

**THAI NGUYEN UNIVERSITY  
UNIVERSITY OF INFORMATION AND COMMUNICATION TECHNOLOGY**



**PROGRAMME SPECIFICATION  
FOR ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING  
TECHNOLOGY EDUCATION PROGRAMME**

**THAI NGUYEN - 2017**

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THAI NGUYEN UNIVERSITY  
**UNIVERSITY OF INFORMATION AND COMMUNICATION TECHNOLOGY**  
**Faculty of Electronics and Communications Technology**

**PROGRAMME SPECIFICATION**  
**OF ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING TECHNOLOGY**  
**EDUCATION PROGRAMME**

*Decision No 809/QĐ-ĐHCNTT&TT dated on August 11<sup>th</sup>, 2017 by the Rector  
of TNU - University of Information and Communication Technology*

**I. BASIC INFORMATION ABOUT THE TRAINING PROGRAM**

**1. Program name:**

+ Vietnamese name: Công nghệ kỹ thuật điện tử - viễn thông.

+ English name: Electronics and Telecommunications Engineering Technology.

**2. Program code:** 7510302.

**3. Program type:** Full time.

**4. Degree name:** Electronics and Telecommunications Engineering Technology Engineer.

**5. Training and degree places:** Faculty of Electronics and Communications Technology - University of Information and Communication Technology - Thai Nguyen University.

**II. DESCRIPTION OF TRAINING PROGRAM**

**1. Training Objectives**

**1.1. General objectives**

Training bachelors/engineers in Electronics and Telecommunications Engineering Technology with professional qualifications, solid political qualities, a sense of discipline, and professional ethics; graduates can independently solve technical problems, have solid professional knowledge in the design, construction, operation, and exploitation of telecommunications systems, electronic and telecommunications equipment; develop research in the field of Electronics and telecommunications, meeting the needs of society.

**2.2. Detail objectives**

By the end of the course, graduates have the knowledge, skills and qualities:

- Have basic and intensive knowledge of electronic circuits and components to design, simulate, and assemble electronic circuits; Proficiently apply basic programming languages and simulation tools in electronic and telecommunications systems; Understand the processes

of operation, exploitation, troubleshooting, and administration of electronic and telecommunications systems.

- Have good health, ensure the ability to work with high intensity;
- Have full knowledge of politics, security and defense, law as required by the Ministry of Education & Training;
- Have the ability to use foreign languages for work;
- Have the necessary soft skills for the job.

## 2. Program learning outcomes

The output standards of the Software Engineering training program promulgated under Decision No. 690/QĐ-ĐHCNTT&TT are shown through the following contents (encoded: L1 ÷ L14):

<b>Notation</b>	<b>PLOs of ETET programme</b>
<i>L1</i>	Apply knowledge of math and physics to solve scientific and technical problems in Electronics and Telecommunications Engineering Technology
<i>L2</i>	Understand general educational knowledge on Theory of Marxism-Leninism and Ho Chi Minh Thought, the revolutionary line of the Communist Party of Vietnam, the Party's policy and the State's laws, and national security.
<i>L3</i>	Approach foreign language ability (English), level 3/6 of Vietnam's Foreign Language Competency Framework; specialized English skills.
<i>L4</i>	Obtain one of the following certificates: IC3, MOS, ICDL, Certificate of Information Technology Application (according to Circular 03/2014/TT – BTTTT of the Ministry of Information and Communications), or equivalent certificate.
<i>L5</i>	Have independent work and teamwork skills; report writing and presentation skills on technical issues; autonomy and self-responsibility.
<i>L6</i>	Have knowledge of professional responsibilities and professional ethics
<i>L7</i>	Have the ability to lead professionally; be creative in the working process; have the ability to self-study, accumulate knowledge and experience to improve professional qualifications; and plan, coordinate, and promote collective intelligence.
<i>L8</i>	Master the basic knowledge of electronic circuits, electronic components; applied to survey, analyze, design, simulate and assemble electronic circuits.
<i>L9</i>	Mastering knowledge of signal processing, transmission, and measurement in electronic and telecommunications systems.
<i>L10</i>	Proficient in basic programming languages in electronic and telecommunications systems
<i>L11</i>	Explain the processes of operation, exploitation, troubleshooting, and administration of telecommunications systems.
<i>L12</i>	Design, simulation, construction, and installation of telecommunication systems in practice
<i>L13</i>	Developing and improving technology and techniques to enhance the operational efficiency of telecommunications networks.
<i>L14</i>	Planning to implement projects on electronics and telecommunications, developing value-added service systems in the field of electronics and telecommunications.

