VINUNIVERSITY

CURRICULUM FRAMEWORK

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Electrical and Computer Engineering program

PROGRAM CODE: **7520201**

Applicable from Cohort 2025-2029, Academic Year 2025-2026

(Decision No. 477/2025/QĐ-VUNI dated August 15, 2025 by Provost of VinUniversity)

This curriculum framework has been reviewed and validated by Cornell University

Records of changes

Version	Published date	Effective Date	Approved by	Description of changes
1	15/8/2025	15/8/2025	Developed by Curriculum Review Taskforce Reviewed by College Academic Committee; Scientific and Educational Committee Approved by: Provost (Decision No. 477/2025/QĐ-VUNI dated August 15, 2025 by Provost of VinUniversity).	First release for Cohort 2025-2029

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1. PROGRAM OVERVIEW

1.1.Program Profile

Name of the degree	Bachelor of Science in Electrical Engineering
Name of the program	Electrical and Computer Engineering
Program Code	7520201
Vietnam Qualifications Framework Level	6
Length of Program	4 years
Mode of Delivery	Full-time
Language of Delivery	English
Total credits	*Single major:* 124 crecdits
	Major + minor in Robotics or Product Design or Artificial Intelligence or another minor: 139 credits
Home College	College of Engineering and Computer Science

1.2.Program Purpose

The overall aim of the program is to nurture and develop young leaders in electrical engineering with clear direction and vision, creativity and sound personal values; who pave the way for the development of science and technology, to increase labor productivity and to benefit society.

2. PROGRAM EDUCATIONAL OBJECTIVES AND PROGRAM LEARNING OUTCOMES

2.1.Program Educational Objectives

The educational objectives of the Bachelor of Science in Electrical Engineering program are that within a few years of graduation, a majority of our graduates will demonstrate excellence in top graduate programs; or in technical and managerial leadership tracks in technology-based industries or other sectors; or pursuing entrepreneurial ventures. In these roles they will:

PEO1: Apply basic knowledge of electrical and computer engineering principles and in-depth knowledge of one area of concentration to solve a full range of technical and societal problems in professional engineering practice, industry, or advanced academic study

PEO2: Conceive, design, and realize products, systems, and services, while properly respecting economic, environmental, cultural, safety, and ethical standards or constraints encountered in professional or research environments.

PEO3: Be leaders with an entrepreneurial mindset, capable of critical thinking and creativity, effective communication, and informed decision-making as members of multidisciplinary teams, supporting collaborative and inclusive environments;

PEO4: Discover and apply new knowledge, and engage in life-long learning for the profession of electrical and computer engineering;

PEO5: Engage with their communities, profession, the nation, and the world.

2.2. Program Learning Outcomes (Student Outcomes)

After successful completion of the program, students are able to:

PROGRAM LEARNING OUTCOMES (PLOs)	PERFORMANCE INDICATORS (PIs)
PLO 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	**PI 1.1:** Students identify the components of a complex problem and formulate approaches to solve it.
	PI 1.2: Students apply principles and/or knowledge from relevant disciplines to solve a complex problem.
PLO 2: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	**PI 2.1:** Students identify critical stakeholder needs, constraints and societal factors that must be considered in an engineering solution.
	PI 2.2: Students apply principles of engineering design to propose a holistic solution that meets stakeholder needs and technical as well as societal constraints.
PLO 3: An ability to communicate effectively with a range of audiences.	**PI 3.1:** Students compose content that is factually accurate, supported with evidence, explained with sufficient detail, and presented with consideration to standards such as spelling, grammar, usage and clarity.
	PI 3.2: Students effectively communicate with their intended audience through appropriate modes (e.g. oral, written, visual).
PLO 4: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	**PI 4.1:** Students make informed engineering judgements by recognizing ethical and societal issues in engineering as well as consider the implications of engineering solutions in global, environmental, and societal contexts, including Vietnam-specific context.
	PI 4.2: Students identify, interpret and/or apply standards, regulations, and laws to engineering decisions.
PLO 5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	**PI 5.1:** Students create an effective team environment that is respectful, supportive, and inclusive.
	PI 5.2: Students follow a structured approach to establish goals, plan tasks, and meet objectives.

PLO 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	**PI 6.1:** Students develop and conduct an appropriate experiment.
	PI 6.2: Students analyze and evaluate experimental results using engineering judgment to draw conclusions.
PLO 7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	**PI 71.1:** Students identify knowledge gaps and independently acquire new knowledge using appropriate learning strategies (e.g., research, tutorials, experimentation, consultation).
	PI 7.2: Students apply newly acquired knowledge to solve engineering problems, make design decisions, or improve technical work.

3. CURRICULUM STRUCTURE

3.1.Curriculum Composition

No.	Curriculum Components	Number of Credits	Credit Distribution (%/Total Credits)
I	**VINCORE**	**35**	**28.2%**
I.1	*Enterprise and Innovation*	4	3.2%
I.2	*Leadership Mindset*	2	1.6%
I.3	*Civic Responsibility*	2	1.6%
I.4	*Ethics*	2	1.6%
I.5	*Community Service Learning*	45 hours	
I.6	*Working with the Brain*	2	1.6%
I.7	*Working with Technology*	4	3.2%
I.8	*Working with Others*	4	3.2%
I.9	*Working with the Self*	90 hours	
I.10	*Integrated Vietnam Studies*	11	8.8%
I.11	*Sustainability and Global Citizenship*	2	1.6%
I.12	*Creative Arts*	2	1.6%
II	**PROFESSIONAL EDUCATION**	**89**	**71.8%**
II.1	*College Core Requirement*	37	29.8%
II.2	*Major Core Requirement*	19	15.3%
II.3	*Major Foundation Requirement*	15	12.1%
II.4	*Area of Concentration (Elective)*	12	9.7%
II.5	*Minor*	15	
II.6	*Internship/Co-op*	640 hours	
II.7	*Capstone Design*	6	4.8%
	TOTAL (Without minor)	**124**	**100%**
	TOTAL (With minor)	**139**	

Important Note:

- The Vincore Program has been isssued along with the Decision No. 342a/2025/QĐ-VUNI dated June 20, 2025.

- Students have the option to obtain a minor in a different area of study. ***A minor needs to have at least 15 credits that are not already counted towards the major program****. Information about the available minors is provided here: LINK.*

- *International students are exempted from National Defense Education. However, they are still required to take ideology courses, including: History of the Communist Party, Ho Chi Minh Ideology, Scientific Socialism, Marxism-Leninism Political Economy, Marxism-Leninism Philosophy (In line with Decision No. 494/QĐ-TTg, issued on June 24, 2002, by the Prime Minister).*

3.2. Courses and Credit Distribution by Courses

No	Course code	Name of Courses	Credit	Credit Hour Allocation		Pre-requisite(s)	Grading System (Letter Grade or Pass/Fail)
				Theory	Practice		
I	**VINCORE**						
I.1	**Enterprise and Innovation**		**4**				
1	ENTR1022	Agile Innovation and Entrepreneurship	2	2			P/F
2	IDEA1010/11/12/X	Big Ideas: X *(The IDEA1010/11/12 series, titled 'Big Ideas (X)' will have its course code and title defined each semester, allowing the course content to align with the key themes and innovative design concepts)*	2	2			L
I.2	**Leadership Mindset**		**2**				
	LEAD1031	Leadership and Teambuilding Bootcamp	2	2			P/F
I.3	**Civic Responsibility**		**2**				
1	VCOR1030	National Defense Education	165 hrs				P/F
2	LAW1010	Introduction to Law	2	2			L
I.4	**Ethics**		**2**				
	TECH1010	Technology Ethics	2	2			L
I.5	**Community Service Learning**						
	COSL1010	Community Service Learning	45 hrs				P/F
I.6	**Working with the Brain**		**2**				
	THINK1010	Critical and Creative Thinking	2	2			L
I.7	**Working with Technology**		**4**				
1	CECS1040	Introduction to AI Literacy	2	2			L
2	*Students select 1 course from the list below*						
2.1	CECS1050	Introduction to Data Literacy	2	2			L
2.2	CECS1031	Computational Thinking	2	2			L
I.8	**Working with Others**		**4**				
1	ENGL1030	Academic and Professional Writing	2	2			L

No	Course code	Name of Courses	Credit	Credit Hour Allocation		Pre-requisite(s)	Grading System (Letter Grade or Pass/Fail)
				Theory	Practice		
2	*Students select 1 course from the list below*						
2.1	ENGL1040	Interpersonal and Multimedia Communication	2	2			
2.2	MANA1011	Introduction to Managing Skills	2	2			
I.9	**Working with the Self**						
1	VCOR1012A /B	OASIS *(Orientation, Advising, Skills, Identity & Diversity and Spirit of Pay-it-Forward)*	45 hrs				P/F
2	VCOR1021	Healthy Lifestyle 1	45 hrs				P/F
	VCOR1022	Healthy Lifestyle 2					
I.10	**Integrated Vietnam Studies**		**11**				
1	HASS1010	Marxism-Leninism Political Economy (Philosophy, Science and Society)	3	3			L
2	HASS1020	Marxism-Leninism Philosophy (Global Political Economy)	2	2			L
3	HASS1030	Scientific Socialism (Politics and Social Change)	2	2			L
4	HASS1041	Ho Chi Minh Ideology (Vietnam: History and Cultures II)	2	2			L
5	HASS1050	History of the Communist Party (Vietnam: History and Cultures I)	2	2			L
I.11	**Sustainability and Global Citizenship** *(students may select 1 course from the list below)*						
1	HASS1070	Cross-Cultural Navigation	2	2			L
2	HASS1100	Introduction to International Relations	2	2			L
3	SUST1010	Humans and Environmental Intelligence	2	2			
4	UROP1010/ 20/30/40	UROP (Undergraduate Research Opportunity Program) - *Students are required to complete 2*	2		2		L

