

CURRICULUM

*(Issued under Decision No. /QD-SIU dated... 2022
of the Chancellor of the Saigon International University)*

Program:	Bachelor of Computer Science
Level:	Undergraduate
Mode of Study:	Full-time
Major:	Computer Science
Code:	7480101
Concentrations:	Artificial Intelligence (AI) Big Data Software Engineering Computer Networks and Information Security

1. Program Educational Objectives (PEOs):

1.1. General Objective:

The program aims to train the top international-standard information technology bachelors in Vietnam, meeting the demand for human resources in the domestic, regional and international information technology industry.

1.2. Detailed Objectives:

PEO1: to work effectively and successfully in their chosen profession, and pursue higher education.

PEO2: to take social responsibility, especially in decision-making and recognizing the impact of technology on society, thus, becoming global citizens.

PEO3: to lead and plan the projects in the field of computer science.

PEO4: to become computer science specialists, professionals, or academics whose knowledge and expertise contribute to the development of science and technology in the country.

2. Student Outcomes (SOs):

SOs	SOs
Knowledge	SO1: Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
Skills	SO2: Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline. SO3: Communicate effectively in a variety of professional contexts.
Levels of autonomy and responsibility	SO4: Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. SO5: Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline. SO6: Apply computer science theory and software development fundamentals to produce computing-based solutions.

3. Matrix of program educational objectives and student outcomes:

Program Educational Objectives	Student Outcomes					
	Knowledge	Skills		Levels of autonomy and responsibility		
	SO1	SO2	SO3	SO4	SO5	SO6
PEO1	X	X			X	X
PEO2			X	X		
PEO3			X	X	X	
PEO4	X	X		X		X

4. Career:

After graduation, students are capable of working in the following positions:

- Engineers specializing in developing applications and software for AI, big data

systems, computer network systems as well as robots in accordance with the trained disciplines/majors at technology companies;

- Taking various positions at software and artificial intelligence development departments as well as big data processing/analysis/exploitation departments. Handling computer network systems and information security at domestic and foreign technology corporations;
- Engineers specializing in designing, manufacturing, deploying, operating, installing, maintaining and repairing automation systems, equipment and robots at domestic and foreign enterprises;
- Experts in consulting and transferring technology for businesses in the field related to Information Technology and Computer Science;
- Researchers and lecturers working at institutes, research centers and universities related to the trained disciplines/majors;
- Starting new businesses specializing in developing Information Technology applications for real-life purposes.

5. Training duration: 4 years

6. Number of credits: 135 credits

7. Admission requirements:

Follow the current Admissions Regulations issued by the Ministry of Education and Training and the Admission Schemes issued by the Saigon International University.

7.1. Eligible candidate: Students who have graduated from high school according to the admission standards set by the Ministry of Education and Training and the admission criteria set by the Saigon International University.

7.2. Admission method: Updated annually according to the admission scheme of the Saigon International University and in accordance with the regulations set by the Ministry of Education and Training and the University."

8. Academic procedure and graduation requirements:

8.1. Academic procedure:

Follow the current Regulation on academic affairs issued by the Ministry of Education and Training and the Saigon International University.

8.2. Graduation requirements:

Follow the current Regulation on academic affairs issued by the Ministry of Education

and Training and the Saigon International University.

9. Evaluation methods:

Follow the current Regulation on academic affairs issued by the Saigon International University.

10. Content:

10.1. Knowledge blocks:

Knowledge block		Number of credits	Percentage %
1. General knowledge		53	39%
1.1	Politics - Economics	13	10%
1.2	Math – Natural Sciences	15	11%
1.3	Foreign Language	13	10%
1.4	Culture - Skills	6	4%
1.5	Natural Sciences	6	4%
2. Professional knowledge		72	53%
2.1	Foundation knowledge	51	38%
2.2	Specialized knowledge	21	15%
3. Internship and graduation thesis		10	8%
Total		135	100%

10.2. Detailed content:

No	Code	Name of course		Credits	Allocation					Prereq
		Vietnamese	English		Total	Theo	Prac	Proj	TT	
I. GENERAL KNOWLEDGE										
I.1. Politics				13						
I.1.01	2GEN0011	Triết học Mác-Lênin	Philosophy of Marxism and Leninism	3	45	45				
I.1.02	2GEN0012	Kinh tế chính trị Mác-Lênin	Political Economics of Marxism and Leninism	2	30	30				
I.1.03	2GEN0013	Chủ nghĩa Xã hội khoa học	Scientific Socialism	2	30	30				
I.1.04	2GEN0007	Tư tưởng Hồ Chí Minh	Ho Chi Minh Thought	2	30	30				
I.1.05	2GEN0014	Lịch sử Đảng Cộng sản Việt Nam	History of the Communist Party of Vietnam	2	30	30				
I.1.06	2GEN0008	Pháp luật đại cương	General Laws	2	30	30				
I.2. Mathematics										
Compulsory				15						
I.2.01	2SOC11497	Đại số tuyến tính	Linear Algebra	3	45	45				

I.2.02	2SOC2485	Toán rời rạc	Discrete Mathematics	3	45	45				
I.2.03	2BUS11440	Xác suất thống kê	Probability & Statistics	3	45	45				
I.2.04	2SOC1498	Giải tích	Mathematics Analytics	3	45	45				
I.2.05	2SOC1499	Phương pháp số	Numerical Methods	3	45	45				
I.3. Foreign language				13						
I.3.01	2LAN11453	English Proficiency 1	English Proficiency 1	4	90	30	60			2LAN11452
I.3.02	2LAN11454	English Proficiency 2	English Proficiency 2	4	90	30	60			2LAN11453
I.3.03	2LAN11455	English Proficiency 3	English Proficiency 3	5	90	60	30			2LAN11454
I.4. Culture				6						
I.4.01	CTS53178	Khởi nghiệp sáng tạo	Creative Entrepreneurship	3	45	45				
I.4.02	2ENG11491	Viết luận Anh	English Composition	3	45	45				
I.5. Natural Sciences				6						
I.5.01	2SCE1104	Lý	Physics	3	45	45				
I.5.02	2SCE1113	Hoá	Chemistry	3	45	45				
II. PROFESSIONAL KNOWLEDGE										
II.1 Foundation knowledge				51						
II.1.01	CTS14123	Cơ sở lập trình	Introduction to Programming	4	90	30	60			
II.1.02	CTS13124	Cơ sở dữ liệu	Introduction to Databases	3	60	30	30			
II.1.03	CTS12125	Kiến trúc máy tính	Computer Architecture	2	30	30				
II.1.04	CTS13126	Mạng máy tính	Computer Networks	3	60	30	30			
II.1.05	CTS22127	Hệ điều hành	Operating Systems	2	30	30				
II.1.06	CTS24128	Cấu trúc dữ liệu và giải thuật	Data Structures and Algorithms	4	90	30	60			CTS14123
II.1.07	CTS24129	Lập trình hướng đối tượng	Object-Oriented Programming	4	90	30	60			CTS14123
II.1.08	CTS23130	Phân tích, trực quan dữ liệu với Python	Data Analysis and Visualization with Python	3	60	30	30		(*) TA	CTS13124
II.1.09	CTS33131	Trí tuệ nhân tạo	Artificial Intelligence	3	60	30	30		(*) TA	CTS24129
II.1.10	CTS34132	Lập trình Web và ứng dụng	Web and Application Programming	3	60	30	30			CTS24129
II.1.11	CTS33133	Công nghệ phần mềm	Software Engineering	3	60	30	30			CTS24129
II.1.12	CTS34134	Máy học	Machine Learning	3	60	30	30		(*) TA	CTS24128
II.1.13	2BAS0007	Phương pháp nghiên cứu khoa học	Research Methods	2	30	30				
II.1.14	CTS43135	Dữ liệu lớn	Big Data	3	60	30	30			CTS24128

