



**MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY**

PROGRAMME SPECIFICATION

Academic year 2019-2020

BACHELOR OF ENGINEERING IN SOFTWARE ENGINEERING

College of Information and Communication Technology

July 2019

PROGRAMME SPECIFICATION

Academic year 2019-2020

BACHELOR OF ENGINEERING IN SOFTWARE ENGINEERING

Programme specification was last revised in June 2019 and enclosed with the Decision 3019/QD-DHCT, dated July 31, 2019 by CTU's Rector.

Programme: Software Engineering
Discipline: Software Engineering
Degree: Engineer
Training time: 4.5 years
The minimum number of credits accumulated: 156

Programme code: 7480103
Mode of training: Full-time
Administration unit: Department of Software Engineering, College of Information and Communication Technology, Can Tho University

Appendix

Part 1. General information of the programme.....	4
1.1 Programme title.....	4
1.2 Degree awarding institution.....	4
1.3 Administration unit.....	4
1.3 Degree.....	4
1.4 Mode of training.....	4
1.5 Training time.....	4
1.6 Admission criteria.....	4
1.7 Course workload.....	4
Part 2. Programme objectives and expected learning outcomes	5
2.1 Programme objectives.....	5
2.2 Expected learning outcomes	5
2.3 The alignment between POs and ELOs of the BESE Programme	6
Part 3. Programme structure and curriculum	7
3.1 Programme structure.....	7
3.2 Curriculum	7
3.3 Curriculum Map.....	11
3.4 Mapping POs to ELOs	12
3.5 Mapping CLOs to ELOs	13
Part 4. Brief outline of all courses in the programme.....	18
Part 5. Student assessment method	46
5.1 Course assessment	46
5.2 Course grade	46
5.3 Semester, year and cumulative grade point average.....	46
5.4 Training grade	47
5.5 Graduation classification	48
Part 6. Learning environment.....	49
6.1 Library.....	49
6.2 Dormitory.....	49
6.3 Natural and social environment	49
6.4 Health care	49
6.5 Sport.....	50
6.6 Extra-curricular activities.....	50
6.6 Internet	50
Part 7. After graduation	51
7.1 Career prospects.....	51
7.2 Further study	51

Part 1. General information of the programme

1.1 Programme title: Software Engineering

1.2 Degree awarding institution: Can Tho University

1.3 Administration unit: Department of Software Engineering, College of Information and Communication Technology, Can Tho University

1.3 Degree: Engineer in Software Engineering

1.4 Mode of training: Full-time, on campus

1.5 Training time: 4.5 years (maximum 9 years)

1.6 Admission criteria

High school graduates must pass the National High School Graduation Examination which is held by MOET around end of June every year. They must have the total score of groups of subjects equal or higher than the cut-off level set by CTU based on the admission quota of MOET. Those groups of subjects are: (1) Mathematics, Physics, and Chemistry (group A, A00); (2) Mathematics, Physics and English (group A1, A01). The admission score is announced in August annually. The admission scores for the academic years 2018-2019 and 2018-2019 are 17.75 and 2018-2019, respectively.

1.7 Course workload: 156 (Required credits: 120; elective credits: 36)

Part 2. Programme objectives and expected learning outcomes

2.1 Programme objectives

The Bachelor of Engineering in Software Engineering (BESE) programme has the following objectives:

- PO1: To train students to have health, ethics, professional responsibility and social responsibility.
- PO2: To equip students with fundamental knowledge of the theoretical basis of mathematics, science and technology relevant to Software Engineering.
- PO3: To equip students with solid specialized knowledge and skills to satisfy various tasks related to analysis, design, implementation, testing and maintenance of software systems, software project management and career development to high positions, and holding a leadership role.
- PO4: To equip students with foundation knowledge and skills to develop embedded & IoT software systems, business software, or simulation software.
- PO5: To train students to have professional behavior, communication skills, teamwork skills, lifelong learning skills, scientific research, adaptability and working in the field of software engineering inside the country and abroad.

2.2 Expected learning outcomes

After completion, the graduates are able to:

A. Knowledge

General knowledge

- ELO 1: Show basic understanding of political science, social science and humanities; law; basic knowledge about physical education, national defense education.
- ELO 2: Demonstrate basic understanding of mathematics and fundamental of information technology to acquire professional knowledge and to study at higher levels.
- ELO 3: Demonstrate basic understanding of English or French, equivalent to level 3/6 of Vietnam's Framework of Foreign Language Proficiency (i.e., level B1 according to the European Framework).

Fundamental knowledge

- ELO 4: Implement the basics of programming, object-oriented programming, web programming, data structure, algorithm analysis and design, graph theory, and artificial intelligence.
- ELO 5: Implement the basics of databases, modeling language, and analysis and design of information systems for organizations and enterprises.
- ELO 6: Implement the basics of computer architecture, operating system, system administration, and computer network.

Specialized knowledge

- ELO 7: Apply in-depth knowledge of mathematic problem recognition, analysis, design, implementation, testing, quality assurance, and software maintenance and software project management to software development.
- ELO 8: Apply knowledge of one of the three following areas: embedded software and IoT, business software, or simulation software to software development.

B. Skills**Technical skills**

- ELO 9: Demonstrate the following skills: problem identification, analysis, design and implementation, testing and quality assurance, project management, and maintaining a software system.
- ELO 10: Write standardized technical documentation for software development and maintenance phases.
- ELO 11: Professionally use tools that support all phases of the software development and maintenance process.

Soft skills

- ELO 12: Use basic English or French and common office informatics software.
- ELO 13: Develop skills to adapt to the working environment and skills to organize, manage and effectively solve problems in a team working environment; innovation and start-up skills.
- ELO 14: Communicate effectively with team members, customers, supervisors, etc., in both written and spoken forms.

C. Attitude and Perception

- ELO 15: Demonstrate professionalism ~~in~~at work and ability of self-study and lifelong learning.
- ELO 16: Demonstrate professional ethics and social responsibility

2.3 The alignment between POs and ELOs of the BESE Programme

POs	ELOs															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2																
3																
4																
5																

Part 3. Programme structure and curriculum

3.1 Programme structure

Group	Credits		
	Required	Elective	Total
General Knowledge	41	15	56
Foundational Knowledge	46	0	46
Specialized Knowledge	33	21	54
Total	120	36	156

3.2 Curriculum

Curriculum of the BESE programme was issued under the Decision 3019/QĐ-DHCT, dated July 31, 2019 by CTU's Rector.

Programme: Software Engineering

Discipline: Software Engineering

Degree: Engineer

Training time: 4.5 years

The minimum number of credits accumulated: 156

Programme code: 7480103

Mode of training: Full-time

Administration unit: Department of Software Engineering, College of Information and Communication Technology, Can Tho University

No	Course ID	Course Name	Credits	Required credits	Elective credits	Theory hours	Practice hours	Prerequisite course	Parallel course	Semester
General Knowledge										
1	QP006	National Defence Education 1 (*)	2	2		30				Taught in groups of majors
2	QP007	National Defence Education 2 (*)	2	2		30				Taught in groups of majors
3	QP008	National Defence Education 3 (*)	3	3		20	65			Taught in groups of majors
4	QP009	National Defence 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	General English 1 (*)	4		10 credits of English or 10 credits of French	60				I,II,III
7	XH024	General English 2 (*)	3			45		XH023		I,II,III
8	XH025	General English 3 (*)	3			45		XH024		I,II,III
9	XH031	Level B1 English 1 (*)	4			60		XH025		I,II,III
10	XH032	Level B1 English 2 (*)	3			45		XH031		I,II,III
11	XH033	Level B1 English 3 (*)	3			45		XH032		I,II,III
12	FL001	General French 1 (*)	4			60				I,II,III
13	FL002	General French 2 (*)	3			45		FL001		I,II,III
14	FL003	General French 3 (*)	3			45		FL002		I,II,III
15	FL007	Intensive French 1 (*)	4			60		FL003		I,II,III
16	FL008	Intensive French 2 (*)	3			45		FL007		I,II,III
17	FL009	Intensive French 3 (*)	3			45		FL008		I,II,III
18	ML014	Marxist - Leninist Philosophy	3	3		45				I,II,III
19	ML016	Marxist - Leninist Political Economy	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 Vietnam	2	2		30		ML018		I,II,III
22	ML021	Ho Chi 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 Archive	2			30				I,II,III
29	KN001	Transferable Skills	2			20	20			I,II,III
30	KN002	Innovation and Entrepreneurship	2			20	20			I,II,III
31	TN001	Calculus 1	3	3		45				I,II,III
32	TN002	Calculus 2	4	4		60		TN001		I,II,III
33	TN010	Probability and Statistics	3	3		45				I,II,III
34	TN012	Linear Algebra & Analytic Geometry	4	4		60				I,II,III
35	CT100	Study skills in higher education	2	2		20	20			I,II,III
36	CT200	Fundamentals of Information Technology	4	4		45	30			I,II,III
Total: 56 credits (Required credits: 41; elective credits: 15)										
Fundamental Knowledge										
37	CT172	Discrete Mathematics	4	4		60				I,II
38	CT101	Introduction to 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	Algorithms Analysis and Design	3	3		30	30	CT177		I,II
42	CT180	Database	3	3		30	30	CT177		I,II
43	CT173	Computer Architecture	3	3		45				I,II
44	CT178	Principles of Operating System	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	CT180		I,II
48	CT182	Unified Modeling Language	3	3		30	30	CT176	CT180	I,II
49	CT179	IT Systems 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 (Required credits: 40; elective credits: 0)										
Specialized Knowledge										
52	CT189	Introduction to Simulation Platform	3	CN1	3	30	30	CT176		I,II
53	CT295	Principles of IoT and Embedded Software	3	CN2		30	30	CT176		I,II
54	CT460	Business Process Management	3	CN3		30	30	CT176		I,II
55	CT113	Introduction to Software Engineering	2	2		20	20			I,II
56	CT239	Project - Basic Topics	3	3			90	≥90 credits, CT174		I,II,III
57	CT240	Software Constructions	3	3		45		CT113, CT176, CT182		I,II