### 3. Matching matrix between the modules with the output standards of the training program

No.	Courses	Output standards of training programs													
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14
<b>General education knowledge block</b>															
1	English 1			x		x		x							
2	Linear algebra	x				x		x							
3	Marxist-Leninist Philosophy 1		x			x	x	x							
4	General Physics	x				x		x							
5	English 2			x		x		x							
6	Analytics	x				x		x							
7	Ho Chi Minh's Ideology		x			x	x	x							
8	Marxist-Leninist Philosophy 2		x			x	x	x							
9	English 3			x		x		x							
10	Statistics-Probability	x				x		x							
11	General law		x			x	x	x							
12	English 4			x		x		x							
13	Revolutionary line of the Communist Party of Vietnam		x			x	x	x							
14	General Informatics				x	x		x							
15	Soft skills					x	x	x							
16	Physical education					x		x							
17	National defense education		x			x		x							
<b>Basic knowledge block</b>															
18	Digital signal processing					x	x	x		x					
19	Analog Electronic Engineering					x	x	x	x						
20	Electronic Circuit Engineering					x	x	x	x						
21	Digital Electronic Engineering					x	x	x	x						
22	Electronic Measurement Technique					x	x	x		x					
23	Data Structures and Algorithms				x	x	x	x			x				
24	Microprocessing Engineering and Applications				x	x	x	x	x		x				
25	C Programming in Electronics				x	x	x	x			x				
26	Advanced C Programming				x	x	x	x			x				



No.	Courses	Output standards of training programs													
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14
	Simulation														
49	Telecommunications Design and Planning						X	X	X	X			X	X	
<b>Specialization elective courses 3</b>															
50	Optical Transmission Devices Practice						X	X	X	X		X	X		
51	Broadband Access Devices Practice						X	X	X	X		X	X		
<b>Specialization elective courses 4</b>															
52	Switching Devices Practice						X	X	X	X		X	X		
53	BTS Installation and Maintenance Practice						X	X	X	X		X	X		
<b>Internship / Graduation Thesis</b>															
<i>Mandatory module</i>															
54	Specialized Internship				X	X	X	X		X	X		X		
55	Graduation internship			X	X	X	X	X	X	X	X	X	X	X	X
56	Graduation Thesis			X	X	X	X	X	X	X	X	X	X	X	X
<b>Alternative Courses to replace Graduation Thesis</b>															
57	Radio Transceiver Techniques						X	X	X	X					
58	Information Encoding Technique						X	X		X	X			X	
59	Electronic and Telecommunications Project Management					X	X	X					X		X
60	Advanced Communications Technology	X					X	X	X	X		X	X	X	

#### 4. Training time

4.5 years spread over 9 semesters.

#### 5. The volume of knowledge of the whole programme

- The amount of knowledge of the whole course: 140 credits (*excluding the subjects of Physical Education, Defense - Security*).

