MINISTRY OF EDUCATION & TRAINING
CAN THO SOUTHERN UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

UNIVERSITY-LEVEL TRAINING PROGRAMS
COMPUTER NETWORK AND DATA COMMUNICATIONS ENGINEER

(Issued under Decision No:271/QD-UHNCT dated December 31, 2022 of Rector of Can Tho Southern University)

Program Name: ***Computer*** **Networks and Data Communication Training Program**

Training level: **Regular university**

Training industry: **Computer networks and data communication**

CODE: **7480102**

Type of training: **Formal**

1. DESCRIPTION OF THE TRAINING PROGRAM

1.1 Introduction to the training program

The Computer Networks and Data Communication Training (CN&DC) Program aims to train Computer Network and Data Communication Engineers to have sufficient knowledge, professional skills, political qualities, ethics, professional manners and good health to be able to work effectively in fields related to Computer Network operations and data communication.

1.2 General information about the training program

Program Name (Vietnamese)	Mạng máy tính và truyền thông dữ liệu
Program Name (English)	Data communication and Computer networks
Training industry code	7480102
Degree schools	Can Tho Southern University
Name of diploma	Computer Network and Data Communications Engineer
Training level	University
Number of credits required	150
Forms of training	Regular
Duration of training	4.5 years
Subjects of enrollment	High school graduates
Rating scale	10

Graduation requirements	- Accumulate a sufficient number of modules and the volume of the training program reaches 150 credits; - An overall cumulative GPA of 4.0 or higher; - Meet the outcome standards of English and Informatics proficiency according to the general regulations of the school. - Meet the outcome standards of Soft skills and professional skills; - Have certificates in Defense-Security Education and Physical Education.
Job Placement	- IT staff in organizations and enterprises; - Specialist in programming, database management, information systems; - Employees working in the field of computer network application in enterprises, organizations, agencies and departments.
Advanced learning	It is possible to continue master's and doctoral studies at home and abroad.
Reference program when building	Overseas training programs; Can Tho University's Training Program;
Update time	**12/2022**

1.3 Training objectives of the program

1.3.1 General objectives

- To train human resources with engineer and bachelor degrees with sufficient health, solid knowledge, professional capacity to meet social requirements and needs of learners, in accordance with the process of industrialization and modernization of the country.

- Have moral qualities, ability to self-study and self-research in order to achieve standards of knowledge and study to improve professional qualifications.

- Train qualified human resources to work at agencies, schools, research institutes and companies related to the field of computer networks and communications.

1.3.2 Specific objectives

M1: Understand and apply the background and in-depth knowledge of the field of Computer Networks and Communications to professional work.

M2: Form professional ideas in Computer Networks and Communications and develop the ability to manage and administer the working step process.

M3: Meet the requirements of professional skills, soft skills from society, working environment and research.

M4: Organize and implement professional operations Computer networks and communications, thereby developing creative capacity at work.

M5: Develop the capacity of administration, environmental management, working personnel.

M6: Forming the ability to self-study and self-study in the professional field, thereby developing corresponding competencies in both life and guiding those around them, thereby changing and improving social life.

1.4 Output standards of CTEs

1.4.1 Education

General knowledge

PO1: Understand the basic principles of Marxism-Leninism, Ho Chi Minh Thought, the revolutionary line of the Communist Party of Vietnam and Vietnamese law, taking that as a basis for cultivating political ethics.

PO2: Apply knowledge of National Defense Education, thereby training awareness and responsibility to defend the country.

PO3: Achieve foreign language proficiency in English and Informatics as prescribed by the school.

Expertise

PO4: Master the basic knowledge of CN&DC with basic and interdisciplinary scientific knowledge and be able to apply to the specialized field of CN&DC.

PO5: Master the knowledge of analysis, programming, database management, knowledge management and the ability to apply the knowledge learned to the software development process to solve real problems.

PO6: The ability to analyze, evaluate and select contemporary technologies in accordance with actual needs, applied to the management process of computer-based systems.