58	CT241	Software Requirements Engineering	3	3		30	30	CT113, CT182		I,II
59	CT242	Software Architecture and Design	3	3		30	30	CT113		I,II
60	CT243	Software Quality Assurance and Testing	4	4		45	30	CT113		I,II
61	CT244	Software Maintenance	3	3		30	30	CT113		I,II
62	CT223	Software Project Management	3	3		30	30			I,II
63	CT287	Model Checking	3	3		30	30	CT241		I,II
64	CT250	Software Development Project	3	3			90	CT241, CT242, CT243, CT223		I,II,III
65	CT474	Internship for Software Engineering	3	3			90	≥120 credits		III
66	CT276	Java Programming	3		3	30	30	CT176		I,II
67	CT246	.NET Programming	3			30	30	CT176		I,II
68	CT449	Web Application Development	3			30	30			I,II
69	CT483	Mobile Programming	3			30	30	CT176		I,II
70	CT446	Simulation Programming Language	3		15	30	30	CT189		I,II
71	CT456	Simulation Platform Development	3			30	30	CT189		I,II
72	CT470	IoT and Embedded System Design	3			30	30	CT295		I,II
73	CT457	IoT and Embedded Software Development	3			30	30	CT295		I,II
74	CT288	Client-Server Software Architectures	3			30	30	CT460	CT459	I,II
75	CT459	Business Application Development	3			30	30	CT460	CT288	I,II
76	CT199	Linear Programming	3			30	30			I,II
77	CT292	Information Theory	3			30	30			I,II
78	CT202	Principles of Machine Learning	3			30	30			I,II
79	CT211	Network Security	3			30	30	CT112		I,II
80	CT222	System Security	3			30	30			I,II
81	CT233	Cloud Computing	3			30	30			I,II
82	CT258	E-commerce Systems Development	3			30	30	CT296		I,II
83	CT205	Database Management Systems	3			30	30	CT180		I,II
84	CT255	Business Intelligence	3			30	30	CT109		I,II
85	CT316	Image Processing	3			30	30	CT176		I,II
86	CT335	Network Design	3			30	30	CT112		I,II
87	CT505	Graduation Project for Software Engineering	6				180	≥120 credits		I,II,III
88	CT553	Thesis for Software Engineering	15				450	≥120 credits		I,II
Total: 54 credits (Required credits: 33; elective credits: 21)										
Total: 156 credits (Required credits: 120; elective credits: 36)										

Total of required credits: 120.

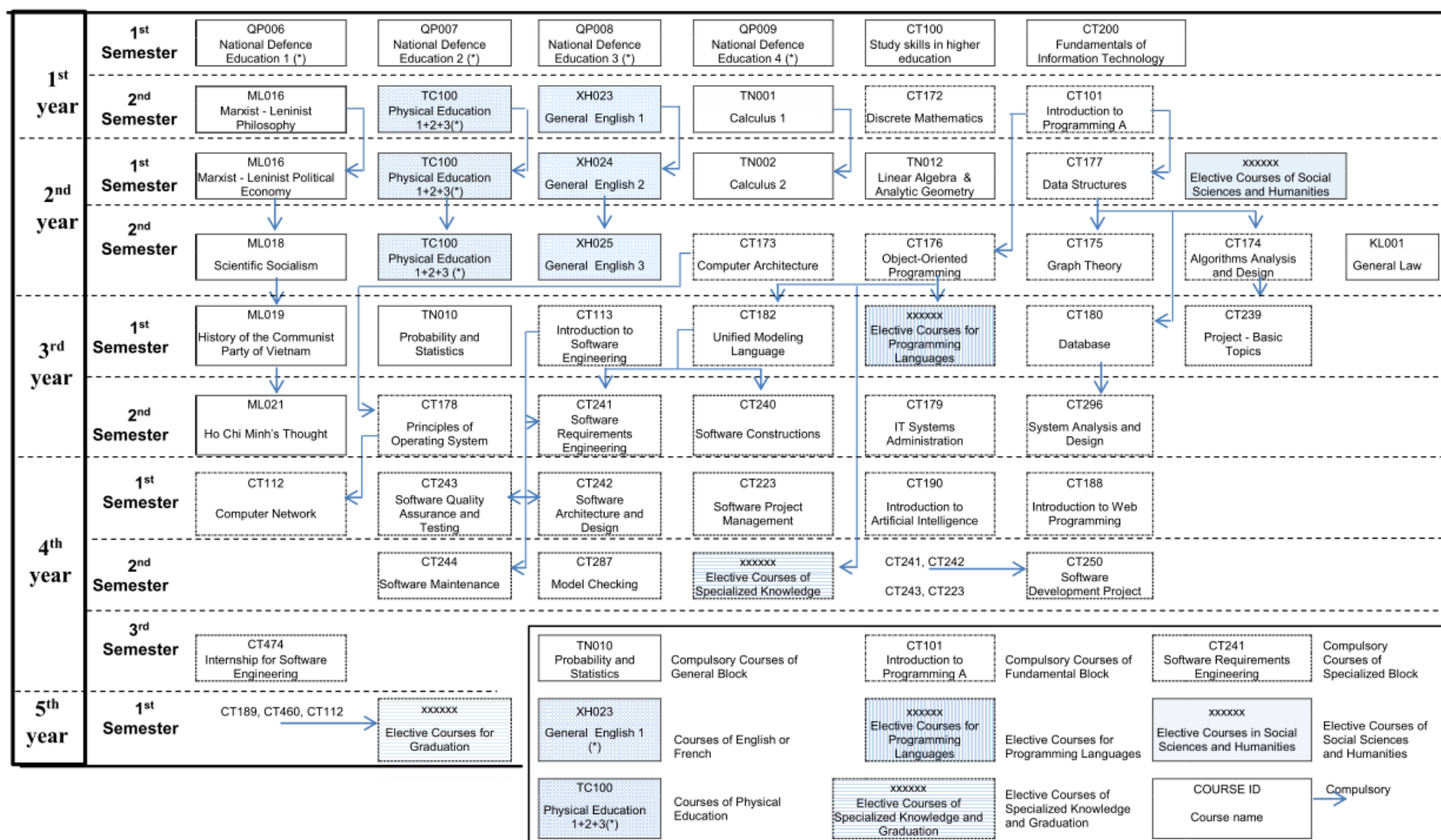
Total of elective credits: 36.

15 credits of graduation are structured into three options:

1. Thesis for Software Engineering (15 credits).
2. Graduation Project for Software Engineering (6 credits) and courses (9 credits).
3. Courses (15 credits).

(*) conditional courses, pass required but not included in GPA. Students must pass the exams of National Defence Education, Physical Education and English (or French) as specified by CTU. Students can complete the above courses by submitting certificates according to CTU's regulations or cumulative study.

3.3 Curriculum Map



3.4 Mapping POs to ELOs

Programme objectives	Expected Learning Outcomes															
	Knowledge								Skills						Attitude and Perception	
	General Knowledge			Fundamental Knowledge			Specialized Knowledge		Hard skills			Soft skills				
	ELO 1	ELO 3	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15	ELO 16
PO1	X															X
PO2		X														
PO3				X	X	X	X		X	X	X					
PO4								X								
PO5			X									X	X	X	X	X

Note: X = Supporting

3.5 Mapping CLOs to ELOs

Courses			Expected Learning Outcomes															
			Knowledge								Skills						Autonomy and responsibility	
			General Knowledge			Fundamental Knowledge			Specialized Knowledge		Hard Skills			Soft Skills				
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15	ELO 16
	General Knowledge																	
1	QP006	National Defence Education 1 (*)	X														X	
2	QP007	National Defence Education 2 (*)	X														X	
3	QP008	National Defence Education 3 (*)	X														X	
4	QP009	National Defence Education 4 (*)	X										X				X	
5	TC100	Physical Education 1+2+3 (*)	X															
6	XH023	General English 1 (*)			X								X			X		
7	XH024	General English 2 (*)			X								X			X		
8	XH025	General English 3 (*)			X								X			X		
9	XH031	Level B1 English 1 (*)			X								X			X		
10	XH032	Level B1 English 2 (*)			X								X			X		
11	XH033	Level B1 English 3 (*)			X								X			X		
12	FL001	General French 1 (*)			X								X			X		
13	FL002	General French 2 (*)			X								X			X		
14	FL003	General French 3 (*)			X								X			X		
15	FL007	Intensive French 1 (*)			X								X			X		
16	FL008	Intensive French 2 (*)			X								X			X		
17	FL009	Intensive French 3 (*)			X								X			X		
19	ML016	Marxist - Leninist Political Economy	X														X	
20	ML018	Scientific Socialism	X														X	
21	ML019	History of the Communist Party of Vietnam	X														X	
22	ML021	Ho Chi Minh's Thought	X														X	

