MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

PROGRAMME SPECIFICATION

BACHELOR OF ENGINEERING IN COMPUTER NETWORKS AND DATA COMMUNICATION

COLLEGE OF INFORMATION AND COMMUNICATION TECHNOLOGY

2020

Department of Computer Networks and Communication

College of Information and Communication Technology

Can Tho University

Address: Campus 2, 3/2 Street, Ninh Kieu District, Can Tho City, Vietnam

Website: http://www.cit.ctu.edu.vn

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PART 1.   GENERAL INFORMATION

1   Name and code of the program: Computer Networks and Data Communication (7480102)

2   Degree awarding institution: Can Tho University

3   Training unit: Department of Computer Networks and Communication, College of Information and Communication Technology

4   Degree title: Engineer

5   Type of training: Regular

6   Training time: 4.5 years (up to 9 years)

7   Admission applicants:

Admissions of Computer Networks and Data Communication (CNDC) is done under the guidance of the Ministry of Education and Training (MOET). Admission criteria is based on scores of one of the following two combinations: (i) Math, Physics, Chemistry; and (ii) Math, Physics, English. Before 2020, admission is based on the results of the national high school graduation exam. Particularly in 2020, because of Covid-19, there is a new selection method which based on high school transcripts and candidates can choose the selection method that they want.

8   Total number of credits: 156 credits

PART 2.   PROGRAM OBJECTIVES AND EXPECTED LEARNING OUTCOMES

1   Program objectives

Based on Vietnam's law on higher education, the BECNDC has its objectives (POs) aligned with CTU's mission. After graduation from the BECNDC program, students will:

- PO1: Memorize basic knowledge of law, security and defense, political and social science; build physical health, ethics, social awareness, and professional responsibility according to current regulations;
- PO2: Present basic knowledge of mathematics and science applicable in computer network and data communication;
- PO3: Integrate fundamental knowledge and skills in computer science and information technology that enable them to study related fields or graduate programmes;
- PO4: Analyze and apply specialized knowledge and skills to meet practical needs of an individual or an organization in the field of computer network and data communication in the context of Industry 4.0;
- PO5: Develop communication skills, presentations skills, teamwork skills, foreign language competence, professional and creative working style, and entrepreneurship to meet the requirements of globalization and lifelong learning.

2   Expected learning outcomes

After graduation from the BECNDC program, students should have the ability to:

2.1   General knowledge

- ELO 1: Recall the basic knowledge of law, political and social science, national defense and security, physical education, ethics, and professional responsibility in accordance with current regulations;
- ELO 2: Demonstrate the basic knowledge of mathematics, computers, and information technology;
- ELO 3: Apply basic knowledge of English or French in communication and study equivalent to level 3/6 of Vietnam's Framework of Foreign Language Proficiency (B1 in the European Framework of Reference);

2.2   Fundamental knowledge

- ELO 4: Master programming techniques such as structure, object orientation, web;
- ELO 5: Explain and generalize the principle of operation of computer systems, operating systems, computer networks;
- ELO 6: Identify and analyze problems, determine suitable computational requirements in the fields of data structures and algorithms, artificial intelligence, database, system modeling, and then offer information technology solutions based on users' requirements;

2.3 Specialized knowledge

- ELO 7: Provide solutions to problems of analyzing, designing, and administering computer networks;
- ELO 8: Apply processes and techniques for developing applications in networking, mobile and web applications, distributed applications, high-performance computing and big data applications;
- ELO 9: Recommend measures and solutions for information security and network security of individuals and organizations;

2.4 Professional skills

- ELO 10: Utilize software and contemporary tools in analyzing, designing, installing, testing, administering and maintaining computer systems, computer networks, network security and distributed applications;
- ELO 11: Develop, design, analyze, and evaluate applications meeting the requirements of Industry 4.0 trends: network applications, mobile applications, web applications, high-performance computing, big data, artificial intelligence;

2.5 Soft skills

- ELO 12: Communicate in English or French, read and comprehend specialized materials in English or French;
- ELO 13: Develop communication skills, presentation skills and effective teamwork skills such as formation, operation, cooperation and team management;
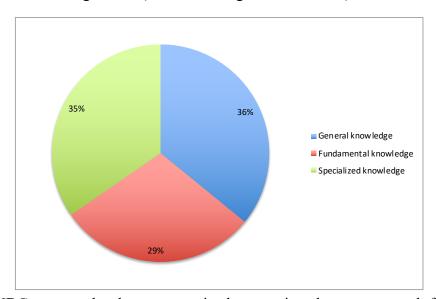
2.6 Attitudes

- ELO 14: Develop a professional working style; compliance with ethics, professional and social responsibility;
- ELO 15: Develop creativity, self-control and lifelong learning habits.

PART 3.   STRUCTURE AND TRAINING PROGRAM

1   Structure

-   156 credits (111 compulsory and 45 elective credits), of which 56 credits are in general knowledge block, 46 credits in fundamental knowledge block and 54 credits in specialized knowledge block (15 credits for graduation thesis)

The BECNDC program has been appropriately apportioned among general, fundamental and specialized knowledge blocks;

-   The average training time is 4.5 years. Depending on their own ability and conditions, students can shorten or extend their study time by making their own study plan. Elective credits allow students to pursue different study and research paths in CNDC field or IT field.

2   Training program

-   Training program: **Computer Networks and Data Communications**
-   Program code: 7480102   Type of training: Regular
-   Training time: 4.5 years   Degree title: Engineer
-   Training unit: Department of Computer Networks and Communication, College of Information and Communication Technology

2.1 Curriculum

No	Code	Course name	Num of credits	Obligatory	Optional	Theory hours	Practice hours	Prerequisite	Parallel	Semester
General knowledge										
1	QP006	National Defense Education 1 (*)	2	2		30		Taught in groups of majors		
2	QP007	National Defense Education 2 (*)	2	2		30		Taught in groups of majors		
3	QP008	National Defense Education 3 (*)	3	3		20	65	Taught in groups of majors		
4	QP009	National Defense Education 4 (*)	1	1		10	10	Taught in groups of majors		
5	TC100	Physical Education 1+2+3 (*)	1+1+1		3		90			I,II,III
6	XH023	Basic English 1 (*)	4		10 credits of English or 10 credits of French	60				I,II,III
7	XH024	Basic English 2 (*)	3			45		XH023		I,II,III
8	XH025	Basic English 3 (*)	3			45		XH024		I,II,III
9	XH031	Advanced English 1 (*)	4			60		XH025		I,II,III
10	XH032	Advanced English 2 (*)	3			45		XH031		I,II,III
11	XH033	Advanced English 3 (*)	3			45		XH032		I,II,III
12	FL001	Basic French 1 (*)	4			60				I,II,III
13	FL002	Basic French 2 (*)	3			45		FL001		I,II,III
14	FL003	Basic French 3 (*)	3			45		FL002		I,II,III
15	FL007	Advanced French 1 (*)	4			60		FL003		I,II,III
16	FL008	Advanced French 2 (*)	3			45		FL007		I,II,III
17	FL009	Advanced French 3 (*)	3			45		FL008		I,II,III
18	ML014	Marxist-Leninism Philosophy	3	3		45				I,II,III
19	ML016	Marxist-Leninism Political Economic	2	2		30		ML014		I,II,III
20	ML018	Scientific Socialism	2	2		30		ML016		I,II,III
21	ML019	History of the Communist Party of Viet Nam	2	2		30		ML018		I,II,III
22	ML021	Hồ Chí Minh's Thought	2	2		30		ML019		I,II,III
23	KL001	General Law	2	2		30				I,II,III
24	ML007	Basic Logic	2		2	30				I,II,III
25	XH028	Overview of Sociology	2			30				I,II,III
26	XH011	Basic Vietnamese Culture	2			30				I,II,III
27	XH012	Vietnamese in Use	2			30				I,II,III
28	XH014	General Management Documents and Archives	2			30				I,II,III
29	KN001	Soft Skills	2			20	20			I,II,III
30	KN002	Creation, Innovation, Start-up	2			20	20			I,II,III
31	TN001	Calculus A1	3	3		45				I,II,III

No	Code	Course name	Num of credits	Obligatory	Optional	Theory hours	Practice hours	Prerequisite	Parallel	Semester
32	TN002	Calculus A2	4	4		60		TN001		I,II,III
33	TN010	Probability and Statistics	3	3		45				I,II,III
34	TN012	Linear Algebra and Analytic Geometry	4	4		60				I,II,III
35	CT100	Study Skills	2	2		20	20			I,II
36	CT200	Fundamentals of Information Technology	4	4		45	30			I,II,III
Total: 56 credits (Obligatory: 41 credits; Optional: 15 credits)										
Fundamental knowledge										
37	CT172	Discrete Mathematics	4	4		60				I,II
38	CT101	Basic Programming A	4	4		30	60			I,II
39	CT177	Data Structures	3	3		30	30	CT101		I,II
40	CT175	Graph Theory	3	3		30	30	CT177		I,II
41	CT174	Design and Analysis of Algorithms	3	3		30	30	CT177		I,II
42	CT180	Databases	3	3		30	30	CT177		I,II
43	CT173	Computer Architecture	3	3		45				I,II
44	CT178	Principles of Operating Systems	3	3		30	30	CT173		I,II
45	CT112	Computer Network	3	3		30	30	CT178		I,II
46	CT176	Object-Oriented Programming	3	3		30	30	CT101		I,II
47	CT296	System Analysis and Design	3	3		30	30			I,II
48	CT182	Unified Modeling Language	3	3		30	30			I,II
49	CT179	System Administration	3	3		30	30			I,II
50	CT188	Introduction to Web Programming	3	3		30	30			I,II
51	CT190	Introduction to Artificial Intelligence	2	2		30				I,II
Total: 46 credits (Obligatory: 46 credits; Optional: 0 credits)										
Specialized knowledge										
52	CT335	Network Design	3	3		30	30	CT112		I,II
53	CT212	Network Management	3	3		30	30	CT112		I,II
54	CT428	Web Programming	3	3		30	30	CT180, CT176		I,II
55	CT221	Network Programming	3	3		30	30	CT112, CT176		I,II
56	CT211	Network Security	3	3		30	30	CT112		I,II
57	CT126	Queuing Theory	2		6	30				I,II
58	CT127	Information Theory	2			30				I,II
59	CT479	Numerical Analysis	3			30	30			I,II