No	Course code	Name of Courses	Credit	Credit Hour Allocation		Pre-requisite(s)	Grading System (Letter Grade or Pass/Fail)
				Theory	Practice		
		courses, each carrying 1 credit					
I.12	**Creative Arts** *(students may select 1 course from the list below)*						
1	ARTS1030	Arts Appreciation and Application	2	2			
2	PERF1010	Artistic Performance and Application	2	2			
II	**PROFESSIONAL EDUCATION**						
II.1	**College Core Requirement**		***37***				
1	MATH1010	Calculus I	4	3	1		L
2	MATH1020	Calculus II	4	3	1	MATH1010	L
3	MATH2010	Probability and Statistics	4	3	1	MATH1020	L
4	MATH2030	Differential Equations	3	2	1	MATH1020	L
5	MATH2050	Linear Algebra	4	3	1		L
6	PHYS1010	Physics I	4	3	1	MATH1010	L
7	PHYS2020	Physics II	3	2	1	PHYS1010	L
8	PHYS2030	Physics III	2	2	0	MATH1020, PHYS2020	L
9	CHEM2010	Chemistry	3	2	1		L
10	CECS1011	Introduction to Engineering and Computer Science	2	1	1		L
11	COMP1010	Introduction to Programming	4	2	2		L
II.2	**Major Core requirement**		***19***				
12	MATH2020	Discrete Mathematics	4	3	1		L
13	ELEC2010	Introduction to Circuits for Electrical Engineers	4	3	1	PHYS2020, MATH2030	L
14	ELEC2020	Signals and Information	4	3	1	COMP1010, MATH2030, MATH2050	L
15	ELEC3010	Digital Logic and Computer Organization	4	3	1	COMP1010	L
16	ELEC2030	Computer Systems Programming	3	3	0	COMP1010	L
II.3	**Major Foundation requirement**						
17	ELEC3020	Electromagnetic Fields and Waves	4	3	1	MATH2030, PHYS2020,	L

No	Course code	Name of Courses	Credit	Credit Hour Allocation		Pre-requisite(s)	Grading System (Letter Grade or Pass/Fail)
				Theory	Practice		
						ELEC2010, MATH2050	
18	ELEC4010	Introduction to Microelectronics	4	3	1	ELEC2010	L
19	ELEC4020	Embedded Systems	4	3	1	ELEC3010/ MECE3060	L
20	ELEC3030	Intelligent Physical Systems (Interdisciplinary Engineering Design Project)	3	2	1 (lab + project)	CECS1011, COMP1010	L
II.4	**Area of Concentration (Elective)** *(Students may select one concentration below or design own concentration)*						
II.4.1	***Communications and Signal Processing***		***12***				
1	ELEC3040	Digital Signal and Image Processing	4	3	1 (project)	ELEC2020	L
2	ELEC4030	Computer Networks and Telecommunications	4	3	1	ELEC2020	L
3	ELEC4040	Digital Communication System Design	4	3	1	MATH2010, ELEC2020	L
II.4.2	***Control and Automation***		***12***				
1	ELEC3050	Control Systems	4	3	1	ELEC2010	L
2	ELEC4050	Control System Theory and Design	4	3	1	ELEC3050	L
3	ELEC4060	Robotics and Automation	4	3	1	ELEC3050/ MECE3060	L
II.4.3	***Power and Clean Energy***		***12***				
1	ELEC3060	Introduction to Electric Power Systems	3	2	1	ELEC2020	L
2	ELEC3070	Green Electric Energy	3	2	1	ELEC2010	L
3	ELEC4070	Power Electronics	3	2	1	ELEC2010	L
4	ELEC4080	Modern Distribution Systems with Renewable Resources	3	3	0	ELEC3060	L
II.4.4	***Computer Engineering***		***12***				
1	COMP2040	Operating System	4	3	1	COMP2020/ ELEC3010	L
2	ELEC4090	Complex Digital ASIC Design	4	3	1	ELEC3010	L

No	Course code	Name of Courses	Credit	Credit Hour Allocation		Pre-requisite(s)	Grading System (Letter Grade or Pass/Fail)
				Theory	Practice		
3	ELEC4100	Analog Integrated Circuit Design	4	3	1	ELEC4010	L
II.5	**Minor** *(students may take a minor in Robotics or Product Design or Artificial Intelligence or another minor offered by other colleges)*		***15***				
II.6	**Internship**						
1	ELEC3870	Internship	*640 hrs*			Sophomore Standing	P/F
2	CECS1090	Experiential Learning – Company Field Trips *(student must participate in at least 3 trips)*	*Non-credit*				P/F
II.7	**Capstone Design**		***6***				
	ELEC4890	Capstone Design Project	*6*		*6*		L

3.3.Curriculum Block

VINCORE (35 credits)
I.1. CHARACTER (10 credits)
I.1.1. Enterprise and Innovation (4 credits)
- Agile Innovation and Entrepreneurship (2)
- Big Ideas: X (2)

I.1.2. Leadership Mindset (2 credits)
- Leadership and Teambuilding Boot Camp (2)

I.1.3. Civic Responsibility (2 credits)
- Introduction to Law (2)
- National Defense Education (165 hrs)

I.1.4. Ethics (2 credits)
- Technology Ethics (2)

I.1.5. Community Service Learning (45 hrs)
- Community Service Learning (45 hrs)

I2. CAREER (10 credits)
I.2.1. Working with the Brain (2 credits)
- Critical and Creative Thinking (2)

I.2.2. Working with Technology (4 credits)
- Introduction to AI Literacy (2)
- Introduction to Data Literacy/ Computational Thinking (2)

I.2.3. Working with Others (4 credits)
- Academic and Professional Writing (2)
- Interpersonal and Multimedia Communication/Introduction to Managing Skills (2)

I.2.4. Working with the Self
- OASIS (45 hrs)
- Healthy Lifestyle (45 hrs)

I.3. CONNECTIONS (15 credits)
I.3.1. Integrated Vietnam Studies (11 credits)
- Marxism-Leninism Philosophy (Philosophy, Science and Society) (3)
- Marxism-Leninism Political Economy (Global Political Economy) (2)
- Scientific Socialism (Politics and Social Change) (2)
- History of the Communist Party (Vietnam: History and Cultures I) (2)
- Ho Chi Minh Ideology (Vietnam: History and Cultures II) (2)

I.3.2. Sustainability and Global Citizenship (2 credits)
- Cross-Cultural Navigation/Introduction to International Relations/Humans and Environmental Intelligence/UROP ((2)

I.3.3. Creative Arts (2 credits)
- Arts Appreciation and Application/Artistic Performance and Application (2)

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING (124 credits)

II.1. COLLEGE CORE (37 credits)
- Calculus I (4)
- Calculus II (4)
- Linear Algebra (4)
- Probability and Statistics (4)
- Differential Equations
- Physics I (4)
- Physics II (3)
- Physics III (2)
- Chemistry (3)
- Introduction to Engineering and Computer Science (2)
- Introduction to Programming (4)

II.2. MAJOR CORE (19 credits)
- Discrete Mathematics (4)
- Introduction to Circuits for Electrical Engineers (4)
- Signals and Information (4)
- Digital Logic and Computer Organization (4)
- Computer Systems Programming (3)

II.2. MAJOR FOUNDATION (15 credits)
- Electromagnetic Fields and Waves(4)
- Introduction to Microelectronics (4)
- Embedded Systems (4)
- Intelligent Physical Systems (Interdisciplinary Engineering Design Project) (3)

II.3. AREA OF CONCENTRATION (12 credits)
Students may select one concentration below or design own concentration

1. Communications and Signal Processing (12 credits)
- Digital Signal and Image Processing (4)
- Computer Networks and Telecommunications (4)
- Digital Communication System Design (4)

2. Control and Automation (12 credits)
- Control Systems (4)
- Control System Theory and Design (4)
- Robotics and Automation (4)

3. Power and Clean Energy (12 credits)
- Introduction to Electric Power Systems (3)
- Green Electric Energy (3)
- Power Electronics (3)
- Modern Distribution Systems with Renewable Resources (3)