1.4.2 Skills

Professional skills

PO7: Ability to analyze, design and install network systems based on the analysis and modeling of user requirements.

PO8: Ability to identify, analyze, evaluate, and select solutions in accordance with objective practical requirements.

PO9: Ability to participate in implementing, deploying and managing small and medium-sized network and data communication systems to meet the quality requirements of network systems based on different network platforms.

PO10: Access and deploy new technology and knowledge to improve and improve professional qualifications and work efficiency.

Soft skills

PO11: Have critical skills based on practical experience, creative skills and problem-solving skills.

PO12: Ability to work, research, solve problems independently.

PO13: Have effective communication skills, teamwork and the ability to adapt to changes in the professional environment through presentations, reports, discussions, negotiations, listening and mastering situations.

PO14: Have skills to effectively manage a computer network and data communication project.

1.4.3 Capacity for autonomy and self-responsibility

PO15: Have civic responsibility, political qualities, patriotism and love of the profession.

PO16: Have a sense of role, responsibility, professional ethics in society, behave professionally, respect commitment, honesty, prestige and have the ability to perceive and evaluate phenomena logically and positively.

PO17: Recognizing the need and ability to participate in lifelong learning. Share and spread capacity to the community and society.

1.5 *Target matrix and CT outcome standards*

Objectives of the CT	Output standards of CTEs																
	Knowledge						Skill								Capacity for autonomy and self-responsibility		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PO 13	PO 14	PO 15	PO 16	PO 17
M1			X	X	X			X	X	X	X	X		X			
M2					X	X			X			X					
M3			X	X	X		X						X			X	X
M4				X	X	X	X		X	X			X	X			
M5	X	X	X			X			X		X	X	X	X	X		X
M6	X	X	X				X	X		X	X	X			X	X	X

2. Training period: 4.5 years

3. Full-course knowledge load: 150 credits (excluding modules of Physical Education, Defense – Security Education), distributed as follows:

TT	Program structure	Mass	Compulsory	Elective	Rate (%)
1	**General education knowledge**	**40 TC**	**38**	**2**	**26.70%**
2	**Professional education knowledge**	**110 TC**	**95**	**15**	**73.30%**
2.1	Industry Base Knowledge	47 TC	38	9	31.30%
2.2	Specialized knowledge	49 TC	43	6	32,7%
2.3	Graduate Internship	4 TC	4	0	2.70%
2.4	Graduation thesis course	10 TC	10	0	6,7%
TOTAL		**150 TC**	**40**	**17**	**100%**

4. Subjects of enrollment:

- Admission is based on the results of the national high school graduation examination or the academic record of studying at the high school level according to a combination of subjects by discipline and admission throughout the country.

5. Training process, graduation conditions

5.1. Training process

- Implement regulations on formal university and college training according to the current credit system and training regulations of Can Tho Southern University.

5.2. Graduation conditions:

- Students who complete the training program are considered for graduation and recognized for graduation according to article 27 of the training regulations under the credit system.
- Achieve English proficiency according to the general regulations of the school.
- Obtained the Certificate of National Defense and Security Education; Physical education; Soft Skills and Professional Skills.
- Assessment of department and module grades shall comply with Articles 22 and 23 of the training regulations under the credit system.
- Academic year rankings and graduation rankings shall comply with Articles 14 and 28 of the training regulations under the credit system.

