# Undergraduate Program for Electronic and Communication Engineering

## I. Length of Schooling

(1) Standard Length of Schooling: 4 years;

(2) Flexible period of schooling: 3-6 years.

## II. Degrees

Bachelor of Engineering in Communication Engineering from Beijing Jiaotong University; and Bachelor of Engineering in Electronic and Communications Engineering from Lancaster University.

## III. Program Overview

The program provides a broad, rigorous treatment of the fundamental principles of the discipline, combined with their modern day application. And the program is relied on “Communications and Information Systems” and “Signal and Information Processing”, the two national-level key disciplines. It gives prominence to the communication and networking technology. It also includes the application domains in the public communication industry as well as the specialized communication in transportation industry. It intends to help students build a solid theoretical foundation, strengthens their creativities, and emphasizes both in theory and practice. It brings up senior specialized professionals with the ability to following frontiers of communication and networking technologies, system design and apply multiple technologies. It enhances its professional advantages and railway characteristics gradually to step to the advanced ranks and increase their international awareness. The program on communication engineering is designed for students seeking a broad yet rigorous grounding in this innovative discipline, with a strong emphasis on capability of solving complex engineering problems in communication engineering. Its balanced curriculum combines theory and practice to equip students with the cutting-edge knowledge and well-rounded professional and technical skills needed for a broad range of careers.

## IV. Program Objectives

This program is to impart the students to have a sense of social responsibility, a good command of professional engineering knowledge and fundamental theory of Communication Engineering, a comprehension of engineering practical, team working and professional communication, a profound consciousness of innovation and creation, a global perspective of following the technology frontier and service demands, and a proper adaptation of continuous professional development. The graduates of this program is able to engage in research, design, manufacture, operation and administration work in the information and communication technology fields.

Specifically, the graduates of this program will have the following competence at about 5 years after their graduation.

1. Be able to effectively apply the principles of engineering knowledge to solve complex engineering problems of communication or related fields, and to undertake the research and development of communications-related technologies or products;

2. Be able to assess alternative solutions based on competing requirements and incomplete knowledge and make right decisions, and to assess the reasonably foreseeable social, cultural and environmental effects of engineering activities generally, as well as the sustainability of the engineering project;

3. Be able to take the management and the decision-making responsibilities during the for part or the whole project in the engineering practice;

4. Be able to communicate effectively and to work in a team, including multi-disciplinary team and cross-cultural context;

5. Be able to undertake continuing professional development activities to maintain and extend his or her competence and knowledge, and to keep tracking the state-of-art;

6. Be able to observe laws and regulations, respect engineering ethics in practice and have good sense of social responsibility.

## V. Requirements of Graduation and Degrees

To obtain a degree and diploma, the undergraduates need to complete the relevant credits and GPA in accordance with the graduation requirements as follows.

**1. Engineering knowledge: Students should have the ability to abstract complex engineering problems to mathematical or physical ones, and choose appropriate models to analyze and solve these problems by applying the principles of mathematics, natural science, basic engineering knowledge and professional knowledge of communication engineering.**

1.1 Master mathematics, physics and other natural science knowledge.

1.2 Describe complex engineering problems properly by using mathematics, natural science, basic engineering knowledge and professional knowledge.

1.3 Calculate and analyze engineering problems by using mathematics, natural science, basic engineering knowledge and professional knowledge.

1.4 Abstract complex engineering problems to mathematical or physical ones, choose appropriate models to describe and solve the problems, and understand the limitations of the solutions.

**2. Problem Analysis: Students should have the ability to identify, formulate, and analyze a complex communication engineering problem with the help of literature research to get substantial conclusions.**

2.1 Clarify the design requirements, determine the design goals, the actual constraints, and the metrics of design performance

2.2 Decompose an engineering problem into sub-problems and illustrate them clearly with the aid of literature research.

2.3 Model and analyze engineering problems to obtain substantial conclusions with knowledge of mathematics, physics and professional principals.

**3. Design/Develop Solutions: Students should have the ability to design solutions for a complex problem in communication engineering. Specifically they can design or develop communication systems or modules to meet specific demands, validate the solutions and make necessary improvement. In this process, the students should exhibit innovative awareness and consideration of the non-technical factors including economy, society, health, safety, laws, culture and environment.**

3.1 Consider the factors including economy, society, health, safety, laws, culture and environment, analyze and compare the feasibility and the performance of candidate schemes and determine the solution.