Courses			Expected Learning Outcomes															
			Knowledge								Skills						Autonomy and responsibility	
			General Knowledge			Fundamental Knowledge			Specialized Knowledge		Hard Skills			Soft Skills				
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15	ELO 16
23	KL001	General Law	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	
27	XH012	Vietnamese in Use	X												X		X	
28	XH014	General Management Documents and Archive	X												X		X	
29	KN001	Transferable Skills	X											X	X	X	X	
30	KN002	Innovation and Entrepreneurship	X											X	X	X	X	
31	TN001	Calculus 1		X												X		
32	TN002	Calculus 2		X												X		
33	TN010	Probability and Statistics		X												X		
34	TN012	Linear Algebra & Analytic Geometry		X												X		
35	CT100	Study skills in higher education												X	X	X	X	
36	CT200	Fundamentals of Information Technology		X									X			X		
	Fundamental knowledge																	
37	CT172	Discrete Mathematics				X					X							
38	CT101	Introduction to Programming A				X					X		X			X		
39	CT177	Data Structures				X					X		X			X		
40	CT175	Graph Theory				X					X							
41	CT174	Algorithms Analysis and Design		X		X					X		X			X		
42	CT180	Database					X				X		X					
43	CT173	Computer Architecture						X			X					X		
44	CT178	Principles of Operating System						X			X		X					
45	CT112	Computer Network						X			X		X			X		

Courses			Expected Learning Outcomes														
			Knowledge							Skills						Autonomy and responsibility	
			General Knowledge			Fundamental Knowledge			Specialized Knowledge		Hard Skills			Soft Skills			
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15
46	CT176	Object-Oriented Programming				X				X		X					
47	CT296	System Analysis and Design					X			X		X		X	X	X	
48	CT182	Unified Modeling Language					X			X		X		X		X	
49	CT179	IT Systems Administration						X		X		X				X	
50	CT188	Introduction to Web programming				X				X		X		X		X	
51	CT190	Introduction to Artificial Intelligence				X				X							
	Specialized knowledge																
52	CT189	Introduction to Simulation Platform							X	X	X	X		X	X	X	X
53	CT295	Principles of IoT and Embedded Software							X	X	X	X		X	X	X	
54	CT460	Business Process Management							X	X	X	X		X	X	X	X
55	CT113	Introduction to Software Engineering						X		X	X			X	X	X	
56	CT239	Project - Basic Topics		X		X	X	X				X	X			X	
57	CT240	Software Constructions						X	X					X	X	X	
58	CT241	Software Requirements Engineering						X		X	X	X				X	
59	CT242	Software Architecture and Design						X		X	X	X				X	
60	CT243	Software Quality Assurance and Testing						X		X	X	X		X	X	X	X
61	CT244	Software Maintenance						X		X	X	X		X	X	X	
62	CT223	Software Project Management						X		X	X	X				X	
63	CT287	Model Checking						X		X				X		X	
64	CT250	Software Development Project						X	X	X	X	X	X	X	X	X	X
65	CT474	Internship for Software Engineering						X	X	X	X	X	X	X	X	X	X
66	CT276	Java Programming				X		X		X				X	X	X	
67	CT246	.NET Programming				X		X		X				X	X	X	

Courses			Expected Learning Outcomes															
			Knowledge								Skills						Autonomy and responsibility	
			General Knowledge			Fundamental Knowledge			Specialized Knowledge		Hard Skills			Soft Skills				
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15	ELO 16
68	CT449	Web Application Development				X					X		X		X	X	X	
69	CT483	Mobile Programming		X		X					X		X				X	
Elective courses for graduation (15 credits)																		
70	CT446	Simulation Programming Language								X	X	X	X		X	X	X	X
71	CT456	Simulation Platform Development						X		X					X	X	X	
72	CT470	IoT and Embedded System Design							X	X	X	X	X	X			X	X
73	CT457	IoT and Embedded Software Development						X		X					X	X	X	
74	CT288	Client-Server Software Architectures								X	X				X		X	
75	CT459	Business Application Development								X	X	X	X		X	X	X	X
76	CT199	Linear Programming				X					X							
77	CT292	Information Theory				X					X							
78	CT202	Principles of Machine Learning				X				X	X				X	X	X	
79	CT211	Network Security						X		X			X				X	X
80	CT222	System Security						X		X			X				X	X
81	CT233	Cloud Computing						X		X			X				X	X
82	CT258	E-commerce Systems Development								X	X		X		X	X		X
83	CT205	Database Management Systems					X			X			X		X			X
84	CT255	Business Intelligence					X			X	X		X		X	X		X
85	CT316	Image Processing				X				X	X						X	
86	CT335	Network Design						X		X	X		X				X	

Courses			Expected Learning Outcomes														
			Knowledge							Skills						Autonomy and responsibility	
			General Knowledge			Fundamental Knowledge			Specialized Knowledge	Hard Skills			Soft Skills				
			ELO 1	ELO 2	ELO 3	ELO 4	ELO 5	ELO 6	ELO 7	ELO 8	ELO 9	ELO 10	ELO 11	ELO 12	ELO 13	ELO 14	ELO 15
87	CT505	Graduation Project for Software Engineering		X		X	X	X	X	X	X	X	X		X	X	X
88	CT553	Thesis for Software Engineering		X		X	X	X	X	X	X	X	X		X	X	X

Note: X = Supporting

Part 4. Brief outline of all courses in the programme

4.1 National Defence Education 1 (*) (QP006)

Credit: 2

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course presents the Party's basic theory of the military policy, including: the basic issues Marxist-Leninist Theory, Ho Chi Minh's thought on war, the army and the defense of the country; Party's views on the people war, building the armed forces, the all-people defense, the people's security; the Party's views on combining socio-economic development with strengthening national defense and security. In addition, the course introduces some basic contents about the history of Vietnamese military art through the periods.

4.2 National Defence Education 2 (*) (QP007)

Credit: 2

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course presents the basic contents of the defense and security tasks of the Party and State in the new situation, including: building the militia, self-defense, mobilization reserve force; increasing the potentials of national defense and technical and material foundations; defeating the strategy of "peaceful evolution", and riot to overthrow hostile forces toward the Vietnamese revolution. The course addresses a number of issues of ethnicity, religion and the fight against the enemies who take advantage of issues of ethnicity and religion to fight the Vietnamese revolution; building and protecting border sovereignty, sovereignty over islands, national security, fighting crime prevention and maintaining social order and safety, combating non-traditional security threats in Vietnam.

4.3 National Defence Education 3 (*) (QP008)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The course provides theory combined with practice to provide students with some basic skills to practice shooting with pistols, basic knowledge of maps, military terrain, and combat against the enemies with a weapon, high-tech gas, forging bravery and health through military content, training for class and block formation. The contents of the course include the followings: unit team (platoon level); training combat skills; commanding combat units; combat synergies in attack and defense.

4.4 National Defence Education 4 (*) (QP009)**Credit: 1****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course introduces the history, traditions of the army, the army, the organization of the forces of the army, visiting to learn the history, units in the armed forces. The course helps students: 1) master basic knowledge about the military in the Vietnam People's Army; 2) raising awareness in building, consolidating the people's armed forces, being ready to join militia and self-defense force, reserve mobilization and military service; and 3) training for quality, strong political bravery, patriotism, love of socialism and building and strengthening the people's armed forces.

4.5 Physical Education 1+2+3 (*) (TC 100)**Credit: 3****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

Physical Education 1+2+3 (*) is a general course that represents the Physical Education courses. All students who are not majoring in Physical Education must study these courses to complete the curriculum of their majors.

To complete the Physical Education courses, the students do not register for course TC100, instead, students must register for each specific course depending on their ability and desire to learn. For example, if a student wants to learn Taekwondo, they register for the following 3 modules: Taekwondo 1 (TC003), Taekwondo 2 (TC004) and Taekwondo 3 (TC019). The other Physical Education courses are the same.

4.6 General English 1 (*) (XH023)**Credit: 4****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course provides students with common English vocabulary for basic communication, focusing on topics such as introduction to personal information, family, residence, and daily life items, sports, free time activities, basic shopping, eating habits, food, festivals, culture and facilities. In addition to developing the ability to communicate some basic communication situations in English on these topics, the course also aims to develop foreign language skills at level 2 for students according to the 6-level Foreign Language Proficiency Framework applied for Vietnam.

4.7 General English 2 (*)**Credit:** 3**Course participation conditions**

Prerequisite course: XH023

Parallel course: None

Course description

This course provides students with common English vocabulary for basic communication, focusing on topics such as introduction to travel, fashion, art and the environment. In addition to developing the ability to communicate some basic communication situations in English on these topics, the course also aims to develop foreign language skills at level 2 for students according to the 6-level Foreign Language Proficiency Framework applied for Vietnam.

4.8 General English 3 (*) (XH025)**Credit:** 3**Course participation conditions**

Prerequisite course: XH024

Parallel course: None

Course description

This course reviews common English words in basic communication, focusing on topics such as introduction to personal information, family, residence, daily life items, technology equipment, sports, free time activities, festivals, basic shopping, learning, etc. In addition to developing the ability to communicate some basic communication situations in English on these topics, the course also aims to develop foreign language skills at level 3 for students according to the 6-level Foreign Language Proficiency Framework applied for Vietnam.

4.9 Level B1 English 1 (*) (XH031)**Credit:** 4**Course participation conditions**

Prerequisite course: XH025

Parallel course: None

Course description

This course provides students with English knowledge and the opportunity to practice the skills needed to suit the requirements of international communication competency with common situations. The course presents the following principles and characteristics: (1) towards developing competency-based learning; (2) integrated and blended learning method; (3) promote self-study (promoting learner independence in learning); (4) learning by interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing the ability to communicate and use language, the course also aims to support students to reach level B1 (level 3) in the 6-level Foreign Language Proficiency Framework applied for Vietnam (through VSTEP exam).

4.10 Level B1 English 2 (*) (XH032)**Credit:** 3**Course participation conditions**

Prerequisite course: XH031

Parallel course: None

Course description

This course provides students with English knowledge and the opportunity to practice the skills needed to suit the requirements of international communication competency with common situations. The course gives the following principles and characteristics: (1) towards developing competency-based learning; (2) integrated and blended learning method; (3) promote self-study (promoting learner independence in learning); (4) learning by interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing the ability to communicate and use language, the course also aims to support students to reach level B1 (level 3) in the 6-level Foreign Language Proficiency Framework applied for Vietnam (through VSTEP exam).

