VINUNIVERSITY

FRM11. PROGRAM SPECIFICATION

Program name: Bachelor of Science in Mechanical Engineering

Academic year: 2025–2026

This program specification is designed for prospective students, current students, academic staff, and potential employers. It provides a summary of the programs' main features and expected learning outcomes that a typical student might achieve if he/she takes full advantage of the learning opportunities provided. Detailed information on the teaching and assessment methods, course expected learning outcomes and content can be found in the course specifications through the link at the end of this document. Detailed information on the university's regulations can be found on the website: https://policy.vinuni.edu.vn/.

This program specification is relevant to students entering AY 2025–2026.

Program Director

Dr. Do Tho Truong

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Section A. Admissions/ Management Information

1	Title of program:	Bachelor of Science in Mechanical Engineering
2	Program code:	7520203
3	Vietnam Qualifications Framework level of award	Bachelor's degree – level 6
4	This program specification is relevant to students entering	AY 2025–2026 (Cohort 6)
5	Awarding institution:	VinUniversity
6	Administrative college:	College of Engineering and Computer Science
7	Website of program:	https://cecs.vinuni.edu.vn/undergraduate/mechanical-engineering/
8	Final award title:	Bachelor of Science in Mechanical Engineering
9	Job titles of graduates:	Career prospects in the following fields: Designer/Structural Engineer; Aerospace Engineer; Robotics and Automation Engineer; Automotive Engineer; Manufacturing Engineer; Sustainable Energy Engineer
10	Competency of program graduates: *(according to the DACUM competency set or national, regional or international professional competency framework)*	*A. General Knowledge* *B. Foundational Knowledge* *C. Professional Knowledge* *D. Professional Skills* *E. General Skills* *F. Attitude*
11	Admission criteria: *(according to the regulations of the Ministry of Education and Training, and of university)*	

Attribute	Key Aspects	Criteria
Ability	Scores, Skills, Accolades, Prizes, Demonstration	Does the student have strong academic potential to be successful in a rigorous, demanding and fast paced program at VinUni? In addition to academics, do they have a remarkable or impressive ability in some other field such as sports, music, art, entrepreneurship, etc.? Is this evident in their prior accomplishments or activities? Do they have a track record of success

				of high performance. During the interview, did they demonstrate that ability in some way?
		Aspiration	Goals, Dreams, Inspirations, Targets, Plans, Role-Models	Does the student have a passion for what they want to study? Do they have a goal in mind? Do they want to have a positive impact on the world? In what way? Is it authentic? Have they demonstrated that they venture outside their comfort zone to reach a little higher, try new and difficult things, take on challenges, not take the easy path?
		Commitment	Resilience, Risk-Taking, Self-Reliability	Does the student challenge himself/herself? Have they participated in competitions, sports? Have they taken challenging courses in high school? Have they shown that they have grit and determination to stick to a goal and work hard at accomplishing it? Did they overcome some adversity to succeed despite challenges?
		Creativity	Problem-Solving, Uniqueness, Communication and Expressiveness	Does the student demonstrate an out of the box thinking? Do they use innovative methods to solve problems or tackle a project? Can they express themselves creatively through different kinds of method or medium?
12	Length of program and mode of study:	***Number of credits**: 122 credits (without Minor)* *137 credits (with Minor)* ***Length of program**: 4 years (full-time)* ***Mode**: face-to-face (campus-based)* ***Start month**: September*		
13	Language of delivery:	English		
14	Graduation requirements:	Achieve the required number of accumulated credits		
15	Transfer to and from other programs, opportunities for	***Transfer policy**: Students are allowed to transfer to another program based on the university regulations.*		

