Communication Engineering

(Grade 2022)

Course code: 080703

I. Cultivation Objectives

1. General cultivation objective

This program insists on making moral education a fundamental task, cultivating people who can serve the construction of socialism modernization, have high cultural quality cultivation, professionalism and social responsibility, master the basic theoretical knowledge of Communication Engineering and its application fields, have strong independent ability and engineering practice ability, be able to work in the field of communication and be capable of designing, developing, producing and testing communication systems, and planning, organizing, optimizing, operating, managing and maintaining communication networks.

2. Objective of value guidance

Through the combination of humanities and social science courses, general education and professional courses, this program realizes the value-led objective, takes the spirit of model workers and craftsmanship as the value orientation, cultivates craftsmanship, nurtures craftsmen, cultivates students' good humanities and social science literacy, professional ethics, psychological quality and a strong sense of social responsibility, as well as innovation consciousness and entrepreneurship. In the process of education and teaching, the values of engineers and Ethics in Engineering are incorporated into the education through the spirit of craftsmanship, and students are trained to develop a rigorous, meticulous, dedicated and responsible working attitude, the concept of fine craftsmanship and excellence, and to master the basic theories and key technologies of Communication Engineering.

3. Five years after graduation, students in this program should achieve the following objectives:

(1) Have a sound personality, good scientific and cultural literacy, a sense of social responsibility and professional ethics, and be able to integrate legal, environmental, social, cultural and sustainable development impacts in their engineering practice.

(2) Have knowledge of the fundamentals of Communication Engineering, the relevant mathematical and scientific fundamentals, the principles of engineering technology, and the professionalism and basic skills of an engineer.

(3) Have knowledge of the standards, specifications and regulations related to Communication Engineering, strong engineering innovation skills and the ability to solve complex engineering problems.

(4) Have good teamwork and communication skills, engineering Project Management and organizational coordination skills and the ability to play a leadership or core role in Communication Engineering tasks.

(5) Master autonomous, lifelong learning habits and abilities to keep abreast of domestic and international technology trends and continuously improve their professionalism to meet future challenges.

II. Graduation requirements

1. Engineering knowledge: Have knowledge of the relevant mathematics, natural sciences, engineering fundamentals and communications-related professional knowledge required for Communication Engineering, and the ability to use it to solve complex communications systems development, system integration, maintenance and other related engineering problems.

1-1: Have basic knowledge of mathematics and related natural sciences required for Communication Engineering, including Calculus, Linear Algebra, functions of complex variables, Probability Theory and Mathematical Statistics, electricity, optics and mechanics of physics. Have knowledge of the humanities and social sciences.

1-2: Have knowledge of engineering theory and technical fundamentals of communications and related application fields, including basic concepts of communication principles. Be familiar with the system components and working principles of communication networks, key technologies, and the implementation of the main components.

1-3: Have in-depth knowledge of at least one type of communication network (data communication, mobile communication) and basic knowledge of planning, surveying, network formation, optimization, operation, management and maintenance of communication networks in this field.

2. Analysis of the Problem: Be able to apply mathematical, natural science, engineering fundamentals and communications-related professional knowledge to analyse, identify and represent complex engineering problems in Communication Engineering and related applications. Be able to analyse literature through independent study and research in order to reach valid conclusions.

2-1: Be able to apply basic principles of natural sciences such as mathematics and the fundamentals and professional knowledge of Communication Engineering to analyse, identify and express engineering problems in the fields of communication circuits, information processing and transmission, and communication networks.

2-2: Be able to apply basic professional theory as well as hardware and software methods to identify and analyse the basic aspects and parameters of complex engineering problems.

2-3: Be able to analyse, solve and obtain effective solutions to complex engineering problems in the field of Communication Engineering with help of literature research.

3. Design/develop of solutions: Have the ability to apply appropriate theoretical and practical experience to design and plan communication network solutions that meet specific requirements, design and develop functional modules for communication terminal products that meet communication industry standards, and demonstrate basic professionalism in their design and development.

3-1: Be able to master the engineering design concepts, principles and methods involved in the discipline. Be able to master the engineering design concepts, principles and methods involved in the discipline. Be able to draw on practical experience to identify design requirements, carry out schematic design, implement design solutions, complete engineering tasks and participate in relevant evaluations for at least one engineering problem in the field of communications networks..

3-2: Have a certain sense of innovation, preliminary software and hardware development capabilities, and the ability to transform technologies related to Communication Engineering and application fields; Be able to draw on practical experimental experience to complete software/hardware design solutions for simple systems or stand-alone modules by applying basic professional knowledge and fundamental principles to specific needs, and be able to demonstrate professionalism in their design and development.