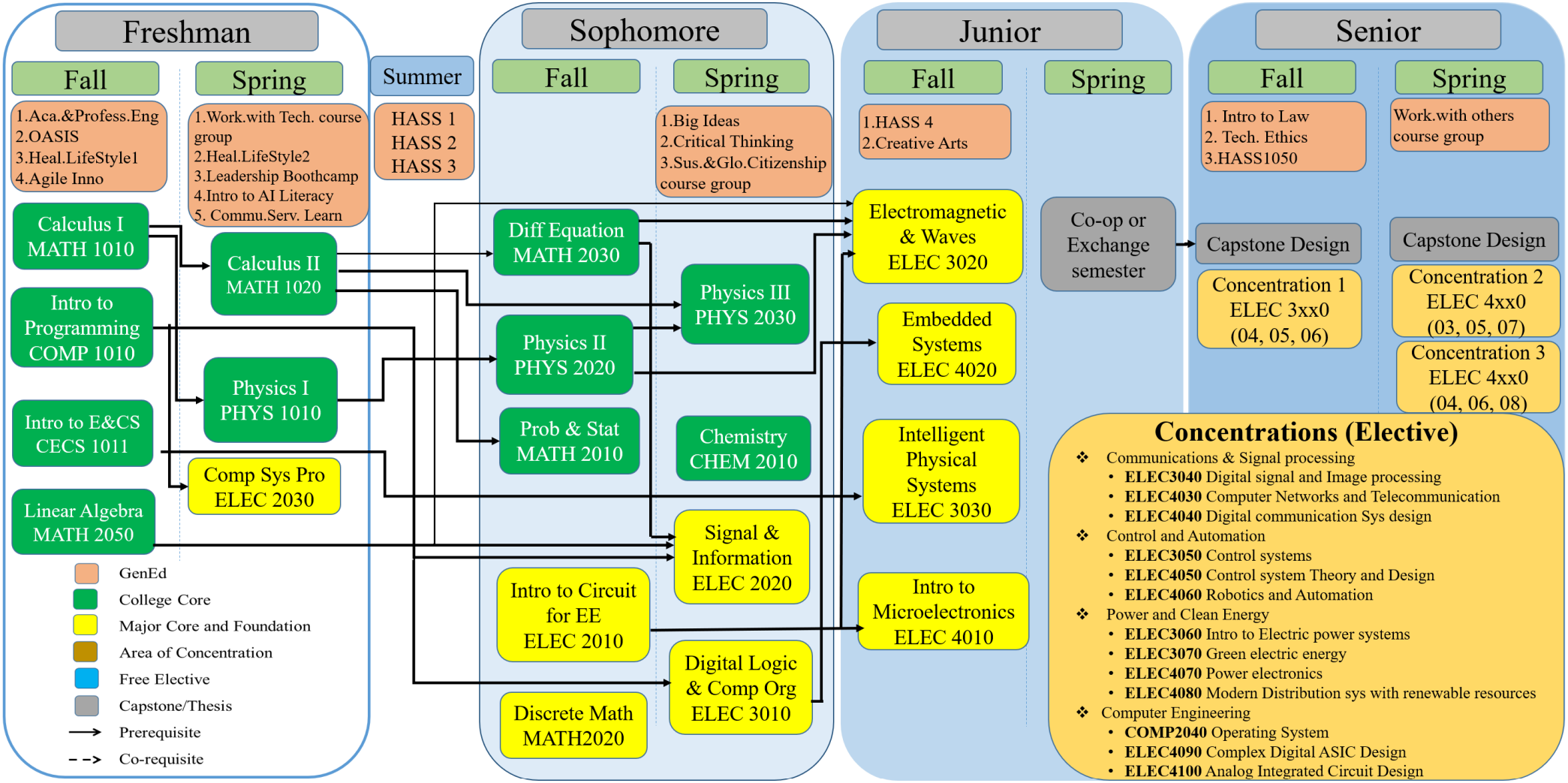
4. Computer Engineering (12 credits)
- Operating System (4)
- Complex Digital ASIC Design (4)
- Analog Integrated Circuit Design (4)

II.7. PRACTICE/ INTERNSHIP
- Internship (640 hrs)
- Experiential Learning – Company Field Trips (Student must participate at least 3 trips) (Non-credit)

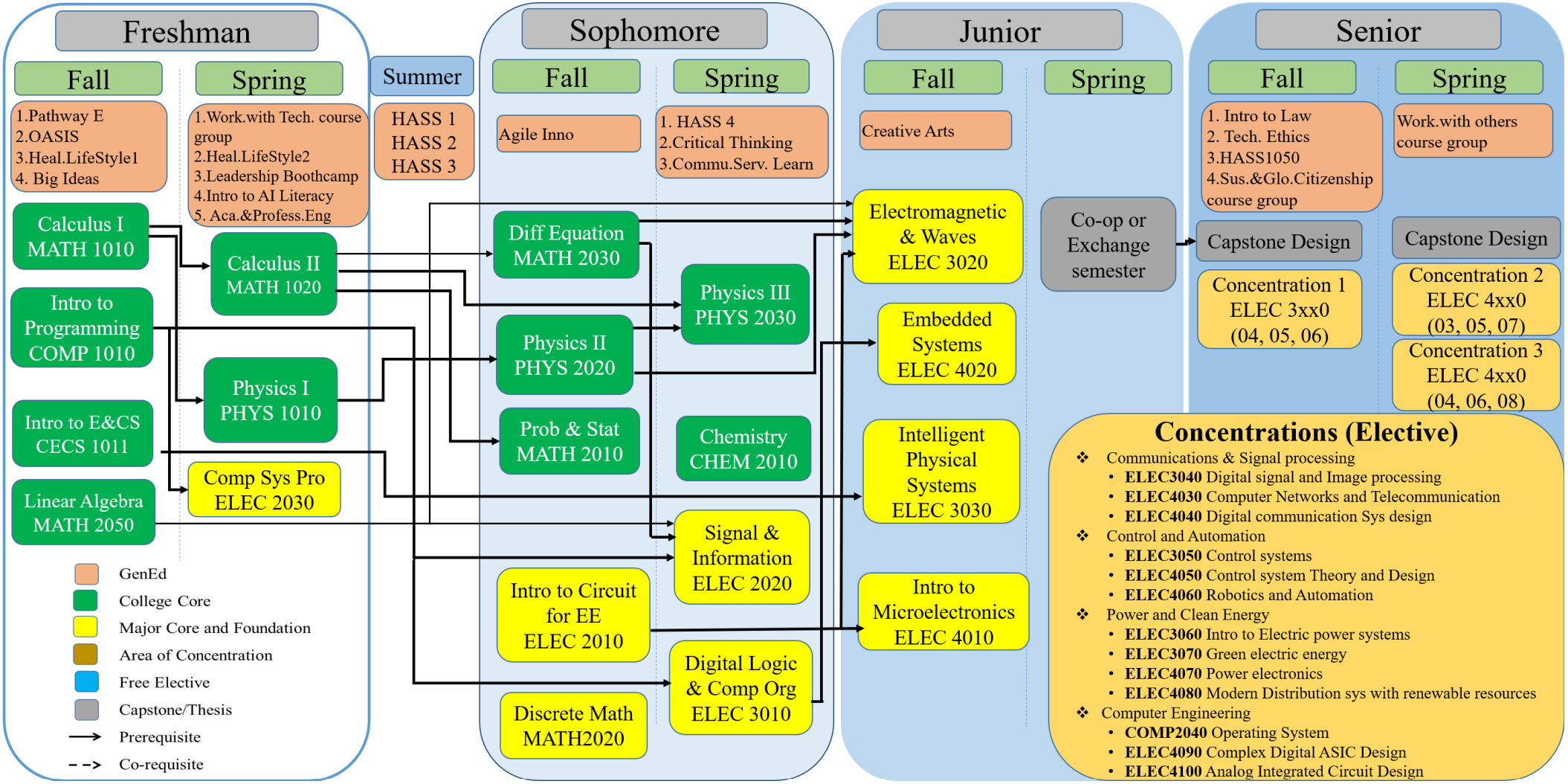
II.8. GRADUATION THESIS/CAPSTONE (6 credits)
- Capstone Design (6)

3.4. Curriculum Roadmap

For Main track



For Pathway track



3.5.Standard Study Plan

For Main Track

Semester 1:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH1010	Calculus I	Giải tich I	4
2	MATH2050	Linear Algebra	Đại số Tuyến tính	4
3	COMP1010	Introduction to Programming	Nhập môn Lập trình	4
4	CECS1011	Introduction to Engineering and Computer Science	Nhập môn kỹ thuật và KHMT	2
5	ENTR1022	Agile Innovation and Entrepreneurship	Khởi nghiệp và Đổi mới sáng tạo	2
6	ENGL1030	Academic and Professional Writing	Kỹ năng viết học thuật	2
7	VCOR1012A/B	OASIS	OASIS	Non-credit
8	VCOR1021	Healthy Lifestyle 1	Lối sống Khoẻ Mạnh 1	Non-credit
Total				18

Semester 2:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH1020	Calculus II	Giải tich II	4
2	PHYS1010	Physics I	Vật Lý I	4
3	ELEC2030	Computer Systems Programming	Lập trình Máy tính	3
4	LEAD1031	Leadership and Teambuilding Bootcamp	Trại huấn luyện kỹ năng lãnh đạo và làm việc nhóm	2
5	CECS1031/ CECS1050	Computational Thinking/Introduction to Data Literacy	Tư Duy Máy Tính/ Nhập Môn Hiểu Biết về Dữ Liệu	2
6	CECS1040	Introduction to AI Literacy	Nhập môn Trí tuệ Nhân tạo	2
7	VCOR1022	Healthy Lifestyle 2	Lối sống Khoẻ Mạnh 2	Non-credit
8	COSL1010	Community Service Learning	Học tập qua phục vụ cộng đồng	Non-credit
Total				17

