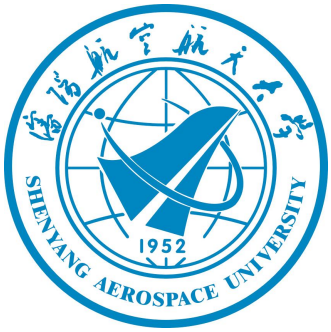
课程计划/课程描述

Curriculum /Course Description

通信工程

Telecommunication Engineering



沈阳航空航天大学

Shenyang Aerospace University

2022

Foreword

Mission

The mission of the Telecommunication Engineering Program is to cultivate senior engineer and technical personnel who develop and enhance understanding of both theoretical and applied knowledge of the fundamentals of Telecommunication Engineering in the fields of aeronautical telecommunication, satellite telecommunication and computer communication etc. The cultivated personnel will mainly engage in the telecommunication equipment operation management, telecommunication electronic system design and development, telecommunication system business and marketing management.

Programs Educational Objectives

1. Educate students to have a certain natural science and humanistic science basic theory knowledge, the good humanistic quality.
2. Prepare students to have the solid and broad theory, knowledge and skill of optical fiber communication, mobile communication and satellite telecommunication technology etc, understand the recent research progress and development of telecommunication.
3. Cultivate students to understand the basic theory and knowledge of telecommunication engineering systematically, have the ability to analyze, develop and maintain the telecommunication system.
4. Prepare students to have the capabilities of self-learning and solving practical problems in the field of telecommunication, utilize complementary non-technical skills such as communication skills, teamwork, leadership, ethical and societal responsibility considerations.
5. Provide ongoing consultation with students, faculty, industry, and telecommunication professional for the continuous process of academic improvement.

Telecommunication Engineering

1st Semester First Year

Code	Course Name	Hours	Credits
17001	Comprehensive Chinese I	96	6
17002	Chinese Culture and History	32	2
17003	Fundamental Law	32	2
14013	Advanced Mathematics I	80	5.5
26005	C Programming*	56	3.5
06013	Engineering Drawing I	24	1.5
		320	20.5

2nd Semester First Year

Code	Course Name	Hours	Credits
17002	Comprehensive Chinese II	96	6
14014	Advanced Mathematics I	80	5
14004	Physics I	64	4
14051	Physics Lab I	24	1.5
02024	Practice of Electronic Knowledge	1W	1
1002	C Programming Language	2W	2
		264	19.5

1st Semester Second Year

Code	Course Name	Hours	Credits
17003	Comprehensive Chinese III	64	4
14053	Linear Algebra	40	2.5
14010	Probability and Statistics	48	3
02018	Introduction to Circuit Analysis*	72	4.5
02023	Electronic Process Practice	2W	2
02045	Introduction to software technology	48	3
		272	19

2nd Semester Second Year

Code	Course Name	Hours	Credits
17004	Comprehensive Chinese IV	64	4
02120	Analog electronic circuits*	64	4
02069	Signal and Linear Systems*	64	4
02050	Digital Circuits	64	4
02121	Digital Circuit Design Projects	2W	2
02116	Electronic Design and Application Software Training (1)	2W	2
		256	20

1st Semester Third Year

Code	Course Name	Hours	Credits
17005	Technical Chinese (1)	48	3
02141	Introduction to Controls	32	2
02016	Electromagnetic Field and Microwave Technology*	64	4
02052B	Digital Signal Processing	48	3
02057 B	Telecommunication Electronic Circuits*	64	4
L1037	Fundamentals of Computer Orgnanization	72	4.5
		328	20.5

2nd Semester Third Year

Code	Course Name	Hours	Credits
17006	Technical Chinese (2)	32	2
01147A	Microprocessor Theory and Applications	64	4
02003	Introduction to EDA*	48	3
02059	Communication Theory*	72	4.5
L01077	Computer Network	64	4
02117	Electronic Design and Application Software Training (2)	2W	2
02075	E-Professional Internships	2W	2
		280	21.5