II.1.15	CTS44136	Đồ án 1 (Đồ án cơ sở)	Project 1	3	45	45				
II.1.16	CTS53145	Điện toán đám mây	Cloud Computing	3	45	45				CTS24129
II.1.17	CTS53176	Lập trình thiết bị di động	Mobile Device Programming	3	60	30	30			CTS24129
II.2. Specialized knowledge				21						
II.2.1. Artificial Intelligence (AI)										
Compulsory				15						
II.2.1.01	CTS53148	Thị giác máy tính	Computer Vision	3	60	30	30		(*) TA	CTS13124
II.2.1.02	CTS43137	Robotics và ứng dụng	Robotics	3	60	30	30		(*) TA	CTS14123
II.2.1.03	CTS53147	Xử lý ngôn ngữ tự nhiên	Natural Language Processing	3	60	30	30			CTS34134
II.2.1.04	CTS43138	Các mô hình học sâu và ứng dụng	Deep Learning	3	60	30	30			CTS34134
II.2.1.05	CTS53179	Đồ án chuyên ngành 2	Project 2	3	45	45				CTS33131
Elective (choose 2 among the following courses or 2 compulsory courses of other majors)				6						
II.2.1.06	CTS53155	Lập trình Hệ thống nhúng	Embedded Systems Programming	3	60	30	30			CTS14123, CTS12125
II.2.1.07	CTS53156	Xử lý âm thanh và tiếng nói	Audio and Speech Processing	3	60	30	30			CTS24128
II.2.1.8	CTS43140	Khai thác dữ liệu và ứng dụng	Data Mining	3	60	30	30			CTS34134
II.2.1.09	CTS53158	Dịch máy	Computer Linguistics	3	60	30	30			CTS34134
II.2.1.10	CTS53159	Thị giác máy tính trong tương tác người – máy	Advanced Computer Vision	3	60	30	30			CTS4324
II.2.1.12	CTS53160	Hệ khuyến nghị	Recommender Systems	3	60	30	30			CTS34134
II.2.1.13	CTS53161	Triển khai và vận hành các mô hình học máy	Machine Learning DevOps	3	60	30	30			CTS34134
II.2.2. Big Data										
Compulsory				15						
II.2.2.01	CTS43139	Dữ liệu lớn chuyên sâu	Advanced Big Data	3	60	30	30			CTS43135
II.2.2.02	CTS43140	Khai thác dữ liệu và ứng dụng	Data Mining	3	60	30	30		(*) TA	
II.2.2.03	CTS53149	Cơ sở dữ liệu phân tán	Distributed Database	3	60	30	30			CTS13124
II.2.2.04	CTS53150	Lập trình phân tán	Distributed Programming	3	60	30	30		(*) TA	CTS24129
II.2.2.05	CTS53179	Đồ án 2 (Đồ án chuyên ngành)	Project 2	3	45	45				

Elective (choose 2 among the following courses or 2 compulsory courses of other majors)				6						
II.2.2.06	CTS83112	Hệ cơ sở tri thức	Knowledge-Based Systems	3	60	30	30			CTS24128
II.2.2.07	CTS53162	Python nâng cao	Advanced Python Programming	3	60	30	30			CTS4324
II.2.2.08	CTS53163	Kiểm thử Phần mềm	Software Testing	3	60	30	30			CTS24129
II.2.2.09	CTS53164	Blockchain	Blockchain	3	45	45				
II.2.2.10	CTS83116	Các mô hình học sâu và ứng dụng	Deep Learning	3	60	30	30			CTS23130, CTS43139
II.2.3. Software Engineering										
Compulsory				15						
II.2.3.01	CTS43141	Thiết kế phần mềm hướng đối tượng	Object-Oriented Software Development	3	60	30	30		(*) TA	CTS24129
II.2.3.02	CTS43142	Kiến trúc phần mềm	Software Architecture	3	60	30	30			CTS33133
II.2.3.03	CTS53152	Một số vấn đề hiện đại trong CNPM	Modern Issues in Software Engineering	3	60	30	30		(*) TA	CTS33133
II.2.3.04	CTS53151	Phát triển vận hành và bảo trì phần mềm	Software Deployment, Maintenance and Operations	3	60	30	30			CTS33133
II.2.3.05	CTS53179	Đồ án 2 (Đồ án chuyên ngành)	Project 2	3	45	45				CTS24129
Elective (choose 2 among the following courses or 2 compulsory courses of other majors)				6						
II.2.3.06	CTS53166	Phát triển phần mềm mã nguồn mở	Open-Source Software Development	3	60	30	30			CTS24129
II.2.3.07	CTS53167	Nhập môn lập trình game	Introduction to Game Programming	3	60	30	30			CTS24129
II.2.3.08	CTS53168	Quản lý dự án công nghệ thông tin	Information Technology Project Management	3	60	30	30			CTS33133
II.2.3.09	CTS53149	Cơ sở dữ liệu phân tán	Distributed Database	3	60	30	30			CTS13124
II.2.3.10	CTS53163	Kiểm thử Phần mềm	Software Testing	3	60	30	30			CTS33133
II.2.3.11	CTS53175	Lập trình Java	Java Programming	3	60	30	30			CTS24129
II.2.4. Computer Network and Information Security										
Compulsory				15						
II.2.4.01	CTS43143	Mạng nâng cao	Advanced Computer Networks	3	45	45			(*) TA	CTS13126
II.2.4.02	CTS43144	Quản trị mạng	Network Management	3	45	45				CTS13126
II.2.4.03	CTS53153	An ninh thông tin	Information Security	3	60	30	30		(*) TA	CTS24129