No	Code	Course name	Num of credits	Obligatory	Optional	Theory hours	Practice hours	Prerequisite	Parallel	Semester
60	CT121	Theory of Computation	3			30	30	CT101		I,II
61	CT224	J2EE Technology	2			15	30	CT176		I,II
62	CT225	Python Programming	2			20	20	CT176		I,II
63	CT274	Programming for Mobile Devices	3			30	30	CT176		I,II
64	CT226	Fundamental Project on Computer Network and Data Communication	3	3			90	≥ 90 TC		I,II
65	CT439	Annual Project on Computer Network and Data Communication	3	3			90	≥ 110 TC		I,II
66	CT476	Intership in Computer Network and Data Communication	3	3			90	≥ 120TC, CT428, CT296, CT112		III
67	CT227	Techniques for Network Intrusion Detection	3	G1	9 credits of G1 or G2	30	30			I,II
68	CT228	Firewall	3			30	30			I,II
69	CT229	Website Security	2			20	20			I,II
70	CT222	System Security	3			30	30			I,II
71	CT344	Network Troubleshooting	2			30		CT335		I,II
72	CT232	Network Performance Evaluation	3			30	30	CT112		I,II
73	CT207	Open Source Software Development	3	G2		30	30			I,II
74	CT230	Service-Oriented Application Development	3			30	30	CT428		I,II
75	CT231	Parallel Programming	3			30	30			I,II
76	CT233	Cloud Computing	3			30	30			I,II
77	CT482	Big Data Processing	3			30	30	CT176		I,II
78	CT555	Graduation Thesis	15		15		450	≥ 120 TC		I,II
79	CT507	Graduation Project	6				180	≥ 120 TC		I,II
80	CT338	Wireless and Mobile Networks	2			30		CT112		I,II
81	CT272	E-Commerce	3			30	30			I,II
82	CT234	Embedded Software Development	3			30	30			I,II
83	CT223	Software Project Management	3			30	30	CT171		I,II
84	CT235	MS Windows Network Management	3			30	30	CT112		I,II
85	CT205	Database Management Systems	3			30	30	CT180		I,II
86	CT237	Principles of Database Systems	3			30	30	CT180		I,II
87	CT251	Application Development for Windows	3			30	30	CT180, CT176		I,II
88	CT206	Application Development for Linux	3			30	30	CT180, CT176		I,II
89	CT238	Classifying Very Large Datasets	3			30	30			I,II

No	Code	Course name	Num of credits	Obligatory	Optional	Theory hours	Practice hours	Prerequisite	Parallel	Semester
90	CT332	Artificial Intelligence	3			30	30			I,II
91	CT202	Machine Learning	3			30	30			I,II
92	CT273	Human-Computer Interaction	3			30	30			I,II
Total: 54 credits (Obligatory: 24 credits; Optional: 30 credits)										
Total: 156 credits (Obligatory: 111 credits; Optional: 45 credits)										

2.2 Sample of study plan

Semester 1

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	QP00*	National Defense Education (*)	8	8		115	50		Arranged by the University	1
2	TN033	Basic Informatics	1	1		15			I, II, H	1
3	TN034	Practice on Basic Informatics	2	2			60		I, II, H	1
4	TN001	Calculus for computer science 1	3	3		45			I, II, H	1

Total: 14 obligatory credits

Semester 2

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	ML007	Basic Logic	2			30				
	XH028	Overview of Sociology	2			30				
	XH011	Basic Vietnamese Culture	2			30				
	XH012	Vietnamese in Use	2		2	30				
	XH014	General Management Documents and Archives	2			30				
	KN001	Soft Skills	2			30				
	KN002	Creation, Innovation, Start-up	2			20	20			
2	ML014	Marxist-Leninism Philosophy	3	3		45				
3	TN001	Calculus A1	3	3		45				
4	CT101	Basic Programming A	4	4		30	60			
5	TN012	Linear Algebra and Analytic Geometry	4	4		60				
6	XH023	Basic English 1 (*)	4		4	60				
	FL001	Basic French 1 (*)	4			45				

Total: 14 obligatory credits, 6 optional credits

Semester 3

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	CT172	Discrete Mathematics	4	4		60				
2	CT173	Computer Architecture	3	3		45				
3	ML016	Marxist-Leninism Political Economic	2	2		30		ML014		
4	ML018	Scientific Socialism	2	2		30		ML016		
5	TC100	Physical Education 1 (*)	1		1		30			
6	TN002	Calculus A2	4	4		60				
7	XH024	Basic English 2 (*)	3		3	45		XH024		
	FL002	Basic French 2 (*)	3			45		FL001		

Total: 15 obligatory credits, 4 optional credits

Semester 4

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	ML021	Hồ Chí Minh's Thought	2	2		30		ML019		
2	TC100	Physical Education 2 (tiếp theo)	1		1		30			
3	KL001	General Law	2	2		30				
4	CT177	Data Structures	3	3		30	30	CT101		
5	CT178	Principles of Operating Systems	3	3		30	30	CT173		
6	XH025	Basic English 3 (*)	3		3	45		XH024		
	FL003	Basic French 3 (*)	3			45		FL002		
7	TN010	Probability and Statistics	3	3		45				

Total: 13 obligatory credits, 4 optional credits

Semester 5

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	ML019	History of the Communist Party of Viet Nam	2	2		30		ML018		
2	TC100	Physical Education 3 (tiếp theo)	1		1		30			
3	CT175	Graph Theory	3	3		30	30	CT177		
4	CT174	Design and Analysis of Algorithms	3	3		30	30	CT177		
5	CT180	Databases	3	3		30	30	CT177		

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
6	CT112	Computer Network	3	3		30	30	CT178		
7	CT176	Object-Oriented Programming	3	3		30	30	CT101		

Total: 17 obligatory credits, 1 optional credits

Semester 6

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	CT296	System Analysis and Design	3	3		30	30			
2	CT182	Unified Modeling Language	3	3		30	30			
3	CT179	System Administration	3	3		30	30			
4	CT188	Introduction to Web Programming	3	3		30	30			
5	CT190	Introduction to Artificial Intelligence	2	2		30				
6	CT335	Network Design	3	3		30	30	CT112		

Total: 17 obligatory credits, 0 optional credits

Semester 7

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	CT428	Web Programming	3	3		30	30	CT180, CT176		
2	CT221	Network Programming	3	3		30	30	CT112, CT176		
3	CT211	Network Security	3	3		30	30	CT112		
4	CT226	Fundamental Project on Computer Network and Data Communication	3	3			90	≥ 90 TC		
5	CT126	Queuing Theory	2			30				
	CT127	Information Theory	2			30				
	CT124	Numerical Analysis	2			30				
	CT121	Theory of Computation	3		6	30	30	CT101		
	CT224	J2EE Technology	2			15	30	CT176		
	CT225	Python Programming	2			20	20	CT176		
	CT274	Programming for Mobile Devices	3			30	30	CT176		

Total: 12 obligatory credits, 6 optional credits

Semester 8

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	CT212	Network Management	3	3		30	30	CT112		
2	CT439	Annual Project on Computer Network and Data Communication	3	3			90	≥ 110 TC		
3	CT227	Techniques for Network Intrusion Detection	3	G1	9 credits of G1 or G2	30	30			
	CT228	Firewall	3			30	30			
	CT229	Website Security	2			20	20			
	CT222	System Security	3			30	30			
	CT344	Network Troubleshooting	2			30		CT335		
	CT232	Network Performance Evaluation	3			30	30	CT112		
4	CT207	Open Source Software Development	3	G2		30	30			
	CT230	Service-Oriented Application Development	3			30	30	CT428		
	CT231	Parallel Programming	3			30	30			
	CT233	Cloud Computing	3			30	30			
	CT482	Big Data Processing	3			30	30	CT176		

Total: 6 obligatory credits, 9 optional credits

Summer Semester:

No	Code	Course name	Credits	Obligatory	Optional	Theory	Practice	Prerequisite	Semester opened	Suggested semester
1	CT476	Intership in Computer Network and Data Communication	3	3			60	≥120TC, CT428, CT109, CT112		