Summer 1:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	HASS1010	Marxism-Leninism Political Economy (Philosophy, Science and Society)	Triết học Mác-Lênin (Triết học, Khoa học và Xã hội)	3
2	HASS1020	Marxism-Leninism Philosophy (Global Political Economy	Kinh tế Chính trị Mác-Lênin (Kinh tế chính trị toàn cầu)	2
3	HASS1030	Scientific Socialism (Politics and Social Change)	Chủ Nghĩa Xã Hội Khoa Học (Chính trị và Biến đổi Xã hội)	2
Total				7

Semester 3:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH2030	Differential Equations	Phương trình vi phân	3
2	PHYS2020	Physics II	Vật Lý II	3
3	MATH2010	Probability and Statistics	Xác suất Thống kê	4
4	MATH2020	Discrete Mathematics	Toán rời rạc	4
5	ELEC2010	Introduction to Circuits for Electrical Engineers	Lý thuyết mạch điện	4
Total				18

Semester 4:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	PHYS2030	Physics III	Vật Lý III	2
2	CHEM2010	Chemistry	Hóa học	3
3	ELEC2020	Signals and Information	Tín hiệu và Thông tin	4
4	ELEC3010	Digital Logic and Computer Organization	Điện tử số và Kiến trúc Máy tính	4
5	THINK1010	Critical and Creative Thinking	Tư Duy Sáng Tạo và Phản Biện	2
6	IDEA10xx	Big Ideas	Ý tưởng lớn	2
7	HASS1070/ HASS100/URO P/SUST1010	Cross Cultural Navigation/Introduction to International Relations/Undergraduate Research Opportunities Program/Humans and Environmental Intelligence	Định Hướng Liên Văn Hoá/ Nhập Môn Quan Hệ Quốc Tế/Cơ hội nghiên cứu cho sinh viên/Con người và Trí tuệ Môi trường	2
Total				19

Summer 2:

Internship or exchange	Non-credit

Semester 5:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4020	Embedded Systems	Hệ thống nhúng	4
2	ELEC3020	Electromagnetic Fields and Waves	Trường điện từ và sóng	4
3	ELEC3030	Intelligent Physical Systems (Interdisciplinary Engineering Design Project)	Hệ thống Vật lý thông minh	3
4	ELEC4010	Introduction to Microelectronics	Vi điện tử	4
5	HASS1041	Ho Chi Minh Ideology (Vietnam: History and Cultures II)	Tư Tưởng Hồ Chí Minh (Lịch sử và Văn hóa Việt Nam II)	2
6	ARTS1030/ PERF1010	Arts Appreciation and Application / Artistic Performance and Application	Thưởng Thức và Thực Hành Nghệ Thuật/ Biểu Diễn và Thực Hành Nghệ Thuật	2
Total				19

Semester 6:

Co-op semester	Credits

Summer 3:

Internship or exchange	Non-credit

Semester 7

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4890	Capstone Design	Đồ án tốt nghiệp	3
2		Concentration eletive 1	Môn chuyên ngành tự chọn 1	4
3	LAW1010	Introduction to Law	Pháp Luật Đại Cương	2
4	TECH1010	Technology Ethics	Đạo Đức Trong Công Nghệ	2
5	HASS1050	History of the Communist Party (Vietnam: History and Cultures I)	Lịch Sử Đảng Cộng Sản Việt Nam (Lịch sử và Văn hóa Việt Nam I)	2
Total				13

Semester 8:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4890	Capstone Design	Đồ án tốt nghiệp	3
2		Concentration eletive 2	Môn chuyên ngành tự chọn 2	4
3		Concentration eletive 3	Môn chuyên ngành tự chọn 3	4
4	ENGL1040/ MANA1011	Interpersonal and Multimedia Communication/ Introduction to Managing Skills	Giao Tiếp Cá Nhân và Đa Phương tiện truyền thông/ Nhập môn kỹ năng quản lý	2
Total				13

For Pathway Track

Semester 1:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH1010	Calculus I	Giải tich I	4
2	MATH2050	Linear Algebra	Đại số Tuyến tính	4
3	COMP1010	Introduction to Programming	Nhập môn Lập trình	4
4	CECS1011	Introduction to Engineering and Computer Science	Nhập môn kỹ thuật và KHMT	2
5	IDEA10xx	Big Ideas	Ý tưởng lớn	2
6		Pathway English	Tiếng anh học thuật chuyển tiếp	Non-credit
7	VCOR1012A/B	OASIS	OASIS	Non-credit
8	VCOR1021	Healthy Lifestyle 1	Lối sống Khoẻ Mạnh 1	Non-credit
Total				16

Semester 2:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH1020	Calculus II	Giải tich II	4
2	PHYS1010	Physics I	Vật Lý I	4
3	ELEC2030	Computer Systems Programming	Lập trình Máy tính	3
4	LEAD1031	Leadership and Teambuilding Bootcamp	Trại huấn luyện kỹ năng lãnh đạo và làm việc nhóm	2
5	CECS1031/ CECS1050	Computational Thinking/Introduction to Data Literacy	Tư Duy Máy Tính/ Nhập Môn Hiểu Biết về Dữ Liệu	2
6	ENGL1030	Academic and Professional Writing	Kỹ năng viết học thuật	2
7	CECS1040	Introduction to AI Literacy	Nhập môn Trí tuệ Nhân tạo	2
8	VCOR1022	Healthy Lifestyle 2	Lối sống Khoẻ Mạnh 2	Non-credit
Total				19

Summer 1:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	HASS1010	Marxism-Leninism Political Economy (Philosophy, Science and Society)	Triết học Mác-Lênin (Triết học, Khoa học và Xã hội)	3
2	HASS1020	Marxism-Leninism Philosophy (Global Political Economy)	Kinh tế Chính trị Mác-Lênin (Kinh tế chính trị toàn cầu)	2
3	HASS1030	Scientific Socialism (Politics and Social Change)	Chủ Nghĩa Xã Hội Khoa Học (Chính trị và Biến đổi Xã hội)	2
Total				7

Semester 3:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MATH2030	Differential Equations	Phương trình vi phân	3
2	PHYS2020	Physics II	Vật Lý II	3
3	MATH2010	Probability and Statistics	Xác suất Thống kê	4
4	MATH2020	Discrete Mathematics	Toán rời rạc	4
5	ELEC2010	Introduction to Circuits for Electrical Engineers	Lý thuyết mạch điện	4
6	ENTR1022	Agile Innovation and Entrepreneurship	Khởi nghiệp và Đổi mới sáng tạo	2
Total				20

Semester 4:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	PHYS2030	Physics III	Vật Lý III	2
2	CHEM2010	Chemistry	Hóa học	3
3	ELEC2020	Signals and Information	Tín hiệu và Thông tin	4
4	ELEC3010	Digital Logic and Computer Organization	Điện tử số và Kiến trúc Máy tính	4
5	THINK1010	Critical and Creative Thinking	Tư Duy Sáng Tạo và Phản Biện	2
6	HASS1041	Ho Chi Minh Ideology (Vietnam: History and Cultures II)	Tư Tưởng Hồ Chí Minh (Lịch sử và Văn hóa Việt Nam II)	2
7	COSL1010	Community Service Learning	Học tập qua phục vụ cộng đồng	Non-credit
Total				17

Summer 2:

Internship or exchange	Non-credit

Semester 5:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4020	Embedded Systems	Hệ thống nhúng	4
2	ELEC3020	Electromagnetic Fields and Waves	Trường điện từ và sóng	4
3	ELEC3030	Intelligent Physical Systems (Interdisciplinary Engineering Design Project)	Hệ thống Vật lý thông minh	3
4	ELEC4010	Introduction to Microelectronics	Vi điện tử	4
5	ARTS1030/ PERF1010	Arts Appreciation and Application / Artistic Performance and Application	Thưởng Thức và Thực Hành Nghệ Thuật/ Biểu Diễn và Thực Hành Nghệ Thuật	2
Total				17

Semester 6:

Co-op semester	Credits

Summer 3:

Internship or exchange	Non-credit

Semester 7

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4890	Capstone Design	Đồ án tốt nghiệp	3
2		Concentration eletive 1	Môn chuyên ngành tự chọn 1	4
3	HASS1070/ HASS100/UROP /SUST1010	Cross Cultural Navigation/Introduction to International Relations/Undergraduate Research Opportunities Program/Humans and Environmental Intelligence	Định Hướng Liên Văn Hoá/ Nhập Môn Quan Hệ Quốc Tế/Cơ hội nghiên cứu cho sinh viên/Con người và Trí tuệ Môi trường	2
4	LAW1010	Introduction to Law	Pháp Luật Đại Cương	2
5	TECH1010	Technology Ethics	Đạo Đức Trong Công Nghệ	2
6	HASS1050	History of the Communist Party (Vietnam: History and Cultures I)	Lịch Sử Đảng Cộng Sản Việt Nam (Lịch sử và Văn hóa Việt Nam I)	2
Total				15

Semester 8:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	ELEC4890	Capstone Design	Đồ án tốt nghiệp	3
2		Concentration eletive 2	Môn chuyên ngành tự chọn 2	4
3		Concentration eletive 3	Môn chuyên ngành tự chọn 3	4
4	ENGL1040/ MANA1011	Interpersonal and Multimedia Communication/ Introduction to Managing Skills	Giao Tiếp Cá Nhân và Đa Phương tiện truyền thông/ Nhập môn kỹ năng quản lý	2
Total				13

3.6.Course Descriptions

3.6.1. VINCORE Courses

ENTR1022 Agile Innovation and Entrepreneurship

Credit: 2

Pre-requisite: None

The purpose of this course is to provide students with a basic understanding of the innovation/entrepreneurial process and experiential learning opportunities to practice and refine those skills. This course is highly interactive and involves a mix of lectures and activities to immediately apply course concepts. The course is intended for students from all academic disciplines and intended to provide skills that are applicable in many other aspects of life beyond creating a new venture.