3-3: Have the ability to consider the impacts of multiple, multifaceted factors such as cost, quality, social, health, safety, legal, cultural and environmental factors in the design of communication system solutions.

4.Research: Master the basic principles and methods of mathematics and science, Communication Engineering disciplines. Be able to use various equipment and instruments skillfully. Be able to model, analyse, design and test complex engineering problems in communications engineering and applications using scientific approaches and

methods, and to reasonably analyse, interpret and evaluate the results and give solutions for improvement.

4-1: Be able to carry out theoretical analysis and simulation of software and hardware modules in the field of communications.

4-2: Be able to design experimental schemes for complex engineering problems in the field of communications such as communications networks, information transmission and signal processing, and to select reasonable experimental materials and equipment to construct experimental systems.

4-3: Be able to reasonably analyse, interpret and evaluate scientific research problems, propose improvement solutions and carry out theoretical analysis and summaries, with a preliminary consciousnesses and ability to conduct research studies.

5.Use of modern tools: Master software and hardware development languages, be familiar with testing software for mobile communication base station, be familiar with communication testing and network optimization software, be able to select and use appropriate modern engineering tools and information technology tools to simulate, predict and give reasonable solutions to complex engineering problems.

5-1: Have knowledge of basic computer operations and applications, knowledge of software development languages, system analysis and design and simulation tools commonly used in the field of profession, and the ability to use integrated development environments for programming.

5-2: Have knowledge of the basic principles and methods of operation of the Program for Communication Engineering instruments and equipment, and the ability to select and use them appropriately in complex, integrated projects.

5-3: Have the ability to use experimental equipment, computer software and modern information tools to model or simulate complex engineering problems in communication systems, and to understand the requirements, scope and limitations of their use.

6.Engineering and Society: Socially responsible: have the ability to undertake sound analysis and evaluate the social, health, safety, legal and cultural impacts of professional engineering practice and solutions to complex engineering problems based on background knowledge of Communication Engineering, and an understanding of the responsibilities involved.

6-1: Knowledge of technical standards, intellectual property rights, industrial policies and laws and regulations relevant to the field of Communication Engineering.

6-2: Be able to analyse and evaluate the social, health, safety, legal and cultural impacts of professional engineering practice and solutions to complex engineering problems in the context of relevant engineering knowledge.

7. Environment and Sustainable Development: Be able to understand and evaluate the impact of professional engineering practice on environmental and social sustainability in relation to complex engineering problems.

7-1: Understand the meaning of environmental protection and sustainable social development and the relevant guidelines, policies, laws and regulations, and be able to correctly understand the environmental and social impacts of professional engineering practices that address complex engineering problems.

7-2: Be able to consider environmental and sustainability constraints in response to practical and complex engineering problems, and properly evaluate and take responsibility for the impact of professional engineering practice on environmental and social sustainability.

8. Professional Codes: Have basic Human, social and scientific literacy, social responsibility, and the ability to

understand and comply with Communication Engineering ethics and codes of practice and responsibilities in the practice of engineering.

8-1: Understand the core values of socialism, understand the national situation, safeguard the national interest and establish a correct political stance, correct perspective on life, world and values.

8-2: Understand the nature of the profession and social responsibilities of Communication Engineers and be able to consciously observe professional ethics and codes of conduct in engineering practice.

9. Individual and team: Be able to communicate effectively with industry peers and the public on complex engineering issues in the communications field, including writing reports, design briefs, presenting statements, expressing or responding clearly to instructions, have an international perspective and the ability to communicate and interact in a cross-cultural context.

9-1: Have the ability to assume the role of an individual, team member in a multidisciplinary project covering Communication Engineering, using professional strengths and taking the initiative to communicate effectively and work collaboratively with other members.

9-2: Understand how teams are organized and managed and be able to manage the interpersonal relationships of team members to take full advantage of teamwork.

10. Communication: Have the ability to communicate effectively with industry peers and the public on complex engineering issues, including writing reports and design briefs, making presentations, and expressing or responding clearly to instructions. They will also have an international perspective and be able to communicate and interact in a cross-cultural context.

10-1: Be able to express design ideas, methods and results in written and oral form for complex engineering problems in the communications field, and to communicate effectively with industry peers and the public.

10-2: Be able to listen, speak, read and write English, be familiar with professional vocabulary, be able to read professional related English literature and understand international developments in the communications industry.

11. Project Management: Understand and master the principles of Communication Engineering management and economic decision-making methods and apply them in a multidisciplinary environment.