6. PROGRAM CONTENT

6.1. General education knowledge: 40 credits

- Political theory

STT	Module name	Credits Number	Theory	Practice
1	Philosophy	3	3	
2	Political economy	2	2	
3	Scientific socialism	2	2	
4	Ho Chi Minh Thought	2	2	
5	History of the Communist Party of Vietnam	2	2	
Total		**11**	**11**	

- ***Humanities and Social Sciences***

STT	Module name	Credits Number	Theory	Practice
1	General legislation	2	2	
2	General psychology	2	2	
3	University Skills	2	2	
Elective modules		**2**	**2**	
4	General sociology	2	2	
5	General logic	2	2	
6	Vietnamese CuTheoryural Foundations	2	2	
Total		**8**	**8**	

- ***Foreign language***

STT	Module name	Credits Number	Theory	Practice
1	Basic English 1	3	3	
2	Basic English 2	3	3	
3	Basic English 3	3	3	
4	English for CN&DC	3	3	
Total		**12**	**12**	

- ***Mathematics - Informatics - Natural Sciences***

STT	Module name	Credits Number	Theory	Practice
1	Advanced Math 1	3	3	
2	Advanced Math 2	3	3	
3	Statistical probability	3	3	
Total		**9**	**9**	

- ***Physical education – defense and security education (*)***

STT	Module name	Credits Number	Theory	Practice
1	Physical Education 1 (*)	1		1
2	Physical Education 2 (*)	1		1
3	Physical Education 3 (*)	1		1
4	Defense and security education (*)	8	5	3

STT	Module name	Credits Number	Theory	Practice
Total		**11**	**5**	**6**

(*) Prerequisite modules, not counting overall GPA.

6.2 Professional education knowledge: 102 credits

- Industry Base Knowledge

STT	Module name	Credits Number	Theory	Practice
Compulsory		**39**		
1	Basic programming	2	2	
2	Basic Programming – Practice	2		2
3	Discrete math 1	3	3	
4	Discrete Math 2	3	3	
5	Data structures	3	3	
6	Data Structures – Practice	1		1
7	Algorithm analysis and design	2	2	
8	Algorithm Analysis and Design – Practice	1		1
9	Databases	2	2	
10	Database – Practice	1		1
11	Introduction to CN&DC	2	2	
12	Operating system principle	**2**	2	
13	Principles of operating systems – Practice	1		1
14	Computer architecture	3	3	
15	Web design	2	2	
16	Web Design – Practice	1		1
17	Research methods and writing scientific reports	2	2	
18	Linear planning	2	2	
19	System Administration	3	2	1
Elective modules		**9**	**3**	
20	Modeling languages	3	3	
21	Graphic engineering	3	3	
22	Information theory	3	3	
23	Telecommunication network	3	3	
24	Embedded systems	3	3	
25	Artificial intelligence	3	3	
26	Device communication programming	3	2	1
27	Optical network	3	2	1
Total		**47**		

- ***Specialized knowledge***

STT	Module name	Credits Number	Theory	Practice
Compulsory		**43**	**23**	**15**
1	Computer networks	2	2	
2	Computer Networks – Practice	1		1
3	Network system analysis and design	2	2	
4	Network System Analysis and Design – Practice	1		1
5	Building network infrastructure	2	2	
6	Network infrastructure construction – Practice	1		1
7	Network deployment	2	2	
8	Network system deployment – Practice	1		1
9	Computer network administration	2	2	
10	Computer Network Administration – Practice	1		1
11	Database Management System	2	2	
12	Database Management System – Practice	1		1
13	Cloud computing	2	2	
14	Cloud Computing – Practice	1		1
15	Cybersecurity	3	3	
16	Evaluate network performance	2	2	
17	Network Performance Assessment – Practice	**1**		1
18	Network programming	2	2	
19	Network Programming – Practice	1		1
20	Basic Project - CN&DC	3		3
21	Specialized Project - CN&DC	3		3
22	Information security	2	2	
23	Network problem solving	2	2	
24	Network attack detection techniques	3	2	1
Elective modules		**6**	**6**	
25	Mobile device programming	3	2	1
26	IoT Technology	3	2	1
27	E-commerce system	3	2	1
28	Machine learning principles	3	2	1
29	J2EE Technology	3	2	1
30	Firewall	3	2	1
	Total	**49**		