Students will gain a broader perspective of both the challenges (i.e. organizational and institutional) and opportunities (i.e. unmet customer needs and possibilities for future ventures) for innovation.

As part of this class, students will form teams for a Hackathon event where they will generate innovative solutions to real-world problems. Students will learn and apply team innovation processes, business model innovation, design thinking, creativity management, product pitches, data analysis, critical thinking, and product innovation. This course also helps students build their professional network.

IDEA1010/11/12 Series: Big Ideas (X)

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Describe and explain a “big idea”, which may be a new solution to a problem, a disrupting technology, or an innovative method or way of doings things

2. Identify the implications of a big idea for everyday life or a professional setting

3. Develop a strategy for using a big idea to improve an existing approach or create a new application

4. Evaluate the application of a big idea, including an assessment of its positive impacts, negative impacts, and mitigating strategies for the theme of the year

TECH1010 Technology Ethics

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Understand and explain the principles and values applied to technology, including privacy and data protection, algorithmic fairness and bias, digital inclusion, accountability and transparency, sustainability, and ethical AI and machine learning)

2. Identify uses of technology that produce unethical behavior or harm to users, society, or the environment

3. Apply relevant ethical theories to moral dilemmas involving technology

4. Evaluate different responses to ethical practice in technologies and justify an opinion based on ethical theory

COSL1010 Community Service Learning

45 hours

Pre-requisite: N/A

The Introduction to Service-Learning is a P/F, course which aims to promote skill-building: reflection, empathy, teamwork, oral communication, written communication (in your reflective journals), and attitudes: societal awareness and social responsibility. Students can choose from different topics such as pollution, teaching, or cultural preservation which change from year to year (see examples below).

In addition, this class focuses on project-based activities during the 8 in-person sessions and requires additional hours participating in a service-learning field experience.

For this course, students will unpack their own motivations and identity related to social issues using a public narrative and concepts related to civic engagement.

CECS1031 Computational Thinking

2 credits

Pre-requisite: N/A

This course is designed for students with no prior background in computing, offering them foundational skills to analyze problems, design computational solutions, and implement basic programs. Through hands-on labs and interdisciplinary case studies, students will learn to approach challenges in areas such as business, economics, engineering, and healthcare. By emphasizing core concepts such as abstraction, algorithms, efficiency, and correctness, this course fosters critical thinking and practical problem-solving abilities. It also introduces students to emerging topics like

artificial intelligence, data science, and ethical computing, helping them become informed and adaptable digital citizens.

CECS1050 Introduction to Data Literacy

2 credits

Pre-requisite: N/A

This course provides a foundational understanding of data collection, analysis, and interpretation. The course equips students with practical skills in data visualisation and problem-solving using tools such as Excel and Python. Students will gain insights into the entire data lifecycle, from data collection and cleaning to analysis and presentation within data-centric projects. The course will also introduce basic probabilistic ideas and ethical considerations in data. Learning will occur through lectures, recitations, and projects, with assessment based on quizzes, take-away activities, and in-class project presentations. Upon completion, students will be able to interpret data sets, articulate data analysis workflows, apply data visualisation techniques, and function effectively within data-centric projects.

CECS1040 Introduction to AI Literacy

2 credits

Pre-requisite: N/A

This course provides a foundational understanding of the fundamental concepts, principles, and key technologies underlying Artificial Intelligence. The course equips students with the competence to use contemporary AI tools, such as ChatGPT for work and study tasks. Students will cultivate the ability to discuss the significant ethical considerations and societal impacts associated with AI systems, including data privacy and algorithmic bias. Furthermore, the course will explore how AI together with appropriate user interfaces can be strategically applied to improve efficiency and foster innovation in academic and professional settings. Learning will occur through lectures, and assessment will be based on individual assessments and a group assignment. Upon completion, students will be able to understand basic AI principles, use AI tools effectively, recognise ethical implications, apply AI to improve efficiency and innovation, and contrast user interfaces for better human-AI interaction.

ENGL1040 Interpersonal and Multimedia Communication

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Identify and explain the fundamental concepts, scope, and diversity of oral and visual communication.

2. Identify communication expectations based on an understanding of different professional audiences and contexts and apply this knowledge in delivering communication.

3. Demonstrate responsible, ethical, and respectful attitudes as the field undergoes disruptive changes fueled by rapid technological advancements.

4. Develop your own oral communication skills in key situations, from speeches to conversation, discussion, giving feedback.

5. Grow your skills in developing digital content for multimedia, including presentations, pitches, blog posts, viral videos, podcasts, and basic media management.

MANA1011 Introduction to Managing Skills

2 credits

Pre-requisite: N/A

On successful completion of the course, students will be able to:

1. Apply the SMART technique to define specific, measurable, achievable, relevant, and time-bound goals, ensuring clarity and focus on their objectives.

2. Develop skills to effectively organize tasks and prioritize them based on importance and urgency, facilitating efficient and systematic progress towards achieving objectives.

3. Understand how to assign tasks based on team members' individual strengths, skills, and expertise, ensuring optimal use of resources, and enhancing team performance.

4. Learn to create and manage project schedules, monitor progress, and employ motivational techniques to keep team members engaged and productive, overcoming challenges and maintaining momentum.

5. Acquire the ability to give professional, accurate, and timely feedback, fostering a positive energy and environment within the team.

HASS1100 Introduction to International Relations

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Know the main actors, structures, and processes of international relations

2. Understand the basic theoretical principles of international relations and compare the competing underlying frameworks on human and social nature

3. Identify the respective objectives of international organizations in international politics, collaboration, and cooperation

4. Explore a case study, problem-solving scenario or dilemma involving international relations and devise a strategy/solution supported by theory and solid argumentation

5. Critically assess alternative strategies and points of view on complex scenarios requiring international relations

ARTS1030 Art Appreciation and Application

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Demonstrate an understanding and appreciation of arts and visual arts in general, including their function, and historical, religious, cultural, social, and environmental contexts and relevance;

2. Understand and define the basic principles of arts, visual arts, and design; explain and analyze a work of art from an informed and objective viewpoint, its physical attributes and formal construction;

3. Identify how art works are created and processed;

4. Make a reference to the significance and application of the arts in students' own field of studies and interests;

5. Analyze Vietnam arts and situate Vietnam arts in the global context.

PERF1010 Artistic Performance and Application

2 credits

Pre-requisite: N/A

On successful completion of this course, students will be able to:

1. Show improved skill in their chosen artistic field (e.g., music, dance, theatre, visual arts) and express their creativity and individuality through performance(s).

2. Evaluate and discuss different forms of artistic performance, identifying key elements and techniques, and write reflective assessments on their personal artistic development.

3. Work well with peers to create and perform artistic pieces, and effectively give and receive constructive feedback.

4. Clearly communicate the artistic vision and choices behind their performances both verbally and in writing (if required) and develop their skills in presenting artistic work to an audience, including stage presence and audience engagement.

5. Explore and appreciate a variety of artistic traditions from around the world, with a special focus on Vietnamese culture, and place their own artistic work in a wider cultural and historical context.

6. Plan, organize, and complete an artistic performance project from start to finish, demonstrating good time management and organizational skills.

7. Understand and apply ethical considerations in artistic performance, including respecting intellectual property and cultural sensitivities, and behave professionally during rehearsals, performances, and collaborative projects.

ENGL1030 Academic and Professional Writing

Credit: 2

Pre-requisite: NA

On successful completion of this unit, students will be able to:

1. Identify and explain core attitudes, values, and practices of academic culture and how academic writing reflects these.

2. Reflect critically on the differences between academic and opinion writing and apply this understanding in the composition of academic essays, including referencing, quoting, and paraphrasing.

3. Evaluate the differences between academic and professional writing in terms of style, purpose, target audience, and techniques.

4. Develop your clear, concise, and well-structured writing skills, focusing on the most critical documents and situations in academic and professional work such as academic essays, newspaper articles, business reports, proposals, speeches...

5. Use AI to develop, enhance, and revise writing in both academic and professional contexts.

LEAD1031 Leadership and Team building Bootcamp

2 credits

Pre-requisites: None

This course is designed for all students to assist in leadership and teamwork development and training within an experiential outdoor setting.

This course offers hands-on leadership concepts and frameoworks that can be used for real-world situations. For example, collaboration, teamwork, communication, conflict resoluation through immersion in challenging scenarios.

THINK1010 Critical & Creative Thinking

2 credits

Pre-requisites: None

In this course students will develop their critical thinking skills through studying the nature of arguments, good reasoning, fallacies, and the art of debating. Different kinds of arguments will be presented, such as the distinction between deduction and induction, as well as causal reasoning in the sciences. With an eye on application to real-world issues, students will apply the reasoning skills they develop to evaluate and improve arguments from case studies. The examples chosen will be reflective of STEM and Business content so they can see the relevance of the skills developed to their own major and future career. Creative thinking will be developed through the study of problem-solving cases and training in various methods of idea generation. This will culminate in a case-based competition in the final two classes that will be introduced and judged by an industry expert.