II.2.4.04	CTS53154	Phân tích đánh giá an toàn mạng	Computer Networking Security Analysis and Evaluation	3	60	30	30			CTS13126
II.2.4.05	CTS53179	Đồ án 2 (Đồ án chuyên ngành)	Project 2	3	45	45				
Elective (choose 2 among the following courses or 2 compulsory courses of other majors)				6						
II.2.4.06	CTS53170	An toàn IoTs	Cybersecurity and the Internet of Things	3	60	30	30			CTS53153
II.2.4.07	CTS53171	Mạng không dây	Wireless Network	3	60	30	30			CTS43144
II.2.4.08	CTS53172	Hệ điều hành Linux	Linux Operating Systems	3	60	30	30			CTS43143
II.2.4.09	CTS53173	Đánh giá hiệu năng mạng	Network Performance Analysis	3	45	45				CTS43144
II.2.4.10	CTS53174	Thiết kế hệ thống mạng	Computer Networks Design	3	60	30	30			CTS43144
II.2.4.11	CTS53149	Cơ sở dữ liệu phân tán	Distributed Database	3	60	30	30			CTS13124
II.2.3.12	CTS53175	Lập trình Java	Java Programming	3	60	30	30			CTS24129
II.3. Internship and graduation thesis				10						
II.3.01	CTS73180	Thực tập tốt nghiệp	inter	3	45					
II.3.02	CTS77181	Khóa luận tốt nghiệp	Graduation Thesis	7	105					CTS53179
III. NATIONAL DEFENSE AND SECURITY EDUCATION, PHYSICAL EDUCATION				16						
(According to regulations of the Ministry of Education and Training)										
Compulsory, uncumulative				16						
III.1.01	2GEN0001	Giáo dục quốc phòng và an ninh	National Defense and Security Education	11	165	165				
III.1.02	2GEN0002	Giáo dục thể chất	Physical Education	5	150		150			

10.3. Matrix of correspondence between courses and student outcomes

(Level of correspondence: 1: Not directly relevant; 2: Partially relevant; 3: Relevant; 4: Closely relevant; 5: Specially relevant)

COURSE	STUDENT OUTCOMES					
	SO1	SO2	SO3	SO4	SO5	SO6
GENERAL KNOWLEDGE						
Politics - Economics						
Triết học Mác – Lênin/ Philosophy of Marxism and Leninism			X	X		
Kinh tế chính trị Mác – Lênin/ Political Economics of Marxism and Leninism	X		X	X		
Chủ nghĩa Xã hội khoa học/ Scientific Socialism			X	X		
Tư tưởng Hồ Chí Minh/ Ho Chi Minh Thought			X	X		

Lịch sử Đảng Cộng sản Việt Nam/ History of The Communist Party Of Vietnam			X	X		
Pháp luật đại cương/ General Laws	X		X	X		
Mathematics						
Compulsory						
Đại số tuyến tính/ Linear Algebra	X	X				X
Toán rời rạc/ Discrete Mathematics	X	X				X
Xác suất thống kê/ Probability & Statistics	X	X				X
Giải tích/ Mathematics Analytics	X	X				X
Phương pháp số/ Numerical Methods	X	X				X
Foreign Language						
English Proficiency 1/ English Proficiency 1			X		X	
English Proficiency X/ English Proficiency 2			X		X	
English Proficiency X/ English Proficiency 3			X		X	
Culture - Skill						
Khởi nghiệp sáng tạo/ Creative Entrepreneurship			X	X	X	
Viết luận anh/ English Composition	X	X	X		X	X
Natural Sciences						
Lý/ Physics	X			X		
Hoá/ Chemistry	X			X		
PROFESSIONAL KNOWLEDGE						
Foundation knowledge						
Cơ sở lập trình/ Introduction to Programming	X	X				X
Cơ sở dữ liệu/ Introduction to Databases	X	X			X	X
Kiến trúc máy tính/ Computer Architecture	X	X		X		X
Mạng máy tính/ Computer Networks	X	X				X
Hệ điều hành/ Operating Systems	X	X		X		X
Cấu trúc dữ liệu và giải thuật/ Data Structures and Algorithms	X	X				X
Lập trình hướng đối tượng/ Object-Oriented Programming	X	X				X
Phân tích, trực quan dữ liệu với Python/ Data Analysis and Visualization with Python	X	X			X	X
Trí tuệ nhân tạo/ Artificial Intelligence	X	X			X	X
Lập trình web và ứng dụng/ Web and Application Programming	X	X		X		X
Công nghệ phần mềm/Software Engineering	X	X		X		X
Máy học/ Machine Learning	X	X			X	X
Phương pháp nghiên cứu khoa học / Research Methods			X	X	X	
Dữ liệu lớn/ Big Data	X	X			X	X
Đồ án 1 (Đồ án có sở)/Project 1	X	X	X	X	X	X
Điện toán đám mây / Cloud Computing	X	X		X		X
Lập trình thiết bị di động/ Mobile Device Programming	X	X		X		X
Artificial Intelligence						
Compulsory						
Thị giác máy tính/ Computer Vision	X	X			X	X
Robotics và ứng dụng/ Robotics	X	X		X		X
Xử lý ngôn ngữ tự nhiên/ Natural Language Processing	X	X		X		X
Các mô hình học sâu và ứng dụng/ Deep Learning	X	X			X	X
Đồ án 2 (Đồ án chuyên ngành)/ Project 2	X	X	X	X	X	X
Elective (choose 2 courses)						
Lập trình Hệ thống nhúng/ Embedded Systems Programming	X	X		X		X
Xử lý âm thanh và tiếng nói/ Audio and Speech Processing	X	X		X		X
Khai thác dữ liệu và ứng dụng/ Data Mining	X	X		X		X
Dịch máy/ Computer Linguistics	X	X		X		X
Thị giác máy tính tương tác người – máy/ Advanced Computer Vision	X	X		X		X
Hệ khuyến nghị/ Recommender Systems	X	X		X		X