4.11 Level B1 English 3 (*) (XH033)

Credit: 3

Course participation conditions

Prerequisite course: XH032

Parallel course: None

Course description

This course provides students with English knowledge and the opportunity to practice the skills needed to suit the requirements of international communication competency with common situations. The course provides the following principles and characteristics: towards developing competency-based learning; (2) integrated and blended learning method; (3) promote self-study (promoting learner independence in learning); (4) learning by interaction and by doing; (5) purposeful learning; and (6) flexibility. In addition to developing the ability to communicate and use language, the course also aims to support students to reach level B1 (level 3) in the 6-level Foreign Language Proficiency Framework applied for Vietnam (through VSTEP exam).

4.12 General French 1 (*) (FL001)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The course aims to help students to communicate in daily life, such as introducing themselves, family, talking about habits, interests, getting to know and referring someone, talking and writing about hours in the usual and administrative ways, etc. In addition, knowledge of the language and French culture is also incorporated into the course content. Through this course, the students will be familiar with the pronunciation, intonation, alphabet of French, know how to conjugate verbs of group I, group II and some verbs of group III at present, write a simple sentence numbers, etc.

4.13 General French 2 (*) (FL002)

Credit: 3

Course participation conditions

Prerequisite course: FL001

Parallel course: None

Course description

The course provides students with basic knowledge of grammar, phonetics, vocabulary, etc. of the French language. The course content is aimed at helping students to communicate in daily life, such as asking for information, explaining, accepting invitations or declining, talking about their working days, talking about their future plans, etc.

The students will be familiar with how to make questions with complex French pronouns, know how to conjugate group I, group II verbs and some group III verbs in the imperative form, know directions, locate in the space, etc. In addition, knowledge of French language and culture is also incorporated into the course content.

4.14 General French 3 (*) (FL003)

Credit: 3

Course participation conditions

Prerequisite course: FL002

Parallel course: None

Course description

The course aims to help students communicate in daily life such as discussing holidays, New Year, food, describing people, objects, clothes, expressing their choices, and quantity, introducing family members, retelling a story of the past, etc. In this course, the students are introduced to texts of 100 words or more, long dialogues, writing paragraphs of about 100 words and writing letters. The students can apply their knowledge of grammar in their writing such as noun matching, adjective conjugation, past tense conjugation, past tense combination, etc. After completing the course, the students will also know how to explain and make simple arguments.

4.15 Intensive French 1 (*) (FL007)

Credit: 4

Course participation conditions

Prerequisite course: FL003

Parallel course: None

Course description

The course aims to help students communicate in daily life such as introducing family members, getting to know someone, narrating daily activities, describing people and places, and comparing quantity or quality, etc. In addition, knowledge of French language and culture is also incorporated into the course content.

4.16 Intensive French 2 (*) (FL008)

Credit: 3

Course participation conditions

Prerequisite course: FL007

Parallel course: None

Course description

The course provides students with a rich and diverse range of vocabulary and grammatical structures to help them develop comprehensively four skills (listening, speaking, reading and

writing) related to six main topics: eating habits, sports, employment, education, communication and entertainment.

4.17 Intensive French 3 (*) (FL009)

Credit: 3

Course participation conditions

Prerequisite course: FL008

Parallel course: None

Course description

This course provides students with a rich and diverse range of vocabulary and grammar structures to help students develop comprehensively the four skills (listening, speaking, reading and writing) related to six main topics of expression when speaking, such as talking about memories, traveling, habits, personal motivation, narrating other people's words.

4.18 Marxist - Leninist Philosophy (ML014)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with basic and in-depth knowledge of Marxist-Leninist philosophy, including: philosophy and its role in social life; Marxist-Leninist philosophy and its role in social life; dialectical materialism: matter and consciousness, materialistic dialectic and cognitive reasoning; historical materialism: socio-economic morphology, class and nation, state and social revolution, man's social consciousness and philosophy.

4.19 Marxist - Leninist Political Economy (ML016)

Credit: 2

Course participation conditions

Prerequisite course: ML014

Parallel course: None

Course description

In this course, students are provided with basic and in-depth knowledge of Marxist-Leninist political economy, including: subjects, research methods and functions of Marxist-Leninist Political Economy; goods, the market and the role of actors when participating in the market; surplus values in the market economy; competition and monopoly in the market economy; the socialist-oriented market economy and economic interest relations in Vietnam.

4.20 Scientific Socialism (ML018)

Credit: 2

Course participation conditions

Prerequisite course: ML016

Parallel course: None

Course description

In this course, students will study the common theoretical issues of socialism and practice in the construction of socialism in our country today. The course content mainly focuses on a number of issues such as: the birth and development of scientific socialism; the historic mission of the working class, socialism and the transition to socialism; socialist democracy and a socialist state; alliances of class, class; ethnicity, religion issues; the family problem in the transition to socialism.

4.21 History of the Communist Party of Vietnam (ML019)**Credit:** 2**Course participation conditions**

Prerequisite course: ML018

Parallel course: None

Course description

The course equips students with the understanding of objects, purposes, tasks, research methods, learning of the Party History course and the basic, core and systematic knowledge about the Party's birth (1920-1930), the Party leadership process in the struggle for power (1930-1945), leading in two resistance wars against the French colonialists and American imperialists, completing national liberation, unification of the country (1945-1975), transitional leadership to socialism and national renewal (1975-2018). Thereby, the course affirms the successes, raises the limitations, summarizes the experiences of the revolutionary leadership of the Party to help learners increase awareness, belief in the Party and the ability to apply knowledge, which has just been learned, into practical work to contribute to building and defending the Socialist Vietnam Fatherland.

4.22 Ho Chi Minh's Thought (ML021)**Credit:** 2**Course participation conditions**

Prerequisite course: ML019

Parallel course: None

Course description

Together with Marxist-Leninist Philosophy, Marxist-Leninist Political Economy, Scientific Socialism, History of the Communist Party of Vietnam, this course creates an understanding of the ideological foundation, the guideline for the Party's actions and our country's revolution. It continues to provide basic knowledge about Marxism-Leninism, contributing to building a new human moral foundation. The course consists of 6 chapters, which present the basic contents of Ho Chi Minh's Thought according to the objectives of the module, providing a systematic understanding of Ho Chi Minh's ideology, morality and values.

4.23 General Law (KL001)**Credit:** 2**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course is designed to teach non-law students. It introduces the basic theoretical issues of the Marxist-Leninist doctrine of the state and the law from the origin, nature, form, function as well as the types of state and the law that have formed, existed and developed through different socio-economic forms in human history. In addition, the course also includes the study of the position of the state in the political system, the composition of the state apparatus, and the systems of state agencies. A large amount of basic knowledge in the common law disciplines of Vietnam is also introduced such as basic rights and obligations of citizens, crimes, violation of administrative laws, regulations of law on marriage, divorce, inheritance, etc.

4.24 Basic Logic (ML007)**Credit: 2****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course provides the knowledge of formal logic. It provides the rules and requirements of the basic laws of thought such as the law of identity, non-contradictory law, the law of dismissing the third thing, the law of full reason. The course also introduces basic forms of thinking such as concepts, judge, deductive, hypothesis, proving, refuting and sophistication.

4.25 Overview of Sociology (XH028)**Credit: 2****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course provides the law, the regularity of formation, movement, changing relationships, interactions between people and society. The module focuses on social relationships, social interactions manifested through human-to-person behaviors in groups, organizations and social systems.

4.26 Vietnamese Culture (XH011)**Credit: 2****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course content is presented in 5 chapters, covering from theory to practice. In Chapter 1, after introducing necessary scientific concepts and terminology (culture, cultural studies, cultural processes, cultural exchange, cultural acculturation, etc.), it presents the types of Vietnamese culture. Chapters 2, 3 and 4 present knowledge about the valuable aspects of culture and their rich and varied manifestations in the material and spiritual life of Vietnamese people. Chapter 5 focuses on discovering characteristics of the national culture and future.

4.27 Vietnamese in Use (XH012)**Credit:** 2**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course is designed into 4 chapters. Each chapter consists of two main parts which are interwoven: theory and practice exercises. Chapter 1 focuses on writing and spelling. Chapter 2 focuses on practicing word skills. Chapter 3 teaches students about sentences. Chapter 4 trains students' skills in creating and using texts.

4.28 General Management Documents and Archive (XH014)**Credit:** 2**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course provides students with theoretical knowledge and practical skills of management documents and archives. It helps the students to realize the role of administrative documents and archives in management. In addition, this module also helps learners to master the systematic methods of editing and managing various types of administrative documents; know how to select and classify documents for archiving; know how to search, use archives to be able to do a good job of management at schools as well as at agencies in general.

4.29 Transferable Skills (KN001)**Credit:** 2**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course provides basic knowledge and instructions to train the necessary skills for learners: communication skills, general principles of communication; effective listening, speaking, and presentation skills; team work skills to ensure good cooperation in learning and working; creative thinking skills; time management skills and emotional management skills.

4.30 Innovation and Entrepreneurship (KN002)**Credit:** 2**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

The course focuses on the general knowledge of creativity, innovation and conceptualization for entrepreneurship, choosing the type of business ownership, basic understanding of intellectual property rights. In addition, students are also provided with basic knowledge and skills about the market such as assessment of strengths, opportunities, threats, risks of product

commercialization from business ideas, discovery of potential businesses and planning for start-up. More importantly, the students have the opportunity to share their startup experiences from successful entrepreneurs and/or visit a successful startup model.