HASS1070 Cross Cultural Navigation

2 credits

Pre-requisite: None

To thrive in the 21st century, young people must be able to navigate cross-cultural differences and achieve a level of cultural intelligence (CQ) – the ability to adapt to and understand culturally diverse contexts – as never before. The global impact of the Covid 19 pandemic has only further confirmed this need. Consequently, this course helps students to explore the cross-cultural experience, examine their own cultural biases, and prepare for the demands of 21st-century interconnectedness.

The main goal of this course is that everyone (including the instructor and TA) will become a better cross-cultural communicator. We will explore together and learn from each other.

Therefore, Cross-Cultural Navigation (CCN) explores factors that influence communication in an intercultural context as well as the rules and customs governing behavior. We will approach communication from the perspective of Anthropology and Cultural Geography, understanding that all relationships and group dynamics are

developed and fostered within a specific cultural context. With this in mind, the course will cover a host of topics relating to communication including Ethics, Social Structure, Religion, Communication, National Identity, Decision-making, and Leadership.

CCN will primarily focus on practical applications and case studies. Lectures will be used to frame and enhance content. We will explore how to communicate effectively in a multicultural environment and how to manage, negotiate, and resolve cross-cultural conflicts. Students will engage in real-world and simulated cross-cultural scenarios, to gain practical experience relevant to cooperating with and living with people from diverse backgrounds. In these simulations, as well as in-class discussions, course members will analyze and reflect critically upon the multifaceted nature of communication, which includes verbal, non-verbal, and written forms of expression, as well as central customs and practices that give shape to relationships.

VCOR1021/22 Healthy Lifestyle 1, 2

Credit: non-credit, required min 45 hours across Year 1

Pre-requisite: None

"Healthy Lifestyle" is a mandatory and non-credit bearing course of the General Education Program. Undergraduate students are required to enroll in this course to fulfill part of the graduation requirements and are expected to complete it by the end of their first-year study. This course provides the essential knowledge, skills and practicum lessons (exercise/sport classes), whereby students are able to develop a suitable approach in attaining a physically, mentally, socially and spiritually healthy lifestyle.

Specifically, this course provides students with the knowledge to make better choices during their daily routines to build a healthy lifestyle. A healthy lifestyle includes physical wellbeing, psychosocial, and spiritual health. Students receive mentorship that guides and shapes their perspective, showcasing the importance of having a well-balanced life. Components of a healthy lifestyle will be discussed as a process and science that allows students to have a greater understanding of what it takes to achieve their goals for overall wellbeing. Nutrition and diet will be taught to dispel the myths about how and what you should eat to achieve desired health results. Having a healthy mind, healthy body, clarity of thought and the ability to effectively process information are key trademarks of a healthy lifestyle.

This course emphasizes practical application of the learned concepts in order to integrate subject matter into students' current daily routines and throughout life. The majority of coursework will be held in different environments and venues in order to expose students to the many varieties of fitness tools and resources to maintain a healthy foundation.

HASS1010 Marxism-Leninism Philosophy (Philosophy Science and Society)

3 credits

Pre-requisite: NA

Marxist-Leninist Philosophy

Marxist-Leninist Philosophy (MLP) is a compulsory course in university curriculum according to the Vietnam Ministry of Education and Training (MOET). The course provides students with basic and foundational understanding of philosophy in general and Marxist-Leninist philosophy in particular. It is the prerequisite for other courses in the block of compulsory political and theoretical courses required by MOET (the others include: Marxist-Leninist Political Economics, Scientific Socialism, The Revolutionary Way of The Communist Party of Vietnam, and Ho Chi Minh Thoughts). MLP also plays the role of preparing students for the scientific and academic contents that they will study in different majors at VinUniversity.

As an introduction to philosophy, MLP aims at widening students' worldviews and stimulating their critical thinking. As a presentation of Marxist-Leninist philosophy, the official political ideology of the Communist Party of Vietnam (CPV) and the Socialist Republic of Vietnam, MLP provides students the most basic philosophical contents of Marxism and Leninism as well as the theoretical improvisation and development of the CPV. As a methodological preparation for students' academic journey at VinUniversity, MLP spares a small amount of its weekly contents to relate the philosophical knowledge with the development of science and society. Students will start the course with an overview of the role of Philosophy and Metaphysics and examples of important philosophical ideas East and West. The course then focuses on the presentation of Marxist worldview and method via two components: Dialectical Materialism—the Marxist philosophy of nature and Historical Materialism—the Marxist philosophy of history and human beings.

Integrated Studies: Philosophy, Science and Society

Philosophy, Science & Society (PSS) provides students with a broad survey of key ideas in Philosophy, its relevance to society and the way we think we understand the world, or to put it broadly, "science." We begin the course with an overview of the role of Epistemology and Metaphysics as we embark on this journey of critically re-examining the way we look at our world. In the second part of the course, we take a deep dive into questions of Scientific Progress based on which students can orient and develop their creative thinking, philosophy of humanity and action. We follow up with an exploration of trends that came into being with the "social turn" of epistemology found in the critical works of Thomas Kuhn and later in the burgeoning body of works clustered as Sociology of Science. Following this radical re-thinking, we return to the fundamental questions about humanity posed in Social Philosophy and Ethics, to round up our critical inquiry of the complex relationship among philosophy, science and society. PSS is one of four courses in the General Education

Program forming the ideology/national education component required for higher education curriculum as directed by the Ministry of Education & Training, Socialist Republic of Vietnam. This course forms 3 credits out of a total of 12 credits dedicated to this requirement for higher education curriculum. These four courses are written to achieve the primary objective of helping students understand core values of both country and university through objective and critical academic lenses in a global context. As these courses will be taught in English to students for whom English is mainly a second language at VinUniversity, each course is designed to be delivered in the spirit of content-based language learning approach to help students both develop English language competency (focusing on speaking, listening and reading) and basic understanding of the content.

HASS1020 Marxism-Leninism Political Economy (Global Political Economy)

2 credits

Pre-requisite: NA

Marxism-Leninism Political Economy

Marxist-Leninist Political Economy is a compulsory course in the undergraduate curriculum. This course aims to systematically equip students with knowledge of the economic theory of Marxism-Leninism and the general economic model of contemporary Vietnam, as defined and implemented by the Communist Party of Vietnam, the sole ruling party in the country. The course helps students enhance their understanding of economics and politics, gain a clear insight into the major issues facing the country and the nation in relation to global and contemporary challenges. It also contributes to fostering patriotism, a sense of responsibility, national pride, dignity, self-reliance, and the determination for national independence.

Global Political Economy: Vietnam-the Region-the World

This component offers opportunities to study how various political and economic actors, systems, conditions, and schools of thought interact and influence each other in shaping the world around us. The course would engage complex questions as to why various issues and challenges including climate change, international trade, poverty have no pure political or economic explanation? Why do foreign economic policies defy the logic of economics? The course begins with an introduction to *Political Economy* and a survey of various political-economic actors and select schools of economic thought. The students will be presented with nuanced narratives of globalization, its benefits and risks, and the future. A key development in studies of the political economy suggests that the ability of a country to integrate or cope with the extending reach of globalization is largely determined by domestic governance. In line with this, the second part of the course focuses on the economic history of Vietnam in the regional and global context and the changing domestic governance of the country from past to present. We pay attention to “alternate histories” of change

that underlined the road leading to the *Doi Moi* reforms and Vietnam's re-entry into the global political economy. In the third part of this course, we examine the changing configurations of the global political economy vis-à-vis Vietnam, paying special attention to the immediate regions surrounding Vietnam, namely ASEAN, East Asia (in particular, China), and South Asia. We shall conclude this stand-alone course on the global political economy by examining the status of Vietnam and possible pathways the country might take in the globalized digital present and future.

HASS1030 Scientific Socialism (Politics and Social Change)

2 credits

Pre-requisite: NA

The course is part of the VinCore curriculum of VinUniversity. This course is an ideology course mandated by the Vietnamese Government and it teaches the socialist path of development. It equips students with fundamental knowledge about socialism, including its birth, the system, its stages of development, its objectives, and understanding the meaning derived from studying about socialism. The approach takes philosophical, economic, and socio-political angles to understand the stages of human societal development, from capitalism to socialism and then capitalism. On that basis, students will be able to further research on advanced topics about scientific socialism.

HASS1041 Ho Chi Minh Ideology (Vietnam: History and Culture II)

2 credits

Pre-requisite: NA

HASS 1041 is one of four courses in the General Education Program forming the ideology/national education component required for higher education curriculum as directed by Vietnam's Ministry of Education & Training, Socialist Republic of Vietnam. This course forms 2 credits out of a total of 12 credits dedicated to this requirement for higher education curriculum. These four courses are written to achieve the primary objective of helping students understand core values of both country and university through objective and critical academic lenses in a global context.

As these courses will be taught in English to students for whom English is mainly a second language at VinUniversity, each course is designed to be delivered in the spirit of content-based language learning approach to help students both develop English language competency (focusing on speaking, listening and reading) and basic understanding of the content. The course has two components: 1. Hồ Chí Minh Thought and 2. Vietnam History and Culture II Extension.