Triển khai và vận hành các mô hình học máy/ Machine Learning DevOps	X	X		X		X
Big Data						
Compulsory						
Dữ liệu lớn chuyên sâu/Advanced Big Data	X	X		X		X
Khai thác dữ liệu và ứng dụng/ Data Mining	X	X		X		X
Cơ sở dữ liệu phân tán/ Distributed Database	X	X		X		X
Lập trình phân tán/ Distributed Programming	X	X		X		X
Đồ án 2 (Đồ án chuyên ngành)/ Project 2	X	X	X	X	X	X
Elective (choose 2 courses)						
Hệ sơ sở tri thức/ Knowledge-Based Systems	X	X		X		X
Python nâng cao/ Advanced Python Programming	X	X		X		X
Kiểm thử phần mềm/ Software Testing	X	X		X		X
Blockchain/ Blockchain	X	X		X		X
Các mô hình học sâu và ứng dụng / Deep Learning	X	X			X	X
Software Engineering						
Compulsory						
Thiết kế phần mềm hướng đối tượng/ Object-Oriented Software Development	X	X		X		X
Kiến trúc phần mềm/ Software Architecture	X	X		X		X
Một số vấn đề hiện đại trong CNPM/ Modern Issues in Software Engineering	X	X		X		X
Phát triển vận hành và bảo trì phần mềm/ Software Deployment, Operations and Maintenance	X	X		X		X
Đồ án 2 (Đồ án chuyên ngành)/ Project 2	X	X	X	X	X	X
Elective (choose 2 courses)						
Phát triển phần mềm mã nguồn mở/ Open-Source Software Development	X	X		X		X
Nhập môn lập trình game/ Introduction to Game Programming	X	X		X		X
Quản lý dự án công nghệ thông tin/ Information Technology Project Management	X	X		X		X
Cơ sở dữ liệu phân tán/ Distributed Database	X	X		X		X
Kiểm thử Phần mềm/ Software Testing	X	X		X		X
Lập trình Java/ Java Programming	X	X				X
Computer Network and Information Security						
Compulsory						
Mạng nâng cao/ Advanced Computer Networks	X	X				X
Quản trị mạng/ Network Management	X	X				X
An ninh thông tin/ Information Security	X	X		X		
Phân tích đánh giá an toàn mạng/ Computer Networking Security Analysis and Evaluation	X	X		X		
Đồ án 2 (Đồ án chuyên ngành)/ Project 2	X	X	X	X	X	X
Elective (choose 2 courses)						
An toàn IoTs/ Cybersecurity and the Internet of Things	X	X		X		
Mạng không dây/ Wireless Network	X	X				X
Hệ điều hành Linux/Linux Operating Systems	X	X				X
Đánh giá hiệu năng mạng / Network Performance Analysis	X	X				X
Thiết kế hệ thống mạng/ Computer Networks Design	X	X				X
Cơ sở dữ liệu phân tán/ Distributed database	X	X		X		X
Lập trình Java/ Java Programming	X	X				X
Internship and graduation thesis						
Thực tập tốt nghiệp / Graduation Internship	X	X	X	X	X	X
Khóa luận tốt nghiệp / Graduation Thesis	X	X	X	X	X	X
UNCUMMULATIVE KNOWLEDGE						
Compulsory, uncumulative						
NATIONAL DEFENSE AND SECURITY EDUCATION, PHYSICAL EDUCATION						

Giáo dục quốc phòng an ninh / National Defense and Security Education		X	X	X	X	
Giáo dục thể chất/ Physical Education		X	X	X	X	

10.4. Teaching plan (expected):

No	Course	Name of course	Num of cred	Num of period	Allocation				Note
					Theo	Prac	Proj	TT	
Semester 1									
1	CTS14123	Introduction to Programming	4	90	30	60			
2	CTS13124	Introduction to Databases	3	60	30	30			
3	CTS12125	Computer Architecture	2	30	30				
4	CTS13126	Computer Networks	3	60	30	30			
5	2BUS11440	Probability & Statistics	3	45	45				
Total accumulated credits of Semester 1			15						
Total credit of Semester 1			15						
Semester 2									
6	CTS22127	Operating Systems	2	30	30				
7	CTS24128	Data Structures and Algorithms	4	90	30	60			
8	CTS24129	Object-Oriented Programming	4	90	30	60			
9	CTS23130	Data Analysis and Visualization with Python	3	60	30	30			
10	2SOC11497	Linear Algebra	3	45	45				
Total accumulated credits of Semester 2			16						
Total credit of Semester 2			16						
Summer Semester 1									
11	2GEN0008	General Laws (follow the allocation made by academic office)	2	30	30				
12	2GEN0002	PE 1 (follow the allocation made by academic office)	1	30		30			uncumulative
13	2GEN0011	Philosophy of Marxism and Leninism (follow the allocation made by academic office)	3	45	45				
Total accumulated credits of Summer Semester 1			5						
Total credit of Summer Semester 1			6						
Semester 3									
14	CTS33131	Artificial Intelligence	3	60	30	30			
15	2SOC2485	Discrete Mathematics	3	45	45				
16	CTS34132	Web and Application Programming	3	60	30	30			
17	CTS33133	Software Engineering	3	60	30	30			
18	CTS34134	Machine Learning	3	60	30	30			
19	2SOC1498	Mathematics Analytics	3	45	45				