4.31 Calculus A1 (TN001)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The course consists of 4 chapters. Chapter 1 introduces functions, functional limits, and continuity of functions. Chapter 2 covers the basics of single-variable differential computing and its applications. Chapter 3 presents the basics of one-variable integral calculus and the application of integral calculus. Chapter 4 presents string theory knowledge. At the end of each chapter, there are exercises for application.

4.32 Calculus A2 (TN002)

Credit: 4

Course participation conditions

Prerequisite course: TN001

Parallel course: None

Course description

The course provides the basic knowledge of integral functions of multivariate functions such as the concept of multivariate functions, limits, continuity, differentials of multivariate functions, curves in space, multivariate integrals, line integrals, surface integrals and differential equations.

4.33 Probability and Statistics (TN010)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The course consists of 5 chapters:

Chapter 1: Probability and Probability Formula: Definition and basic formula of probability; understand what a probability is and how to put it into practice. This chapter helps learners analyze the problem and calculate the likelihood of each case in the problem.

Chapter 2: Random variable and probability distribution law: Calculate characteristic parameters of random variables such as mean, variance, standard deviation, mode, etc.

Chapter 3: Statistics and data. This chapter is the descriptive statistics section.

Chapter 4: Parameter estimation: Methods to estimate or predict the parameters of random variables such as mean estimation, scale estimation, variance estimation using two point estimation problems and interval estimation.

Chapter 5: Test of statistical hypotheses: Propose methods to test real-world problems such as the average test (comparing the average with a number, comparing many means, etc.)

testing the billion Ratio (comparing ratios to a number, comparing ratios), testing variance, etc.

4.34 Linear Algebra and Analytic Geometry (TN012)

Credit: 4

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The course provides basic mathematical knowledge of linear algebra such as: systems of linear equations, matrices, determinants, vector spaces, linear maps, eigenvalues, eigenvectors, totals and ants, the fundamental formula of the quadratic in the plane and the quadratic plane in the space given by the normal equation. After completing the course, students have the opportunity to continue learning other mathematics and specialized courses. In addition to theoretical issues, the course also provides a system of diverse exercises, arranged from easy to difficult and exercises to help improve students' thinking ability.

4.35 Study skills in higher education (CT100)

Credit: 2

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with general knowledge about studying at university level, understanding the nature of learning, necessary study skills as well as applying these learning skills to improve learning efficiency. The course also helps students grasp other useful knowledge in life to help them adapt to the learning environment at university level.

4.36 Fundamentals of Information Technology (CT200)

Credit: 4

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about the information technology background. Main contents include: introduction to computers, computer systems, computer equipment, operating systems, communications and computer networks, database systems, information security and specialized computing systems.

4.37 Discrete Mathematics (CT172)

Credit: 4

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a piece of knowledge related to discrete objects in mathematics, such as propositional logic, predicates, combinatorial algebra, and Boolean algebra. This module also covers mathematical reasoning, proof methods, Boolean algebra, and logical functions. In addition, the knowledge of division and congruence relations on a set of integers is also presented in this module.

4.38 Introduction to Programming A**Credit:** 4**Course participation conditions**

Prerequisite course: None

Previous course: None

Course description

This course provides students with the basics of structured programming through C programming language. It is the foundation for students to acquire most of the other courses in the curriculum. On the other hand, mastering C language is the basis for developing applications. The main contents of the course are the following: the concept of programming language; the concept of data types and structured data types; the concept of the algorithm and the language of representation of the algorithm; overview of C programming language; data types in C; structured statements; how to design and use functions in C; and some data structures in C.

4.39 Data Structures (CT177)**Credit:** 3**Course participation conditions**

Prerequisite course: CT101

Parallel course: None

Course description

The module provides students with insight into traditional data structures from design and implementation to computing performance; from which students can choose and apply them in real problems. In addition, some of the basic algorithms as well as how to measure their performance are mentioned to develop students' programming thinking.

4.40 Graph Theory (CT175)**Credit:** 3**Course participation conditions**

Prerequisite course: CT177

Parallel course: None

Course description

This course includes 6 chapters. Chapter 1 introduces the basic concepts of graphs, presents graph representation and classification of graphs. Chapter 2 focuses on graph continuity, graph navigation, and application. Chapter 3 presents the problem of finding the shortest path on the graph and algorithms of finding it. Chapter 4 describes the topological order of vertices in the graph, the graph ranking problem, and its application in the project management problem. Chapter 5 presents the concept of trees (a special form of graph), the problem of

finding the least weighted spanning tree, and algorithms for finding the least weighted spanning tree for both undirected and directed graphs. Chapter 6 presents the concept of flow in the network and algorithms to find maximum flow in the network.

4.41 Algorithms Analysis and Design (CT174)

Credit:

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a relatively complete knowledge of how to analyze and design programming algorithms for computers. The main contents of the course include: analyzing techniques to evaluate algorithms through calculating time complexity of the algorithms; sorting algorithms; basic techniques to design algorithms and apply them to solve a number of practical problems; these techniques include: divide and conquer algorithms, greedy algorithms, branch and bound algorithms, dynamic programming algorithms, local search algorithms, etc; data structures for organizing files and algorithms that find, insert, and delete information in files in an external processing model.

4.42 Database (CT180)

Credit: 3

Course participation conditions

Prerequisite course: CT177

Parallel course: None

Course description

The course consists of 3 parts: basic theoretical knowledge about design and programming for relational database. Because the relational data model is still commonly used and is closely related to many other models, it will be presented as a background data model in the whole course.

Part A provides basic knowledge, including general concepts about database, relational data model described in more detail, and supplemented by relational algebra. The SQL language for querying relational data is also described and used, from the basic to the advanced level.

Part B presents the theory of relational database design through functional dependency concepts and normalized rules.

Part C introduces in depth programming on database.

4.43 Computer Architecture (CT173)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides learners with an overview of the history of computer development, information and the encryption of information used in the system; introduces the basic components of a computer system; introduces instruction set architecture design principles;

provides knowledge of processors using RISC and CISC instruction set architecture; introduces the role of compilers in computer systems; introduces in detail about the architecture of the central processing unit (CPU), including: organization, functions and operating principles of the internal parts of the processor; introduces John Von Neumann's sequential processor; parallel processors on the levels: instruction, thread, data, and request; introduce knowledge of functions and basic operating principles of computer memory levels; introduces the operation of virtual memory and cache; introduces methods and criteria for evaluating computer performance through processors and memory; introduces a number of peripheral devices: components and systems; method of securing data on external storage devices (RAID).

4.44 Principles of Operating System (CT178)

Credit: 3

Course participation conditions

Prerequisite course: CT173

Parallel course: None

Course description

The course provides students with relatively complete knowledge of computer operating systems. The main contents of the course include: concepts related to the operating system, the structure of the operating system, concepts related to process management, memory management, CPU timing algorithms and deadlock.

4.45 Computer Network (CT112)

Credit: 3

Course participation conditions

Prerequisite course: CT178

Parallel course: None

Course description

This course provides students with the fundamental principles of computer networking. Students will find problems that arise when building a computer network from aspects of hardware, operating systems, system software, and network applications. The knowledge in the course will help students explain how a computer network or a network application works and operates. These are the necessary foundations for students to study and research different fields of networking such as design and installation of computer networks, computer network security and network application development.

4.46 Object-Oriented Programming (CT176)

Credit: 3

Course participation conditions

Prerequisite course: CT101

Parallel course: None

Course description

The course provides the foundation of object-oriented programming method and uses the Java programming language to implement and illustrate this programming method. First, the module introduces the basic idea of object-oriented programming method and the important concepts of this programming method include: object, class, attribute, method, abstraction,

encapsulation, polymorphism, and inheritance. Later, learners will be introduced to the Java programming language and use it to illustrate the concepts of object-oriented programming. Learners will also be familiarized with how to model a problem and develop an object-oriented approach. In addition, the course also provides some other knowledge of the Java programming language such as exception handling, import and export, Java Swing Graphical User Interface (GUI) programming, etc. to help learners use the object-oriented Java programming language proficiently to develop real applications.

4.47 System Analysis and Design (CT296)

Credit: 3

Course participation conditions

Prerequisite course: CT180

Parallel course: None

Course description

The main contents taught in this module are: basic concepts of systems, information systems, phases of the system development life cycle; requirements and requirements analysis methods; data components (including conceptual data model, logical data model, and physical data model) and processing components (including data-flow diagrams and functional models) of an information system. Two tools that can be used for this module are WinDesign and Sybase Power Designer.

4.48 Unified Modeling Language (CT182)

Credit: 3

Course participation conditions

Prerequisite course: CT176

Parallel course: CT180

Course description

The course content consists of 4 chapters. Chapter 1 gives an overview of the Unified Modeling Language (UML). Chapters 2 to 4 go into more depth on the basic diagrams in UML: use case diagram, class diagram, and sequence diagram.

Examples are given at the end of each concept section. Depending on the chapter, there may be general examples for the whole chapter, taken from the common problems encountered in practice. Lecturers can ask students to do exercises in classrooms. Moreover, the students can do teamwork projects and submit a result report.

4.49 IT systems administration (CT179)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

Effective management of information technology systems, in response to the constant increase in the number of devices and services in the systems, requires administrators to be equipped with relevant background knowledge and need continuous learning. To meet the above-mentioned needs, this course will first introduce students to the role and position of an

administrator in information technology systems. Next, the components of an IT system such as hardware, software, network, services, users, etc. will be mentioned. Based on these knowledge, the course will discuss security and security requirements for a system. Finally, the documentation of the administration for a system will be discussed. Note that this course does not cover network administration operations and in-depth knowledge of network security, which are introduced in other courses.