11-1: Understand the importance of engineering management and economic decision-making, the basic principles of engineering management and common methods of economic decision-making.

11-2: Be able to apply management principles, economic decision-making to Management of Communication Engineering Project.

12. Spirit and ability of lifelong learning: A sense of independent and lifelong learning, with the ability to learn and adapt to development.

12-1: Have the ability to acquire, update and use professional knowledge through modern retrieval systems and the ability to quickly acquire and learn new knowledge and technologies.

12-2: Understand the characteristics of developments in communication technologies, have a sense of independent and lifelong learning, and the ability to adapt proactively to technological developments.

12-3 Acquire an active learning approach through independent learning in solving of complex engineering problem and the ability to continuously learn to adapt to development.

III. Schooling System

Four years.

IV. Length of Study

Flexible study period, generally four years, the minimum length of flexibility is not less than three years, the longest not more than six years.

V. Requirements for Graduation and Degree Conferring

In order to graduate, students must complete the minimum number of credits required by the Instructive Cultivation Plan for each course category and all the content required by the Extracurricular Class, with a total of 164 credits, and will be awarded a Bachelor of Engineering degree if they meet the requirements for the award of a Bachelor's degree.

VI. Discipline

Information and Communication Engineering disciplines, Electronic Science and Technology, Computer Science and Technology.

VII. Core Courses

Probability Theory and Mathematical Statistics, Analog Electronic Technology, Digital Electronic Technology, Signal and System, Digital Signal Processing, Electromagnetic Fields and Antennas, Principles of Communication, Communication Electronic Circuits, Fundamentals of Mobile Communication, Introduction to the Internet, Integrated Design of Signal and Information Processing, Integrated Design of Communication Systems.

VIII. Course Structure and Course Hours (excluding Extracurricular Class)

Category	**Total Credit**	**%**	**Total Course Hours**	**Theory Learning**	**Practical Training**
Public Fundamental Course	57.5	35	1056	976	80
General Education	10	6	160	160	0
Engineering Fundamental Course	16	10	256	196	60
Professional Fundamental Course	19	11	304	234	70
Professional Course	37	23	592	422	170
Professional Practice	23.5	15	712	0	712
Total	163	100	3080	1988	1092
Theory: **Practical** (%)	65:35				

IX. Teaching schedule (1)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Public Fundamental Course	required	School of Marxism	b1080001	Basic Principles of Marxism	non-test	3	48	42	6	Spring 1
	required	School of Marxism	b1080009	Ethics and the Rule of Law	test	3	48	42	6	Spring 1
	required	School of Marxism	b1080006	Outline of Modern Chinese History	test	3	48	42	6	Autumn 1
	required	School of Marxism	b1080004	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics I	non-test	3	48	42	6	Autumn 2
	required	School of Marxism	b1080007	Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II	non-test	2	32	28	4	Spring 2
	required	School of Marxism	-----	Situation and Policy (Modules 1 to 4)	test	2	32	28	4	Autumn 1 to Spring 2
	required	School of Marxism	b1080008	Labour Education A	test	0.5	16	16		Autumn 2
	required	College of Arts and Sciences	b1020112	Advanced MathematicsD1	non-test	5	80	80		Autumn 1
	required	College of Arts and Sciences	b1020113	Advanced MathematicsD2	non-test	5	80	80		Spring 1
	required	College of Arts and Sciences	b1020108	Linear Algebra	non-test	3	48	48		Autumn 2
	required	College of Arts and Sciences	b1020114	Probability Theory and Mathematical Statistics	non-test	3	48	48		Autumn 2
	required	College of Arts and Sciences	b1020018	Academic Chinese	test	2	32	32		Spring 1
	required	College of Arts and Sciences	b1020063	Academic Physics A (Module 2)	non-test	3	48	48		Spring 1
	required	College of Arts and Sciences	b1020065	Academic Physics B	non-test	2	32	32		Autumn 2
	required	College of Arts and Sciences	b1020111	Academic Physics C	test	2	32	0	32	Autumn 2
	required	College of Physical Education	-----	Physical Education I to VI	test	3	160	160		Autumn 1 to Autumn 4
	required	Others	b1110003	Military skills	test	0.5	2W	0		Autumn 1
	required	Others	b1110004	Mental Health Education for University Students	test	2	32	16	16	Spring 1
	required	College of Arts and Sciences	b1110002	Military theory	test	0.5	32	32		Autumn 2
	required	College of Arts and Sciences	b1020003	General English III	non-test	3	48	48		Autumn 1
	required	College of Arts and Sciences	b1020004	General English IV	non-test	3	48	48		Spring 1
	required	College of Arts and Sciences	b1020005	General Academic English A	non-test	2	32	32		Autumn 2
	required	College of Arts and Sciences	---	Foreign Language Expansion	test	2	32	32		Spring 2
				Subtotal (Public Fundamental Course)		**57.5**	**1056**	**976**	**80**	
General Education	selective	Art Education Center	b0-----	Aesthetic Education	test	2	32	32		Autumn, Spring
	selective	Each College	b0-----	Social Sciences and Humanistic Qualities	test	4	64	64		Autumn, Spring
				Natural Sciences and Technology Innovation	test	4	64	64		Autumn, Spring
			Subtotal	**(General Education)**		**10**	**160**	**160**		