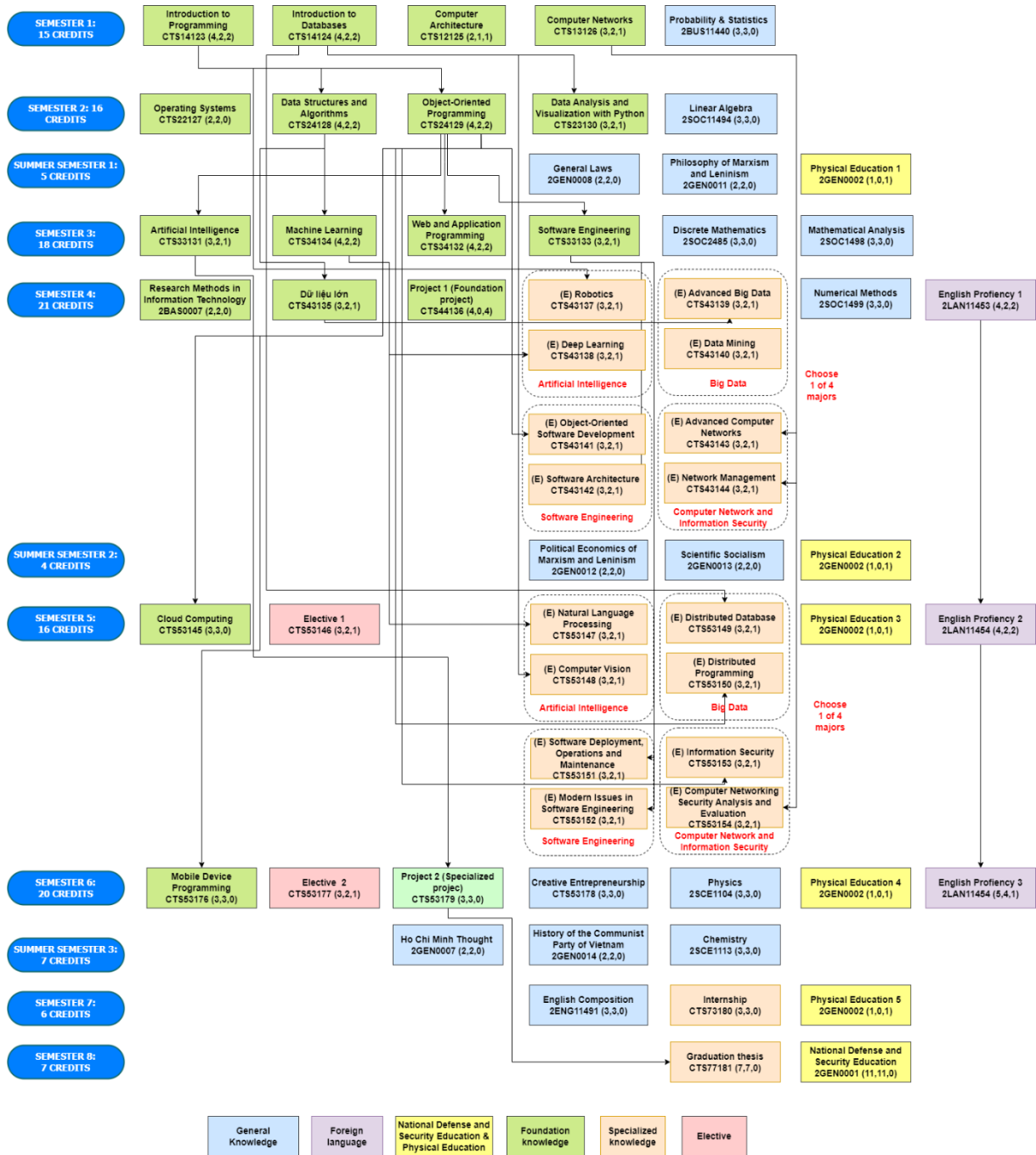
Total accumulated credits of Semester 3			18						
Total credit of Semester 3			18						
Semester 4									
20	2BAS0007	Research Methods	2	30	30				
21	CTS43135	Big Data	3	60	30	30			
22	CTS44136	Project 1 (Foundation project)	3	45	45				
23	2LAN11453	English Proficiency 1	4	90	30	60			
24	2SOC1499	Numerical Methods	3						
Artificial Intelligence									
25	CTS43137	Robotics	3	60	30	30			
26	CTS43138	Deep Learning	3	60	30	30			
Big Data									
27	CTS43139	Advanced Big Data	3	60	30	30			
28	CTS43140	Data Mining	3	60	30	30			
Software Engineering									
29	CTS43141	Object-Oriented Software Development	3	60	30	30			
30	CTS43142	Software Architecture	3	60	30	30			
Computer Network and Information Security									
31	CTS43143	Advanced Computer Networks	3	60	30	30			
32	CTS43144	Network Management	3	60	30	30			
Total accumulated credits of Semester 4			21						
Total credit of Semester 4			21						
Summer Semester 2									
33	2GEN0012	Political Economics of Marxism and Leninism (follow the allocation made by academic office)	2	30	30				
34	2GEN0002	PE 2 (follow the allocation made by academic office)	1	30		30			uncumulative
35	2GEN0013	Scientific Socialism (follow the allocation made by academic office)	2	30	30				
Total accumulated credits of Summer Semester 2			4						
Total credit of Summer Semester 2			5						
Semester 5									
36	CTS53145	Cloud Computing	3	45	45				
37	CTS53146	3 credits of elective (Choose among the elective courses or courses of other majors)	3	60	30	30			

38	2GEN0002	PE 3 (follow the allocation made by academic office)	1	30		30			uncumulative
39	2LAN11454	English Proficiency 2	4	90	30	60			
Artificial Intelligence									
40	CTS53147	Natural Language Processing	3	60	30	30			
41	CTS53148	Computer Vision	3	60	30	30			
Big Data									
42	CTS53149	Distributed Database	3	60	30	30			
43	CTS53150	Distributed Programming	3	60	30	30			
Software Engineering									
44	CTS53151	Software Deployment, Operations and Maintenance	3	60	30	30			
45	CTS53152	Modern Issues in Software Engineering	3	60	30	30			
Computer Network and Information Security									
46	CTS53153	Information Security	3	60	30	30			
47	CTS53154	Computer Networking Security Analysis and Evaluation	3	60	30	30			
Elective Courses (Choose among the elective courses or courses of other majors)									
48	CTS53155	Embedded Systems Programming	3	60	30	30			
49	CTS53156	Audio and Speech Processing	3	60	30	30			
50	CTS43140	Data Mining	3	60	30	30			
51	CTS53158	Computer Linguistics	3	60	30	30			
52	CTS53159	Advanced Computer Vision	3	60	30	30			
53	CTS53160	Recommender Systems	3	60	30	30			
54	CTS53161	Machine Learning DevOps	3	60	30	30			
55	CTS53162	Advanced Python Programming	3	60	30	30			
56	CTS53163	Software Testing	3	60	30	30			
57	CTS53164	Blockchain	3	45	45				
58	CTS53165	Distributed Database	3	60	30	30			
59	CTS53166	Open-Source Software Development	3	60	30	30			
60	CTS53167	Introduction to Game Programming	3	60	30	30			
61	CTS53168	Information Technology Project Management	3	60	30	30			
62	CTS53169	Distributed Programming	3	60	30	30			
63	CTS53170	Cybersecurity and the Internet of Things	3	60	30	30			
64	CTS53171	Wireless Network	3	60	30	30			