	further education, opportunities to acquire additional professional licenses and certificates:	***Opportunities for further education****: Upon completion of the program, students can pursue post-graduate degrees in programs such as Master's or PhD programs in Mechanical Engineering, or related areas* ***Opportunities to acquire additional professional licenses and certificates****: The program allows students to earn professional certificates in order to expand their knowledge; certificates from professional unions or organizations within the industry; certificates from international competitions.*
16	Academic quality assurance:	***Program stakeholders****: the government, employers, experts, alumni, the university, Ministry of Education and Training, lecturers, and students* ***Feedback mechanism****: Document research, DACUM workshops, survey* ***Quality goals****:* ***Objective 1****: Continuously improve the quality assurance system* *1.1. Strengthen the organizational structure of Quality Assurance System of the university* *1.2. Develop professional capabilities of staff within the Quality Assurance System* *1.3. Continue to implement quality assurance policies* *1.4 Develop the university's Internal Evaluation System* ***Objective 2****: Standardize activities based on American Psychological Association and British Psychological Society quality criteria* ***Objective 3****: Register for program-level accreditation based on American Psychological Association and British Psychological Society quality criteria* ***National accreditation at institutional and program level****: N/A* ***International accreditation at institutional level****: FIBAA (2025), QS 5 star (2024)*
17	Program leaders and recruitment support staff:	***Program director: Dr. Do Tho Truong*** ***Email****: truong.dt@vinuni.edu.vn* ***Phone****: +84335508938*

Section B. Detailed program information

18	Internationalization/ globalization	*The BS in Mechanical Engineering program was developed in collaboration with and validated by Cornell University (USA). The program fulfills the entrance requirements for postgraduate degrees (MA/PhD) of many leading international universities. The core faculty involved in delivering the program have extensive international experience in Asia, Europe, Oceania, and the USA.*
19	Program educational objectives (PEOs)	*Engineering students who graduate from VinUniversity are expected to be well-rounded individuals with specific expert-level knowledge in psychological theory and practice and who align with the values of VinUniversity: (1) Empathy, (2) Exceptional Ability, (3) Creativity, (4) Entrepreneurial Spirit, and (5) Leadership Mindset.*
20	Benchmarking: *(Benchmarked with domestic and international programs, international standards such as AACSB, ABET, NASAD, AHLEI, etc.)*	***International programs**: Cornell University (USA)* ***Domestic universities**: Hanoi University of Science and Technology* ***International accreditation standards:***
21	Program learning outcomes (PLOs): *After successful completion of the program, students are able to:*	

K-S-A	*Program Learning Outcomes (PLOs)*	*Program Performance Criteria (PPC) OR PERFORMANCE INDICATORS*
	PLO 1 (Apply, Level 3): Identify, formulate, and **solve** complex engineering problems by applying principles of engineering, science, and mathematics.	**PI 1.1: Identify** the components of a complex problem and formulate approaches to solve it. **PI 1.2: Apply** principles and/or knowledge from relevant disciplines to solve a complex problem.
	PLO 2 (Apply, Level 3): 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: Identify** critical stakeholder needs, constraints and societal factors that must be considered in an engineering solution. **PI 2.2: Apply** principles of engineering design to propose a holistic solution that meets stakeholder needs and technical as well as societal constraints.
	PLO 3 (Apply, Level 3): Communicate effectively with a range of audiences.	**PI 3.1: 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:** Effectively **communicate** with their intended audience through appropriate modes (e.g. oral, written, visual).

	PLO 4 (Evaluate, Level 5): 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: Recognize** 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: Identify, interpret and/or apply** standards, regulations, and laws to engineering decisions.
	PLO 5 (Create, Level 6): 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: Create** an effective team environment that is respectful, supportive, and inclusive. **PI 5.2: Follow** a structured approach to establish goals, plan tasks, and meet objectives.
	PLO 6 (Create, Level 6): Develop and **conduct** appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	**PI 6.1: Develop** and **conduct** an appropriate experiment. **PI 6.2: Analyze** and **evaluate** experimental results using engineering judgment to draw conclusions.
	PLO 7 (Apply, Level 3): Acquire and **apply** new knowledge as needed, using appropriate learning strategies.	**PI 7.1: Identify** knowledge gaps and independently acquire new knowledge using appropriate learning strategies (e.g., research, tutorials, experimentation, consultation). **PI 7.2: Apply** newly acquired knowledge to solve engineering problems, make design decisions, or improve technical work.

