purpose of this course is to enable students to master a programming language, to understand the basic concepts and methods of structured programming, and then learn to use C language to solve the general practical problems and to lay the programming foundation for subsequent professional courses.

Recommended Textbooks/References:

1. HE Xinming, YAN Hui. C Language Program Design. Higher Education Press, 2010
2. YAN Hui. Practical Training on C Language Program Design. Higher Education Press,2010

Course Number: 0004933

Course Title: Introduction to Robot Technology

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

Students: Undergraduate students Major in Automation

Prerequisites: Principle and Application of Microcomputer, Mono-Chip Computers and Interface Technique, Principle of Automatic Control, Measurement Technique, Motion Control System, Basis of C Program Design I

Evaluation Method: Combination of Assignment, Subjective Report and Test

Course Description:

"Introduction to Robot Technology" is an elective course for the students majoring in automatic control. It bases on the related knowledge of Robotics. Linear state-space model and it is involved in various subjects, such as Computer Science, Mechanics, Electronics, Control Science, Artificial Intelligence, etc. The course tries to make the undergraduates majoring in automatic control widely understand the research and the development of today's robot field, know the domains involving in the Robot Technology, master the basic concept, theory and the design and control methods of robot, have the initial capabilities of system analysis and design. The contents include the following knowledge: mechanical structure, sensory system, machine vision and application, kinematics and dynamics, the control basic of robot (servo system, hardware structure and the interface of control system), mobile robot localization, path planning, and navigation, and so on.

Recommended Textbooks/References:

1. CHEN Ken, YANG Xiangdong, LIU Li, YANG Dongchao, Robot Technique and Application S Tsinghua University Press, 2006.9
2. XIE Cunxi, ZHANF Tie, Robot Technique and Its Application. Mechanical Industry Press, 2006.7
3. R. Siegwart and I.R.Nourbakhsh, Introduction to Autonomous Mobile Robots. Xi'an Jiaotong University Press, 2006.9
4. MENG Qingxin, WANG Xiaodong, Fundamentals of Robotics. Harbin Institute of Technology Press, 2006.9

Course Number: 0000937

Course Title: Computer Network Application

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

Students: Undergraduate students Major in Automation

Prerequisites: Basis of Computer Engineering; Microcomputer Principles and Interface

Technology

Evaluation Method: Written Exam

Course Description:

This course is a professional curriculum for the undergraduate majoring in electronic information. Students should have pre-knowledge of the Basis of Computer Engineering and Microcomputer Principles and Interface Technology. Through the study of this curriculum, students can systematically and comprehensively master the principle of computer network and its practical application, especially in the field of automatic control. It has a significant value for the education of the modern high-tech talents. Computer network is a product of combining the technology of communications and computer. Therefore, students will have a more comprehensive grasp of the structure and working process of the data communication system, computer network composition and its theory of architecture, network interconnection equipment and knowledge of WAN after learning this curriculum. And they will also possess the ability to operate, manage and maintain a computer network, to set up a typical local area network, and to apply the Internet.

Recommended Textbooks/References:

1. XIE Xiren. Computer Network (fourth Edition). Electronic Industry Press, 2003.6
2. HE Li, XU Linying. Overview of Computer Network (second Edition). Higher Education Press, 1999.4

Course Number: 0004934

Course Title: Computer Networks and Application（Chinese/English）

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

Students: Undergraduate students Major in Automation

Prerequisites: Principle and Application of Computer

Evaluation Method: Written Exam

Course Description:

This course is adapted to undergraduate students major in automatic control. Before learning this course, students should have prior knowledge of computer theory. After learning this course, students can have a comprehensive grasp of the working principles of computer network and its application in engineering. The network is the product of the combination of communications and computer technology. So students can learn more about the structure and working process of the data communications systems, the construction and architecture of computer networks, network interconnection and modern network technology. Specific knowledge, including data communications, division multiplexing, coding and modulation, error control, synchronization control. Network standard of OSI/RM, TCP/IP and the IEEE80 2. LAN topologies, transmission media, MAC technology. Switches, routers, subletting, TCP flow control and congestion control. Learning of this course allows students to have some practical ability of computer network operations, management and maintenance, for instance, building of some typical Local Area Networks, planning and configuration of the WAN, Internet applications, and to lay the necessary knowledge of network applications reserves for future employment in the IT field.