Total: 3 obligatory credits, 0 optional credits

Semester 9

STT	Mã HP	Tên học phần	Tín chỉ	Bắt buộc	Tự chọn	Lý thuyết	Thực hành	Tiên quyết	Học kỳ mở	Học kỳ đề nghị
1	CT555	Graduation Thesis	15				300	≥ 120 TC		
2	CT507	Graduation Project	6				120	≥ 120 TC		
3	CT338	Wireless and Mobile Networks	2			30		CT112		
4	CT272	E-Commerce	3			30	30			
5	CT234	Embedded Software Development	3			30	30			
6	CT223	Software Project Management	3			30	30	CT171		
7	CT235	MS Windows Network Management	3			30	30	CT112		
8	CT205	Database Management Systems	3			30	30	CT180		
9	CT237	Principles of Database Systems	3			30	30	CT180		
10	CT251	Application Development for Windows	3		15	30	30	CT180, CT176		
11	CT206	Application Development for Linux	3			30	30	CT180, CT176		
12	CT238	Classifying Very Large Datasets	3			30	30			
13	CT332	Artificial Intelligence	3			30	30			
14	CT202	Machine Learning	3			30	30			
15	CT273	Human-Computer Interaction	3			30	30			

Total: 0 obligatory credits, 15 optional credits

3   Correlation Matrix Between Program Objectives and Expected Learning Outcomes

Program objectives (1)	Expected learning outcomes (2)														
	Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
	General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
	ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
PO1	x											x	x	x	
PO2		x								x	x				
PO3				x	x	x				x	x				
PO4							x	x	x	x	x				
PO5			x							x	x	x	x	x	x

4 Correlation Matrix Between Expected Learning Outcomes and Course Learning Outcomes

Courses			Expected learning outcomes (2)													
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
General Knowledge																	
1	QP006	National Defense Education 1 (*)	X													X	X
2	QP007	National Defense Education 2 (*)	X													X	X
3	QP008	National Defense Education 3 (*)	X													X	X
4	QP009	National Defense Education 4 (*)	X													X	X
5	TC100	Physical Education 1+2+3 (*)	X														
6	XH023	Basic English 1 (*)			X									X			X
7	XH024	Basic English 2 (*)			X									X			X
8	XH025	Basic English 3 (*)			X									X			X
9	XH031	Advanced English 1 (*)			X									X			X
10	XH032	Advanced English 2 (*)			X									X			X
11	XH033	Advanced English 3 (*)			X									X			X
12	FL001	Basic French 1 (*)			X									X			X

		Courses	Expected learning outcomes (2)														
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
		General Knowledge															
13	FL002	Basic French 2 (*)			x									x			x
14	FL003	Basic French 3 (*)			x									x			x
15	FL007	Advanced French 1 (*)			x									x			x
16	FL008	Advanced French 2 (*)			x									x			x
17	FL009	Advanced French 3 (*)			x									x			x
18	ML014	Marxist-Leninism Philosophy	x													x	
19	ML016	Marxist-Leninism Political Economic	x													x	
20	ML018	Scientific Socialism	x													x	
21	ML019	History of the Communist Party of Viet Nam	x													x	
22	ML021	Hồ Chí Minh's Thought	x													x	
23	KL001	General Law	x													x	x
24	ML007	Basic Logic	x													x	x
25	XH028	Overview of Sociology	x													x	x
26	XH011	Basic Vietnamese Culture	x													x	x

		Courses	Expected learning outcomes (2)														
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
		General Knowledge															
27	XH012	Vietnamese in Use	x													x	x
28	XH014	General Management Documents and Archives	x													x	x
29	KN001	Soft Skills	x												x	x	x
30	KN002	Creation, Innovation, Start-up	x												x	x	x
31	TN001	Calculus A1		x													x
32	TN002	Calculus A2		x													x
33	TN010	Probability and Statistics		x													x
34	TN012	Linear Algebra and Analytic Geometry		x													x
35	CT100	Study Skills													x	x	x
36	CT200	Fundamentals of Information Technology		x												x	x
		Fundamental Knowledge															
37	CT172	Discrete Mathematics						x				x				x	x
38	CT101	Basic Programming A				x						x				x	x
39	CT177	Data Structures						x				x				x	x

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Courses			Expected learning outcomes (2)														
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
	Fundamental Knowledge																
40	CT175	Graph Theory						X				X				X	X
41	CT174	Design and Analysis of Algorithms						X				X				X	X
42	CT180	Databases						X				X				X	X
43	CT173	Computer Architecture					X					X				X	X
44	CT178	Principles of Operating Systems					X					X				X	X
45	CT112	Computer Network					X					X				X	X
46	CT176	Object-Oriented Programming				X						X				X	X
47	CT296	System Analysis and Design						X				X				X	X
48	CT182	Unified Modeling Language						X				X				X	X
49	CT179	System Administration						X				X				X	X
50	CT188	Introduction to Web Programming				X						X				X	X
51	CT190	Introduction to Artificial Intelligence						X					X			X	X

		Courses	Expected learning outcomes (2)														
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
		Specialized Knowledge															
52	CT335	Network Design							x			x				x	x
53	CT212	Network Management							x			x				x	x
54	CT428	Web Programming								x			x			x	x
55	CT221	Network Programming								x			x			x	x
56	CT211	Network Security									x	x				x	x
57	CT126	Queuing Theory							x							x	x
58	CT127	Information Theory							x							x	x
59	CT479	Numerical Analysis							x							x	x
60	CT121	Theory of Computation							x							x	x
61	CT224	J2EE Technology								x			x			x	x
62	CT225	Python Programming								x			x			x	x
63	CT274	Programming for Mobile Devices								x			x			x	x
64	CT226	Fundamental Project on Computer Network and Data Communication				x	x	x				x	x	x	x	x	x
65	CT439	Annual Project on Computer Network and Data Communication							x	x	x	x	x	x	x	x	x

		Courses	Expected learning outcomes (2)															
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
		Specialized Knowledge															
66	CT476	Intership in Computer Network and Data Communication							x	x	x	x	x	x	x	x	x
67	CT227	Techniques for Network Intrusion Detection								x	x					x	x
68	CT228	Firewall								x	x					x	x
69	CT229	Website Security								x	x					x	x
70	CT222	System Security								x	x					x	x
71	CT344	Network Troubleshooting							x			x				x	x
72	CT232	Network Performance Evaluation							x			x				x	x
73	CT207	Open Source Software Development								x			x			x	x
74	CT230	Service-Oriented Application Development								x			x			x	x
75	CT231	Parallel Programming								x			x			x	x
76	CT233	Cloud Computing							x	x		x	x			x	x
77	CT482	Big Data Processing							x	x		x	x			x	x
78	CT555	Graduation Thesis							x	x	x	x	x	x	x	x	x
79	CT507	Graduation Project							x	x	x	x	x	x	x	x	x

		Courses	Expected learning outcomes (2)													
			Knowledge (2.1)									Skill (2.2)				Attitude (2.3)	
			General Knowledge (2.1.1)			Fundamental Knowledge (2.1.2)			Specialized Knowledge (2.1.3)			Hard Skill (2.2.1)		Soft Skill (2.2.2)			
			ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8	ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15
		Specialized Knowledge															
80	CT338	Wireless and Mobile Networks							x			x				x	x
81	CT272	E-Commerce								x			x			x	x
82	CT234	Embedded Software Development								x			x			x	x
83	CT223	Software Project Management							x			x				x	x
84	CT235	MS Windows Network Management							x			x				x	x
85	CT205	Database Management Systems							x			x				x	x
86	CT237	Principles of Database Systems							x			x				x	x
87	CT251	Application Development for Windows								x			x			x	x
88	CT206	Application Development for Linux								x			x			x	x
89	CT238	Classifying Very Large Datasets								x			x			x	x
90	CT332	Artificial Intelligence								x			x			x	x
91	CT202	Machine Learning								x			x			x	x
92	CT273	Human-Computer Interaction							x			x				x	x

5   Cirriculum Map

Mathematics

Physics

Chemistry

English

[High school level]

TN001, TN002, TN010, TN012

CT190

CT172

CT200

CT175

CT174

CT177

CT101

CT176

{XH023,XH024,XH025}|
{XH031,XH032,XH033}|
{FL001,FL002,FL003}
|{FL007, FL008,FL009},
KL001,ML007|XH011|XH012
|XH014|XH028
|KN001|KN002,
CT100

CT179

CT173   CT178   CT112

CT335

CT212   CT211

CT221

CT126 | CT127|
CT479 | CT121 |
CT224 | CT225 |
CT274

CT226

CT273

CT188

CT428

CT205
CT237

CT180   CT296

CT182   CT223

CT227, CT228,
CT229, CT222,
CT344, CT232

CT439   CT476

CT207, CT230,
CT231, CT233,
CT482

CT555 |
{CT507 and 09 credits of
{CT338, CT272, CT234,
CT223, CT235, CT205,
CT237, CT251, CT206,
CT238, CT332, CT202,
CT273}}

Legend
- Math, statistics, AI and machine learning
- Social and professional issues
- IT fundamentals
- Programming fundamentals, integrative programming and technologies
- Platform technologies, system administration and maintenance
- Information Management, man-machine interaction
- System integration and architecture
- Web and mobile systems, high performance computing, big data
- Networking
- Information assurance and security
- Projects and internship
- Graduation thesis or courses

Memorize basic knowledge of law, security and defense, political and social science; build physical health, ethics, social awareness, and professional responsibility according to current regulations;

Present basic knowledge of mathematics and science applicable in computer network and data communication;

Integrate fundamental knowledge and skills in computer science and information technology that enable them to study related fields or graduate programmes;

Analyze and **apply** specialized knowledge and skills to meet practical needs of an individual or an organization in the field of computer network and data communication in the context of Industry 4.0;

Develop communication skills, presentations skills, teamwork skills, foreign language competence, professional and creative working style, and entrepreneurship to meet the requirements of globalization and lifelong learning.