Structure of the programme:

TT	Knowledge group	Number of credits
1	General knowledge	40
1.1	Political Course: 10	

<b>TT</b>	<b>Knowledge group</b>	<b>Number of credits</b>
1.2	Natural/social sciences, informatics: + Mandatory: 18 + Optional: 0	
1.3	Foreign language: 12	
<b>2</b>	<b>Basic faculty knowledge</b>	<b>49</b>
	+ Mandatory: 47 + Optional: 0	
<b>3</b>	<b>Specialized faculty knowledge</b>	<b>33</b>
	+ Mandatory: 23 + Optional: 10	
<b>4</b>	<b>Internship, Graduation Thesis</b>	<b>18</b>
	+ Mandatory: 8 + Optional: 10	
<b>Total</b>		<b>140</b>

## **6. Admission Criteria**

According to the general regulations of the Ministry of Education and Training, Thai Nguyen University and the University of Information and Communication Technology.

## **7. Training process, graduation conditions**

### **7.1. Training method**

According to the credit system (specified by the Board of Education and Training).

### **7.2. Organize classes**

According to the current credit training regulations of the Department of Education and Training, Thai Nguyen University, University of Information and Communication Technology.

### **7.3. Graduation conditions**

Applying university training regulations according to the credit system of the Ministry of Education and Training, Thai Nguyen University, and University of Information and Communication Technology.

## **8. Scoring**

Evaluation according to the training scale according to the credit system, prescribed by the Board of Education and Training.

## **9. Career prospects**

### ***Job positions:***

- Managers, operators, and technicians at agencies and enterprises in the field of electronics and telecommunications;



- Engineers working at telecommunications service operators, domestic and foreign telecommunications service providers;
- Technicians at telecommunications centers, post offices, and broadcasting stations;
- Technical specialists in companies, factories, and industrial parks in the field of electronics and telecommunications;
- Consultant on equipment sales in electronic and telecommunications systems;
- Researchers and lecturers at research and training centers.

### 10. Teaching, learning and assessment methods

Teaching, learning, and assessment methods are carried out based on the requirements in the training program's output standards and each course, according to the accreditation standards issued by the Ministry of Education and Training. These methods are oriented towards regional and international standards like AUN-QA.

### 11. Course abstract

No.	Course code	Courses	Number of credits	Description
<b>1. General knowledge</b>				
1	ENG131	English 1	3	The course consists of 7 lessons with 7 basic grammar and vocabulary topics at the beginner level. Grammar topics in this module include verb to be, article a, an, quantifier some, pronouns, countable and uncountable nouns, singular, plural, present simple, simple past, present continuous. These contents are associated with familiar vocabulary topics in daily life to help students have basic language knowledge and necessary vocabulary. In addition, students are trained to evenly develop four skills of listening, speaking, reading and writing, especially basic communication skills. At the end of the module, students can communicate at a simple level with the vocabulary and grammar materials provided in this module.
2	ENG132	English 2	3	The course consists of 7 lessons with 7 basic grammar and vocabulary topics at the beginner level. Grammar topics in this module include present continuous, present perfect, near future, comparative level, article. These contents are associated with familiar vocabulary topics in daily life to help students have basic language knowledge and necessary vocabulary. In addition, students are trained to evenly

No.	Course code	Courses	Number of credits	Description
				develop the four skills of listening, speaking, reading and writing, especially basic communication skills. At the end of the module, students can communicate at a simple level with the vocabulary and grammar materials provided in this module.
3	ENG136	English 3	3	The course consists of 5 lessons with 5 basic grammar and vocabulary topics at intermediate level. Grammar topics in this module include Present simple, simple past, present continuous, present perfect, past continuous, have to, can. These contents are associated with familiar vocabulary topics in daily life to help students have basic language knowledge and necessary vocabulary. In addition, students are trained to evenly develop the four skills of listening, speaking, reading and writing, especially basic communication skills. At the end of the module, students can communicate at a simple level with the vocabulary and grammar materials provided in this module.
4	ENG135	English 4	3	The course consists of 5 lessons with 5 basic grammar and vocabulary topics at the pre-intermediate level. Grammar topics in this module include comparative level, will, might, may, real conditional, some, any, passive voice, present perfect tense, near future tense. These contents are associated with familiar vocabulary topics in daily life to help students have basic language knowledge and necessary vocabulary. In addition, students are trained to evenly develop the four skills of listening, speaking, reading and writing, especially basic communication skills. At the end of the module, students can communicate at a simple level with the vocabulary and grammar materials provided in this module.
5	DST131	Linear algebra	3	Provides basic knowledge of linear algebra such as: Sets, maps and complex numbers, Matrix and determinant, System of linear equations, Vector space, Linear mapping and quadratic form
6	VCP131	Revolutionary lines of Vietnamese Communist Party	3	To provide students with the basic contents of the Communist Party of Vietnam's revolutionary line, which mainly focuses on the Party's line in the renovation period on a number of basic fields of social life, service for life and work.
7	GTT141	Analytics	4	Equip basic knowledge of analysis such as:

No.	Course code	Courses	Number of credits	Description
				Functions and limits of functions of one variable, Differential Calculus of functions of one variable, Calculus of integral of functions of one variable, Series of numbers and series of functions; multi variable Functions, partial derivatives, full differentials and extremes of them.
8	PML121	The Basic Principles of Marxism 1	2	Briefly introduce Marxism-Leninism and some general problems of the subject; Dialectical materialism; Historical materialism.
9	PML132	The Basic Principles of Marxism 2	3	The central content of the economic theory of Marxism-Leninism on the capitalist mode of production: Chapter I: Theory of value; Chapter II: Theory of Surplus Value; Chapter III: Economic theory of monopoly capitalism and state monopoly capitalism. The basic content belongs to the theory of Marxism-Leninism on socialism; overview of real and prospective socialism; The historical mission of the working class and the socialist revolution; The socio-political issues of regularity in the process of socialist revolution; Realistic and prospective socialism
10	FOL121	General law	2	Equip with basic and important contents about the state and law as well as mentioned some basic branches of law in Vietnam today.
11	GIS131	General Informatics	3	Equip students with the most basic knowledge in computer science. Instruct students in the application of manipulation and proficient use of computers. Specific contents include Windows operating system; Word editing system; Electronic spreadsheet Excel; Build PowerPoint presentations.
12	HCM121	Ho Chi Minh Thought	2	Provide systematic insights into Ho Chi Minh's ideology, morality and cultural values; Basic knowledge of Marxism-Leninism.
13	PHY121	Physics	2	Equip with basic knowledge of General Physics of electricity and magnetism; understand physical phenomena in nature, practice calculation skills and solve basic physics problems.
14	PRS221	Probability statistics	2	Equip students with knowledge about: Basic concepts of probability, Probability formulas and its applications, Random quantity and its probability distribution laws, Sample theory and the problem of parameter estimation, Statistical hypothesis testing.

No.	Course code	Courses	Number of credits	Description
15	SSK221	Soft skills	2	The course aims to equip students with basic knowledge of soft skills. Train learners' communication ability, form and develop self-awareness skills, critical thinking skills, teamwork skills, presentation skills and job interviewing skills. Students can stand on their own to present clearly, effectively, and accurately in technical work, in business work, in conferences, scientific seminars, etc.
<b>2. Basic knowledge</b>				
16	DSP231	Digital Processing      Signal	3	The course covers the basics of signals and systems; Laplace signal transformations, Fourier transforms, and z transforms; Designs FIR and IIR filters using MATLAB tools; The course deals with some applications of DSP in audio and image processing; The course helps students have a general knowledge of signal processing as a basis for modules on audio, video, embedded systems, and other modules in electronics and telecommunications.
17	AET231	Analog Electronic Engineering	3	Equip students with basic knowledge about the structure and operating principle of basic electronic components such as Diode; Bipolar Transistor, Field-effect transistor; structure and operating principle of PN multiple-transistor semiconductor devices; structure and operating principle of optoelectronic components, operating principle of basic electronic circuits with Diode, Transistor, oscillator circuits.
18	EED231	Electronic Circuit Engineering	3	Equip students with knowledge of analysis, design, and simulation methods of applied electronic circuits. This course includes General problems of algorithmic amplifiers; linear computing and control circuits using algorithmic amplification; nonlinear computational and control circuits using algorithmic amplification; analog-to-digital converter circuits and digital-to-analog converters; power supply circuits; frequency converter circuits.
19	TDS231	Digital Electronic Engineering	3	Equips students with knowledge of Arithmetic and logical foundations of digital devices, Fundamentals of electronic computers, Logical algebra, and methods of representing variables, logic functions, and reducing logic functions. The course helps students to analyze and design special combinational circuits of arithmetic