1st Semester Final Year

Code	Course Name	Hours	Credits
02056	Introduction to Antennas	32	2
02073	Mobile Telecommunication	48	3
02151	Satellite Telecommunication	32	2
02071	Information Theory and Coding*	48	3
02030	Optical Fiber Telecommunication	48	3
02072	Remote Control and Measurement Technology*	48	3
02077	Integrated Design Projects	4W	4
		256	20

2nd Semester Final Year

Code	Course Name	Hours	Credits
02048	Production Practice/Internship	3W	3
02008	Graduation Project & Thesis	16W	16
			19
		Total	160

Medium of Education: English

Comprehensive Chinese Ⅰ/Ⅱ/Ⅲ/Ⅳ/Ⅴ/Chinese for Science and Technology

This course is aimed at developing students' skills in listening, speaking, reading, and writing. It also focuses on improving basic communication competence in Chinese language.

Introduction to China

This course introduces students to the characteristics of China's social development, Chinese history, and culture, Chinese traditional thinking inheritance and innovation of Chinese life changes, China's contribution to human civilization, and various manifestations of China's modernization. It also introduces the students to China's ideology of past, present, and future.

Introduction to Chinese Law

This course introduces students to Chinese legal tradition and law, such as constitutionalism and rule of law, administrative law, civil law, marriage law, succession law, criminal law, and the procedural law. The course also focuses on fundamental and practical aspects of the Chinese law to familiarize international students about legal issues in China.

Advanced Mathematics Ⅰ/Ⅱ

This course is designed to introduce the student to the main ideas of calculus. It is divided into two semesters.

C Programming Language

C Programming Language is a professional basic and pilot course of Computer Science & Technology.

Here we'll learn about the basic steps of programming using a kind of high-level programming language tool, C. We'll learn relevant knowledge of grammar about C programming language, and based on which, learn how to analyze a specific question, how to design suitable data structure, how to design appropriate algorithm, how to edit, compile and debug a program , and at the end, to get the expected result with this high-level programming language. At the same time, We'll know the essential procedure to deal with a question with a programming language, and lay a sound foundation for later study.

Engineering Drawing I

Descriptive geometry and mechanical drawing is an application oriented subject that introduces the preparation, representation and reading of mechanical drawings, similar to characters and numbers, mechanical drawing is one of the tools used by human for the expression. The course is divided into two parts, I and II. The first it mainly covers basic

theories and methods for the preparation and reading of mechanical drawings.

College Physics Ⅰ

This course is the introduction to classical mechanics, electromagnetism and special relativity. In classical mechanics, it includes motion in one and two dimensions, Newton's laws of motion and their applications, work and energy, linear momentum and collisions, rotational motion, and principles of conservation. In electromagnetism, it covers a study of electric charges, forces, and field, Coulomb's law, electric potential and electric potential energy, electric current, electric circuits, and an introduction to magnetism. In special relativity, it includes frame of reference, Galilean transformation, Michelson, Morley experiment, postulates of special theory of relativity, Lorentz transformation, length contraction, time dilation, relativity of simultaneity in addition to velocities, variation of mass with velocity, Mass energy equation.

Linear Algebra

This course encompasses the study of linear equations, matrices, determinants, vectors in the plane and space, vector spaces, linear transformations, inner products, eigen values and eigenvectors. Students will learn to recognize and express the mathematical ideas graphically, numerically, and symbolically.

Probability and Statistics

This course provides an elementary introduction to probability and statistics with applications.

Fundamentals of Circuit Analysis

Fundamentals of circuit analysis is the first professional basic course for telecommunication engineering and computer science major undergraduate students. It covers fundamentals of knowledge necessary in this field, such as basic concepts and laws for circuits, mesh and nodal analysis, circuit theorems, first-order circuit analysis, AC steady-state circuit analysis, single-phase and three-phase circuits.