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6 Course description

6.1 Physical Education (TC100)
- Num of credits: 03
- Description:
The 1 + 2 + 3 Amateur Physical Education module is a common module that represents the Physical Education modules that non-Physical Education students must study to complete their undergraduate degree programs.

6.2 National Defense Education 1 (QP010)
- Num of credits: 02
- Description:
Refers to the Party's basic theory of military lines, including: fundamental issues of Marxism-Leninism, Ho Chi Minh's ideas on war, military and national defense; the Party's views on the people's war, the building of the armed forces, the entire people's defense and the people's security; The Party's views on combining socio-economic development with enhanced consolidation defense security. A certain amount of time introduces some basic content of the history of Vietnamese martial arts through periods.

6.3 National Defense Education 2 (QP011)
- Num of credits: 02
- Description:
To select the basic contents of tasks of defense and security work of the Party and the State in the new situation, including the building of the militia and self-defense force, the reserve force, physical security, defense techniques, defeat the strategy of "peaceful evolution", the overthrow of hostile forces against the Vietnamese revolution. The course mentions a number of issues related to ethnicity, religion and the fight against enemy use of ethnic and religious issues against the revolution of Vietnam. To build and defend border sovereignty, island sovereignty and national security, fight against crimes and maintain social order and safety, fight against non-traditional security threats in Vietnam.

6.4 National Defense Education 3 (QP012)
- Num of credits: 02
- Description:
The theory combines with practice to equip learners with some basic skills in shooting, basic knowledge of maps, military terrain, advanced defense against high technology weapons, train the bravery, health through the military content, practice the class, block. Content includes: unit form (platoon level). Practice fighting skills, fighting command, fighting in combat, defense.

6.5 National Defense Education 4 (QP013)
- Num of credits: 02
- Description:
Introduction of history, military tradition, army, organization of forces, army, visit to understand the history, units in the armed forces.

6.6 Basic English 1 (XH023)
- Num of credits: 04
- Description:
The Basic English 1 course provides students with basic English vocabulary in basic communication, focusing on topics such as personal information, family, places, things in daily

life, sports, free time activities and basic shopping. In addition to developing the ability to communicate in some basic English communication situations on these topics, the curriculum also aims to develop language competence at A2 level for students in 6 Level Framework (V-step Vietnam).

6.7 Basic English 2 (XH024)
- Num of credits: 03
- Description:
The Basic English 2 course provides students with basic English vocabulary in basic communication, focusing on topics such as countryside, cities of interest, culinary arts, tourism, fashion, money. In addition to developing the ability to communicate on some basic English communication situations on these topics, the curriculum also targets the development of language proficiency at A2 level for undergraduate students in 6 Level Framework (V-step Vietnam).

6.8 Basic English 3 (XH025)
- Num of credits: 03
- Description:
The Basic English 3 course provides students with basic English vocabulary in basic communication, focusing on topics such as introduction to film genres, science and technology, tourism and natural environment. In addition to developing the ability to communicate in some basic English communication situations on these topics, the curriculum also aims to develop language competence at A2 level for students in the 6 Level Framework (V-step Vietnam).

6.9 Advanced English 1 (XH031)
- Num of credits: 04
- Description:
Advanced English Course 1 (in Advanced English Program 1-3) provides students with knowledge of English and the opportunity to practice the skills required to meet international communication competence in common situations. The program demonstrates principles and characteristics: (1) to develop competence-based learning; (2) integrated and blended learning; (3) promoting learner independence in learning; (4) through interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing communication and language skills, the curriculum also aims to support students who achieve B1 (tier 3) in Vietnam foreign language competence system (through VSTEP examination).

6.10 Advanced English 2 (XH032)
- Num of credits: 03
- Description:
The Advanced English Course 2 (in Advanced English Program 1-3) provides students with knowledge of English and the opportunity to practice the skills they need to meet international communication skills in common situations. The program demonstrates principles and characteristics: (1) to develop competence-based learning; (2) integrated and blended learning; (3) promoting learner independence in learning; (4) through interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing communication and language skills, the curriculum also aims to support students who achieve B1 (tier 3) in Vietnam foreign language competence system (through VSTEP examination).

6.11 Advanced English 3 (XH033)
- Num of credits: 03

- Description:
The Advanced English Course 3 (in Advanced English Program 1-3) provides students with knowledge of English and the opportunity to practice the skills they need to meet international communication skills in common situations. The program demonstrates principles and characteristics: (1) to develop competence-based learning; (2) integrated and blended learning; (3) promoting learner independence in learning; (4) through interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing communication and language skills, the curriculum also aims to support students who achieve B1 (tier 3) in Vietnam foreign language competence system (through VSTEP examination).

6.12   Basic French 1 (FL001)
- Num of credits: 04
- Description:
The content of the course aims to communicate in daily life, such as introducing yourself, your family, talking about habits, hobbies, acquaintances and introducing someone, speaking and writing about hours in the common or formal way, etc. In addition, the knowledge of language, French culture is also integrated into the curriculum. Through this course, students will be introduced to pronunciation, intonation, French alphabet, know how to conjugate from Group I, Group II and some Group III verbs in the present time, write a number of simple sentences.

6.13   Basic French 2 (FL002)
- Num of credits: 03
- Description:
The course will continue to equip learners with the basics of Grammar, Phonetics, Vocabulary of French. The content of the course aims to communicate in daily life such as information, explanation, invitation or refusal, talk about your workday, talk about future plans. Students are introduced to questioning, questioning with more complex French pronouns, groupings of groups I and II, and group III verbs in order, directions, positioning in space. In addition, the knowledge of language, French culture is also incorporated into the curriculum content.

6.14   Basic French 3 (FL003)
- Num of credits: 03
- Description:
The content of the course continues to target communication in daily life such as discussing about holidays, Tet, food, depicts people, objects, clothes, express choices, number, introduction family members, tell a story in the past, etc. In this course, students are introduced to 100- or more-word texts, longer conversations, writing about 100 word texts, write letters. Students can apply grammatical knowledge to their writing, such as the number of nouns, adjectives, past tense verbs, past tenses, and so on. Completion of the module, students will also know how to explain and perform simple arguments.

6.15   Advanced French 1 (FL007)
- Num of credits: 04
- Description:
The content of the course continues towards the goal of communication in daily life such as introducing family members; get acquainted with a person; tell daily activities; describe the person, place of residence; quantitative or quality comparison. In addition, the knowledge of language, French culture is also incorporated into the content of the curriculum.

6.16 Advanced French 2 (FL008)

- Num of credits: 03
- Description:

Advance French 2 will provide students with a wealth of knowledge about vocabulary and grammatical structures to help students develop the comprehensive four listening, speaking, reading and writing skills about six main themes of eating habits, sports, employment, education, communication and recreation.

6.17 Advanced French 3 (FL009)

- Num of credits: 03
- Description:

The Advanced French 3 will provide students with a rich and varied knowledge of vocabulary and grammatical structures to help students develop the comprehensive four listening, speaking, reading and writing skills, which deals with six major themes of speaking, talking about memories, travels, habits, motivations, narrating the words of others.

6.18 Marxist-Leninism Philosophy (ML014)

- Num of credits: 03
- Description:

The module presents the following basic contents: dialectical materialism, dialectic materialism, historical materialism.

6.19 Marxist-Leninism Political Economic (ML016)

- Num of credits: 02
- Description:

This course introduces students to following issues: the preconditions for the production of goods; goods; currency; value law; The transformation of money into capital; production process of surplus value; wages in capitalism; transformation of surplus value into capital - capital accumulation; circulation of capital and surplus value; capital forms and expressions of surplus value; Monopoly capitalism; state monopoly; today's capitalism and its manifestations; the role, limitations and movement tendencies of capitalism.

6.20 Scientific Socialism (ML018)

- Num of credits: 02
- Description:

This course introduces students to the historical mission of the working class; socialist revolution; Socio-economic form of communism; To build socialist democracy and the socialist state; building a socialist culture; solve ethnic and religious problems; Real socialism; the crisis, the collapse of the Soviet socialist model and its causes; the prospect of socialism.

6.21 History of the Communist Party of Viet Nam (ML019)

- Num of credits: 02
- Description:

The content of the course presents the line of the Communist Party from 1930 to present. Thereby, it provides students with basic knowledge about the birth of the Communist Party of Vietnam and the first political platform of the Party; The way to fight for government (1930-1945); Resistance war against French colonialists and American invaders (1945-1975); Industrialization; The way to build a socialist-oriented market economy; The way to build the political system; The way of building, developing culture and solving social problems; Foreign policy.