4.50 Introduction to Web programming (CT188)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with basic knowledge of web design and programming. Students are able to apply CSS and JavaScript libraries for user-friendly interface programming. The course provides background knowledge for students to study Web application development, and develop personal and business applications.

4.51 Introduction to Artificial Intelligence (CT190)

Credit: 2

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course gives students an overview of Artificial Intelligence and AI-related fields (such as machine learning, natural language processing, robotics, etc.), demonstrates how to analyze problems, introduces basic principles and algorithms used to solve Artificial Intelligence problems, explores a number of specific applications in the AI-related fields.

4.52 Introduction to Simulation Platform (CT189)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about multi-agent systems and the application of multi-agent systems in simulation. The main contents of the course include: introduction to the agent and the multi-agent systems; intelligent agents; interaction in multi-agent systems; communication in multi-agent systems; multi-agent simulation and the GAML simulation language.

4.53 Principles of IoT and Embedded Software (CT295)

Credit: 3

Course participation conditions

Prerequisite course: CT176

Parallel course: None

Course description

Internet of Things (IoT) is a technology that allows hardware components (sensors, devices, and computers) to connect and interact with each other via the Internet, thereby implementing remote control and monitoring for a certain system. This course provides students with fundamental knowledge in the field of IoT, thereby helping students apply what they have learned in practical exercises and real applications.

The main contents of this course include the basic concepts, the architecture of the IoT, sensors and actuators, the communication network, the analysis and visualization of data.

4.54 Business Process Management (CT460)**Credit: 3****Course participation conditions**

Prerequisite course: CT176

Parallel course: None

Course description

This course introduces the main principles and methods of business process management along the entire life cycle of business processes: from definition to redesign, automation, and monitoring. The course emphasizes the role of business process models as a tool to understand and analyze business operations and to move towards the design of Information Technology (IT) solutions that support to realization of business processes. The course combines business and IT approaches.

4.55 Introduction to Software Engineering (CT113)**Credit: 2****Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a broad knowledge of technology principles, organizational and operational methods, tools and quality standards so that they can apply them to the development and maintenance of systems as well as management of these activities. The main contents of this course provides the software development process and the main phases of software development life cycle. In addition, the course will also take time to equip knowledge of management such as project management, risk management, organizational and human resource management, software process management and quality assurance.

4.56 Project - Basic Topics (CT239)**Credit: 3****Course participation conditions**

Prerequisite course: The student accumulated greater than or equal to 90 credits, CT174

Parallel course: None

Course description

This course helps students master the basic knowledge and skills for the BESE programme. It helps the students to approach to small-scale problem solving completely by computers. The students will be assigned to develop an application project related to subject knowledge. They need to write a report and give a presentation of results

During the development time, the students must regularly communicate with their instructor (via email/face-to-face) so that the instructor can monitor the project progress, solve problems (if any) and evaluate the results.

4.57 Software Constructions (CT240)

Credit: 3

Course participation conditions

Prerequisite course: CT113, CT176, CT182

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about general principles and techniques for medium-sized software development projects. The course contents include: designs, design principles and some prototyping techniques, libraries and frameworks; object-oriented programming concepts; and basic principles of multithreaded and concurrent programming.

4.58 Software Requirements Engineering (CT241)

Credit: 3

Course participation conditions

Prerequisite course: CT113, CT182

Parallel course: None

Course description

This course provides students with the amount of knowledge and skills needed when collecting requirements for a software project. Through it, learners will have a more detailed view of the importance and complexity of the requirement collection. The main contents of the course include: the concepts and terms used in the requirement collection phase; the models and techniques used to support the requirement analyst; requirements specification and management.

4.59 Software Architecture and Design (CT242)

Credit: 3

Course participation conditions

Prerequisite course: CT113

Parallel course: None

Course description

This course provides students with a broad knowledge of how to design a software in general and how to design a software based on a template, web or service in particular. The course contents include an overview of software design methods, data/class design, architecture design, interface design and component-level design. Some of the most important design

directions today will be also discussed such as pattern-oriented design, web-oriented design and service-oriented design.

4.60 Software Quality Assurance and Testing (CT243)

Credit: 4

Course participation conditions

Prerequisite course: CT113

Parallel course: None

Course description

This course provides concepts, standards, metrics, methods, techniques, and tools in Software Quality Assurance and Testing. The course introduces the components of a software quality assurance system before and during the software project life cycle. It provides a framework for software quality assurance and discuss in detail the individual components within the framework such as planning, evaluation, review, testing, configuration management, etc. It also introduces standards and metrics for software quality as a product and in a process. Students will do planning, inspection, automated testing and manual testing to ensure software quality.

4.61 Software Maintenance (CT244)

Credit: 3

Course participation conditions

Prerequisite course: CT113

Parallel course: None

Course description

This course not only provides students with an overview of software maintenance operations, but also gives them in-depth knowledge of the methods, techniques and tools used to solve problems in software maintenance.

The course is organized into 5 parts. Part 1 introduces the basic concepts and framework of software maintenance. Part 2 presents some common software maintenance models. In particular, the international maintenance process incorporated by the three organizations ISO, IEC and IEEE is introduced. In addition, this chapter covers activities that are specific and available only at the maintenance phase as well as activities that support software maintenance. Part 3 discusses the key issues in software maintenance. These are technical and managerial issues, cost estimation, and software maintenance metrics. Section 4 covers techniques that are widely used in maintenance such as programming comprehension, reverse engineering, and reconstructive techniques. These are techniques that facilitate maintainers in making the change. The last part focuses on tools used in software maintenance through key areas such as selection criteria for maintenance tools and types of tools according to groups of maintenance activities.

4.62 Software Project Management (CT223)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course equips students with broad knowledge of how to manage a project in general and how to manage a software project in particular.

The main contents that this course provides include an overview of project management, organization in project management, project life cycle, project management process. Key knowledge areas in project management are fundamentally covered such as integrated management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, procurement management, and stakeholder management. Characteristics in software project management are also mentioned on the basis of the software project management plan framework.

4.63 Model Checking (CT287)

Credit: 3

Course participation conditions

Prerequisite course: CT241

Parallel course: None

Course description

This course is intended to provide the basic knowledge of verification of requirements and specifications of embedded and concurrent systems. After completing the course, learners will have an overview of formal verification models, techniques for verifying functions of information and communication systems. They are techniques that automatically checks the systems without errors and they are applied in hardware verification and software engineering.

4.64 Software Development Project (CT250)

Credit: 3

Course participation conditions

Prerequisite course: CT241, CT242, CT243, CT223

Parallel course: None

Course description

Software development project will help students acquire most of the key skills required in the Software Engineering. Each student team will be assigned to develop a software project, write complete documentation, perform testing and quality assurance, maintain and manage configuration.

Instructors will describe requirements for software systems developed for companies/organizations. The students under the guidance of their instructor study themselves and choose an appropriate model to develop their software project. Each student team is considered as a project team of a software company. This means that the student teams must report project progress and results to achieve the followings:

- The manager of a unit/organization has required to develop the software system.
- The developers in a unit/organization is developing the software system.

During the development time, the students must regularly communicate their instructor (via email/face-to-face) so that the instructor can monitor the project progress, solve issues (if any), and evaluate the results.

4.65 Internship for Software Engineering (CT474)**Credit:** 3**Course participation conditions**

Prerequisite course: The student accumulated greater than or equal to 120 credits.

Parallel course: None

Course description

Students will spend 8 weeks of internships in a practical work environment. The purpose of this internship is to help students to: (1) consolidate knowledge already equipped in the university and apply that knowledge and incorporate new knowledge into practical software development; (2) practice software engineering skills and gain work experience through the implementation of practical work assigned by companies/organizations that accepts the students; (3) comply with labor discipline and internal work regulations; (4) have good attitude of communicating with people, promoting the spirit of learning, activeness and creativity in solving practical problems, labor, and life. Internship results will be assessed in accordance with the objectives of the BESE programme.

4.66 Java Programming (CT276)**Credit:** 3**Course participation conditions**

Prerequisite course: CT176

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about Java. The main contents of the course are the following: basic data types, constants, variables, statements and blocks of statements, arrays; object-oriented programming in Java; Applet programming; GUI (Graphical User Interface) programming with AWT and JFC; Java programming with database applications; network programming with Java; JSP; and security issues in Java.

4.67 .NET Programming (CT246)**Credit:** 3**Course participation conditions**

Prerequisite course: CT176

Parallel course: None

Course description

This course provides learners with the basics of .NET programming through Visual Basic.NET (or C#.NET). After completing the course, the learners can apply Visual Basic.NET (or C#.NET) to develop software applications (databases, systems, etc.).

4.68 Web application development (CT449)**Credit:** 3**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course aims to provide students with knowledge of web application development using Javascript as a main language. Technologies introduced in chapters revolve around the MEAN Stack Technology (MongoDB, Express.js, Angular.js, Node.js), which is being preferred in developing modern web applications. In addition, there are some other contents, such as JSON data format, REST API, creating templates with Handlebars and authenticating users with OAuth2.

4.69 Mobile Programming (CT483)**Credit:** 3**Course participation conditions**

Prerequisite course: CT176

Parallel course: None

Course description

This module provides students with the basics of programming for mobile devices (Android operating system) through the Kotlin programming language. Mastering the Kotlin language is the basis for developing apps on the Android operating system. The main contents of the course are the following: concepts of mobile programming languages; the concept of data types and structured data types; the concept of the algorithm and the language of representation of the algorithm; overview of the Kotlin programming language; data types in Kotlin; structured statements; how to design and use functions in Kotlin; and some data structures in Kotlin.