Introduction to software technology

This course is set up for non-computer science students a comprehensive course on basic knowledge of software, covering software engineering, data structures, and other content. Students can have an overall knowledge and understanding of software systems. The course is based on the emphasis of practice, set a few experiments to improve the students' actual

programming ability. In addition, this course is designed to provide students with a professional platform for working in professions and roles that utilize knowledge of software development. This course requires students to complete 8 hour experiments, which is relative with the teaching material.

Analog Electronic Circuits

This course is a technical basic course of Higher School, it focuses on training students' ability to analyze and solve problems. Through the curriculum learning, let students learn to read classic electronic circuit principle diagram and understand the composition and working principle of each part. Also able to qualitative or quantitative analysis /estimates the each part of circuit performance. Students can be roughly selected design scheme of circuit, Selects the related components and learn to install debug the circuit. So this course to strengthen introduced the basic concepts and basic unit of the circuit is and set up the training link. Courses also strengthen the basic principle and basic analysis method, Subsequent through experiment or design courses to cultivate students' practical ability.

Signals and Linear Systems

This course is frequently found in electrical engineering curricula, the concepts and techniques that form the core of the subject are of fundamental importance in all engineering disciplines. It is divided into three parts. The first part of the course mainly introduces some of the elementary ideas related to the mathematical representation of signals and systems, discusses transformations of the independent variable of a signal, introduce some of the most important and basic continuous-time and discrete-time signals, and introduces block diagram representations of interconnections of systems and discuses several basic system properties. The second part introduces the description and analysis of continuous-time and discrete-time linear, time-invariant (LTI) systems in time-domain. In this part, discusses causal, LTI systems characterized by linear constant-coefficient differential and difference equations, and also provides a discussion of analogous methods for linear difference equations. The third part introduces the description and analysis of continuous-time and discrete-time LTI systems in transform-domain.

Digital Circuit

Digital logic is a compulsory course, degree course, and exam course for the undergraduate of electronic specialties. Digital logic also is the first discipline basic course directly related to many industry control systems. Through studying this course the students should master the

basic concept of digital logic circuit, basic principles, basic methods and basic circuits. The students should learn the basic design method of the digital system and related technology. The students should be able to finish preliminary analysis and design of simple digital systems. Here we will learn about the logic algebra fundamental. We will focus on the basic analysis and design method of combinational circuits, sequential circuits, and pulse circuits. Digital laboratories can provide the opportunity to connect several typical logic circuits.

Introduction to Controls

This course is set up for non-automation students a comprehensive course on basic knowledge of automatic control system. The course deals with introduction to design of feedback control systems, properties and advantages of feedback systems, time-domain and frequency-domain performance measures, stability and degree of stability. It also covers root locus method, ny-quist stability criterion and frequency-domain design. Examples are drawn from electrical, mechanical, and other applications. This course requires students to complete 8 hours experiments with MATLAB.

Electromagnetic Field and Microwave Technology

This course provides in depth coverage of all aspects electromagnetic, with a focus on field and wave generation and propagation. The course will focus on the more practical aspects of E-M theory, with application examples taken from the problems in the textbook as well as from other references. The specific subjects covered will be vectors analysis, time-varying field, Maxwell's equations, electromagnetic wave propagation, transmission lines, waveguides and resonators. Students are expected to complete problem-based assignments, quizzes and tests on material that will largely follow the course textbook.

Digital Signal Processing

The course of Digital Signal Processing is an important course of technical foundations in communication engineering, electronic & information engineering, and other related disciplines, which is designed for undergraduate students at junior level. The course focuses on the analysis of deterministic discrete-time signals, and on the analysis and design of an important class of discrete-time systems known as linear time-invariant (LTI) systems. The course discusses the design techniques of IIR and FIR digital filters. Indeed, the realization of teaching and training objectives in this course outline will greatly help students lay a firm foundation for further studying of up-level courses in concerned disciplines and for their future career in engineering practice.

Communication Circuit

This course is the basic course for the students with majors of communication engineering and electronic & information engineering. The basic teaching objective of this course is : master the composition of amplifying, oscillating, frequency transformation circuits, their operation principle, performance characteristics and engineering calculation methods.