6.22　Hồ Chí Minh's Thought (ML021)

- Num of credits: 02
- Description:
This course helps the understanding of the foundation of thought, the guiding principles of the Party and the revolution of our country, basic knowledge of Marxism-Leninism contributing to building a new human moral foundation. In addition to the opening chapter, the content of the course includes 7 chapters: Chapter 1 presents the basics, the formation and development of Ho Chi Minh ideology; Chapters 2 through 7 present the basic contents of Ho Chi Minh Thought according to the course objectives, providing a systematic understanding of Ho Chi Minh's thought, morality and cultural values.

6.23　General Law (KL001)

- Num of credits: 02
- Description:
The course introduces the basic theoretical issues of Marxist-Leninist doctrine on the state and law from the origin, nature, form, function as well as the types of state and law that have formed and existed and developed through various socio-economic forms in human history. In addition, the course also includes the study of the state's position in the political system, the constitution the state apparatus, and the systems of government. The large volume of basic knowledge in the common law disciplines of Vietnam is also introduced such as fundamental rights and obligations of citizens, crimes, violations of administrative law, the law on marriage, divorce, and inheritance.

6.24　Basic Logic (ML007)

- Num of credits: 02
- Description:
This course introduces the basic knowledge of formal logic, including judge, inference, hypothesis, demonstrate, reject.

6.25　Overview of Sociology (XH028)

- Num of credits: 02
- Description:
This course studies the laws, the rules of formation, the movement of relationships, the interaction between people and society. Research subjects of sociology are social relations, social interaction manifested through behaviors between people in groups, organizations and social systems.

6.26　Basic Vietnamese Culture (XH011)

- Num of credits: 02
- Description:
Basic knowledge of this course is presented in five chapters, covering from theory to practice. Chapter 1 presents the concepts, scientific terminologies (culture, cultural study, cultural process, cultural exchange, cultural adaptation, etc.), and various types of Vietnamese culture. Chapters 2, 3, 4 present the knowledge of the cultural values and the manifold expression of their diversity in the material and spiritual life of the Vietnamese people. Chapter 5 focuses on the characteristics of identity and the future of national culture.

6.27　Vietnamese in Use (XH012)

- Num of credits: 02

- Description:
The course is designed in 4 chapters. Each chapter consists of two main sections that are interwoven: theoretical and practical exercises. Chapter 1 focuses on characters and grammar. Chapter 2 focuses on the use of words. Similarly, the content of chapter 3 is the practice of sentence skills. Chapter 4 focus on the practice of text writing and reading comprehension skills.

6.28   General Management Documents and Archives (XH014)
- Num of credits: 02
- Description:
This course provides theoretical and practical knowledge of management documents and archives, helping students become aware of the role of administrative documents and archives for management. Besides, this course also helps the learner master the method of drafting and managing scientific types of administrative documents, know how to select and classify documents for archives; know how to look up, use archives to do well in school management as well as in general agencies.

6.29   Soft skills (KN001)
- Num of credits: 02
- Description:
This module provides basic knowledge and instructions to practice on the required skills for learners such as: communication skills, general principles of communication; effective listening, speaking and presentation skills; teamwork skills to ensure good cooperation in learning and working; creative thinking skills; time management skills and emotional management skills.

6.30   Creation, Innovation, Start-up (KN002)
- Num of credits: 02
- Description:
The course focuses on general knowledge of creation, innovation and start-up ideas, business ownership, property rights. In addition, students are also provided with basic knowledge and skills of the market such as assessing strengths, opportunities, threats, risks of commercializing products from business ideas, discovering business potential. business and start-up planning. Students have the opportunity to share their startup experiences from successful entrepreneurs and / or visit a successful startup model.

6.31   Calculus A1 (TN001)
- Num of credits: 03
- Description:
The course consists of four chapters. The first chapter introduces the function, the limit of the function, and the continuity of the function. Chapter 2 presents the calculus of one variable function and its applications. The integral of a variable as well as its application is that of the third chapter. Finally in chapter four, the numerical series theory will be introduced.

6.32   Calculus A2 (TN002)
- Num of credits: 04
- Description:
The module covers the basic knowledge of the multivariable functions such as the concept of multivariable functions, limits, continuity, differential calculus of multivariable functions, curves in space, line integrals, surface integrals and differential equations.

6.33 Probability and Statistics (TN010)

- Num of credits: 03
- Description:

The module consists of 5 chapters. Chapter 1: Probability and Probability Formula: Define Probability and the Basic Formulas of Probability. Understand what probability is and how to use it in practice. Help learners analyze problems and calculate the probability of each case in the problem. Chapter 2: Random Variables and Probability Distribution Laws. Calculate the characteristic parameters of random variables such as mean, variance, standard deviation, mode. Chapter 3: Statistics and Data. This chapter is a descriptive statistic section. Chapter 4: Parameter Estimation. The method for estimating or predicting the parameters of random variables such as mean, scaling, and variance estimation. Chapter 5: Statistical Assay Verification. Provides a method to test real-world problems such as verifying the mean (averaging against a number, comparing multiple averages, etc.), testing the ratio (proportional to some, multiple scaling), testing variance.

6.34 Linear Algebra and Analytic Geometry (TN012)

- Num of credits: 04
- Description:

The module provides basic mathematical knowledge in linear algebra, such as Linear Equation Systems, Matrices, Equations, Vector Space, Linear Mapping, Eigenvalues, Eigenvectors, Quadratic curves and Quadratic surfaces so that students have the opportunity to continue studying other Maths and specialized subjects later. In addition to equipping theoretical issues, the module also offers a variety of exercises, easy-to-do assignments, and advanced exercises to enhance students' thinking.

6.35 Study skills (CT100)

- Num of credits: 02
- Description:

The course introduces learning goals, the learning environment, active learning methods, the P.O.W.E.R. method. This module illustrates how to learn knowledges, skills, attitudes for studying and working.

6.36 Fundamentals of Information Technology (CT200)

- Num of credits: 04
- Description:

This course provides students with a relatively comprehensive knowledge of the IT background. The main contents include: Introduction to computers, computer systems, computer equipment, operating systems, communications and computer networks, database systems, information security, and specialized computing systems.

6.37 Discrete Mathematics (CT172)

- Num of credits: 04
- Description:

The main content of the course consists of 5 chapters. Chapter 1 introduces the concept of propositions and predicates, mathematical reasoning and proofing methods on propositions and predicates. Chapter 2 presents the concept of relation on set, Boolean algebra and Boolean functions, how to solve Boolean equations, Boolean functions and simple formulas. Chapter 3 presents the concept of combinatorial and probability, and methods of combining and probability. Chapter 4 presents the theory of divisible and divisible over the whole number. Chapter 5 presents congruence and related issues.

6.38 Basic Programming A (CT101)

- Num of credits: 04
- Description:

Basic Programming course provides students with basic knowledge of structured programming through the C programming language. This course is the foundation for absorbing most of the other subjects in the curriculum. On the other hand, mastering the C language is the basis for developing applications. The main contents are: Concept of programming language; The concept of data types and structured data types; The concept of algorithm and language of algorithm expression; Overview of C programming language; Data types in C; Structured commands; How to design and use functions in C; Some data structures in C.

6.39 Data Structures (CT177)

- Num of credits: 03
- Description:

This course provides students with a relatively comprehensive knowledge of data structures. The main contents include: From problem to program. Basic abstract types such as lists, stacks, queues. Tree structures such as general trees, binary trees and binary search trees. The aggregation structure includes: aggregation, dictionary and hash. Unidirectional and directional scalar graphing and some algorithms related to graphs.

6.40 Graph Theory (CT175)

- Num of credits: 03
- Description:

The main content of the course is presented in 5 chapters. Chapter 1 introduces the basic concepts of graphs, presents graph representations, and classifies graph classes. Chapter 2 presents the shortest path finding problem on the graph and the shortest path finding algorithm on the graph. Chapter 3 presents the concept of trees, the problems of finding the minimum weight tree and the least weight tree algorithm. Chapter 4 presents the concept of network flow and algorithms for finding the maximum flow in a network. Chapter 5 presents the concept of coloring graphs and methods of coloring graphs.

6.41 Design and Analysis of Algorithms (CT174)

- Num of credits: 03
- Description:

This course provides students with a relatively comprehensive knowledge of the analysis and design of computer programming algorithms. The main contents include: Technical analysis and evaluation of algorithms through the calculation of complexity; Sort algorithms; The techniques of algorithm design, applied to solving some practical problems; Data structures to organize files and algorithms to find, insert, and delete information in a file.

6.42 Databases (CT180)

- Num of credits: 03
- Description:

The course consists of three parts: basic knowledge, theory of database design (relational database) and database programming. Since the relational model is still widespread and closely related to many other models, it will be presented as a cross-platform for the whole course. In Section A-Basic Knowledge, from the general concepts of the database, the relationship model of the database is described in more detail, and is supplemented by relational algebra. The SQL language for querying is well- defined in both grammar and usage from basic to advanced

levels, primarily for the relational model of the database. Section B provides the theory of relational database design through dependency concepts and normalization rules. Part C supports in-depth programming on the database.