HASS1050 History of the Communist Party (Vietnam: History and Culture I)

2 credits

Pre-requisite: NA

Vietnam History and Culture (I) examines Vietnamese history and cultural production from its mythical origins to the early Nguyễn empire (prehistory - *ca*.1820). We parse this history in three acts: Unit 1 – Prehistory, places, and peoples; Unit 2 – Early Empire (1010-1527); and Unit 3 – Fragmentation (1527 – 1802). Throughout this journey through time, we will pause to consider Vietnamese adaptations, developments, and innovations regarding ideology, religion, and culture.

Ultimately, we engage the former worlds of premodern Vietnam as a foil for understanding of the place and possibilities of the Vietnamese Communist Party today. We seek to accomplish this by grappling big questions. What are history and culture? Who are the Vietnamese? Where should we position Vietnamese in place and time? How has geography, climate, and ecology shaped their lives? What ideas shaped Vietnamese sense of self? How did they outlook on the world direct their responses to crisis and change? What does the past teach us about possibilities for future? By beholding the past, how can we better understand the Vietnamese Communist Party's history and reflect on its forward trajectories?

VCOR1012A/B: OASIS Orientation, Advising, Skills, Identity & Diversity, and Spirit of Pay it Forward

Non-credit

Pre-requisite: NA

This is a mandatory and non-credit bearing course of the VinCore program. Undergraduate students are required to enroll in this course to fulfill part of the graduation requirements and are expected to complete it by the end of their first-year study. This course provides the essential knowledge, skills and practicum lessons (exercise/sport classes), whereby students are able to develop a suitable approach in attaining a physically, mentally, socially and spiritually healthy lifestyle.

Specifically, this course provides students with the knowledge to make better choices during their daily routines to build a healthy lifestyle. A healthy lifestyle includes physical wellbeing, psychosocial, and spiritual health. Students receive mentorship that guides and shapes their perspective, showcasing the importance of having a well-balanced life. Components of a healthy lifestyle will be discussed as a process and science that allows students to have a greater understanding of what it takes to achieve their goals for overall wellbeing. Nutrition and diet will be taught to dispel the myths about how and what you should eat to achieve desired health results. Having a healthy mind, healthy body, clarity of thought and the ability to effectively process information are key trademarks of a healthy lifestyle.

This course emphasizes practical application of the learned concepts in order to integrate subject matter into students' current daily routines and throughout life. The majority of coursework will be held in different environments and venues in order to expose students to the many varieties of fitness tools and resources to maintain a healthy foundation.

LAW1010 Introduction to Law

2 credits

Pre-requisites: None

Introduction to law (IL) is an introduction to concepts, role and principles of law as well as major fields of law in society. It provides students with general knowledge of law that will serve as a helpful foundation for understanding how law interacts with other disciplines that they study and pursue in the future. The course covers various aspects from legal theory including notion, nature, sources, rule of law, major legal and government systems, legal profession and comparative legal analysis between different bodies of law, branches of international law as well as different mechanisms of dispute settlement, either at municipal courts or other international forums worldwide. All the topics combine

legal understanding and practical issues in both the Vietnamese context and a wide diversity of international legal backgrounds to help students gain familiarity with basic concepts of national law and be aware of international fundamental legal standards. Throughout the course, students develop critical analysis and problem solving, work-in-group and presentation skills, research literacy in law through theoretical lectures, case law analysis, individual and team assignments.

IL is among the courses in the General Education Program forming the ideology/national education component required for higher education curriculum as directed by the Ministry of Education & Training, Socialist Republic of Vietnam. This course forms 2 credits. These ideology courses are written to achieve the primary objective of helping students understand core values of both country and university through objective and critical academic lenses in a global context. As these courses will be taught in English to students for whom English is mainly a second language at VinUniversity, each course is designed to be delivered in the spirit of content-based language learning approach to help students develop basic understanding of the content.

3.6.2. BSEE Core Courses

MATH1010 Calculus I

4 credits

Pre-requisites: High school three years high school mathematics, including trigonometry and logarithms, and at least one course in differential and integral calculus

This course teaches techniques of integration, finding areas and volumes by integration, exponential growth, partial fractions, infinite sequences and series, tests of convergence, and power series.

MATH1020 Calculus II

4 credits

Pre-requisites: Calculus I

This course gives an introduction to multivariable calculus. Topics include partial derivatives, double and triple integrals, line and surface integrals, vector fields, Green's theorem, Stokes' theorem, and the divergence theorem.

MATH2030 Differential Equations

3 credits

Pre-requisites: Calculus II

Taking with Linear Algebra simultaneously is not recommended.

This course gives an introduction to ordinary and partial differential equations. Topics include first order equations (separable, linear, homogeneous, exact); mathematical modeling (e.g., population growth, terminal velocity); qualitative methods (slope fields, phase plots, equilibria and stability); numerical methods; second order equations (method of undetermined coefficients, application to oscillations and resonance, boundary value problems and eigenvalues); and Fourier series. A substantial part of this course involves partial differential equations, such as the heat equation, the wave equation, and Laplace's equation.

MATH2050 Linear Algebra

4 credits

Pre-requisites: none

Taking with Differential Equations simultaneously is not recommended.

This course teaches linear algebra and its applications. Topics include matrices, determinants, vector spaces, eigenvalues and eigenvectors, orthogonality and inner product spaces; applications include brief introductions to difference equations, Markov chains, and systems of linear ordinary differential equations. This course also includes computer use in solving problems.

MATH2010 Probability and Statistics

4 credits

Pre-requisites: Calculus II

This course gives students a working knowledge of basic probability and statistics and their application to engineering including computer analysis of data and simulation. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

PHYS1010 Physics I

4 credits

Pre-requisites: Calculus I (integration, finding areas and volumes by integration, exponential growth, partial fractions, infinite sequences and series, tests of convergence, and power series).

This course covers the mechanics of particles with focus on kinematics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, rotational equilibrium, and fluid mechanics. Temperature, heat, the laws of thermodynamics.

PHYS2020 Physics II

3 credits

Pre-requisites: Physics I

This course covers electrostatics, the behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, AC circuits, and electromagnetic waves

PHYS2030 Physics III: Oscillations, Waves, and Quantum Physics

2 credits

Pre-requisites: Physics II (Electromagnetism), Calculus II

This course covers the physics of oscillations and wave phenomena, including driven oscillations and resonance, mechanical waves, sound waves, electromagnetic waves, standing waves, Doppler effect, polarization, wave reflection and transmission,

interference, diffraction, geometric optics and optical instruments, wave properties of particles, particles in potential wells, light emission and absorption, and quantum tunneling.

CHEM2010 Chemistry

3 credits

Pre-requisites: High school chemistry

This course covers basic chemical concepts, such as reactivity and bonding of molecules, introductory quantum mechanics, and intermolecular forces in liquids and solids and gases. Attention will be focused on aspects and applications of chemistry most pertinent to engineering.

CECS1011 Introduction to Engineering and Computer Science

2 credits

Pre-requisites: None

This course provides a general introduction to the engineering design process–spanning core topics from problem definition through prototyping and testing, as well as other important considerations such as sustainability, failure analysis, and engineering economics. This course also emphasizes multidisciplinary design via a design project (e.g., design a line following robot) which involves students from different majors of college of engineering and computer science.

COMP1010 Introduction to Programming

4 credits

Pre-requisites: None

This course teaches programming and problem-solving using Python. Emphasizes principles of software development, style, and testing. Topics include procedures and functions, iteration, recursion, arrays and vectors, strings, an operational model of procedure and function calls, algorithms, exceptions, object-oriented programming, and GUIs (graphical user interfaces).

MATH2020 Discrete Mathematics

4 credits

Pre-requisites: None

This course covers notions, techniques and algorithms of discrete mathematics with the special emphasis on sets and proof techniques, functions and relations, number

theory, combinatorics, probability, logic, the basics of graph theory and the basics of cryptography.

ELEC2010 Introduction to Circuits for Electrical Engineers

4 credits

Co-requisites: Differential Equations and Physics II

This course establishes the fundamental properties of circuits with application to modern electronics. Topics include circuit analysis methods, operational amplifiers, basic filter circuits, and elementary transistor principles. The laboratory experiments are coupled closely with the lectures.

ELEC2020 Signals and Information

4 credits

Pre-requisites: Differential Equations, Introduction to Programming, Linear Algebra

This course teaches introduction to signal processing. Topics include frequency-based representations: Fourier analysis and synthesis; discrete-time linear systems: input/output relationships, filtering, spectral response; analog-to-digital and digital-to-analog conversion; continuous time signals and linear time-invariant systems: frequency response and continuous-time Fourier transform.

ELEC3010 Digital Logic and Computer Organization

4 credits

Pre-requisites:

Introduction to Programming

This course provides an introduction to the design and implementation of digital circuits and microprocessors. Topics include transistor network design, Boolean algebra, combinational circuits, sequential circuits, finite state machine design, processor pipelines, and memory hierarchy. Design methodology using both discrete components and hardware description languages is covered in the laboratory portion of the course.

ELEC2030 Computer Systems Programming

3 credits

Pre-requisites: Introduction to Programming

This course provides a strong foundation in the principles, practices, and art of computer systems programming using the C and C++ programming languages.