65	CTS53172	Linux Operating Systems	3	60	30	30			
66	CTS53173	Network Performance Analysis	3	45	45				
67	CTS53174	Computer Networks Design	3	60	30	30			
68	CTS53175	Java Programming	3	60	30	30			
Total accumulated credits of Semester 5			16						
Total credit of Semester 5			17						
Semester 6									
69	CTS53176	Mobile Device Programming	3	60	30	30			
70	CTS53177	Elective (Choose 1 among the elective courses or courses of other majors)	3	60	30	30			
71	2GEN0002	PE 4	1	30		30			uncumulative
72	CTS53178	Creative Entrepreneurship	3	45	45				
73	CTS53179	Project 2 (Specialized projec)	3	45	45				
74	2LAN11455	English Proficiency 3	5	90	60	30			
75	2SCE1104	Physics	3	45	45				
Total accumulated credits of Semester 6			20						
Total credit of Semester 6			21						
Summer Semester 3									
76	2GEN0007	Ho Chi Minh Thought (follow the allocation made by academic office)	2	30	30				
77	2GEN0014	History of the Communist Party of Vietnam (follow the allocation made by academic office)	2	30	30				
78	2SCE1113	Chemistry	3	45	45				
Total accumulated credits of Summer Semester 3			7						
Total credit of Summer Semester 3			7						
Semester 7									
Internship and Graduation Thesis									
79	2GEN0002	PE 5	1	30		30			uncumulative
80	CTS73180	Graduation Internship	3	45					
81	2ENG11491	English Composition	3	45	45	0			
Total accumulated credits of Semester 7			6						
Total credit of Semester 7			7						
Semester 8									
82	CTS77181	Graduation thesis	7	105					

83	2GEN0001	National Defense Education (follow the University's academic year plan)	11	165	165				uncumulative
Total accumulated credits of Semester 8			7						
Total credit of Semester 8			18						

11. Teaching mapping



12. Guidelines to implementation of curriculum

- The curriculum is implemented according to the University's Teaching Plan.

- The courses are assigned to lecturers by the corresponding schools/course management units and are taught according to the approved course syllabus.
- The organization of teaching, testing and assessment of courses is implemented in accordance with the Regulation on academic affairs and relevant regulations of the Saigon International University.

13. Course descriptions

13.1. Philosophy of Marxism and Leninism

This course lays out the basic issues regarding the world view and methodology of Marxism – Leninism conducive to the study and research of other courses within this curriculum as well as knowledge attainment and real-life applications.

13.2. Political Economics of Marxism and Leninism

This course systematically and selectively provides basic knowledge for Political Economics of Marxism – Leninism, on which students will comprehend the Communist Party’s platforms and policies in the context of late-stage society in Vietnam, therefore building and reinforcing trust in the Party and in Socialist Regime of Vietnam.

13.3. Scientific Socialism

Combined with Marxism – Leninism, Ho Chi Minh Thought, and other relevant subjects, this course provides a comprehensive understanding of Marxism – Leninism, Ho Chi Minh thoughts, and the path to socialism in Vietnam.

13.4. Ho Chi Minh Thought

This course provides knowledge on: the origin, formation, and development of Ho Chi Minh thoughts; key Ho Chi Minh thoughts on revolution in Vietnam, on culture, morals, and human development. Students will grasp scientific, revolutionary, and humane values of Ho Chi Minh thoughts and life.

13.5. History of the Communist Party of Vietnam

This course helps students understand that the Vietnam Communist Party is the pioneering force of the proletariat, their royal representatives, with Marxism – Leninism and Ho Chi Minh Thought as ideological foundation for actions, with continual strive for sovereignty, powerful and prosperous nation, equal, democratic, and civil society with socialist orientation.

13.6. General Laws

This course provides fundamental knowledge regarding state and laws, including:

theoretical frameworks of state and laws (their origin, nature, functions, and key characteristics of the state; origin, forms, concepts, and features of laws); legal system and relations; legal violations and responsibilities; basic institutions of important laws.

13.7. Linear Algebra

This course provides knowledge on matrix, operands, determinants, and linear equations. Other modules include: How to solve linear equations employing Cramer's rule, Gaussian quadrature, Gauss-Jordan elimination; Vector space, linear dependence and independence, generating set, basis, and dimension; Diagonalizable matrix and its significance; Linear mapping, linear operator, quadratic and canonical forms and their conversion. Upon completion, students will grasp basic knowledge conducive to studying other engineering courses, develop the ability to reason, analyze, detect and solve problems, generating a mathematical model for any given engineering problem.

13.8. Discrete Mathematics

This course provides knowledge on logic, relations, set theory, counting problem, pigeonhole principle, listing problem, Boolean logic, graph theory and trees.

13.9. Probability & Statistics

This course provides concepts concerning probability theory (probability space; random variable; characteristic function; sequence of random variables; probability distribution rules; limit of distributions) and statistics (random sample; point and interval estimation; statistical hypothesis testing; correlation and regression analysis; issues concerning random processes). Students will be guided to detect, analyze, and solve practical problems; process statistical data to draw appropriate inference (for decision making process).

13.10. English Proficiency 1

Upon completion, students will be able to compose simple paragraphs on familiar topics or areas of interest; to describe their experiences, events, dreams, hopes, ambitions; to make simple elaborations for their opinions or plans.

13.11. English Proficiency 2

Upon completion, students will be able to comprehend the main ideas of a complex text on specific and abstract issues, including those pertaining to their specialization; to communicate fluently with native speakers.

13.12. English Proficiency 3

Upon completion, students will be able to compose thorough and detailed text on various topics, to elaborate their position regarding a particular issue, to point out the pros and cons of different options.

13.13. Creative Entrepreneurship

This course provides general understanding of creativity, innovation, and formation of startup ideas, as well as intellectual property. Students will also learn basic skills and knowledge pertaining to the market such as assessment of advantages, opportunities, risks of product commercialization, discovery of business potential, and establishment of startup plan.

13.14. Introduction to Programming

This course serves as an introduction to programming through C programming language, laying the foundation for other specialized subjects in this curriculum. A firm grasp of this course is crucial for development of reasoning and programming skills necessary in problem solving in theory as well as in practice.

13.15. Object-Oriented Programming

This course helps students approach object-oriented programming, learning how to analyze, design, and execute a program via such approach. They will be introduced to Unified Modeling Language (UML) and Java programming language.