6.43 Computer Architectures (CT173)

- Num of credits: 03
- Description:

This course provides an overview of the history of computer development, information and information encoding used in the system; introduces the basic components of a computer system, computer architecture, instruction set, and basic memory address modes; provides conceptual knowledge of RISC and CISC architectures, high-level language and machine language; introduces the structure of the central processor: the organization, function and operating principle of the components inside the processor; some information processing techniques; knowledge of basic functional and operating principles of computer memory levels; introduction of some peripherals: components and interconnected systems; the method of establishing data security on external storage devices (RAID).

6.44 Principles of Operating Systems (CT178)

- Num of credits: 03
- Description:

This course provides students with a relatively comprehensive knowledge of Computer Operating Systems. The main contents include: Operating System Concepts, Operating System Structure, Process and Process Synchronization, Processor Synchronization, Memory Management, and Virtual Memory.

6.45 Computer Network (CT112)

- Num of credits: 03
- Description:

This course is intended to provide learners with the basics of computer networking. Learners will discover the problems that arise when building a computer network from the hardware, network operating system, system software and network applications and can explain how a computer network or a network application operates. The knowledge gained in this course is the foundation to study and do further research in various areas of the networking such as computer network design and installation, computer network security, network application design, etc.

6.46 Object-Oriented Programming (CT176)

- Num of credits: 03
- Description:

The course provides background knowledge of object-oriented programming methods and uses the Java programming language to implement and illustrate this programming methodology. First, the course introduces the basic idea of object-oriented programming methodology and the important concepts of this programming method include: object, class, encapsolation, inheritance, and polymorphism. Then, the learner will be introduced to the Java programming language and use this language to illustrate the concepts of object-oriented programming. In addition, the module provides some other knowledge of the Java programming language such as exception handling, graphical programming with Swing, etc., so that learners can use well-formed Java programming language to write applications according to object-oriented programming methods.

6.47 System Analysis and Design (CT296)
- Num of credits: 03
- Description:
The main contents taught in this course are basic concepts of system, information system, stages of information system development, data composition of a information system (including concept-level data model, logical-level data model, and physical-level data model) and processing elements (including flowchart and functional model). The two tools that can be used for this course are WinDesign, Sybase Power Designer.

6.48 Unified Modeling Language (CT182)
- Num of credits: 03
- Description:
The syllabus consists of 6 chapters. Chapter 1 introduces an overview of the UML language. Chapters 2 through 5 delineate the basics of UML in turn, which are activity diagrams, class diagrams, activity diagrams, and sequence diagrams. Examples are often inserted after each concept item. And depended on the chapter, there may be general examples for the entire chapter, taken from real-world problems. Similarly for assignments, the instructor can give individual learners simple homework in the classroom after one or more items, or whole chapter assignments, and also group exercises throughout the models in order to make a report with practical value.

6.49 System Administration (CT179)
- Num of credits: 03
- Description:
The course will introduce students to the role and responsibility of a system administrator in the information technology systems. Next, components of an information technology system such as hardware, software, networks, services, users, etc. will be mentioned. Based on that knowledge, the course will continue to discuss about the security requirements for the system. Finally, the system administration documentation will be discussed. Note that this course does not cover advanced network management skills and advanced network security knowledge, which will be introduced in other courses.

6.50 Introduction to Web Programming (CT188)
- Num of credits: 03
- Description:
The course provides basic knowledge in developing web applications. Topics covered in the course include Internet introduction and architecture of the WWW service, the process of building a website, HTML language, CSS language, JavaScript programming language, DOM object modeling.

6.51 Introduction to Artificial Intelligence (CT190)
- Num of credits: 02
- Description:
The course includes an overview of artificial intelligence, the goal of artificial intelligence, the tasks of artificial intelligence, artificial intelligence approaches in solving problems and applications.

6.52 Network Design (CT335)
- Num of credits: 03
- Description:

This course provides fundamental knowledge about analyzing, designing and implementing LAN, Intranet, Campus, and Enterprise network systems. The main contents include: Methods to specify user requirements and objectives; technologies to design networks at logical and physical levels; testing and optimizing performances of networks; documenting, designing and implementing networks.

6.53   Network Management (CT212)
- Num of credits: 03
- Description:
The course provides the basic knowledge and skills on administrating network system, including the principles of network administration, network components, workstations, servers, networks, network services, ...), TCP/IP network model. Linux is used to manage user and user groups, files systems, partitions, LVM and common network services on TCP/IP networks such as WWW, FTP, SAMBA, DNS, SSH, etc.

6.54   Web Programming (CT428)
- Num of credits: 03
- Description:
The course provides basic knowledge in developing dynamic web applications in LAMP stack (Linux, Apache, MySQL, PHP). Topics covered in the course include techniques commonly used in dynamic web applications, HTML language, CSS language, JavaScript programming language, DOM object modeling, MySQL database management, and finally the PHP.

6.55   Network Programming (CT221)
- Num of credits: 03
- Description:
This course is to deliver relatively complete knowledge of network programming principles and skills with use of Java. Main contents include: inter-process communication mechanism; TCP/IP networking model; types of program architecture; several standard protocols of Internet; method to build a protocol for certain network application; concept of port of a network application; concept of socket; method of socket programming under TCP connection-oriented and UDP connectionless approach; multicast programming; RPC; building distributed application using Java with RMI utility; introduction to some Java classes for dealing with network service.

6.56   Network Security (CT211)
- Num of credits: 03
- Description:
This course provides fundamental knowledge about building safety policies and mechanisms for a computer system and network systems. The main contents include: basic knowledge of network security, network attacks and defenses, the technical and safety technology and network security systems such as against harmful software, hardening systems, cryptography and authentication systems, virtual private network (VPN), firewalls, intrusion detection systems, safety for network equipment, safety communications, network security models.

6.57   Queuing Theory (CT126)
- Num of credits: 02
- Description:
The course presents knowledges of the queuing theory, Markov chain, network of queue. The content includes random variables, the probability distribution, Markov chain, Chapman-

Kolmogorov, Kendall's notation, the M/M/1 queue, the M/G/1 queue, and various scheduling policies.

6.58 Information Theory (CT127)
- Num of credits: 02
- Description:
The module provides knowledge of information metrics, Shannon entropy, separable code generation, discrete memoryless channel, error correction codes (Hamming code, parity check code, cyclic redundancy check).

6.59 Numerical Analysis (CT479)
- Num of credits: 03
- Description:
The module provides knowledge of the approximation, solving equations and system of linear equations, the approximation of function values, polynomial interpolation of functions.

6.60 Theory of Computation (CT121)
- Num of credits: 03
- Description:
The module provides knowledges of languages, formal languages, language classification, formal languages, finite automats, context-free languages, pushdown automata, Turing machines, and von Neumann machine model.

6.61 J2EE Technology (CT224)
- Num of credits: 02
- Description:
The course provides insights for developing large-scale, specialized applications on the Java 2 Platform Enterprise Edition (J2EE), a platform for developing distributed applications. Content covered in the module includes: the architecture of a multi-tiered application, MVC modeling, J2EE application architectures, development of Web applications based on servlets and JSP, EJB based components include EJB Session Bean and EJB Entity Bean. In addition, the module also introduces the database binding method in J2EE applications.

6.62 Python Programming (CT225)
- Num of credits: 02
- Description:
The module introduces programming language Python, interpreter and programming environment. Basic knowledges include variables, data types, arithmetic, branching, iteration, functions, and data types complex data, import and export, catch exceptions, object-oriented programming. The course also presents network application programming, Web programming, graphic interface programming, IoT programming, Robot control, machine learning, with Python.

6.63 Programming for Mobile Devices (CT274)
- Num of credits: 03
- Description:
This course provides principles and fundamental concepts for wireless communication technology and mobile software technology. The course introduces methods to setup a development environment and to use tools for programming and developing applications on the top mobile application development platforms such as Android, iOS and Windows. The course

helps students to setup development environment for mobile devices (e.g., smart phone and tablet), do application development process, test and release applications on Android, iOS and Windows phones. The course also helps students train network programming skills, create user interface, handle user interaction, save data and develop some network applications and simple games on Android platform.

6.64 Fundamental Project on Computer Network and Data Communication (CT226)
- Num of credits: 03
- Description:
The main content of this module is that students will apply the knowledge and skills from the courses in the fundamental knowledge block to develop a simple application. Key tasks include: analyzing problems to be solved, applying appropriate solutions, designing solutions, developing solutions and writing reports.

6.65 Annual Project on Computer Network and Data Communication (CT439)
- Num of credits: 03
- Description:
The main content of this module is that students will apply the knowledge and skills from the courses in the specialized knowledge block to analyze, design and develop an application at a moderate level. Key tasks include: Identifying and analyzing problems to be solved, finding appropriate solutions, designing solutions, developing and implementing solutions, and writing reports.

6.66 Intership in Computer Network and Data Communication (CT476)
- Num of credits: 03
- Description:
This course is an opportunity for students to apply the knowledge (theories, practice) they have learned to solve practical problems in the field of computer networks, data communication, information technology at the enteprises, organizations and business. Students will be trained in practical skills, programming, problem solving skills, skills in applying appropriate solutions to solve real problems. In addition, students are trained in soft skills such as teamwork, communication skills and presentation skills.