Recommended Textbooks/References:

1. James F. Kurose. Computer Networking: A Top-down Approach Featuring the Internet (3rd Edition). Higher Education Press, 2006
2. XIE Xiren. Tutorial of Computer Networks (2nd Edition). Posts and Telecom Press, 2006

3. Douglas E.Comer. Computer Networks and Internets (5th Edition). TSinghua University Press, 2010

Course Number: 0004936
Course Title: Fundamental of Visual Programming Language
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation;
Prerequisites: Programming methodology in C, computer principle and interface technique, computer software fundamentals
Evaluation Method: Written Exam, Program Design Reports, Project Design Report
Course Description:
Object-oriented analysis and design methodology, object oriented programming in c++ language, Microsoft Windows programming essentials and Visual c++ programming are introduced in this course. The students are expected to understand the basic concepts, principles, techniques of Object-oriented technology of software design and implementations. Through a series of practical programming experiments covering the knowledge elements of c++ programming language and a comprehensive project design, the students are expected to be trained in mastering the Visual studio IDE to practical design and programming in C++ language and to acquire the beginning experiences in utilizing theoretical knowledge and computing tools to solve practical problem. The basic topics include: UML notations, use case diagram, interaction diagram, class diagram, object diagram, state machine diagram, class, object, inheritance, virtual function and dynamic binding, window and its handle, window procedure, event-driven program mode, device context, graphics device programming interface, pen, brush, mapping mode between logical window and physical viewport. The techniques include creating appropriate project in visual studio IDE, making resources such as dialog modal and menus, as well as debugging skills.
Recommended Textbooks/References:
1. LEE Jiajun Visual C++ programming practical course (Electronic edition). Beijing University of Technology 2011(will be updated to keep with the advances of Microsoft visual studio timely).
2. SHAO Liangshan etc .Practical Visual c++.NET Programming. Tsinghua University Press, 2007
3. TANG Dashi,LIU Guang. Visual C++.NET Application Course. Tsinghua University Press,Beijing Jiaotong University Press, 2006.5
4. HUANG Weitong. Visual c++ and Object Oriented Visual Programming (Second Editon). Tsinghua University Press,Beijing Jiaotong University Press, 2003.12
5. ZHENG Li. C++ Language (Forth Edition). Tsinghua University Press, 2011

Course Number: 0004932
Course Title: Control Theory
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation
Prerequisites: Principle of Automatic Control, Linear System Theory Basis

Evaluation Method: Written Exam

Course Description:

This course is the major elective course for students of information control engineering. The course opened for the students who have already completed professional required courses—"Principle of Automatic Control" and "Modern Control Theory basis". The teaching method of the courses are modularized and designed to consolidate, deepen and expand students' knowledge of automatic control theory, trying to train and improve the ability of analyzing and solving problems by using automatic control theory and methods, which builds a good theoretical basis for students in the further professional development. Curriculum knowledge is expressed in a modular form, including six modules: the mathematical model of the control system, the time-domain analysis of the system, the system analysis and controller design based on the root locus, the system analysis and controller design based on the frequency characteristics, the nonlinear system analysis, and the discrete control system analysis.

Recommended Textbooks/References:

1. SUN Liang. Automatic Control Theory (3rd Edition). Beijing: Higher Education Press, 2011
2. HU Shousong. The Principles of Automatic Control (5th Edition). Beijing: Science Press, 2011
3. Richard C. Dorf , Robert H.Bishop. Modern Control System (8th Edition). Beijing: Higher Education Press, 2008

Course Number: 0007271

Course Title: Fundamental of Pattern Recognition

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

Students: Undergraduate students Major in Automation

Prerequisites: Linear Algebra, Probability and Mathematics Statistics

Evaluation Method: Written Exam and Regular Exercise

Course Description:

Pattern recognition is a specialty elective course for automation senior undergraduates. With the learning of basic theories, methods and examples in pattern recognition, students should master basic concepts, theories and research method of pattern recognition, and should acquire the ability of using pattern recognition methods and skills to solve practical problems in profession and related fields. The basic topics include: The concept of patterns and pattern recognition, cluster analysis method, geometric classification (linear and nonlinear discriminate function), probabilistic classification, feature selection and feature extraction methods, fuzzy pattern recognition method and neural network pattern recognition method and so on. This course can lay foundation for students engaged in both solving engineering technical problems in his/her future jobs and learning and researching in the following postgraduate stage of Pattern Recognition and Intelligent System specialty.

Recommended Textbooks/References:

1. ZHANG Xuegong. Pattern Recognition (third Edition). Beijing: Tsinghua University Press, 2010
2. SHENG Lidong. Introduction of Pattern Recognition (first Edition). Beijing: Beijing University of Post and Telecommunications Press, 2010
3. QI Min, LI Dajian, HAO Chongyang. Introduction of Pattern Recognition (first Edition).

Beijing: Tsinghua University Press, 2009

Course Number: 0004935
Course Title: Theory and Application of Database (Self Learning)
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation
Prerequisites: Basis of Computer Software, Programming Language (any one of C, VC++, VB and Html)
Evaluation Method: Written Exam
Course Description:
This course is a basic computer curriculum. It is a specialty elective course of undergraduates Major in the electronic information and control engineering. This course enable students to master the basic theory of database systems, design and implementation and to have the necessary foundation and the ability to solve practical problems, which can ensure that students better adapt to the needs of the community after graduation. The basic topics include: basic concepts and principles of database systems, relational data model, relational data theory and relational database systems, database design and its steps, implementation of a real simple database system, the usage of SQL Server database management system, the Transact SQL language and related software, development of Internet/Intranet-based network database.
Recommended Textbooks/References:
1. WANG Xiuying. Practical Tutorial of SQL Server 2005. Tsinghua University Press, 2010
2. LI Ying ET. al. Projects Development with ASP + SQL Server 2005. People's Posts and Telecom Press, 2007
3. J. D. Ullman el. al. Introduction to Databse, Tsinghua University Press, 2010.
4. SUN Wenyu, XU Chengxian, ZHU Detong. Basis of Computer Software. XiDian University Press, 2003.

Course Number: 0007272
Course Title: Introduction to System Engineering
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Automation
Prerequisites: Linear Algebra
Evaluation Method: Written Exam and Regular Exercise
Course Description:
System engineering is the discipline which is widely used in engineering technology and engineering management. In the learning process, students are required to understand the global development of the basic theory in system engineering, and master the basic concepts, principles and methods in this discipline. This course mainly consists of the following contents: concepts and classification of system, concepts of system engineering, methodology in system engineering, concepts, methods and procedures of system modeling, system analysis methods and principles (technical and economic analysis, cost-benefit analysis, etc), the key methods used for system evaluation, methods and procedures of continuous and discrete system simulation, system

reliability design and so on. Students are required to establish the fundamental systematic standpoint in dealing with technical problems encountered in practice, and have the capability of observing and solving problems from the global system viewpoints. This course will meet the education requirement of Automation specialty, and lay the foundation for graduate students engaged in engineering technical development or management jobs.

Recommended Textbooks/References:

1. CHEN Hongmin. Introduction to System Engineering (first Edition). Beijing Higher Education Press, 2006
2. ZHOU Dequn. Introduction to System Engineering (second Edition). Science Press, 2010
3. George A. Hazelrigg, translated by Dai Zhenyu, et al. System Engineering: An Approach to Information-Based Design (First Edition). Tsinghua University Press, 2003

Course Number: 0007273

Course Title: Application & Realization of Modern Motion Control Technology

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

Students: Undergraduate students Major in Automation

Prerequisites: Motion Control System, Electric Machine Principle, Power Electronics

Evaluation Method: Project Study

Course Description:

The course is one of the elective courses in automation. The design, realization, application and engineering practice of common motion control systems around AC and DC motors are introduced. The course is set for students to improve their engineering design and practical ability. The basic topics include: application of electric machine technology, modern power electronics, DC driving system based on digital control and AC variable-frequency driving technology based on DSP.