IX. Teaching schedule (2)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Engineering Fundamental Course	required	School of Computer and Information Engineering	b2012018	Fundamentals of Programming	non-test	4	64	48	16	Autumn 1
	required	Engineering Training	b2090011	Fundamentals of Circuit Analysis	non-test	4	64	52	12	Spring 1
	required	Engineering Training	b2012061	Analog Electronic Technology	non-test	4	64	48	16	Autumn 2
	required	Engineering Training	b2011123	Digital Electronic Technology	non-test	4	64	48	16	Spring 2
Subtotal (Engineering Fundamental Course)						**16**	**256**	**196**	**60**	
Professional Fundamental Course	required	School of Computer and Information Engineering	b2012176	Introduction to the Program of Communication Engineering	test	1	16	10	6	Autumn 1
	required	School of Computer and Information Engineering	b2012231	Data Structures and Algorithms	non-test	4	64	56	8	Spring 1
	required	School of Computer and Information Engineering	b2012129	Signal and System	non-test	3	48	36	12	Autumn 2
	required	College of Arts and Sciences	b1020023	Functions of complex variables and integral transformations	test	2	32	32		Spring 2
	required	School of Computer and Information Engineering	b2012103	Digital Signal Processing	non-test	3	48	36	12	Spring 2
	required	School of Computer and Information Engineering	b2012321	Foundations of Information Theory and Coding	non-test	3	48	40	8	Autumn 3
	required	School of Computer and Information Engineering	b2012286	Electromagnetic Fields and Antennas (English-taught)	non-test	3	48	24	24	Spring 3
Subtotal (Professional Fundamental Course)						**19**	**304**	**234**	**70**	
Professional Course	required	School of Computer and Information Engineering	b2012003	DSP Principles and Applications	non-test	2	32	18	14	Summer 2
	required	School of Computer and Information Engineering	b2012315	Microcontroller Principles and Applications	non-test	5	80	50	30	Spring 2
	required	School of Computer and Information Engineering	b2012006	Java Programming	non-test	2	32	20	12	Spring 2
	required	School of Computer and Information Engineering	b2012187	Mobile Communications Fundamentals	non-test	2	32	32	0	Spring 2
	required	School of Computer and Information Engineering	b2012304	Introduction to the Internet	non-test	2	32	32	0	Spring 2
	required	School of Computer and Information Engineering	b2012287	Communication electronic circuits	non-test	3	48	40	8	Autumn 3
	required	School of Computer and Information Engineering	b2012109	Communication principles	non-test	3	48	36	12	Autumn 3
	required	School of Computer and Information Engineering	b2012296	Artificial Intelligence Technology	test	2	32	32	0	Autumn 3
	Subtotal(Required Professional Course)					**21**	**336**	**260**	**76**	
	select different courses in different modules for 8 credits	Module A	b2012322	LTE systems and key technologies	non-test	2	32	32	0	Autumn 3
			b2012323	Next generation mobile technology	non-test	2	32	32	0	Autumn 3
			b2012324	Mobile Communication Equipment and Tuning	test	2	32	16	16	Spring 3
			b2012189	Network Optimisation and Planning	test	2	32	24	8	Spring 3
		Module B	b2012172	Routing and Switching	test	2	32	18	14	Autumn 3
			b2012173	Extended network design	test	2	32	16	16	Autumn 3
			b2012038	Wide area network access technology	non-test	2	32	16	16	Spring 3
			b2012302	Data communication system engineering	non-test	2	32	8	24	Spring 3
	select different courses in different modules for 8 credits	Module C	b2012325	Communication embedded systems and applications	non-test	2	32	16	16	Autumn 3
			b2012089	Database Principles and Applications	non-test	2	32	20	12	Autumn 3
			b2012328	Fixed Network Application Development	test	2	32	22	10	Spring 3
			b2012326	Mobile Application Development	test	2	32	20	12	Spring 3
		Module D	b2012125	Modern exchange technology	non-test	2	32	20	12	Autumn 3
			b2012034	Fundamentals of Optical Communication	non-test	2	32	20	12	Autumn 3
			b2012054	Broadband Access Technologies and Applications	test	2	32	22	10	Spring 3
			b2012327	Intelligent image processing	test	2	32	22	10	Spring 3
	Subtotal (Selective Professional Course)					**16**	**256**	**162**	**94**	
Subtotal (Professional Course)						**37**	**608**	**442**	**166**	