13.16. Data Structures and Algorithms

This course helps students understand the importance of algorithm and data organization, the two essential features of any program. Students will be provided with organizing methods and basic operations with data structures, thus developing the right algorithms appropriate for specific types of computer programs. The tool to be used in this course is C programming language.

13.17. Computer Architecture

This course focuses on the analysis and organization of a computer system, which includes: digital circuitry in computer design, ALU, CPU, communication among CPU, memory, and peripheral; architecture of personal computer (PC); programming concepts pertaining to microprocessing.

13.18. Operating Systems

This course provides basic knowledge on the mechanism of operating systems and

discusses issues concerning the functions of such systems: process management, memory management, folder and file management, peripheral management, etc.

13.19. Introduction to Databases

This course provides basic concepts regarding databases, data independence, database architecture, from which students can organize physical data, optimize the problems encountered, ensure data security and integrity, evaluate databases, and learn their utilities: algebraic language, structured query language (SQL), data constraints and optimization.

13.20. Computer Networks

This course ensures students will firmly grasp how to build a computer network to organize an information system, program network interaction, or build a secured information network.

13.21. Artificial Intelligence

This course provides a basic understanding of artificial intelligence. The main focus will be on problem solving approaches and their applications, with an emphasis on the heuristic approach. Methods of knowledge representation and processing will also be instructed. Students will be introduced to approximate reasoning, machine learning, description logic, and search strategy using Minimax and α - β pruning, along with new research approaches. Students will be familiarized with problems of optimizing search strategies and representing knowledge using basic methods.

13.22. Machine Learning

After an introduction to machine learning and design schemata, students will learn key concepts pertaining to machine learning methods. In addition to basic algorithms, this course also focuses on learning system design, learning system quality assessment, news on machine learning. Upon attaining specific techniques and algorithms, students will learn how to utilize them, to research specialized topic, and other practical implications.

13.23. Big Data

This course provides students with fundamental knowledge and broad strokes about big data, serving as the basis for data science and technology. Students will familiarize themselves with the mental processes behind building an application and other practical

problems concerning big data. They will also be introduced to big data processors such as Hadoop or Spark.

13.24. Cloud Computing

This course provides basic knowledge on cloud computing, including its components and relevant technologies. Other topics about the basis of cloud computing are also discussed: big data centers, virtualization, cloud service management and control protocols, cloud storage and database, confidentiality and security in using cloud, quality assurance, and service agreements. Students will learn how to develop and execute cloud services with knowledge about web services, cloud development environment, architecture and design of a cloud service.

13.25. Research Methods

Students will be equipped with fundamental knowledge on research methodology, research methods, and the proper steps to conduct research. They will understand the significance of scientific research in professional development and get familiarized with the research process in practice.

13.26. Mobile Device Programming

This course provides students with a fundamental understanding of application design and development for mobile devices, including general concepts and knowledge, app interface design, relevant tools, event processing, toolkits, application development, testing, and deployment. Students will learn Native application development on Android platform, component programming for Android apps such as: Activity, Service, Content provider, Broadcast receiver, Intent.

13.27. Python Programming

This course provides students with basic to advanced knowledge on Python programming.

13.28. Computer Vision

This course focuses on key topics such as computer vision, visual information query for images and video images at content and semantic levels. Upon completion, students will be able to write computer vision applications and retrieve visual information including digital images and videos, as well as biometric features.

13.29. Robotics

This course provides basic knowledge on robot and relevant methods for computing, simulating, pathway design, and robot control.

13.30. Natural Language Processing

This course provides fundamental knowledge on methods of computer natural language processing: morphological, part-of-speech, syntactic, semantic analyses. They are the foundation on which students can build practical applications such as text checker, text comprehension and summary, text categorization, information retrieval, machine translation, text generation, converting texts to structured data, etc.

13.31. Deep Learning

This course provides students with fundamental and specialized knowledge on artificial neural networks, common deep learning models and their implications in solving practical AI problems.

13.32. AI Project

The AI Project is an opportunity for students to apply what they have learned in Artificial Intelligence to practice, serving as the basis for Graduation Thesis and other research.

13.33. Embedded Systems Programming

This course provides knowledge on general concepts of embedded system models, embedded applications, embedded system design, embedded software programming tools and principles, as well as different embedded systems categorized by micro-processor generations.

13.34. Audio and Speech Processing

This course introduces multimedia technologies and relevant research approaches. Students will be introduced to the concepts, roles, and applications of such technologies, as well as audio and audio processing tools, image and video processing tools. To attend this course, basic knowledge on data encryption, image processing, and fluency in one programming language are required.

13.35. Data Analysis and Visualization with Python

Students will be equipped with basic knowledge on data visualization and analytics, knowledge discovery via data mining approach, insight attainment via visual analytics,

data visualization systems that convert a data set to visual presentation for ease of access and knowledge mining.

13.36. Data Mining

This course provides students with proper knowledge and techniques of data mining for attainment of useful insights. The significance of mined insight with respect to decision and policy making will be discussed along with practical implications.

13.37. Computer Linguistics

This course provides students with specialized knowledge on natural language processing specific to machine translation. Students will be familiarized with the models and algorithms used in machine translation.

13.38. Advanced Computer Vision

This course focuses on key topics such as computer vision, visual information query for images and video images at content and semantic levels. Upon completion, students will be able to write computer vision applications and retrieve visual information including digital images and videos, as well as biometric features.

13.39. Recommender Systems

This course provides students with fundamental knowledge on recommender systems such as: their significance, practical implications, key concepts and recommender algorithms (content filter and collaborative filtering), recommender system evaluation (online, offline), programming libraries, tools to build a recommender system. Students will also be introduced to new approaches and trends concerning recommender systems.

13.40. Knowledge-Based Systems

This course covers: introduction to knowledge-based systems (their architecture, development, distinctions with traditional computing systems); knowledge collection and management; inference engine; system interface; reasoning module; fuzzy-logic or ontological system development.

13.41. Advanced Python Programming

Students will be equipped with advanced knowledge on Python programming: object-oriented programming, network and interface programming, database connection, and other topics for specialized research such as data visualization, computer vision, machine learning, etc.

13.42. Blockchain

Students will be equipped with basic knowledge on blockchain technologies and their applications for employment in conducting scientific research.

13.43. Deep Learning in TensorFlow

Students will be equipped with specialized knowledge on deep neural networks; different types of neural networks; collaborative filtering with RBM. They will also gain practical experience with TensorFlow projects.