Recommended Textbooks/References:

1. QI Hui, YANG Yuzhen. Motion Control Test Textbook. Tsinghua University Press 2009.
2. YANG Geng. Electric Machine & Motion Control. Tsinghua University Press 2007.
3. Bose B.K. Modern Electronics & AC Drives. China Machine Press, 2003.

Course Number: 0002542

Course Title: Intelligent Transportation Systems

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

Students: Undergraduate students Major in Automation

Prerequisites: Micro Computer Theory, Single-chip Microcomputer

Evaluation Method: Submitted Report

Course Description:

As an integration of many high-tech research areas, the purpose of this course is to make the students from the relative majors of automation acquire a comprehensive understanding of the basic knowledge of ITS. This course introduces the background of intelligent transportation systems in the United States, Japan and the European, the current developments in our country, varieties of related technologies, such as the collection of traffic information, intelligent control, etc. The course mainly introduces the ITS knowledge including advanced traffic management

systems (ATMS), advanced traveler information system (ATIS), advanced vehicle control system (AVCS), advanced public transportation systems (APTS), Commercial Vehicle Operation Management System (CVOS), and the standardization of intelligent transportation systems.

Recommended Textbooks/References:

1. YANG ZhaoSheng. Introduction of Intelligent Transportation System. China Transportation Publication House. 2004

Course Number: 0000560

Course Title: Fundamentals of Optimization Theory

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

Students: Undergraduate students Major in Automation

Prerequisites: Calculus and Linear Algebra

Evaluation Method: Written Exam 60%, Attendance and Homework 40%

Course Description:

Optimization is widely used in science and engineering. The aim of this course is let students learn the most basic theory and method in optimization and provides them with a necessary foundation of future use such as further study or solving problems in practice. The main contents are: the basic concept of optimization, the math model of optimization problems in practice, the general theory and method in optimization, linear programming and simplex method, the concept of convex optimization, and some typical methods and algorithms for non-linear programming.

Recommended Textbooks/References:

1. XUE Yi, Optimization Principle and Method, Beijing University of Technology Press, 2001, 2.
2. CHEN Baolin, Optimization Theory and Algorithm, Tsinghua University Press, 2005.
3. HU Yunquan, Operations Research: Elements and Application, Higher Education Press, 2010.

Course Number: 0001076

Course Title: Computer Network Application I

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class, Electronic Science and Technology and Communication Engineering

Prerequisites: Foundation of Computer, Signal and System

Evaluation Method: Written Exam

Course Description:

This course is an important professional course offered for the professional student of the communication engineering and the electronic information engineering. This course introduces the student to master the based principle and the application technology from the simple to the complex. By learning this course, the student may comprehensively understand and master the basic knowledge, basic theory and basic working principle of the computer network, and the student may comprehensively understand and master the technology of computer network application. The basic topics include: the development, the definition, the structure and the type of

the computer network; the foundation of the computer data communication; the architecture and the network protocol of the computer network; the LAN; the network interconnection and wide area network. This course also includes some application experiments. The experiment may train the student the ability of the computer network operation, the daily management and maintenance, the establishment of typical LAN and the internet application.

Recommended Textbooks/References:

1. PENG Peng. The Computer Network Tutorial (3rd Edition).Beijing. Machinery Industry Press, 2009.
2. FENG Boqin. The Computer Network (second Edition). Beijing：Higher Education Press, 2008.
3. XIE Xiren. The Computer Network Tutorial (second Edition). Beijing. People's Posts and Telecommunications Press, 2009.
4. James. F. Kurose. Computer networking: a top-down approach. Beijing. Higher Education Press, 2008.
5. LI Fujuan, WANG Qun, The Computer Network Experiment Tutoria. Tsinghua University Press, 2007.
6. YE Shaozheng, JIANG Qiqiang, The Computer Network Experiment Tutorial. Tsinghua University Press, 2010.