No.	Course code	Courses	Number of credits	Description
				circuits, decoder, and encoder circuits, demultiplexers, multiplexers, counters, registers, etc.
20	ELM221	Electronic Measurement Technique	2	Equip students with knowledge of signal measurement methods and devices. Specific contents include basic concepts of measurement techniques; evaluation errors in measurement; observation and measurement signal form; oscilloscope structure; oscilloscope application; multi-ray oscilloscope; analog oscilloscope; digital oscillator; measure frequency, duration, and phase shift; measure voltage and power.
21	PGC232	C Programming in Electronics	3	The course aims to provide students with basic knowledge of the C programming language and its application in the fields of electronics and telecommunications. Students can have an overview of programming in embedded systems with microcontrollers, and microprocessors.
22	PGC234	Advanced C Programming in Electronics	3	The course provides advanced knowledge of the C programming language applied in electronics such as pointers, file management, macros, and GIT... along with applied problems in advanced 32-bit and 64-Bit Microprocessors.
23	DAS231	Data Structures and Algorithms	3	Equip students with an overview of in-depth knowledge of standard data models (lists, stacks, queues, trees, graphs, sets, dictionaries, ...) and manipulate data elements. On that basis, applying the learned knowledge to solve problems using specific programming languages programmatically is possible.
24	MPT331	Microprocessing Engineering and Applications	3	The course provides students with knowledge about Microcontrollers and microprocessors, methods of organizing data input and output in microprocessors, Interrupts, and interrupts handling, introducing some advanced microcontroller families, programming applications with the 8051 families of microcontrollers, and with PIC16F877A Microcontroller.
25	NDC331	Networks and Data Transmission	3	The course introduces basic knowledge about communication networks, such as signal types and channel characteristics, data transmission methods, communication standards, modem devices, multi-media types, wired and wireless transmission, multiplexing techniques, data link layer

No.	Course code	Courses	Number of credits	Description
				issues, network layer, local area network LAN, WAN, wireless communication network, etc.
26	APT231	Wave Propagation and Antenna	3	Equip students with basic knowledge about antennas, specifically: principles of radio transmission; antenna structure and operation direction; antenna classification; Smart antenna techniques, and applications in telecommunications systems.
27	DIC231	Digital Communications	3	Equip students with basic knowledge of digital communication. The course includes essential components of digital information systems; factors affecting communication signals; baseband communications; digital modulation techniques, and analysis and evaluation of information signal quality.
28	TTM321	Transmission Engineering	2	Equip students with general knowledge of transmission engineering, specifically: transmission lines; signal digitization; source code engineering; signal coupling and decoupling techniques; synchronous and asynchronous digital transmission systems.
29	MOC321	Mobile Communications	2	Equip students with basic knowledge about the operation of mobile communication networks. The course content includes the concepts of cellular communication systems and cellular system designing methods; signal equalization and diversity techniques; introduced 2G, 3G, and 4G mobile communication systems.
30	OPC321	Optical Communications	2	The subject provides students with basic knowledge about optical communication systems, including the structure and principles of light transmission in optical fibers, essential components of optical communication systems, and design methods: simple optical communication system, the concept of new optical transmission technologies, and optical communication networks.
31	TEI121	Laboratory Practice	2	The course introduces students to electronic measuring instruments and passive electronic components. Equip students with skills in assembling electronic circuits: automatic light switch circuit using a photoresistor, LED effect circuit with IC 555, multi-harmonic oscillator circuit using transistor, speed control circuit DC motor; the circuit uses LED lights.