Section C. Teaching/learning methods and strategies

22	Educational philosophy of the university:	*VinUniversity graduates for all academic programs are expected to have (1) **E**mpathy, (2) E**x**ceptional Ability, (3) **C**reativity, (4) **E**ntrepreneurial Spirit, and (5) **L**eadership Mindset which enable them to create ideas, services, systems, solutions, and products that can contribute to a better life for people and society. (In short, **EXCEL)**.*
23	Educational philosophy of the faculty/program:	*VinUniversity has made a commitment to conduct all learning activities using the principles of Active Learning. Faculty are expected to prepare learning content and materials in a manner that facilitates effective learner participation in the learning process while ensuring a high level of academic and skill proficiency expected of VinUniversity students. The university does not mandate any Active Learning format, pedagogy, or duration, as long as the teaching method meets the above description.*
24	Teaching and learning paradigm:	*Lectures* *Discussions* *Presentations (group work)* *Practical exercises* *Course project (group work)*

		Graduation project *Internship, field trip* *Research projects*
25	Student assessment:	***Admission assessment**: University admission using AQI, NAQI, and interviews* ***Progress assessment**: In-course assessment methods such as multiple-choice questions and/or written questions; presentations; major assignments; projects; essays, research reports.* ***Exit assessment**: Final-year dissertation*
26	Mechanism to establish and monitor achievement of program outcomes:	*The program assesses students' achievement of PLOs throughout and at the end of their studies using a variety of methods:* ***Assessment through the courses**: the PLOs are transferred into the CLOs of the courses, and students' are assessed on their achievement of the CLOs.* ***Evaluation through internship(s)**: the PLOs are translated into the criteria for assessments during internship(s).* ***Assessment of students' achievement of the PLOs in each academic year**: Based on the number of credits students have obtained; this is done at the end of each academic year.*

27	Program structure and content: *(Block diagram of courses)*

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 MECHANICAL ENGINEERING (122 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 (17 credits)
- Statics and Mechanics of Solids (4)
- Thermodynamics (3)
- Dynamics (3)
- Mechanical Synthesis (4)
- Introductory Fluid Mechanics (3)

II.2. MAJOR FOUNDATION (15 credits)
- Heat Transfer (3)
- Mechatronics (3)
- System Dynamics and Control (3)
- Mechanics of Engineering Materials (3)
- 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. Automotive Engineering (12 credits)
- Automotive Engineering (3)
- Hybrid Electric Vehicles (3)
- Vehicle Dynamics and Control (3)
- Internal Combustion Engines (3)

2. Systems and Manufacturing (12 credits)
- Introduction to Manufacturing Systems (3)
- Innovative Product Design via Digital Manufacturing (3)
- Additive Manufacturing (3)
- Feedback Control Systems (3)

3. Energy and Sustainability (12 credits)
- Wind Power (3)
- Sustainable Energy Systems (3)
- Combustion Processes (3)
- Design of Sustainable Systems (3)

4. Computer Engineering (12 credits)
- Sensors and Actuators (4)
- Embedded Systems (4)
- Robotics and Automation (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)

28	Development of program learning outcomes in the constituent courses *(How individual courses contribute to the PLOs and PPC)*

No.	Courses	PLO1		PLO2		PLO3		PLO4		PLO5		PLO6		PLO7	
		PI 1.1	PI 1.2	PI 2.1	PI 2.2	PI 3.1	PI 3.2	PI 4.1	PI 4.2	PI 5.1	PI 5.2	PI 6.1	PI 6.2	PI 7.1	PI 7.2
1	Calculus I	I	R			I	I					I	I		
2	Calculus II														
3	Linear Algebra	I	R	I	R	I	I								
4	Probability and Statistics														
5	Differential Equations	I	R	I	I	I	R	I	I						
6	Physics I											I	I		
7	Physics II											R	R		
8	Physics III														
9	Chemistry														
10	Introduction to Programming														
11	Introduction to Engineering and Computer Science	I	I	I		I	I	I		I	I				
12	Statics and Mechanics of Solid	R	R												
13	Mechatronics	R	R			R	R			R		R			
14	Thermodynamics	R	R												
15	Dynamics	R	R												
16	Heat Transfer	M	R	R	M				I						
17	Intelligent Physical System (Interdisciplinary Engineering Design Project)	R	R	R	R	R	R	R	R	R	R			R	R
18	Mechanical Synthesis	R	R	R	R	R	R	R	R	R	R			I	I
19	Introductory Fluid Mechanics					R	R	R	R			R	R		
20	Mechanics of Engineering Materials					R	R	R	R	R	R	R	R		
21	System Dynamics and Control	R	R			R	R			R		R			
22	Embedded System														
23	Sensors and Actuators														
24	Robotics and Automation														
25	Automotive Engineering														
26	Hybrid Electric Vehicles														
27	Vehicle Dynamics and Control														
28	Internal Combustion Engines														

