

## UNIVERSITY EDUCATION

### Undergraduate Program

**Name of Program:** Control Engineering and Automation (CEA)

Level of Education: Undergraduate

**Field of study:** Control Engineering and Automation (CEA)

Code: 52520216

Level of award: Engineer

(Issued in Decision No. / QĐ-ĐHKB-ĐTĐH dated / /2011 by the Rector of Hanoi University of Science and Technology)

### 1 Educational Objectives

The objectives of the Training program in Control Engineering and Automation (CEA) is to provide learners with

- (1) Solid basic and fundamental knowledge to adapt to different fields in engineering; solid knowledge in one specialized field of the Industry Control and Automation
- (2) Professional skills and personal qualities to succeed
- (3) Social skills to work effectively in the multi-disciplinary and international workplaces.
- (4) Ability to set up projects, design and operate equipment, devices in the generation, transmission and distribution network, as well as in commercial and industrial systems.
- (5) Political awareness, spirit to serve the society, health quality to fulfill the tasks of building and defending the country

Graduates of the Control Engineering and Automation program can take on the role as

- Project Manager
- Design Engineer
- Operation/Maintenance Engineer
- Assessment/Evaluation Engineers
- Consulting-/Design Engineer/Technical Supervisor
- Sales Engineer/Marketing
- Etc.,

### 2 Expected Learning Outcomes

Student Learning Outcomes (SLOs) – Expectation Learning Outcomes

After graduated from Hanoi University of Science and Technology (HUST), Engineers in Control Engineering and Automation (CEA) have to attain the following outcomes:

1. Solid professional knowledge to adapt to different jobs such as research, development, consulting, management and production in the broad field of Automation and Control Engineering:
  - 1.1 The ability to apply basic knowledge of mathematics, physics and computing science in the modeling, calculation and simulation of instrumentation, control and automated devices and systems.
  - 1.2 The ability to apply basic knowledge of electrical circuit theory, signals and systems, control theory, electronics and computer engineering in the research and analysis of instrumentation, control and automated devices and systems.
  - 1.3 Ability to apply core and specialized knowledge of automation and control engineering in combination with an ability to utilize software tools in the design and evaluation of solutions to industrial automated systems.
2. Professional skills and personal qualities needed to succeed in the profession:
  - 2.1 Technical argumentation, analysis and problem-solving skills.
  - 2.2 Ability to test, do research and explore knowledge
  - 2.3 Systematic and critical thinking
  - 2.4 The dynamic, creativity and seriousness
  - 2.5 Ethics and professional responsibility.
  - 2.6 Understanding of contemporary issues and a sense of lifelong learning.
3. Social skills needed to work effectively in multidisciplinary team and in the international environment:
  - 3.1 Organizational, leadership and (multidisciplinary) teamwork skills,.
  - 3.2 Effective communication skills through writing, presentations, discussions, negotiation and problem handling ability, effective use of tools and modern facilities.
  - 3.3 Effective English skill at work, TOEIC score  $\geq 450$ .
4. The capacity for project formulation, design, implementation and operation of instrumentation, control and automated devices and systems to fit the context of economic, social and environmental.
  - 4.1 Awareness of intimate relationship between technical solutions in automation and control engineering and factors related to economics, society and environment in the world of globalization.
  - 4.2 Capacity for recognizing problems and ideation, proposing and building control systems and automation projects.
  - 4.3 Capacity for designing systems and devices in instrumentation, control and automation.

- 4.4 Ability to deploy, modify and put into operation systems and devices in instrumentation, control and automation.
- 4.5 Ability to operate, maintain systems and devices in instrumentation, control and automation.
5. Political qualities, awareness of serving people, good health that meet the requirements of national construction and defense:
- 5.1 Having the political debate program general regulations of the Ministry of Education and Training.
- 5.2 A certificate of Physical Education and Military Education Certification and Security program general regulations of the Ministry of Education and Training.  
Program duration and number of credits

### **3 Training duration and number of credits**

#### **3.1 Fulltime Engineer Education (High school entrance)**

- Standard study duration is 5 years
- Total number of credits: 162 credits

#### **3.2 Transformation from Bachelor of Engineering Program to Engineer**

Applied to students who have a Bachelor in Electrical Engineering (4 years) or closely related majors. The program duration and the required courses depend on the courses students have chosen in his/her bachelor program

- Program duration: 1-1,5 years
- Total credits: 36 credits

### **4. Admission requirements**

- 4.1 Baccalaureate students admitted to the relevant specialized sectors of Hanoi University of Science Technology will be enrolled in a 5-year program or 4 + 1-year program.
- 4.2 Graduates of the “Bachelor of Automation and Control Engineering” program of Hanoi University of Science and Technology are directly enrolled in the 1-year articulation program.
- 4.3 Graduates from other Bachelor or Engineering programs at Hanoi University of Science and Technology can enroll in the double-degree program in accordance with HUST regulations on the second undergraduate program.
- 4.4 Graduates of Hanoi University of Science and Technology or other universities can enroll in the second undergraduate program under the general regulations of the Ministry of Education and Training and specific regulations of Hanoi University of Science and Technology.
- 4.5 Graduates of Hanoi University of Science and Technology or other universities can enroll in the second undergraduate program under the general regulations of the

Ministry of Education and Training and specific regulations of Hanoi University of Science and Technology

## 5. Training process and graduation conditions

The training process and graduation conditions apply the regulations on the University's credit-based higher education training and vocational training. Students enrolled in the double-degree program must also follow the regulation on studying the second undergraduate program of HUST.