4.70 Simulation Programming Language (CT446)**Credit:** 3**Course participation conditions**

Prerequisite course: CT189

Parallel course: None

Course description

This course provides the basics of programming in simulation through GAML language in the GAMA platform. The course gives students the skills to develop simulation applications. This is also the support for course Introduction to Simulation Platform (CT189).

The main contents of the course include: the concept of simulation and simulation programming; overview of GAMA and GAML; basic components of GAML; GAML statements in GAML; the definition of the simulation environment and the agent; and processing simulation results.

4.71 Simulation platform Development (CT456)**Credit:** 3**Course participation conditions**

Prerequisite course: CT189

Parallel course: None

Course description

This course provides students with a relatively complete knowledge of simulation software development techniques to simulate different fields in real life. The main contents of the

course include: introduction to agent-oriented software, simulation ontology, methodologies for ontology development, and agent-oriented software engineering.

4.72 IoT and Embedded system Design (CT470)

Credit: 3

Course participation conditions

Prerequisite course: CT295

Parallel course: None

Course description

This course teaches students how to design embedded and IoT systems to meet the following requirements: security, interoperability, modifiability and extensibility, and testability. Furthermore, students will learn how to apply the best method for software architecture design for IoT systems that satisfy to different types of application requirements in different fields.

4.73 IoT and Embedded Software Development (CT457)

Credit: 3

Course participation conditions

Prerequisite course: CT295

Parallel course: None

Course description

In this course, students study and apply techniques, tools, and foundations in the development of an embedded and IoT system. They study prototypes suitable for embedded and IoT system development such as real-time application, remote control, etc. The students will carry out, in groups, a project of embedded and IoT software development; their resultant system will be evaluated for the suitability of the system. In addition, students are taught and instructed on English resources to increase their ability to read and understand English documents, vocabulary in specialized English language.

4.74 Client-Server Software Architectures (CT288)

Credit: 3

Course participation conditions

Prerequisite course: CT460

Parallel course: CT459

Course description

The foundation of an information system is their relational data model, in addition to the specification of business rules when these rules cannot be described by that relational data model. During the design phase, a database architecture is chosen, in which this choice is influenced by the need of a single-user or multi-user application. After completing the course, students will understand the above choices and be able to apply the techniques to be able to implement them with modern tools.

4.75 Business Application Development (CT459)

Credit: 3

Course participation conditions

Prerequisite course: CT460

Parallel course: CT288

Course description

This course aims to systematically review the phases in the software development process for information systems. Requirements analysis consists of two phases: feasibility study and requirement specification. Design includes the following phases: architecture design, database design, and user interface (UI) design. In addition, the course will provide students with a way to define and present business rules and business processes in practice. Students have the ability to apply them to develop software that meets customer requirements.

The main contents of the course include: the process of building software for information systems; requirement analysis; architecture design, database design; user interface (UI) design; how to define business rules and business processes.

4.76 Linear programming (CT199)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

The main contents of this course include: modeling for real problems and linear programming problems; and approaches to solving linear programming problems such as simplex method, dual simplex method, and the singularity of the linear programming problem. At the same time, some applications of linear programming, such as the solution to the game problem and the transport problem, are also presented in this course.

4.77 Information Theory (CT292)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

This course introduces the basics of information theory such as entropy concepts, quantity of information, methods of generation of codes, and types of transmission channels. Content of basic concepts includes properties of entropy and methods of calculating volume of information. In the problem of decomposed code generation, the concepts of decomposed code, the relationship between the decoded code and the code length and the computation for optimization of the code length are introduced, in which two typical methods of generating code are Kraft and Huffman. Discrete Memoryless Channel is one of the important contents of this course, introducing the types of transmission channels as well as how to calculate the capacity of each type and the method of building the optimal decoding scheme and calculation of false transmission probabilities on the channel. The final content of the course introduces the self-correction problem of the encoding, including the parity-check code, the Hamming code and the rotation code.

4.78 Machine Learning (CT202)**Credit:** 3**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

Machine learning is one of the rapidly growing fields of computer science, with deep learning applications. The purpose of this course is to introduce the theoretical foundations of machine learning in-depth analysis of the principles of algorithm models. Machine learning theories such as gradient reduction method, regression method, back-propagation algorithm, probability model and reinforcement learning are analyzed in depth. Besides, students have the ability to apply this knowledge to solve problems in practice through practice with illustrative examples.

4.79 Network Security (CT211)**Credit:** 3**Course participation conditions**

Prerequisite course: CT112

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about how to build a secure system for computers and computer networks. After completing this course, students gain the following abilities: 1) explain what network security is; 2) demonstrate threats, types of attacks and certain techniques for hacking computer systems and networks; 3) outline the basic requirements for a secure network; 4) show how malicious software works in a computer system and network, from which techniques are used to prevent and protect the system; 5) explain the foundations of security such as cryptography, cryptographic algorithms, private and public keys, digital signatures, digital certificates, and authentication systems; 6) demonstrate and implement security mechanisms for network equipment; 7) build secure network models; 8) apply secure solutions to Internet services; 9) Select a number of current popular network security techniques, solutions and technologies such as authentication, encryption, firewalls, virtual private networks, intrusion detection systems; and 10) demonstrate how to manage and operate a secure network.

4.80 System Security (CT222)**Credit:** 3**Course participation conditions**

Prerequisite course: None

Parallel course: None

Course description

This course provides students with a relatively complete amount of knowledge about computer system security. The main contents of the course include: basic concepts of information and computer security, operating system security, malware, network security,

web service security, data encryption, and common models for ensuring information safety and security.

4.81 Cloud Computing (CT233)

Credit: 3

Course participation conditions

Prerequisite course: None

Parallel course: None

Course description

Cloud computing is a technology that helps organize and manage a large number of compute resources (including hardware and software) to make the provision of information technology services easier and more efficient. This course will provide students with a full overview of the efficiency, benefits and challenges of the cloud computing technology. The students will learn about the development history of the cloud computing technology, along with the underlying techniques and mechanisms that make the cloud computing a reality. In addition, the students are fully provided with the concepts, models and architectures that can be used to build the features of a cloud computing system. The students will be introduced and familiarized with how to exploit the popular cloud platforms in the world.

4.82 E-commerce Systems Development (CT258)

Credit: 3

Course participation conditions

Prerequisite course: CT296

Parallel course: None

Course description

This course introduces students to concepts and technologies necessary for the design, installation and integration of e-commerce systems in the information systems of enterprises. The course will emphasize the essential requirements of an e-commerce system to have a suitable design and installation solution. The students will also be introduced and familiarized with SEO techniques (Search Engine Optimization) with the purpose of well-promoting their e-commerce system on information search websites (to bring the e-commerce system to customers). The students will gain necessary career skills by participating in emulator software development teams to develop an e-commerce system.

4.83 Management Systems (CT205)

Credit: 3

Course participation conditions

Prerequisite course: CT180

Parallel course: None

Course description

After completing the course, students can apply basic knowledge and skills to design and manage a relational database system with requiring user authentication and security. At the same time, students are able to use programming languages to interact with the database through the design and use of procedures, functions, and triggers.

4.84 Business Intelligence (CT255)**Credit:** 3**Course participation conditions**

Prerequisite course: CT109

Parallel course: None

Course description

After completing the course, students can present key concepts such as components in a business intelligence (BI) architecture; technologies supporting BI such as data warehouse and OLAP; building models in data mining used in BI such as clustering, classification, prediction/regression and forecasting; thereby assessing the reliability of these models.

4.85 Image processing (CT316)**Credit:** 3**Course participation conditions**

Prerequisite course: CT176

Parallel course: None

Course description

The module introduces learners to image digitization methods and different structures when representing an image, from which it is possible to determine the basic image processing methods to clarify images, determine information on images, separating important objects on images, and rendering their borders encrypted.

4.86 Network Design (CT335)**Credit:** 3**Course participation conditions**

Prerequisite course: CT112

Parallel course: None

Course description

This course provides students with an amount of knowledge about the analysis, design and installation of a small- and medium-sized LAN system. The main contents of the course include: techniques to define the needs and goals of a network, inter-network systems; design techniques for network and inter-network systems at a logical level; design techniques for network and inter-network systems at the physical level, and appropriate selection of wide area network technologies; installation, configuration, testing, optimization and documentation for network and inter-network systems.

4.87 Graduation Project for Software Engineering (CT505)**Credit:** 6**Course participation conditions**

Prerequisite course: The student accumulated greater than or equal to 120 credits.

Parallel course: None

Course description

Graduation project is an important part of the BESE programme. It gives students an opportunity to apply and implement a range of skills, theories, and concepts that they have learned in a variety of courses. Students also discover how these can be applied in practice to

create software products that meet customer requirements. Therefore, the students are given the opportunity to test their knowledge and skills before graduation. To do a graduation project, the students must study actively and experimentally. It requires the students to make considerable effort in planning, designing and implementing, as well as preparing a final report document.

The graduation project will be done by a student/a student group within one semester. Project requirements are provided by instructors. The students must plan the project, write a software requirements specification, analyze, design, develop, perform QA, test, maintain, manage configuration, and write a project report.

Final student results will be evaluated by a committee based on the work performed, project report, computer program demonstration, presentation, and answering committee questions.

4.88 Thesis for Software Engineering (CT553)

Credit: 15

Course participation conditions

Prerequisite course: The student accumulated greater than or equal to 120 credits.

Parallel course: None

Course description

The main purpose of the graduation thesis is for students to demonstrate the ability to solve a complex problem in software engineering or application fields independently in a limited time period (one semester) by using a scientific approach. The students must describe problem, related works, concepts, proposed solution, actions (steps will be done), results and benefit assessments, conclusions and future work in the thesis report.