6.67 Techniques for Network Intrusion Detection (CT227)
- Num of credits: 03
- Description:
The course introduces cyber attacks and their consequences network attack caused. The basic principles of common network attacks are: SYN flood, UDP flood, ICMP (Ping) flood, Ping of Death, Slowloris, HTTP flood. The module presents some systems for network attack detection. SNORT is used to detect network intrusions. Students can install, configure SNORT system and also writes detection rules.

6.68 Firewall (CT228)
- Num of credits: 03
- Description:
This module provides complete knowledges of the firewall on a network. The content includes the role of the firewall in network security, the architecture, different types, control techniques, rules of firewall, devices and firewall softwares, the installation, the configuration, rules for monitoring network traffic.

6.69 Website Security (CT229)

- Num of credits: 02

- Description:

This module aims to provide the fundamental of Website security and security principles in Web applications, some common Website security flaws that hackers can exploit, the attack techniques and prevention solutions. The module presents an overview of Web application security, security assessment methods, principles

Web application security, OWASP standards, Website vulnerabilities such as Cross-Site Scripting (XSS), CSRF (Cross Site Request Forgery), Clickjacking, Injection, DoS, Authentication, and Session Management, secure information over transmission by HTTPS protocol (HTTP + SSL) and Firewalls for Web applications.

6.70 System Security (CT222)

- Num of credits: 03

- Description:

This course provides students with a relatively comprehensive knowledge of Computer System Security. Key contents include: Basic concepts of information and computer security, Operating system security, Malware, Network security, Web services security, Data encryption, Information security models.

6.71 Network Troubleshooting (CT344)

- Num of credits: 03

- Description:

This module provides knowledges for solving network problems such as an overview of the network baseline - the stable state of the network, this is the basis for determining system abnormalities. The module illustrates the causes of network problems, approaches for solving network troubleshooting, the description, the analysis of network problems, the report of troubleshooting process, the solution, support tools.

6.72 Network Performance Evaluation (CT232)

- Num of credits: 03

- Description:

The module introduces students to the performance assessment of a computer network. It includes concepts and methods for the performance evaluation, some impact factors and commonly tools used in network performance evaluation. The module also illustrates how to analyse and interpret performance evaluation results.

6.73 Open Source Software Development (CT207)

- Num of credits: 03

- Description:

This course aims to introduce students to the following issues: the concept of free software, open source software, some popular open source software licenses, the benefits of using open source software; the development history and architecture of Linux; proficiency in Linux (Ubuntu Desktop); knowledge of the open source software development model and familiarity with the environments and utilities used to develop open source software.

6.74 Service-Oriented Application Development (CT230)

- Num of credits: 03

- Description:

The module introduces to distributed computing models, service-oriented architecture platform, principles and properties of Service-oriented softwares. The module also provides platform, technology, process and illustrates how to develop SOAP Web service and RESTful. Students study Top-down and Bottom-up approaches, the life cycle, service-oriented modeling.

6.75 Parallel Programming (CT231)

- Num of credits: 03
- Description:

This course provides fundamental knowledge about parallel computations. The main contents include: Introduction to the need of parallel computation, parallel architectures and parallel computation models, analyzing and design parallel algorithms, parallel programming based on shared memory and distributed memory models, tools for analyzing and evaluating parallel programs.

6.76 Cloud Computing (CT233)

- Num of credits: 03
- Description:

Cloud computing is a technology that enables the organization and management of a large number of computing resources (including hardware and software) to provide information technology services easier and more efficient. This course will give learners a full view of the efficiency, benefits and challenges that cloud computing brings. Learners will learn about the history of cloud computing, and the technologies and mechanisms that make this technology a reality. In addition, learners are provided with a complete set of concepts, models, and architectures that can be used to build the features of a cloud computing system. All of this knowledge will be the basis for further research and development of applications on the cloud computing platform.

6.77 Big Data Processing (CT482)

- Num of credits: 03
- Description:

The module provides background knowledge of big data processing. The content includes an overview of big data, the characteristics and effects of big data, the architecture, the storage model for big data. In particular, the popular Apache Hadoop platform is presented in detail such as the ecosystem, the architecture, key components, and Hadoop (HDFS and MapReduce) for big data processing.

6.78 Graduation Thesis (CT555)

- Num of credits: 15
- Description:

The main content of this course is that students will apply the knowledge and skills from the courses in the fundamental and specialized knowledge blocks to analyze, design and develop solutions to solve problems in various fields. Key tasks include: identifying and analyzing problems to be solved, finding appropriate solutions, designing solutions, developing and implementing solutions (including testing), writing reports and defense.

6.79 Graduation Project (CT507)

- Num of credits: 06
- Description:

The main content of this course is that students will apply the knowledge and skills from the courses in the fundamental and specialized knowledge blocks to analyze, design and develop

solutions to solve problems. Key tasks include: identifying and analyzing problems to be solved, finding appropriate solutions,
designing solutions, developing and implementing solutions (including testing)
and writing reports.

6.80 Wireless and Mobile Networks (CT338)

- Num of credits: 02
- Description:
This course provides students with knowledge about the structure of mobile networks and the integration of these networks into other computer networks. The content of the course includes: mobile network concepts and architecture; core mobile network protocols and applications; approaches to integrate mobile network into other networks (local area network, wireless network, Internet).

6.81 E-Commerce (CT272)

- Num of credits: 03
- Description:
This course provides students with knowledge about e-commerce by summarizing the recent development of e-commerce in Vietnam as well as in the world. The student will have an overview as well as the deep understanding of e-commerce by introduced and analyzed of the factors affecting the development of e-commerce, the e-commerce models focusing on the strongly developed models in Vietnam such as B2C (Business-to-Consumer) and C2C (Consumer-to-Consumer). The techniques and tools for rapid development of e-commerce systems will be introduced, including the required specifications of an e-commerce system, the selection of solutions and techniques to build e-commerce websites, the methods to develop and to integrate e-commerce systems based on open source CMS.

6.82 Embedded Software Development (CT234)

- Num of credits: 03
- Description:
The course provides knowledges of embedded systems, devices, operating systems. The content focusses on skills for developing embedded applications on Arduino, Rasperberry Pi.

6.83 Software Project Management (CT223)

- Num of credits: 03
- Description:
The Software Project Management course equips students with extensive knowledge of how to manage a project in general and how to manage a software project in particular. The main contents of this course include the overview of project management, the organization in project management, the life cycle of the project, the process of project management. The key areas of knowledge in project management are also addressed in a fundamental way, such as integrated management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, procurement management and stakeholder management. Specificity in software project management is also addressed on the basis of the software project management framework.

6.84 MS Windows Network Management (CT235)

- Num of credits: 03
- Description:

The course provides the advanced knowledge and skills on administrating Windows Server 2008. The main contents that the course covers include: Windows server active directory, Windows Deployment Service, AD Right Management Service, stand-alone root CA and enterprise root CA, Windows Firewall and NAP, Network Policy Server, Approaches to improve availabilities: Backup and Restore, Clustering, Additional Domain Controller; Forefont TMG.

6.85 Database Management Systems (CT205)
- Num of credits: 03
- Description:
Students will be equipped with fundamental knowledge for managing Oracle Database Server, such as architecture, models, backup, query language, transaction, PL/SQL programming, Triggers.

6.86 Principles of Database Systems (CT237)
- Num of credits: 03
- Description:
Students will be equipped with the fundamental knowledge for the design of database systems, including not only the design techniques of database applications, backup, transaction, but also the technical background to design the database management system.

6.87 Application Development for Windows (CT251)
- Num of credits: 03
- Description:
The course is intended to provide learners with knowledge of building applications on the Windows platform. With the knowledge gained through this course, learners can apply to implement a specific software project.

6.88 Application Development for Linux (CT206)
- Num of credits: 03
- Description:
The main contents of this course are presented 4 chapters: Chapter 1: Linux operating system, Chapter 2: Software development tools, Chapter 3: Basic programming with Qt Creator, Chapter 4: Advanced programming with Qt Creator. The goal of the course is to equip students with the knowledge of Linux to use some of the tools and programming languages to develop applications on a Linux environment.

6.89 Classifying Very Large Datasets (CT238)
- Num of credits: 03
- Description:
The course focuses on the data classification in real applications. The process includes problem defition, data collection, training models and evaluation. The course provides the knowledge of machine learning algorithms, such as Support vector learning and advanced algorithm in big data classification.

6.90 Artificial Intelligence (CT332)
- Num of credits: 03
- Description:

The course includes: an overview of artificial intelligence such as the goal of artificial intelligence, the tasks of artificial intelligence, artificial intelligence approaches in solving problems (problem modeling in the state space, analysis
of the problems in the direction of divide-and-conquer and the And-Or graphical model, etc.), techniques for finding solutions to the modeled problem, the role of knowledge in problem solving, methods of knowledge representation and reasoning.

6.91   Principles of Machine Learning (CT202)
- Num of credits: 03
- Description:
Machine learning (automated learning) researches and develops computer programs capable of improving one's own abilities through experience (eg, human face recognition, audio recognition, auto driving). This course provides theoretical knowledge as well as practical algorithms for machine learning such as decision trees, neural networks, Bayesian methods, k neighbors and genetic algorithms.