Fundamentals of Computer Organization and Architecture

In this course, we will learn the fundamentals of computer organization and architecture, from basic concepts, to the principles of improving and designing for, the performance of computer system. We will cover computer evolution and performance, computer system, central processing unit and its control, parallel processing basics, as well as some necessary groundwork knowledge such as number system. Along with classroom teaching, a few hands-on experiments will be carried out to reinforce the students' understanding.

Micro-controller's Principle and Applications

This course introduces students to microprocessor and micro-controller technologies covering the theory of micro-controller architecture, instruction set, assembly language programming, analogy and digital peripherals, interrupts, parallel and serial interfacing. The 8-bit Intel 8051 micro-controller is selected for laboratory training sessions.

Digital Circuit Design with VHDL

The course of Digital Circuit Design with VHDL introduces the student to the design of digital logic circuits, both combinational and sequential, and the design of digital systems in a hierarchical, top-down manner. The student is also introduced to the use of EDA tools and VHDL to develop complex digital circuits and to prototyping designs using programmable logic devices and field-programmable gate arrays.

Principles of Communications

This course is a specialized course for the majors of electronic & information engineering and communication engineering.

Its objectives and missions: make some research and analysis on different kinds of communication system model and performance, explore the time and frequency domain characteristics of system by mathematical methods, to make students be able to master the

basic principles and analysis methods of communication system and cultivate students' abilities on problem analysis and solving.

Computer Networks

This is a technical fundamental course for undergraduate students in the Computer Science and Technology program and is offered as an introduction to Computer Networks. We will discuss five layers of Computer networks which include physical layer, data link layer, network layer, transport layer and application layer.

Introduction to Antennas

This course will provide students with the fundamental theory in antenna design. Moreover, it will give students hand-on skills related to antenna designs and characterizations. Topics include linear dipole antennas, loop antennas, patch antennas, horn antennas and antenna arrays. Successful completion of this course will allow students to carry out the work and research in the area of antennas.

Mobile Communication

This course mainly introduces the basic concepts, components, theories, techniques and typical systems of modern mobile communication systems. Students should be able to grasp the basic knowledge of mobile communication systems and its trends, including its characteristics, types, basic technique, terminology, and etc. This course mainly focuses on the digital modulation/demodulation methods, error-correcting technique, multiple access technique, channel configuration method, signalling and networking methods. This course can provide a bridge between the basic principle and the realistic system application.

Satellite Communications

With the rapid development of information technology, satellite communications technology has become an important and indispensable part of the electronics and communications courses. We will learn the basic concept, composition and classification of satellite communication system, understanding the characteristics of satellite communication system. In this course we can learn about geostationary orbit and satellite earth eclipse, sun transit outage etc. The satellite orbit and launching and attitude control. We can learn spinning satellite stabilization and momentum wheel stabilization, transponders and antenna subsystem. In addition to study atmospheric loss, ionospheric effects, rain attenuation, propagation loss and other satellite network,

mobile satellite and dedicated service, the family TV receiving system.

Elements of Information Theory

The lecture can be taught in a two-quarter sequence, which includes the asymptotic equipartition property, data compression, and channel capacity, culminating in the capacity of the Gaussian channel. The lecture could cover the rate distortion, the method of types, Kolmogorov complexity, network information theory, universal source coding, and portfolio theory. If only one semester is available, we would add rate distortion and a single lecture each on Kolmogorov complexity and network information theory to the first semester.

Telecontrol and Telemetry Technology

Telecontrol and telemetry technology is widely used in science research, agricultural and industrial development, communicating, military technology and electrical apartments. And the function of remote control devices are turning more reliable and more powerful as various remote control integrated circuits keeps on coming out. This course is an important compulsory subject for electrical information engineering, which mainly provide the basic concepts and principles of radio telemetry and the knowledge of sensor in the telecontrol and telemetry system.