Final student's results will be evaluated by a committee based on the work performed, thesis report, computer program demonstration, presentation, and answering committee questions.

Part 5. Student assessment method

5.1 Course assessment

a) **Theoretical courses or combined theoretical and practical courses:** Total course grade is calculated from component grades, including: exercise grade, midterm test grade, practice grade, cognitive assessment grade, discussion grade, attendance grade, project grade and final exam grade. The final exam is required and its grade must have a weight of no less than 50%.

b) **Practical courses:** Total course grade is calculated by an average grade of the practical exercises.

Forms of assessment and weights of the component grades are proposed by lecturers, the head of the Department of Software Engineering the dean of the College of Information and Communication Technology. They are announced in course syllabuses.

5.2 Course grade

a) The grades for assessment of courses and the final exam grades are given on a 10-grade scale (from 0 to 10), rounded to one decimal place.

b) The course grade is the total grade of all assessment grades of the course multiplied by the corresponding weights. The course grade is calculated on a 10-grade scale and rounded to one decimal place. Lecturers in charge of the course enter the course grades into the online management system; this system automatically converts the course grades on the 10-grade scale to the corresponding ones on letter and 4-grade scales. Table 5.1 presents the course grading system.

Table 5.1: Course grading system

10-grade scale	4-grade scale	Letter scale	Pass/Fail
9,0 - 10,0	4,0	A	Pass
8,0 - 8,9	3,5	B ⁺	
7,0 - 7,9	3,0	B	
6,5 - 6,9	2,5	C ⁺	
5,5 - 6,4	2,0	C	
5,0 - 5,4	1,5	D ⁺	
4,0 - 4,9	1,0	D	
Under 4.0	0,0	F	Fail

c) The passing grade is D. A passed course will be accumulated.

d) The course grade will be announced and recorded with a grade on the 10-grade scale and letter scale. The course grade on letter scale then will be converted to a corresponding one on 4-grade scale to calculate the semester grade point average (SGPA) and the cumulative grade point average (CGPA).

5.3 Semester, year and cumulative grade point average

a) The number of cumulative credits is the total number of credits of passed courses.

b) The semester grade point average (SGPA) is a weighted average of the grades of the courses that a student has learned in a semester (including the F-grade and conditional

semester except courses of Physical Education), with weights equal to the number of credits of the courses. Thus, the SGPA represents the student's performance over all courses taken (pass or fail) by the student. It is for evaluating academic results, evaluating scholarships, rewarding, and warning academic records after each semester. The SGPA is calculated by the following formula:

$$SGPA = \frac{\sum_{i=1}^n a_i X_i}{\sum_{i=1}^n a_i}$$

where: X_i is the grade of course i ;

a_i is the number of credits of course i ;

n is the number of courses learned by the student in the semester.

c) The year grade point average (YGPA) is a weighted average of the grades of the courses that the student has learned in the two main semesters of the academic year (including the F-grades and conditional semester except courses of Physical Education).

d) The cumulative grade point average (CGPA) is a weighted average of the cumulative grades of the courses that have been accumulated up to the time of consideration (excluding F-grade and conditional courses). The CGPA is used for evaluating learning results throughout the student's study period and classifying students' graduation classification.

e) Academic classification by semester is based on SGPA; academic classification by year is based on the YGPA, as shown in Table 5.2.

Table 5.2: Student Classification by SGPA or YGPA

Classification	SGPA or YGPA
Excellent	3,60 – 4,00
Good	3,20 – 3,59
Fair	2,50 – 3,19
Average	2,00 – 2,49
Weak average	1,00 – 1,99
Weak	< 1,00

5.4 Training grade

CTU considers and evaluates the training result of students, which is the assessment of learners' consciousness and attitudes according to the points achieved on the following aspects:

- Consciousness of participation in learning;
- Consciousness of observing the rules, regulations and regulations in the school;
- Awareness of participating in political, social, cultural, cultural, sports activities, crime prevention and social evils;
- Citizen awareness in community relations;
- Awareness and results when participating in class staff, unions, and organizations in schools or learners achieve special achievements in study and practice.

The training grade is assessed for each semester of the two main semesters by a scale of 100. The training result is classified into the following categories: excellent, good, fair, average, weak and poor (see Figure 5.3).

Table 5.3: Classification of the training result

100-point scale	Classification
From 90 to 100	Excellent
From 80 to 89	Good
From 70 to 79	Fair
From 60 to 69	Above average
From 50 to 59	Average
From 30 to 49	Weak
Under 30	Poor

The training grade is used to rank the priority among students when awarding scholarships.

5.5 Graduation classification

Graduation classification is determined based on the cumulative grade point average (CGPA) according to the levels in Table 5.4.

Table 5.3: Graduation Classification

Graduation Classification	CGPA
Excellent	3,60 – 4,00
Good	3,20 – 3,59
Fair	2,50 – 3,19
Average	2,00 – 2,49

Excellent and excellent graduation classification will be decreased by one level if students fall into one of the following categories:

- The volume of the courses with F grade exceeds 5% of the total number of the credits of the programme curriculum (excluding the volume of the courses that improve the F grade).
- Having been disciplined from the school-level warning level during the school period.

Part 6. Learning environment

6.1 Library

The Learning Resource Center (LRC) is built on a land area of 7,560 m² and is one of the largest learning resource centers in the country. LRC provides a wide range of books, textbooks, and reference materials in Vietnamese and foreign languages which are changed and updated regularly. There is a total of 139,289 titles and 306,117 book copies. There are 1,397 titles and 2,054 book copies in the IT field. The center also has electronic library systems and electronic databases (such as ProQuest, Springerlink, Ebrary, Research4Life, etc) that provide documentation in almost every field of teaching and research, allowing users to access from both inside and outside the university, effectively meeting the requirements of lecturers and students. In addition, the LRC has 400 computers, 3 discussion rooms, 1 audio-visual room and many self-study desks.

In addition to the LRC, the CICT has its own library, College Library, built in an area of 180 m², consisting of a reading and self-study room, a library of books and reference materials. Students can visit this library during the office hours, 7h30 to 11h30 and 13h30 to 17h, Monday to Friday. The college library has about 2,423 books and reference materials (total of 3,450 books), including 32 printed text book titles (160 books), 946 books in Vietnamese, 1,477 books in foreign languages, 303 journals and 1,302 graduated theses of IT students. The College Library ensures to provide the most complete and up-to-date resources. At the peak, the number of students using the college library resources was over 50 turns a day.

6.2 Dormitory

The CTU's dormitories have a total of 1,391 rooms which can accommodate 10,200 students. These dormitories are located on Campus I and II of CTU in Ninh Kieu District, Cantho city. They are convenient places to stay and study for students and foreign visitors. They have yards for playing sports and green outdoor areas, as well as canteens for food. The dorms have professional security forces to guard all 24 hours a day, 7 days a week.

6.3 Natural and social environment

CTU has a healthy living and entertainment environment, including cultural house, multi-purpose gym, swimming pool, stadium, outdoor sports field, park, cafeteria, mini supermarket, etc.

Students have the opportunity to study in a harmonious natural environment. Most of the roads on the campus are covered with many trees. There are many sidewalks and pedestrian seats. In addition, there are many large and open lawns for students to organize outdoor activities.

The social environment also creates psychological comfort for students. In general, the majority of students are gentle, active and willing to help each other in learning and daily life. Many friendly instructors' help students feel no pressure to communicate.

6.4 Health care

All students and staffs of CTU have health insurance coverage. All of them are supported by CTU a part of the cost of participating in periodic health examination, consultation and care

at the beginning of each academic year. In addition, CTU also has medical departments to take care of health, answer questions and provide psychological counseling for the students and staffs.

6.5 Sport

CTU's Gymnastics and Sports Stadium has 2 floors, floor area is 3,465 m², usable area is 3,465 m²; the area of the playing field is 1,000 m²; the stands can accommodate nearly 1,000 seats. The Stadium hosts courts that can be adapted for indoor volleyball, steam volleyball, futsal football, tug of war, outdoor run, basketball, javelin, weightlifting and team games, etc. for students' courses of Physical Education and sports services after office-hours.

CTU also has a Gymnasium that serves for sports such as badminton, table tennis, soccer, taekwondo, traditional martial arts, volleyball courts, outdoor basketball, etc. The Gymnasium serves as a training facility for the students as well as staffs not only to train themselves for the sport activities but also to keep them fit.

6.6 Extra-curricular activities

The Youth Union plays an important role in implementing extra-curricular activities for students. The main activities that this organization has been implementing include: cultural, music and sports exchanges; social activities; academic activities; international relation activities (e.g. student exchange with universities in Thailand, Taiwan, the Netherlands, Japan; welcoming and exchanging with Korean students). The Youth Union also co-organizes activities in order to interact with students of other universities in Vietnam and in ASEAN University Network.

In addition, student associations of provinces as well as in-campus and off-campus associations also have many extracurricular activities for the students to attend. The Youth Union has always maintained well the mobilization of students to volunteer in activities such as labor, environmental sanitation, landscape, competition season relay, humanitarian blood donation, etc.

6.6 Internet

The CTU Wi-Fi system allows students to access the internet for searching and updating learning information, course registration and withdrawal, keeping in touch with family and friends via social networks and emails.

Part 7. After graduation

7.1 Career prospects

Graduates are able to work in the following roles: analyst, designer, programmer, tester, maintainer, team leader, project manager in software companies and organizations; business owners; researchers; lecturers at universities, colleges, high schools, professional high schools and vocational schools.

7.2 Further study

Graduates are able to study at higher levels at the CICT or other universities in following fields: Software Engineering, Information Systems, Science Computer, Information Technology, etc. The CICT currently offers two master's programs in Information Systems and Computer Science, and a Doctorate program in Information System.

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