3.2 Follow the solution, establish systems or modules and exhibit innovation in the design and development process.

3.3 Conduct function and performance testing of the system and modify the scheme when necessary.

**4. Investigation: Students should have ability to make investigation of a complex problem in communication engineering, compare candidate schemes comprehensively to reach valid conclusions by applying scientific theories of communication and relevant disciplines and scientific methods including design of experiments or simulations, analysis and interpretation of data and synthesis of information.**

4.1 Collect information, survey literatures and analyze characteristics and limitations of the existing technologies.

4.2 Design candidate schemes, consider technical limitations and evaluate the feasibility.

4.3 Design experiments or simulations, analyze data and integrate information, evaluate and compare technical performances by utilizing computer software and hardware technology and simulation tools and with basic knowledge of circuit.

**5. Utilization of modern tools: Students should have the ability to choose and use appropriate modern engineering tools and available information and communication technology resources to predict and simulate communication complex engineering problems, with understanding of the limitations of the tools or resources.**

5.1 Competence of using modern engineering tools and information technology tools, and understanding their limitations.

5.2 Competence of developing, choosing and using appropriate technologies, resources and modern tools to predict and simulate complex engineering problems.

**6. Engineering and Society: Students should have the ability to reasonably analyze and evaluate the effects of engineering practice and solutions of communication complex engineering problem on the society, health, security, laws and culture, and in turn take corresponding responsibilities.**

6.1 Possession of basic qualities including society, health, security, laws and culture.

6.2 An ability to analyze and evaluate the effects of engineering practice and solution on electronic complex engineering problems on the society, health, security, laws and culture as well as take corresponding responsibilities.

**7. Environment and Sustainable Development: Students should have the ability to understand and evaluate the effects of engineering practice on the sustainable developments of environment and society.**

7.1 Competence of getting aware of the social and environmental influences of engineering schemes.

7.2 An ability to evaluate the sustainability of engineering schemes.

**8. Professional Criterions: Students should have the humanities sciences, social sciences accomplishment, socialist core values and social responsibility. They should also understand and abide by the codes of ethics and take their duties in engineering practice.**

8.1 Possession of humanities sciences, social sciences accomplishment, a good understanding of social responsibilities and willingness to serve the community.

8.2 Competence of understanding and comply with engineering professional ethics in engineering practice.

**9. Individuals and Teams: Students should have team spirit and consciousness, play their roles as a leader and a team member in a cross-disciplinary team, take corresponding responsibility and collectively complete the team task.**

9.1 Competence of understanding the responsibilities of different roles in the team, and having team spirit.

9.2 An ability to cooperate with teammates from the same or other specialties take responsibilities when assuming a member or leader of a team and finish the team task.

**10. Communication: Students should have the ability to communicate effectively with their peers and the public about complex engineering problems in communication engineering field, including writing reports, designing documents, stating and speaking, clearly expressing or responding to the instructions. They should also have an international vision and have the ability to communicate effectively in the cross-cultural working environment.**

10.1 Competence of expressing specialty knowledge properly both in a written or oral way, communicate effectively with others, including writing reports, designing documents, stating and speaking, clearly expressing or responding to the instructions.

10.2 Mastery of at least one language, being aware of professional hot problems and able to establish intercultural communication.

**11. Project Management: Students should understand and master the theories and methods of project management and economic decision-making as well as applying it in multi-disciplinary environment.**

11.1 A grasp of knowledge of fundamental principles of engineering management and efficient personal or group work.

11.2 An ability to analyze cost benefit by using evaluation method.

**12. Lifelong Learning: Students should have the awareness to study independently and have lifelong learning. They should also have the ability to learn continuously and meet the needs of career development.**

12.1 An ability to study proactively and acquire knowledge by using information and literatures.

12.2 Knowledge of the significance of lifelong learning and adaptation to continuous career development with lifelong learning mind.

## VI. Course Statistics

|  |  |  |  |
| --- | --- | --- | --- |
|  | Total Hours | Lancaster Uni. | Percentage Delivered by LU |
| Total Contact Hours | 2452 | 884 | 36% |
| Total Number of Courses | 54 | 16 | 29.6% |
| Total Number of Core Courses | 12 | 5 | 42% |
| Total Contact Hours of Core Courses | 576 | 240 | 42% |

## VI. Specialty Core Courses

There are 12 Specialty core courses as listed below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Course Code | Course Name | Credits | Hours | Delivered By |
| 1 | WK14L185Q | Electromagnetics & RF Engineering | 3 | 48 | LU |
| 2 | WB10L306Q | Digital Electronics | 3 | 48 | LU |
| 3 | WB10L305Q | Analogue and Digital Communication Systems | 3 | 48 | LU |
| 4 | WB10L308Q | Optoelectronics and Networking  | 3 | 48 | LU |
| 5 | WB10L309Q | Advanced Communication Systems | 3 | 48 | LU |
| 6 | WB14L183Q | Circuit Analysis | 3 | 48 | BJTU |
| 7 | WB10L302Q | Computer Network | 3 | 48 | BJTU |
| 8 | WB10L303Q | Signal and Systems | 3 | 48 | BJTU |
| 9 | WB10L304Q | Microcomputer Principle and Interface Technology | 3 | 48 | BJTU |
| 10 | WB10L307Q | Fundamentals of Communication Networks | 3 | 48 | BJTU |
| 11 | WB10L310Q | Digital Signal Processing | 3 | 48 | BJTU |
| 12 | WB14L182Q  | Analogue Electronics | 3 | 48 | BJTU |