- ***Final internship and graduation thesis course***

STT	Subject name			Credits Number	Theory	Practice
1	Graduate Internship (CN&DC)			4		4
2	**Thesis course divided into 2 groups**			**10**	2	**8**
2.1	**Group 1 -** Graduation thesis course (CN&DC)		Select Group 1: Graduate Thesis Course (CN&DC) or Group 2: Alternative Graduation Essays and Thematics.	10	2	8
2.2	**Group 2**	Graduation essay		**4**	**1**	**3**
		CN&DC Graduate Seminar 1		3		3
		CN&DC Graduate Seminar 2		3		3
	Total			**14**	2	**12**

7. INSTRUCTIONAL PLAN (TENTATIVE)

7.1 Semester 1

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Basic English 1	3	45	45	
2	Introduction to CN&DC	2	30	30	
3	General legislation	2	30	30	
4	General psychology	2	30	30	
5	Advanced Math 1	3	45	45	
6	Discrete math 1	3	45	45	
7	University Skills	2	30	30	
8	*Physical Education 1 (*)*	*1*	*30*		*30*
Total:		**17**			

7.2 Semester 2

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Marxist–Leninist philosophy	3	45	45	
2	Basic English 2	3	45	45	
3	Computer architecture	3	45	45	
4	Basic programming	2	30	30	
5	Basic Programming – Practice	2	60		60
6	Discrete Math 2	3	45	45	

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
7	Advanced Math 2	3	45	45	
8	*Physical Education 2 (*)*	*1*	*30*		*30*
9	*Defense Education (*)*	*8*	*165*	*75*	*90*
Total:		**19**			

7.3 Semester 3

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Basic English 3	3	45	45	
2	Statistical probability	3	45	45	
3	Marxist–Leninist political economy	2	30	30	
4	Data structures	3	45	45	30
5	Data Structures – Practice	1	30		30
6	Operating System Principle	2	30	30	
7	Principles of Operating System – Practice	1	30		30
8	*Physical Education 3 (*)*	1	30		30
Elective modules		**2**	**30**	**30**	
9	General sociology	2	30	30	
10	General logic	2	30	30	
11	Vietnamese Cultural Foundations	2	30	30	
Total:		**17**			

7.4 Semester 4

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Web design	2	30	30	
2	Web Design – Practice	1	30		30
3	Databases	2	30	30	30
4	Database – Practice	1	30		30
5	Linear planning	2	30	30	
6	Scientific socialism	2	30	30	
7	Algorithm analysis and design	2	30	30	
8	Algorithm Analysis and Design – Practice	1	30		30
9	Computer networks	2	30	30	
10	Computer Networks – Practice	1	30		30

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
11	Information security	2	30	30	
Total:		**18**			

7.5 Semester 5

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	History of the Communist Party of Vietnam	2	30	30	
2	Database Management System	2	30	30	
3	Database management system – practice	1	30		30
4	Scientific research methods	2	30	30	
5	Network system analysis and design	2	30	30	
6	Network System Analysis and Design – Practice	1	30		30
7	Computer network administration	2	30	30	
8	Computer Network Administration – Practice	1	30		30
	Elective modules	**6**			
9	Telecommunication network	3	45	45	
10	Embedded systems	3	45	45	
11	Modeling languages	3	45	45	
12	Information theory	3	45	45	
Total:		**19**			

7.6 Semester 6

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Specialized English - CN&DC	3	45	45	
2	Ho Chi Minh Thought	2	30	30	
3	Building network infrastructure	2	30	30	
4	Network infrastructure construction – Practice	1	30		30
5	Network deployment	2	30	30	
6	Network system deployment – Practice	1	30		30

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Specialized English - CN&DC	3	45	45	
7	Base Project - CN&DC	3	90		90
	Elective modules	**3**			
8	Artificial intelligence	3	45	45	
9	Device communication programming	3	60	30	30
10	Optical network	3	45	45	
Total:		**17**			