Course Number: 0001078

Course Title: Database Technique and Application Ⅱ

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

Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering

Prerequisites: basis of software of computer

Evaluation Method: Homework Exam

Course Description:

Recommended Textbooks/References:

Database and SQL are introduced in this course. The students are expected to understand relational database theory and design based on relational database, grasp the large-scale data management and use, through which their using the database and writing database applications abilities will be improved. The basic topics include: Database concepts, database users and the role of databases in organizations. Functions of the DBMS, Conceptual Data Model e.g., Entity Relationship and Extended entity relationship diagrams., The relational model, Entity constraints, referential integrity, cardinality and participation constraints, enterprise constraints, Primary, foreign, candidate keys, Mapping a Conceptual Model to a Relational Schema, Functional dependencies and normalization for relational databases, Database query and manipulation languages e.g. SQL, ORACLE.

Recommended Textbooks/References:

1. Hector Garcia-Molina, Jeff Ullman, Database System: The Complete Book, Prentice, 2002

Course Number: 0007274
Course Title: Signals, Systems and Transforms
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering
Prerequisites: Higher mathematics, signals and systems Ⅲ
Evaluation Method: Written Exam
Course Description:
Studying of this course requests a student fully understand the basic concept and theories of the signal and system and basic analysis method of the certain signals pass LTI system, including time domain analysis of continuous system and discrete system and the spectrum domain analysis of continuous system and the z domain analysis of discrete system etc. Understand above-mentioned various analysis method and they are concretely applied to solve practical problem. Fourier transform and analysis, Laplace transform and inverse Laplace transform, convolution theorem, Z transform and inverse Z transform, Discrete time signal and discrete time system analysis, zero-state response, zero-input response, linear time-invariant system, unit impulse response, Convolution, convolution theorem, sampling theorem, parseval theorem etc.
Recommended Textbooks/References:
1. ZHANG Yanhua, LIU Pengyu. Signals and Systems. Machinery Industry Press, 2012
2. ZHENG Junli. Signals and Systems (second Edition). Tsinghua University Press, 2004.
3. LIU Shutang. Signals and Systems (second Edition). Xi'an Jiao Tong University Press, 2009.
4. LIANG Hong, etc. Signal and system analysis and MATLAB Realization. Electronics Industry Press, 2002.

Course Number: 0004942
Course Title: Object Oriented Programming with C++
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronics Information Engineering, Experimental Class and Communication Engineering
Prerequisites: C Programming, Computer Software Foundation
Evaluation Method: Written Exam
Course Description:
This course is combined tightly with modern programming theory and practical applications. This course focuses on strengthening the students' actual programming ability. It is an important foundation for students to master computer technology. The basic concept of the C++ language, the basic characteristics and the design of object-oriented programming methods is introduced in this course. The students are expected to understand the basic concepts, theories, methods, and techniques of C++ language. The basic topics include: the concept of class, object, data types, sentence structure, constructor, destructor, overloading, friend, function overloading, operator weight, inheritance and derivation, multiple inheritance, polymorphism and virtual functions, function templates, C + + input and output. The software development capabilities of student can be trained in this course. By learning of this course, students can master the method of C++ programming. It is useful for them to adapt research and work in future.
Recommended Textbooks/References:

1. TAN Haoqiang. Object Oriented Programming with C++. Tsinghua University Press, 2006
2. Stanley B. Lippman. C++ Primer. Posts and Telecom Press, 2010

Course Number: 0004961

Course Title: Reliability Technology of Semiconductor Devices（Self-learning）

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Transistor Principle: Integrated Circuit Analysis and Design

Evaluation Method: Written Exam

Course Description:

The course will discuss the basic concepts of reliability, data analysis of lifetime test, interface failure, body failure, effect of electrode system and packaging on the devices, etc. The students are expected to grasp the basic knowledge of reliability and the design of reliable devices.