## IX. Schedule of Each Semester

| **School year** | **Semester** | **Course Name** | **required/ optional** | **Theory/ Practice** | **Credits** | **Total hours** | **LG/N Marks** | **Teaching Weeks** | **Hours****Per week** | **Lectured By** | **Notes** | **Required Credits** | **Optional****credits** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 0 | WB00L003T: 军事理论 | Military Theory |  | T | 0.5 | 16 | 2L |  | 8 | BJTU |  | 3 | 0 |
| WB00S001T: 军事训练 | Military Training | R | P | 2.5 | 18D | 2L |  |  | BJTU |  |
| 1 | WB85L003T： C语言程序设计 | C Programming | O | T | 3 | 48 | 5L | 1-12 | 4 | BJTU |  | 18.5 | 4 |
| WB73L001Q: 微积分（B）I | Calculus (B) I | R | T | 6 | 96 | N | 1-16 | 6 | BJTU |  |
| WB85L001T: 大学计算机基础 | Fundamentals of Computer | O | T | 1 | 32 | 2L | 1-8 | 4 | BJTU |  |
| WB73L002Q: 几何与代数（B） | Geometry and Algebra (B) | R | T | 3.5 | 56 | N | 1-16 | 3.5 | BJTU |  |
| WB61L001T: 中国近现代史纲要 | The Outline of Chinese Modern History | R | T | 2 | 32 | 5L | 1-16 | 2 | BJTU |  |
| WB6OS001T: 体育I | Physical Education I | R | P | 1 | 32 | 5L | 1-8 | 2 | BJTU |  |
| WK62L001T: 英语与学习技能I | English Language and Study Skills I | R | T | 3 | 96 | 5L | 1-16 | 6 | LU |  |
| WB20L001Q: 工程制图（B） | Fundamental of Engineering Drawing (B) | R | T | 2 | 32 | 5L | 1-8 | 4 | BJTU |  |
| WB70L007T: 交通运输概论 | Introduction to Transportation | R | T | 1 | 16 | 2L | 1-16 | 1 | BJTU |  |
| 2 | WB61L006T: 思想道德修养与法律基础 | Ideological and Moral Cultivation and Legal Basis | R | T | 2.5 | 48 | 5L | 1-16 | 3 | BJTU |  | 15.5 | 1 |
| WB73L003Q: 微积分（B）II | Calculus (B) II | R | T | 5 | 80 | N | 1-16 | 5 | BJTU |  |
| WB73L149Q: 大学物理（A）I | University Physics (A) I | R | T | 4 | 64 | N | 1-16 | 4 | BJTU |  |
| WB73S194Q: 物理实验Ⅰ | Experiments in Physics I | R | P | 1 | 16 | 5L | 1-16 | 1 | BJTU |  |
| WK62L002T: 英语与学习技能 II | English Language and Study Skills II | R | T | 3 | 96 | 5L | 1-16 | 6 | LU |  |
| WB60S002T:体育选修课 | Physical Education II | O | P | 1 | 32 | 2L | 1-16 | 2 | BJTU |  |
| 2 | 3 | WB61L008T: 毛泽东思想和中国特色社会主义T体系概论 | Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics | R | T | 3 | 64 | 5L | 1-16 | 4 | BJTU |  | 17.5 | 1 |
| WB73L004Q: 概率论与数理统计(B) | Probability Theory and Mathematical Statistics | R | T | 3.5 | 56 | N | 1-16 | 3.5 | BJTU |  |
| WK10L555Q: 数字电子基础 | Fundamentals of Digital Electronics | R | T/P | 1.5 | 24 | 5L | 1-5 | 5 | LU |  |
| WK10L755Q：计算机与控制 | Computer and Control | R | T/P | 1.5 | 24 | 5L | 6-10 | 5 | LU |  |
| WB10L316Q: 通信系统导论 | Fundamentals of Communication Systems | R | T/P | 2 | 32 | N | 1-8 | 4 | LU |  |
| WK62L003T: 英语与学习技能 III | English Language and Study Skills III | R | T | 3 | 96 | 5L | 1-16 | 6 | LU |  |
| WB73L152Q:复变函数与积分变换（A） | Complex Function and Integral Transformations (A) | R | T | 3 | 48 | N | 1-16 | 3 | BJTU |  |
| WB60S003T:体育选修课 | Physical Education III | O | P | 1 | 32 | 2L | 1-16 | 2 | BJTU |  |
| 4 | WB14L183Q: 电路分析 | Circuit Analysis | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  | 18 | 1 |