7.7 Semester 7

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	Practice
1	Cloud computing	2	30	30	
2	Cloud Computing – Practice	1	30		30
3	Network programming	2	30	30	
4	Network Programming – Practice	1	30		30
5	Evaluate network performance	2	30	30	
6	Network Performance Evaluation - Practice	1	30		30
7	CN&DC specialized projects	3	90		90
	Elective modules	**3**			
8	Mobile device programming	3	60	30	30
9	E-commerce system	3	60	30	30
10	IoT Technology	3	60	30	30
Total:		**15**			

7.8 Semester 8

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	TH
1	Cybersecurity	3	60	30	30
2	Network problem solving	2	30	30	
3	Network attack detection techniques	3	60	30	30
4	System Administration	3	60	30	30

TT	Name of course	Credits Number	Sum of Episodic	Number of episodes	
				Theory	TH
1	Cybersecurity	3	60	30	30
	Elective modules	**3**			
5	Machine learning principles	3	60	30	30
6	J2EE Technology	3	60	30	30
7	Firewall	3	60	30	30
Total:		**14**			

7.9 Semester 9

TT	Name of course			Credits Number	Sum of Episodic	Number of episodes	
						Theory	TH
1	CN&DC Graduate Internship			4	180		180
2	**Group 1:** CN&DC graduation thesis course		Select Group 1: Graduate Thesis Course (CN&DC) or Group 2: Alternative Graduation Essays and Thematics(*).	10	420	30	390
3	**Group 2**	Graduation essay		4	105	15	90
		CN&DC Graduate Seminar 1		3	90		90
		CN&DC Graduate Seminar 2		3	90		90
Total:				**14**			

(*) If the student is not eligible to undertake the graduation thesis, alternative modules will be taken.

8. PROGRAM IMPLEMENTATION GUIDE

8.1 For faculties and departments:

- The Faculty of Professional Management is responsible for reviewing and presiding over the compilation of detailed outlines of modules of basic knowledge of sectors, disciplines and majors according to the credit volume of this program. Provide lists of textbooks, lectures and reference materials of all modules to the University Library and store them at the Faculty Office. At the beginning of each semester, coordinate with units of the University to implement the training plan on schedule.

- Assign lecturers with master's degrees or higher (same discipline or related major) to teach theoretical modules, provide detailed module outlines to lecturers to ensure that they follow the general teaching plan of the University.

- The academic advisor team must thoroughly understand the entire credit-based curriculum to guide students to register for modules.

8.2 For lecturers:

- When teachers are assigned to teach one or more modules, it is necessary to carefully study the contents of the detailed module outline to prepare lectures and appropriate teaching facilities and supplies.

- Teachers must prepare all lectures, textbooks, learning materials and provide them to students to prepare before class.

- Organizing seminars, focusing on organizing group study and guiding students to make essays, projects, lecturers to determine transmission methods; Give presentations in class, guide discussions, solve problems in class, in the lab, in the lab, and guide students in harvest writing.

- Pay attention to developing students' self-study and self-research abilities throughout the teaching process and guide internships and practices.

- Attention should be paid to the logic of imparting and acquiring blocks of knowledge, prescribing prerequisite modules of compulsory modules and preparing teachers to meet the requirements of teaching elective modules.

8.3 For students:

- Consult your academic advisor to select modules to suit your progress. You must study the lesson yourself before going to class to easily absorb the lecture. Adequate class time must be ensured to listen to the lecturer's instructions. Self-discipline in self-study and self-research, at the same time actively participating in group learning, attending all seminars.

- Proactively and actively exploit resources online and in the school's library to serve self-study, self-research and graduation projects. Strictly implement regulations on examination, examination and evaluation.

- Regularly participate in mass and cultural activities to practice communication skills, understanding of society and people.

9. Material foundations and equipment for teaching and practice and internship:

- Theoretical classroom system with traditional equipment, equipped with teaching support tools (Projector).
- Computer Labs are installed with software for basic informatics training, graphic application informatics, design application informatics, process simulation applied informatics.

Head

(signed, full name, stamped)

TS. NGUYEN VAN QUANG