Students will learn procedural programming in C and how to theoretically analyze and practically implement basic data structures and algorithms. Students will transition to C++ to explore object-oriented, generic, functional, and concurrent programming before exploring advanced data structures and algorithms involving trees, tables, and graphs. Students will explore systems programming using the POSIX standard library. The course includes a series of programming assignments for students to put the principles they have learned into practice.

ELEC3020 Electromagnetic Fields and Waves

4 credits

Pre-requisites: Physics II, Differential equations, Introduction to Circuits for Electrical Engineers, Linear Algebra

This course covers static, quasi-static, and dynamic electromagnetic fields and waves. Topics include Maxwell's equations (integral and differential forms), fields of charge and current distributions, boundary conditions, fields near conductors, method of images, material polarization and dielectrics; energy, work, and power in electromagnetic systems; wave propagation and polarization, waves in media (dielectrics, conductors, and anisotropic materials); reflection, transmission, and refraction at media interfaces; guided waves in transmission lines, Smith charts, transients; metallic and dielectric waveguides; radiation and antennas, antenna arrays, electric circuits for transmission and reception, aperture antennas and diffraction.

ELEC4010 Introduction to Microelectronics

4 credits

Pre-requisites: Introduction to Circuits for Electrical Engineers

This course introduces the basic devices and circuits in modern microelectronics. Students learn not only basic structures and operations of semiconductor devices through simple models (diodes, CMOS, and BJT) but also how to analyze and design basic transistor modules in digital and analog circuits including biasing, amplifiers, filters, logic gates, and memory. The course introduces intuitive design methods to map circuit specifications to transistor topology, as well as first-order time-constant estimation. SPICE and measurement labs accompany the progress in lectures for hands-on experiences.

ELEC4020 Embedded Systems

4 credits

Pre-requisites: Digital Logic and Computer Organization or Mechatronics

This course provides an introduction to the design of embedded systems, with an emphasis on understanding the interaction between hardware, software, and the physical world. Topics covered include assembly language programming, interrupts, I/O, concurrency management, scheduling, resource management, and real-time constraints.

ELEC3030 Intelligent Physical Systems

3 credits

Pre-requisites: Introduction to Engineering and Computer Science, Introduction to Programming

This is an interdisciplinary design project course which involves students from different engineering and computer science programs. In this course, students will engage in a holistic design approach to Intelligent Physical Systems which can perceive, reason about, and act upon their environment. This course includes topics on algorithms, sensors, actuators, power, and mechanics. Students will learn the value and trade-offs between theory, simulation, and physical implementations, and gain familiarity with rapid prototyping techniques, system debugging, teamwork, leadership skills, time management, and how to disseminate work to a broader audience through wiki-pages.

ELEC3040 Digital Signal and Image Processing

4 credits

Pre-requisites: Signals and Information

This course focuses on developing a toolbox of techniques to process and analyze real-world signals, model them under uncertainty/noise, and make decisions about them. Highlights of the course will include sampling, filtering, multirate signal processing, intro to statistical signal processing including Wiener and Kalman filtering, and the foundations of computer vision. The course will aim to include a broad range of applications including audio/music, imaging, and data analytics. The coursework includes a design project to emphasize design experiences.

ELEC4030 Computer Networks and Telecommunications

4 credits

Pre-requisites: Signals and Information

This course teaches basic networking with an emphasis on the Internet. Examples of topics include the World Wide Web, Email and Peer to Peer networks, data transmission and data encoding, circuit vs. packet switching, local area network technology, routing and switching, congestion control, network security, wireless

networks, and multimedia. Though the emphasis will be on the Internet, application modules on 4G/5G cellular, WiFi (802.11), and Bluetooth will be presented.

ELEC4040 Digital Communication System Design

4 credits

Pre-requisites: Probability and Statistics, Signals and Information

The course covers communication theory, transceiver algorithms that enable reliable communication, wireless channels, and modern communication standards (such as 3GPP LTE and WiFi). The students will design a working audio-band communication system that relies on orthogonal frequency-division multiplexing (OFDM).

ELEC3050 Control Systems

4 credits

Pre-requisites: Introduction to Circuits for Electrical Engineers

This course covers the analysis and design of control systems with emphasis on modeling, state variable representation, computer solutions, modern design principles, and laboratory techniques. Topics include Modeling and dynamic response, Root locus design method, Frequency response design methods, State-space design.

ELEC4050 Control System Theory and Design

4 credits

Pre-requisites: Control Systems

This course covers System modeling and analysis, System structural properties, Feedback system design, Optimum feedback control, Introduction to the minimum principle.

ELEC4060 Robotics and Automation

4 credits

Pre-requisites: Control Systems or Mechatronics

This course introduces fundamental concepts in robotics and applications. Topics include basics of manipulators, coordinate transformation and kinematics, trajectory planning, control techniques, sensors and devices, robot applications in industrial automation.

ELEC3060 Introduction to Electric Power Systems

3 credits

Pre-requisites: Signals and Information

This course teaches modern electric power system modeling, analysis, and computation with a focus on analysis techniques appropriate for power system modeling, analysis, and power flow computation. Topics include transmission line models, transformers and per unit system, generator models, network matrices, power flow analysis and computation, real and reactive power control, voltage control, economic dispatch.

ELEC3070 Green Electric Energy

3 credits

Pre-requisites: Introduction to Circuits for Electrical Engineers

This course provides a quantitative, practical introduction to a wide range of renewable energy systems. Topics include wind resource and turbines, Photovoltaic Cells, Solar Resource, Photovoltaic Systems, energy and financial performance of green energy projects; integration of green energy into the power grid, Demand Side Management, Economics of Energy Efficiency.

ELEC4070 Power Electronics

3 credits

Pre-requisites: Introduction to Circuits for Electrical Engineers

This course teaches major power electronics concepts, from both systems and components perspectives and design considerations for switching power conversion. Topics include switching conversion and analysis, DC-DC converters, rectifiers and switched capacitor circuits, inverters, power semiconductors in converters, feedback control for converters, control modeling, and design, AC-AC conversion, resonance in converters.

ELEC4080 Modern Distribution Systems with Renewable Resources

3 credits

Pre-requisites: Introduction to Electric Power Systems

This course teaches the operation of modern electric power distribution systems with the integration of renewable energy sources. Topics include the operation of distribution systems, power quality, solar power systems, wind power systems, system efficiency, and cost-effectiveness.

COMP2040 Operating Systems

4 credits

Pre-requisites: Computer Organization or Digital Logic and Computer Organization

This course covers systems programming and introductory operating system design and implementation. The basics of operating systems, namely structure, concurrency, scheduling, synchronization, memory management, filesystems, security and networking are covered. The course introduces parallel and distributed computing.

ELEC4090 Complex Digital ASIC Design

4 credits

Pre-requisites: Digital logic and Computer Organization

This course aims to provide a strong foundation for students to understand the principle and practice of designing, implementing, testing, and evaluating complex standard-cell ASIC chips using automated state-of-the-art electronic design automation (EDA) tools. The course will provide deep insight into critical physical design issues for future computing systems and future large-scale chip designs and provide valuable design experience from architecture to digital circuits.

ELEC4100 Analog Integrated Circuit Design

4 credits

Pre-requisites: Introduction to Microelectronics or similar

This course offers an overview of devices available to analog integrated-circuit designers in modern CMOS and BiCMOS processes: resistors, capacitors, MOS transistors, and bipolar transistors. Basic building blocks for linear analog integrated circuits: single-stage amplifiers, current mirrors, and differential pairs will be introduced. Other topics include: transistor-level design of linear analog integrated circuits, such as operational amplifiers and operational transconductance amplifiers; layout techniques for analog integrated circuits. Throughout the course, emphasis is placed on design-oriented analysis techniques.

ELEC3870 Practice/Internship

Non-credit

Pre-requisites: Students must have completed sophomore year.

The professional structured internship offers students opportunities to apply theoretical knowledge to a real-world work environment and know more about companies that students may be interested in joining after graduation. During the

internship, students will have the opportunity to discover and/or confirm their career interests, develop their major knowledge and gain valuable professional skills and connections with industry professionals. Students will complete the program under the guidance and support of a company advisor or Principal Investigator (PI), an industry mentor/ project researcher, and a faculty advisor, who will jointly help students to create SMART learning outcomes (specific, measurable, achievable, relevant and time-bound).

ELEC4890 Graduation Thesis/Capstone

6 credits

Pre-requisites: Practice/Internship; Determined by the advisor

This Capstone course is developed for students in the College of Engineering and Computer Science (CECS) to apply technical knowledge and skills acquired in earlier coursework to a project involving actual designs and experiments. Students are strongly encouraged to work on multidiscipline-major topics to produce an end-to-end solution to a complex real-world problem from industry or academia. The assessment methods are formulated from discussions and agreements between the industry and VinUni in accordance with ABET requirements. More specially, the project involves the development of engineering systems or design alternatives, along with testing the implemented systems. The project should focus on advanced technologies, new applications, and their usefulness and benefits in the development of economy and management. In this course, students work in teams of 3 to 5, with at least one student from the Mechanical Engineering (ME) Program and one from the Electrical Engineering (EE) Program, under the supervision of VinUni faculty instructors. Students are enrolled in Capstone I in the first semester to develop or tailor a project proposal and secure instructor approval. In the following semester, they must take Capstone II to complete the project. Students are expected to be present in person for every meeting of the classes in which they are enrolled. They should be able to deliver their work and contribution to the project and engage in professional dialogues about their project during formal presentations.