| WB10L302Q: 计算机网络 | **Computer Networks** | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| WK62L004T: 英语与学习技能 IV | English Language and Study Skills IV | R | T | 3 | 96 | 5L | 1-16 | 6 | LU |  |
| WB10L316Q: 通信系统导论 | Fundamentals of Communication Systems | R | T/P | 2 | 32 | N | 1-8 | 4 | LU |  |
| WB14L185Q：电力电子 | Power Electronics | R | T/P | 1.5 | 24 | 5L | 9-16 | 4 | BJJTU |  |
| WB10L303Q: 信号与系统 | Signals and Systems | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| WB61L007T: 马克思主义基本原理 | Introduction to the Basic Principles of Marxism | R | T | 2.5 | 48 | 5L | 1-16 | 3 | BJTU |  |
| WB60S004T:体育选修课 | Physical Education IV | O | P | 1 | 32 | 2L | 1-16 | 2 | BJTU |  |
| S2 | WB10S315Q：专业实习 | Professional Training | O | P | 2 | 2W | 2L |  |  | BJTU |  |  | 2 |
| 3 | 5 | WB10L317Q: 高级交流电路 | Advanced AC Circuits | R | T/P | 3 | 48 | 5L | 1-12 | 4 | BJTU |  | 13 | 2 |
| WB10L301Q: 仪表与控制 | Instrumentation and Control | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| WB10L304Q：微机原理与接口技术 | Microcomputer Principle and Interface Technology | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| WB10L306Q: 数字电子技术 | Digital Electronics | R | T/P | 3 | 48 | N | 1-12 | 4 | LU |  |
| WB61S002T: 思想政治课社会实践 | Social Practice of Ideological and Political Theory | R | P | 1 | 2W | 5L |  |  | BJTU |  |
| 创新创业训练 | Innovation and Entrepreneurship Training | O | P | 2 |  |  |  |  |  |  |
| 6 | WK14L185Q:电磁场与射频工程 | Electromagnetics & RF Engineering | R | T/P | 3 | 48 | N | 1-12 | 4 | LU |  | 12 | 2 |
| WB10L305Q: 模拟与数字通信系统 | Analogue and Digital Communications Systems | R | T/P | 3 | 48 | N | 1-12 | 4 | LU |  |
| WB10S312Q 商业开发管理 | Business Development Project | R | P | 3 | 16 | 5L | 1-8 | 2 | BJTU |  |
| WB10S311Q: 团队工程项目 | Engineering Projects Group | R | P | 3 | 48 | 5L | 1-12 | 4 | BJTU |  |
| 全校选修课 |  | O |  |  |  |  |  |  |  |  |
| S3 | WB10S315Q：专业实习 | Professional Training | O | P | 2 | 2周 | 2L |  |  | BJTU |  |  | 2 |
| 4 | 7 | WB14L182Q : 模拟电子技术 | Analogue electronics | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  | 17 | 4 |
| WB10S313Q： 工程管理 | Engineering Management | R | P | 3 | 16 | 5L | 13-16 | 4 | BJTU |  |
| WB10S314Q: 毕业设计 | Individual BEng Project - 300 hours | R | P | 3 | 48 | 5L | 1-16 | 3 | LU&BJTU |  |
| WK10L318Q:集成电路工程 | Integrated Circuit Engineering | R | T/P | 3 | 48 | 5L | 1-12 | 4 | LU |  |
| WB61L005T: 形式与政策 | Situation and Policy | R | T | 2 | 32 | 2L | 1-16 | 2 | BJTU |  |
| 通信系统选题 | Select Topics on Communication Systems | O | T | 2 | 32 | 2L | 9-16 | 4 | BJTU |  |
| 全校选修课 | Optional courses | O |  | 2 |  |  |  |  |  |  |
| WB10L307Q：通信网理论基础 | Fundamentals of Communication Networks | R | T | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| 8 | WB10L309Q: 高级通信系统 | Advanced Communication Systems | R | T/P | 3 | 48 | N | 1-12 | 4 | LU |  | 12 | 0 |
| WB10L310Q: 数字信号处理 | Digital Signal Processing | R | T/P | 3 | 48 | N | 1-12 | 4 | BJTU |  |
| WB10S314Q: 毕业设计 | Individual BEng Project - 300 hours | R | P | 3 | 48 | 5L | 1-16 | 3 | LU&BJTU |  |
| WB10L308Q:光电子学与无线通信 | Optoelectronics and Networking | R | T/P | 3 | 48 | N | 1-12 | 4 | LU |  |