No.	Course code	Courses	Number of credits	Description
32	PAD221	Analog and Digital Electronic Practice	2	The course provides students with the skills to use several specialized ICs in surveying and designing applied electronic circuits such as Counter circuits, algorithmic amplifiers, voltage stabilizers, pulse generators, comparator circuits, ADC circuit, DAC circuit, etc.
33	MMP221	Microprocessor and Microcontroller Practice	2	Equip students with skills to work with microcontrollers such as AT89C51, PIC, Arduino, etc. Equipping application programming skills based on C programming language for microcontrollers and helping students use essential electrical circuit design devices such as led matrix, buttons, motors, LCD, sensors, and wireless signal transmission.
34	BTP221	Basis Telecommunications Practice	2	The course helps students approach, survey, and implement specialized electronic circuits applied in the field of electronics and telecommunications, such as Encoder and decoder circuits, switchboard switches, antennas, transceivers, signals, transmission lines, simulated switchboards, etc.
<b>3. Specialized Knowledge</b>				
35	STE331	Switching Technology and Switchboard	3	The course introduces the basic knowledge of switching systems in telecommunications networks. From there, the course presents details about switching, signaling, and control techniques in the switchboard, specifically knowledge of digital switching and SPC, advanced switching techniques such as ATM switching, and MPLS.
36	TND332	Telecommunications Network Devices	3	Equip students with basic knowledge of telecommunications network devices; location of network-connected devices in the telecommunications system; hardware configuration, use, and operation of network terminal equipment: switchboard, telephone, modem, DSLAM. In addition, the course also equips students with skills in exploiting, managing, designing transmission lines, configuring, and debugging switches and mobile network devices.

No.	Course code	Courses	Number of credits	Description
37	PNS431	Positioning and Navigation Systems	3	The course equips students with basic knowledge about radio navigation systems, overview of radar systems, operating principles of navigation systems, advantages and disadvantages of navigation systems, pulse generation and calculating the receiver location, how to exploit and use the navigation system. General concepts of satellite navigation systems, principles of radio navigation, configuration of satellite navigation systems. Introduction to the global positioning system GPS, structure and operating principle of the GPS system.
38	DMM332	Digital Broadcast and Television Technology	3	Equip students with knowledge of digital broadcasting technology, principles of television, color television techniques, digital television and related issues, encoding and compression of television signals, transmission systems and new TV models such as DVB-T, DVB-C, DVB-S, and DVB-H television.
39	MTS331	Measurement in Telecommunications System	3	The course introduces measurement procedures, and test techniques on current telecommunications systems; the structure of measuring equipment, and methods of testing and assessing the quality of copper and optical cable transmission systems, xDSL, IPTV networks, radio communications, systems using technology PDH, SDH, etc.; metrics that evaluate the grade of a testing system.
40	CSD332	Multimedia Communications System	3	The course equips students with basic knowledge about multimedia communication systems, multimedia data, multimedia data compression techniques, real-time data transmission techniques, network protocols in multimedia communications, and related issues.
41	TNM322	Telecommunications Network Management	2	Equip students with fundamental knowledge about telecommunications network management activities and approaches to network technology management solutions in current telecommunications infrastructure.
42	TOS334	Telecommunications Special Subject	3	The course aims to equip students with knowledge of deployment simulation, analysis, and evaluation of electronics and telecommunications systems.