Recommended Textbooks/References:

1. ZHANG Ankang. Reliability of Mirco-electronic devices and circuit. Electric Industry Press, 1994
2. Ajith Amerasekera. Failure Mechanisms in Semiconductor Devices, 1997 New York
3. YAO Lizhen. Reliability Physics, Electric Industry Press, 2005

Course Number: 0005213

Course Title: Single Chip Microcomputer Application Technologies

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

Students: Undergraduate students Major in Electronic Science and Technology

Prerequisites: Microcomputer Principle and Interface Technology, Integrated Circuit, Basic Theories of Circuit Analysis, Principle of Analog Circuit, Principle of Digital Circuit

Evaluation Method: Open-book Examination

Course Description:

"Application Technique of Single-chip Microcomputer" is a course of electronic engineering with the combination of technique theory and practice. The purpose of the course is for students to understand the new technology, and master the basic skills in the development of SCM. The course is based on the MCS-51 single-chip microcomputer (SCM), giving a comprehensive introduction of the basic principle and application of SCM. The principle of MCS-51 SCM and the development technology of software and hardware are explained through examples. The function of SCM is realized by the assembly language program and C program, respectively. The topics include: the principle of hardware and structure of SCM, memory expansion, I/O expansion, A/D and D/A conversion, instruction system of assembly language and C language, and program design technology.

Recommended Textbooks/References:

1. SUN Yucai. MCS-51 Single-chip Microcomputer and application (fourth Edition). Southeast University Press, 2004
2. HU Jian. SCM Theory and Interface Technology. China Machine Press, 2008
3. CHEN Guiyou. SCM principle and application. China Machine Press, 2007

4. LI Guangdi, Zhu Yuexiu et al. MCU Fundation (Revised Edition). Beijing University of Aeronautics and Astronautics Press, 2002
5. MA Zhongmei etal. c language programming of SCM (Third Edition). Beijing University of Aeronautics and Astronautics Press, 2005
6. LI Qunfang. SCM and Interface Technology. Electronic Industry Press, 2005
7. ZHANG Yingxin. SCM principle, application, and Interface Technology (second Edition). Defense Industry Press, 2004
8. CHEN Guangdong. SCM Principle and Interface Technology (second Edition). Huazhong University of Science Technology Press, 2004
9. GAO Feng. SCM Principle and Interface Technology. Science Press, 2003
10. DING Yuanjie. SCM Principle and Application (second Edition). China Machine Press, 2004
11. ZHU Yuexiu. SCM Principle and Application. Science Press, 2004

Course Number: 0000765
Course Title: Multimedia Technology
Credit: 2 **Total Credit Hours:** 32
Students: Undergraduate students Major in Electronic Science and Technology
Prerequisites: Computer Basic, Computer Network
Evaluation Method: Open-book Examination
Course Description:
"Multimedia Technology" is a restrictive elective course for undergraduate students in Electronic Science and Technology. The purpose of the course is for students to understand the basic concepts and main features of multimedia technology, master the use of multimedia tools, learn how to develop multimedia software and multimedia productions, and thus lay the foundation to learn the follow-up courses and work. The students are expected to understand the multimedia basic concepts and multimedia computer systems, and working principles, including the development method for Multimedia application systems and the use of common development tools. The topics include: multimedia, bitmaps, vector graphics, images, graphics, MIDI, image file formats, data compression and decompression, manufacture of animation, digital audio, digital image, manufacturing, multimedia development environment, multimedia development tools, multimedia software development, and etc.
Recommended Textbooks/References:
1. RAFF STEINMETE, KLARA. Multimedia technologies: computing, communications and applications. Tsinghua University Press, 2000
2. XUE Weimin. Multimedia Technology and Application. Tsinghua University Press, 2006
3. LU Hongwei. Multimedia Computer Technology. Publishing House of Electronics Industry, 2004
4. ZHONG Yuzhou. Fundamentals of Multimedia Technology and Application. Tsinghua University Press, 2006
5. ZHANG Yu. Multimedia Technology. Tsinghua University Press, 2004
6. WANGWen, ZHOU Shu. Multimedia technology experiments. Science Press, 2005
7. HU Xiaofeng. Multimedia Technology Tutorial. Posts and Telecom Press, 2009