6.92   Human-Computer Interaction (CT273)
- Num of credits: 03
- Description:
The module highlights the importance of human-machine interaction, along with the role that users play in an interactive system in today's world. The psychological characteristics, needs and desires of the user are noted to give the principles, general guidelines as well as specific ways to design interactive systems. These support principles and guidelines can also be used as part of the criteria for evaluating an interactive system. Learners find step-by-step design for the general approach, and specificities for different situations: application, web, embedded system, or small device (such as mobile device).

PART 4. STUDENT ASSESSMENT

The assessment of students is done through the learning process and the final evaluation throughout the training program to determine their achieved level of knowledge and competency in comparison with the objectives and learning outcomes of the program. The student assessment is undertaken based on the academic regulations of Can Tho University. The academic regulations are publicly available on the University website and provided directly to students in the form of a student handbook. The evaluation includes assessing the sense of learning (not absent more than 1 practical session), study records (writing reports, presentations, post-harvest assignments, project-based assignments), mid-term test (short essay in class or practical exercises), and final exam (in the form of multiple choice or essay). The percentages of the assessment sections will depend on each subject, but the final score should be at least 50%.

Lecturers can choose the appropriate assessment methods for their courses to accurately reflect the level of achievement of the objectives and expected learning outcomes of the course. The assessment forms and scores of the module are shown in the course outline and are announced directly in the classroom as well as on the Faculty's e-learning website. The questions in the test must follow the content of the module to assess the learners' level of understanding and synchronize with the standard outcomes of the module and the curriculum. The transition between grades as well as the student's understanding of the course is described in Table:

Rank	Scale /10	Scale /4 Letter	Scale /4 Number	Meaning
Excellent	9.0– 10.0	A	4.0	Learners fully understand and apply the knowledge of the subject and successfully complete the requirements of the course.
Good	8.0 – 8.9	B+	3.5	Learners have a firm grasp of the basics of the subject and fulfill the requirements of the course.
Fair	7.0 – 7.9	B	3.0	
Fair average	6.5 – 6.9	C+	2.5	Learners understand part of the module knowledge and complete most of the requirements of the module.
Average	5.5 – 6.4	C	2.0	
Pass	5.0 – 5.4	D+	1.5	Learner understands very little about the subject and completes a portion of the course requirements.
Pass	4.0 – 4.9	D	1.0	
Fail	< 4.0	F	0.0	Learners do not understand the course content and complete very few requirements of the course.

The notification of student registration and information related to training and test-exam activities are regularly and continuously updated through personal accounts to help students understand the content and assessment methods, regulations of evaluation processes, request for re-score.

The course is only cumulative when scores are from D or higher.

Before completing the training program, students must take part in graduation internship at an agency or a company related to information technology such as network management positions. This module is to collect practical experiences and get acquainted with the working environment in agencies and businesses. The assessment of the internship will be conducted by an officer in charge at the company and an instructor assigned by the Faculty. During the internship, the instructor will call or visit the company to check the working conditions, the internship process of the students, and receive opinions from the officer in the company. At the end of the practical internship, the instructors will evaluate the students' internship results based on their reports, tracking internship activities sheet, and the officer's assessment.

In addition, students must do a 15-credit graduation thesis (final project) or study some modules to achieve the equivalent knowledge block. The thesis will help students further develop their own activeness, creativity, and self-research. Thesis-making students must defend their research results in front of an evaluation board. The defense will be publicized with a 3-member board to overall evaluate the skills and knowledge of the program learning outcomes. If a student does an essay rather than a graduation thesis, he must submit his research results to two members of the essay evaluation board. The essay evaluation board is assigned by the department of Computer Networks, in which one member is the instructor.

PART 5.   STUDY ENVIRONMENT

1   Infrastructure to support education and research

CTU has a total area of 2,249,773. 47 m^2, of which the total construction area for training purposes is nearly double the minimum requirement of the Ministry of Education and Training. Since April 2020, CTU has 290 classrooms and lecture halls with a total area of 61,007.70 m^2. The teaching facilities such as televisions, projectors, and microphones are fully equipped. All classrooms have televisions or projectors.

The CICT uses the classrooms of the university, accommodating from 40 to 160 students/room. The CICT currently manages 3 thesis/project rooms, 26 lab rooms, and 15 function rooms including working offices and main halls. The CICT's facilities and equipment are regularly updated, maintained, invested in upgrading, purchased, used, and exploited very effectively. They fully meet the needs of teaching, learning, research, and other activities of staff and students. Each year, the CICT conducts activities to receive the equipment procurement and repair needs from the lecturers and laboratory managers.

In addition, the CICT has an open, clean, and beautiful self-study space with 24/24 wifi coverage, which is one of the favorite places of students for self-studying. This self-study space meets the needs of students' self-study, and group activities.
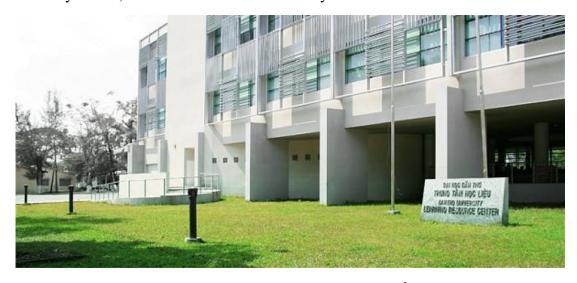
2   Library and learning resources

The library system of the CTU consists of the Learning Resource Center (LRC) and 14 libraries in colleges and institutes. The construction floor area of the LRC is 7,560 m^2, including 23 reading rooms with 1,000 seats. The LRC is equipped with modern facilities, computer labs, discussion rooms, training rooms, private classrooms, multimedia rooms, and a variety of globally connected modern technology facilities. The LRC provides a professional, and comfortable learning and working environment. As of May 2020, the information resources of the LRC have 62,823 electronic collections; resources in the field of knowledge in the print form includes 139,289 book copies and 306,117 books in many different languages. The LRC provides a variety of books, textbooks, references in Vietnamese and foreign languages and is regularly updated.

The LRC provides a variety of electronic databases such as registered online databases (SpringerLink, IEEE, Scopus, …), open-access online database (DSpace@Cambridge, Elsevier Open Access Journals, …), nation and and international open learning materials (MIT

OpenCoursewave, Coursera, edX, Udemy và FutureLearn). The LRC materials are in almost all areas of teaching and research.

The users can access these materials from both inside and outside the University, which effectively responds to user requirements. Users can easily register online for cards or register directly at the center.

In order to make good use of resources, the center usually opens LRC tours and training courses showing how to use resources. Survey results show that the level of student satisfaction with the LRC is very high in both resources and services provided; specifically, in the most recent survey results, the LRC has a total rate of very satisfied and satisfied at 89.6%.
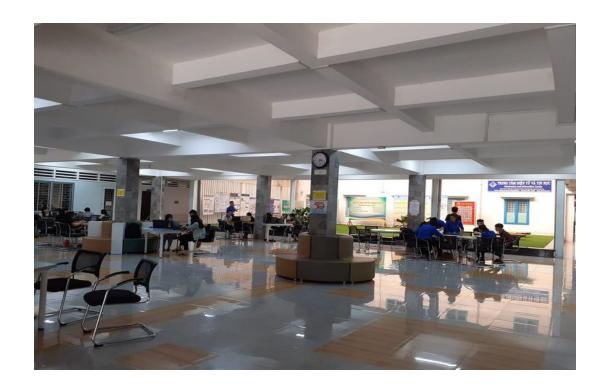

The library of the CICT is built on an area of 180m^2 with 54 seats. The CICT library has 3,431 books, magazines, ebooks, and electronic databases. The CICT library uses the resources of the LRC, ensures a complete and up-to-date provision of specialized resources. Every year, the CICT library updates and orders new resources through additional requests, books, and references of lecturers in the College. The CICT students can also refer to resources from other colleges and institutes within the University. The CICT annually buys and repairs equipment and facilities for the library.

3   Laboratories and equipments

The total number of laboratories, practice rooms, computer labs, and veterinary clinics of CTU is 134 (with 277 sub-divisions), 9 laboratories for studying foreign languages, multimedia, and translation.

Due to the specificity of majors, the laboratories at CICT are for scientific research and training activities. The College has 3 computer labs and 3 laboratories with 29 subordinate rooms. Each subordinate room has an area from 36 to 96 m^2 and is equipped with from 10 to 61 computers. The CICT totally has 1,162 computers including 72 computers in the function rooms and 1,090 computers in the computer labs and laboratories; 21 projectors; 2 robots; 26 televisions and 23 printers for teaching and research activities.

     To ensure the equipment is complete and up to date, the CICT regularly plans and renovates rooms and facilities, purchases new computers and equipment for training and research activities.

PART 6.   **CAREER OPPORTUNITIES**

- Administrator in computer networks, working at companies, organizations, enterprises, in the information technology field,
- Researcher the information technology field at research institutes and applied centers,
- Lecturers in universities and colleges,
- Teachers in high schools, professional high schools and vocational schools,
- Consultant, analyzer, designer, maintainer in computer networks and network security,
- Programmers in companies in the information technology field.

In addition, CNDC engineers can also improve their professional qualifications, develop their skills in an intensive, academic direction, or study postgraduate education programs (masters, doctorates), becoming experts in information technology.

MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

DEPARTMENT OF COMPUTER NETWORKS AND COMMUNICATION

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