No.	Course code	Courses	Number of credits	Description
<b>4. Elective Course/Modules:</b>				
43	<b><i>Elective Course 1</i></b>			
1	MSC332	Microwave - Satellite Communications	3	Equip students with general knowledge about digital microwave system: characteristics, system model, overview configuration, wave transmission base, digital microwave equipment, calculation, and design of microwave route. It also equips students with an overview of satellite communication, ground stations, satellites, and parameters for calculating satellite communication lines.
2	CNM332	Radio Communications Network	3	Equip knowledge about radio networks related to the system models, protocol architecture, and radio connection devices; enable students to analyze and design wireless networks.
3	THN331	Mobile Network Optimization	3	Equip students with basic knowledge about network optimization processes and methods, mobile network quality indicators (KPIs), coverage optimization solutions, and mobile network optimization tools.
44	<b><i>Elective Course 2</i></b>			
1	SDC321	Digital Communications Simulation	3	The subject describes the principles of modern information systems, functions, and operating principles of the components in the system. Building simulations for the system, calculating the quality for modulation, coding, channel components, S/N ratio, BER, and bit error probability.
2	AND331	Telecommunications Design and Planning	3	Equip students with general knowledge of telecommunications network planning and design. The organization of the course includes the overview of telecommunications networks; the planning process; the basis of analysis and design of telecommunications networks; planning and optimization of telecommunications networks.
45	<b><i>Elective Course 3</i></b>			

No.	Course code	Courses	Number of credits	Description
1	POT221	Optical Transmission Devices Practice	2	Equip basic knowledge about optical transmission, skills to read and understand technical features, the position of blocks in the system, the connection of optical transmission equipment, operation and exploitation of actual optical transmission equipment.
2	PBA221	Broadband Access Devices Practice	2	The course helps students understand the MANET broadband network structure in practice and organize network connections at provincial telecommunications stations. Operate and exploit broadband devices (Switch L2, DSLAM, Router).
46	<b>Elective Course 4</b>			
1	PSW221	Switching Devices Practice	2	Equip knowledge about: PBX hardware devices (Hicom, OSB X5, X8); operation, exploitation, and maintenance of switches on the existing network.
2	BTS221	BTS Installation and Maintenance Practice	2	Equip knowledge about: BTS hardware device (Motorola, Alcatel, Huawei) and I/O connections; operation, exploitation, and maintenance of Base transceiver station (BTS).
<b>5. Internship, Graduation Thesis</b>				
47	SPP431	Specialized Internship	3	The course synthesizes and provides students with a way to synthesize the knowledge they have learned in the knowledge blocks from the training program, from which they can apply it to study specific subjects.
48	GRP451	Graduation Internship	5	In this course, learners perform the tasks assigned to apprentice engineers specializing in Electronics and Telecommunications at companies, factories, enterprises, and production facilities.
49	GRA905	Graduation Thesis	10	The course provides students with the ability to apply and synthesize knowledge about electronic and telecommunications systems to recognize all problems related to the field of electronics and telecommunications; Learners have the ability to collect information, analyze and select technical solutions to deploy related problems in the field of electronics and telecommunications.
<b>6. Alternative Course to replace Graduation Thesis</b>				
1	TTV331	Radio Transceiver Techniques	3	Equip students with basic knowledge of radio transceiver techniques and basic

No.	Course code	Courses	Number of credits	Description
				technical criteria. Working principle of radio transceiver system, block diagram in transceiver system.
2	TIC422	Information Encoding Technique	2	Equip students with basic knowledge of Information Theory and coding, and basic coding techniques. Investigate some types of anti-interference coding in radio communications.
3	ETP421	Electronic and Telecommunications Project Management	2	Equip with general knowledge on elaboration and management of electronic and telecommunications technology investment projects: concepts, sequence of project formulation, technical and technological analysis, financial analysis, socio-economic analysis meetings, project planning, project schedule management, project resource allocation, and project control.
4	TVT432	Advanced Communications Technology	3	Provides basic knowledge about the characteristics of radio channels and the effects of radio channels on signal quality. Equip the theoretical basis of modern radio communication techniques.
<b>Total accumulative credits of the curriculum</b>			<b>140</b>	

**RECTOR**

**Ph.D Nguyen Van Tao**

**HEAD OF ECT FACULTY**

**Ph.D Vu Chien Thang**