13.44. Distributed Database

This course provides students with basic knowledge on distributed database and relevant problems. Specifically, the course focuses on: methods of data fragmentation, conditions for verification; approaches to distributed database design and relevant algorithms; conversion of heuristic query into fragmented query and optimization of distributed data; principles for transaction management, semantic data control, and concurrency control. Students will be familiarized with problems concerning data fragmentation, analyzing and developing a distributed database to be installed on management systems such as: SQL Server, Oracle, DB2, PostgreSQL. A project involving 2-3 students working on a practical problem concludes this subject.

13.45. Software Engineering

This course provides an understanding of software engineering processes and basic methods of software development. Students will learn about the specific criteria for each of the software development stages.

13.46. Object-Oriented Software Development

This course provides students with fundamental knowledge on the analysis of structured and object-oriented information system designs; basic concepts regarding object orientation; Unified Modeling Language (UML); Rational Rose; the steps in object-oriented analysis and design. Students will be able to analyze specific problems with an object-oriented programming approach.

13.47. Software Architecture

This is among the optional obligatory courses for all specializations and usually opens at the 7th semester for Information Technology students. They will be equipped with basic knowledge, concepts, and skills necessary for any software development project. Students will take a deep dive into software architecture and relevant issues.

13.48. Software Deployment, Maintenance and Operations

This course provides students with fundamental knowledge on software engineering, with a focus on the last two stages of software production: deployment, operation, and maintenance. Students will learn about the activities pertaining to software development and operation, as well as processes, techniques, and tools involved in software maintenance to be able to address any issue encountered during software maintenance or change, ensuring effective execution and management of software upgrade.

13.49. Software Engineering Project

This course is only available to students who have completed other courses in their major. Students are required to carry out a project relevant to their specialization, to research and find a solution to a theoretical or practical problem, and to compose a final project report.

13.50. Modern Issues in Software Engineering

This is among the optional obligatory courses for all specializations and usually opens at the 7th semester for Information Technology students. They will be equipped with basic knowledge, concepts, and skills necessary for any software development project. This course introduces basic problems concerning RUP software development, CMMI standards. Upon completion, students with a firm grasp of the tasks pertaining to the software development process may participate in practical projects.

13.51. Open-Source Software Development

Open-source softwares are becoming more commonplace, playing a larger part in the software industry. This course provides students with knowledge on open-source softwares and their relevant copyrights, development, utilization, and community; open-source enterprise, combination of open-source and proprietary softwares to facilitate effective entrepreneurial environment, encouraging community feedbacks and contributions. There are seven chapters to be covered: Chapter 1 introduces the history of open-source softwares and their pros and cons; Chapter 2 presents different types of open-source enterprises; Chapter 3 focuses on open-source copyrights; Chapter 4 discusses the development of open-source community; Chapter 5 concerns the development of an open-source software; Chapter 6 instructs the steps to create an open-source project; Chapter 7 focuses on building a specific open-source software.

13.52. Introduction to Game Programming

This course presents basic issues concerning game softwares, including game development, basic game components, design models, artificial intelligence building. Students will be introduced to various object-oriented tools and environments to develop a simple game.

13.53. Information Technology Project Management

This course focuses on information technology management issues such as project planning and supervision. Students will also understand the significance of planning and the roles of different participants.

13.54. Software Testing

This course provides students with knowledge on software testing, relevant processes, and simple techniques in designing and setting up a test. Students will gain the ability to design, test, and evaluate a specific software in practice. They will also get familiarized with some error management tools and automated testing tools.

13.55. Advanced Computer Networks

Students will get familiarized with: configurations of routing protocols such as RIP, OSPF, EIGRP on Cisco devices; VLAN, STP, VTP, ACL, NAT, PPP, Frame Relay configurations on Cisco devices. Students will be able to manage cybersecurity and be skilled at configuring VLAN, STP, VTP on Cisco devices.

13.56. Network Management

This course allows students to: build a management system, use management software, grasp the network structure they are managing and problems concerning cybersecurity, protection of input/output with regards to network requirements; execute frequent monitoring of network anomalies, abnormal logins/logouts; establish a defense to nullify any potential invaders; perform safe upgrade on request; and gather new knowledge.

13.57. Information Security

This course provides fundamental knowledge on information protection in general (common models, data security mechanisms, cryptography, etc.).

13.58. Computer Networking Security Analysis and Evaluation

Students will be equipped with: techniques to detect risks in a network system by employing approaches and methods similar to hackers; discover and check internal and external network protection; methods of risk mitigation for businesses.

13.59. Cybersecurity and the Internet of Things

Students will be equipped with basic knowledge on Internet of Things (IoT). IoT is the connection among various technologies including wireless sensor networks, Pervasive (Ubiquitous) systems, AmI (ambient intelligence, distributed and contextualized systems). The focus is on hardware and software platforms applicable in IoT, M2M protocols (such as Zigbee, Bluetooth, IEEE 802.15.4, IEEE 802.15.6, IEEE 802.15.11), and procedures for data and information processing.

13.60. Wireless Network

This course introduces basic knowledge on wireless networks, with which students can understand the basic components and structure of a wireless network, wireless transmission technologies, and transmission control protocols pertaining to wireless networks.

13.61. Linux Operating Systems

This course allows students to: build Linux servers that meet clients' requirements such as Mail Server, Web Server, Database, etc.; operate Linux system in business settings (installation, configuration, connection with printers, fluency in network management tools, kernel configuration, DFS, planning for data storage and recovery, TCP/IP, DHCP, device configuration).

13.62. Computer Networks Design

Students will be equipped with basic and advanced knowledge on network design by looking into the network devices currently in use, theoretical issues concerning network features and operations. Upon completion, students will have a firm grasp of: IP address classification; Domain system; DNS; Active Directory Domain Forest and Domain; Site and Active Directory; Operation Master.

13.63. Graduation Internship

Students will get the opportunity to experience and learn more about the IT working environment in practice in preparation for their post-graduation career.

13.64. Graduation Thesis

Graduation Thesis helps students improve their skills and apply what they have

learned to build an application or conduct an intensive research into artificial intelligence.

13.65. Physical Education

Students will be equipped with knowledge on Physical Education and trained on exercises, track and field (middle distance), keeping fit, therefore understanding PE's significance.

13.66. National Defense and Security Education

Students will gain a basic understanding of Communist Party's military policies, the practice of national defense and security, general military training and organization.

Note: Please attach the outlines of all courses listed in this curriculum.

CHANCELLOR

DEAN
School of Computer Science & Engineering

Assoc. Prof. Dr. Tran Cong Hung