29	Introduction to Manufacturing Systems														
30	Innovative Product Design via Digital Manufacturing														
31	Additive Manufacturing														
32	Feedback Control Systems														
33	Wind Power														
34	Sustainable Energy Systems														
35	Combustion Processes														
36	Design of Sustainable Systems														
37	Internship							R	R	R	R				
38	Capstone Design Project	M	M	M	M	M	M	M	M	M	M	M	M	M	M

29	Sample study plan *(by semester)*

Year 1 – 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
Total				**18**

Year 1 – 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	CHEM2010	Chemistry	Hóa học	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 Khỏe Mạnh 2	Non-credit
Total				**17**

Year 1 – Semester 3:

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**

Year 2 – Semester 1:

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	MECE3010	Statics and Mechanics of Solids	Tĩnh học và Cơ học vật rắn	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
Total				**18**

Year 2 – Semester 2:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	PHYS2030	Physics III	Vật Lý III	2
2	MECE3060	Mechatronics	Cơ điện tử	3
3	MECE3020	Thermodynamics	Nhiệt động học	3
4	MECE3030	Dynamics	Động lực học	3
5	COSL1010	Community Service Learning	Học tập qua phục vụ cộng đồng	Non-credit
6	IDEA10xx	Big Ideas	Ý tưởng lớn	2
7	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
8	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				**17**

Year 3 – Semester 1:

No	Course Code	Course name (English)	Course name (Vietnamese)	Credits
1	MECE4010	Heat Transfer	Truyền nhiệt	3
2	MECE3040	Mechanical Synthesis	Cơ khí tổng hợp	4
3	MECE3080	Intelligent Physical Systems (Interdisciplinary Engineering Design Project)	Hệ thống Vật lý thông minh	3
4	MECE3050	Introductory Fluid Mechanics	Cơ học chất lỏng	3
5	MECE3070	Mechanics of Engineering Materials	Cơ học Vật liệu kỹ thuật	3
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				18