IX. Teaching schedule (3)

Category	Type	Provided by	Course Code	Course Name	Assessment	Credit	Course Hours	Theory Learning	Practical Training	Recommended semester
Professional Practice	required	Engineering Training	b4090002	Basic Engineering Training B	test	2	48		48	Summer 1
	required	School of Computer and Information Engineering	b4012005	Programming and Practice	test	2	48		48	Summer 1
	required	School of Computer and Information Engineering	b4012198	Signal and Information Processing Course Design	test	2	48		48	Summer 2
	required	School of Computer and Information Engineering	b4012186	Labour Education B	test	0.5	16		16	Spring 3
	required	School of Computer and Information Engineering	b4000016	the Program of Communication Engineering Innovation and Entrepreneurship	test	2	48		48	Spring 3
	required	School of Computer and Information Engineering	b4012197	Integrated design of communication systems	test	3	72		72	Summer 3
	required	School of Computer and Information Engineering	b4012199	Comprehensive Practice for Communication Engineering based on School-Enterprise Cooperation1	test	2	48		48	Summer 3
	required	School of Computer and Information Engineering	b4012200	Comprehensive Practice for Communication Engineering based on School-Enterprise Cooperation 2	test	4	96		96	Autumn 4
	required	School of Computer and Information Engineering	b4012132	Communication Engineering Graduation Internship and Graduation Design (Thesis)	test	6	288		288	Spring 4
Subtotal (Professional Practice)						**23.5**	**712**		**712**	
Extracurricular Class	required	Others	b5110001	Extracurricular Class	test	**1**	-	-	-	Autumn, Spring, Summer
Total						**164**	**3080**	**1988**	**1092**	

Description of Selective Professional Course:

Module A Mobile Communications

The basic principles of 2G to 5G mobile communication systems and techniques for the design, construction, management and optimization of modern mobile communication networks are taught in the context of the intergenerational evolution of mobile communication technologies and are oriented towards practical engineering tasks.

Module B Data communication

This module provides a systematic analysis of the key technologies and solutions involved in data communications, and teaches the entire process of data communications network engineering from planning, selection, construction, testing and management, ultimately equipping students with the ability to design, build and manage the maintenance of medium-scale commercial networks.

Module C System Development

This module teaches the principles and methods of hardware and software development for communication and information systems, with a focus on information acquisition, analysis， processing, storage and query, and equips students with the skills to develop typical embedded systems, database systems, fixed-line communications and mobile communications.

Module D Intelligent Communication

Based on technologies such as fibre optic communication, modern switching and intelligent processing, this module is about the convergent development and cutting-edge applications of communication services.

X. Prerequisite for Course Study

No.	Course Name	Prerequisite Course
1	Analog Electronic Technology	Fundamentals of Circuit Analysis
2	Digital Electronic Technology	Fundamentals of Circuit Analysis
3	Signal and System	Fundamentals of Circuit Analysis, Analog Electronic Technology.
4	Digital Signal Processing	Signal and System
5	DSP technology applications	Digital Signal Processing
6	Electromagnetic fields and antennas	Analog Electronic Technology, Digital Electronic Technology, Signal and System
7	Foundations of Information Theory and Coding	Probability Theory and Mathematical Statistics
8	Communication electronic circuits	Analog Electronic Technology, Digital Electronic Technology
9	Signal and Information Processing Course Design	Signal and System, Digital Signal Processing, Analog Electronic Technology, Digital Electronic Technology
10	Integrated design of communication systems	Analog Electronic Technology, Digital Electronic Technology, Principles of Communication, Communication Electronics Technology

XI. Credit of Extracurricular Class

Through taking extracurricular classes, students are encouraged to take part in academic lectures, social practice activities, campus cultural and sports activities, innovative and entrepreneurial activities, voluntary activities, etc. to improve their social adaptability and enhance the competitiveness in the job market. Details are specified in Students' Manual.