Year 3 – Semester 2: Co-op semester

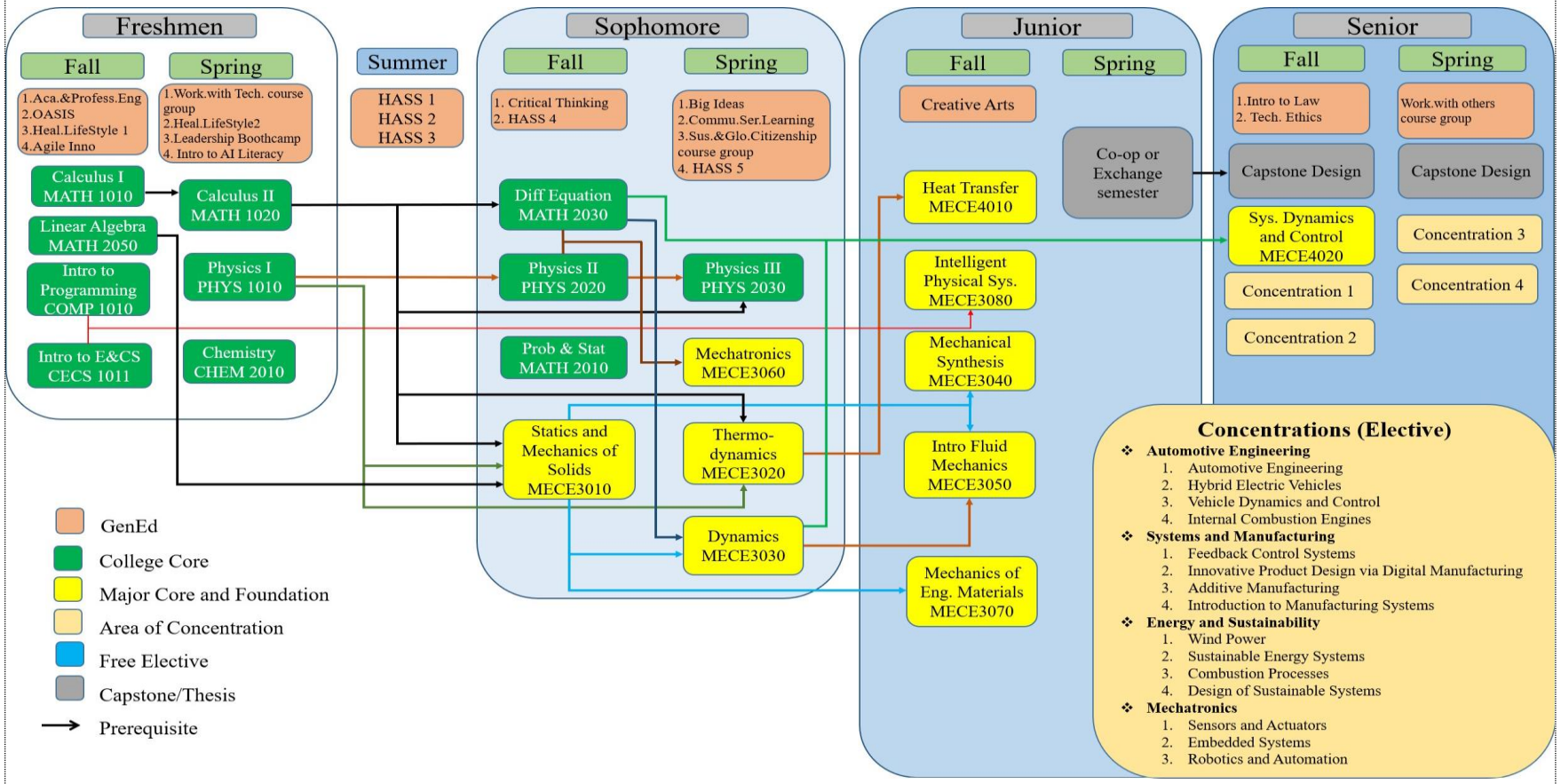
Year 4 – Semester 1:

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	MECE4020	System Dynamics and Control	Động lực học và Điều khiển hệ thống	3
4	LAW1010	Introduction to Law	Pháp Luật Đại Cương	2
5	TECH1010	Technology Ethics	Đạo Đức Trong Công Nghệ	2
Total				**14**

Year 4 - Semester 2:

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**

30	Curriculum learning roadmap: *(the relation and order of courses)*



Section D. Learning environment and student support services

31	Learning environment:	The BS in Mechanical Engineering program provides a rich and immersive learning environment that bridges academic theory with hands-on experience. Students benefit from access to specialized facilities, real-world placements, and interdisciplinary collaboration. **Research Facilities** The college provides infrastructure and support for student-led research projects, for example, by running a student research grant scheme for which students can apply. Students can also get involved in faculty-led research projects as research assistants. **Field trips and Internships** Many courses organize field trips to various institutions to enhance the learning experience. Structured internships in clinical, educational, organizational, or settings, typically in the 3rd and final year, with reflective supervision and academic integration.
32	Support for students and their learning: *(academic support, pastoral support, and other services)*	The BS in Mechanical Engineering program is committed to fostering student success through a comprehensive support system that addresses academic, personal, and professional development needs. **Academic support**

		Faculty Advising: Each student is assigned an academic advisor who provides guidance on course selection, research opportunities, and career planning Research Mentorship: Faculty members mentor students in research design, data analysis, and publication, especially during capstone thesis projects. **Pastoral and Wellbeing Support** Student Counseling Services: Confidential mental health support is available on campus, with counselors trained in student wellbeing and stress management. Peer Support Network: Senior psychology students volunteer as peer mentors to help new students transition into university life. Mindfulness sessions, stress-relief activities, and wellness campaigns are offered throughout the academic year.
33	Student clubs and extracurricular activities available to students:	Career Services: Provides CV writing workshops, mock interviews, and internship placement support specific to psychology-related careers. Student Clubs and Societies: The CECS Student Society organizes academic talks, social events, and community outreach projects to enhance student engagement.

Section E. Approval, publication and update

34	This program specification was published on:	15-08-2025
35	This program specification was last updated on:	15-08-2025