## 6. Grading system

The grades (A, B, C, D, F) and the corresponding 4-point scale official scores of the students' performance. The 10-Point scale is used by lecturers during the course assessment.

	10 point system	4 point system	
		grade	points
Pass grade	from 9,5 to 10	A+	4,5
	from 8,5 to 9,4	A	4,0
	from 8,0 to 8,4	B+	3,5
	from 7,0 to 7,9	B	3,0
	from 6,5 to 6,9	C+	2,5
	from 5,5 to 6,4	C	2,0
	from 5,0 to 5,4	D+	1,5
from 4,0 to 4,9	D	1.0	
Fail grade	< 4,0	F	0

\* for the graduate thesis, the student must obtain a grade of C and above to be considered PASS.

## 7. Program Specification

### 7.1. Program Structure ( in comparison with the Bachelor of Engineering Program)

Index	Curriculum	Bachelor of Engineering degree	Engineer degree	Note
<b>I</b>	<b>General Education</b>	<b>Credits</b>	<b>Credits</b>	<b>General requirements for the Engineering Sector</b>
1.1	Mathematics and Basic Science	32	32	26 general credits for the Engineering sector and 6 additional credits In accordance with the general regulations of the
1.2	Political Theory	10	10	
1.3	Physical Education	(5)	(5)	

1.4	National Defense and Security Education	(10)	(10)	Ministry of Education and Training. Credit-based training and National defense and security education is not counted in the total credits of the education program
1.5	English	6	6	Class is design by student English level
<b>II</b>	<b>Professional education of the Bachelor degree</b>	<b>58</b>	<b>58</b>	<b>General requirements for Bachelor of Engineering and Bachelor of Technology</b>
<b>III</b>	<b>Engineering Practicum</b>	<b>2</b>	<b>2</b>	<b>General requirements for Bachelor of Engineering and Bachelor of Technology</b>
<b>IV</b>	<b>Optional Courses</b>	<b>8</b>	<b>8</b>	Students can select free courses from the approved list of SEE
<b>V</b>	<b>Basic core courses</b>	<b>16</b>	<b>44</b>	<b>Students can select one of three fields of study: Automatic Control, Industrial Automation, Instrumentation and Industrial Informatics</b>
5.1	<b>Oriented selective courses</b>	10	10	<b>General requirements for Bachelor of Engineering and Bachelor of Engineering</b>
5.2	<b>Professional education of the Engineering degree</b>	-	14	<b>Specific requirements for the Engineering Sector, different from Bachelor program from 8<sup>th</sup> semester. Graduation thesis combines with graduation practicum (3 credits) according to field of study</b>
5.3	Compulsory Courses	-	8	
5.4	<b>Graduation thesis and Practicum</b>	6	12	



18	<b>MI1130</b>	Calculus III	3(2-2-0-6)		3							
19	<b>MI1140</b>	Algebra	4(3-2-0-8)	4								
20	<b>PH1110</b>	Physics I	3(2-1-1-6)	3								
21	<b>PH1120</b>	Physics II	3(2-1-1-6)		3							
22	<b>EM1010</b>	Fundamentals of Management	2(2-0-0-4)		2							
23	<b>IT1110</b>	Fundamentals of Informatics	4(3-1-1-8)			4						
<b>Total</b>			<b>44 credits</b>	<b>18</b>	<b>17</b>	<b>6</b>	<b>3</b>					

**Note:**

- 1) **English requirements:** students that have TOEIC certificate above 290 points are exempted from FL1101, above 330 are exempted from FL1102. Before doing the final thesis, students should have TOEIC certificate above 450 points.
- 2) **For politics, physical education and military subjects:** Students will have specific certificates that are not counted into the total number of credits

**7.2.2. List of core courses for Control Engineering and Automation (CEA) Program**

Code	Name of Courses	Credit	Standard course sequence (semester)										
			1	2	3	4	5	6	7	8	9	10	
	<b>Supplementary Maths and Basic Sciences</b>	<b>6 Credits</b>											
<b>MI2020</b>	Probability and Statistics	3(2-2-0-6)			3								
	<b>Option (Chose 3 credits)</b>	<b>3 Credits</b>											
<b>PH1131</b>	Physics 3	3(2-1-1-6)			3								
<b>ME2040</b>	Mechanical Engineering	3(3-1-0-6)											
	<b>Core Courses and Specialized Engineering Courses</b>	<b>53 Credits</b>			10	13	15	15	5				
<b>EE1010</b>	Introduction to Electrical Engineering	3(2-0-2-6)			3								
<b>EE2000</b>	Signals and Systems	3(3-1-0-6)			3								
<b>EE2020</b>	Electrical Circuit Theory I	4(3-1-1-8)			4								
<b>EE2120</b>	Electrical Circuit Theory II	2(2-0-1-4)				2							
<b>EE2030</b>	Electromagnetics Theory	2(2-0-0-4)				2							
<b>EE2110</b>	Analog Electronics	3(3-0-1-6)				3							
<b>EE2130</b>	Digital System Design	3(3-0-1-6)				3							
<b>EE3280</b>	Control Theory I	3(3-1-0-6)				3							
<b>EE3110</b>	Measurement and Techniques	3(3-0-1-6)					3						
<b>EE3140</b>	Electrical Machines I	3(3-0-1-6)					3						
<b>EE3410</b>	Power Electronics	3(3-0-1-6)					3						
<b>EE3480</b>	Microprocessor	3(3-0-1-6)					3						
<b>EE3490</b>	Programming Engineering	3(2-2-0-6)					3						
<b>EE3425</b>	Power Supply Systems	3(3-0-1-6)						3					

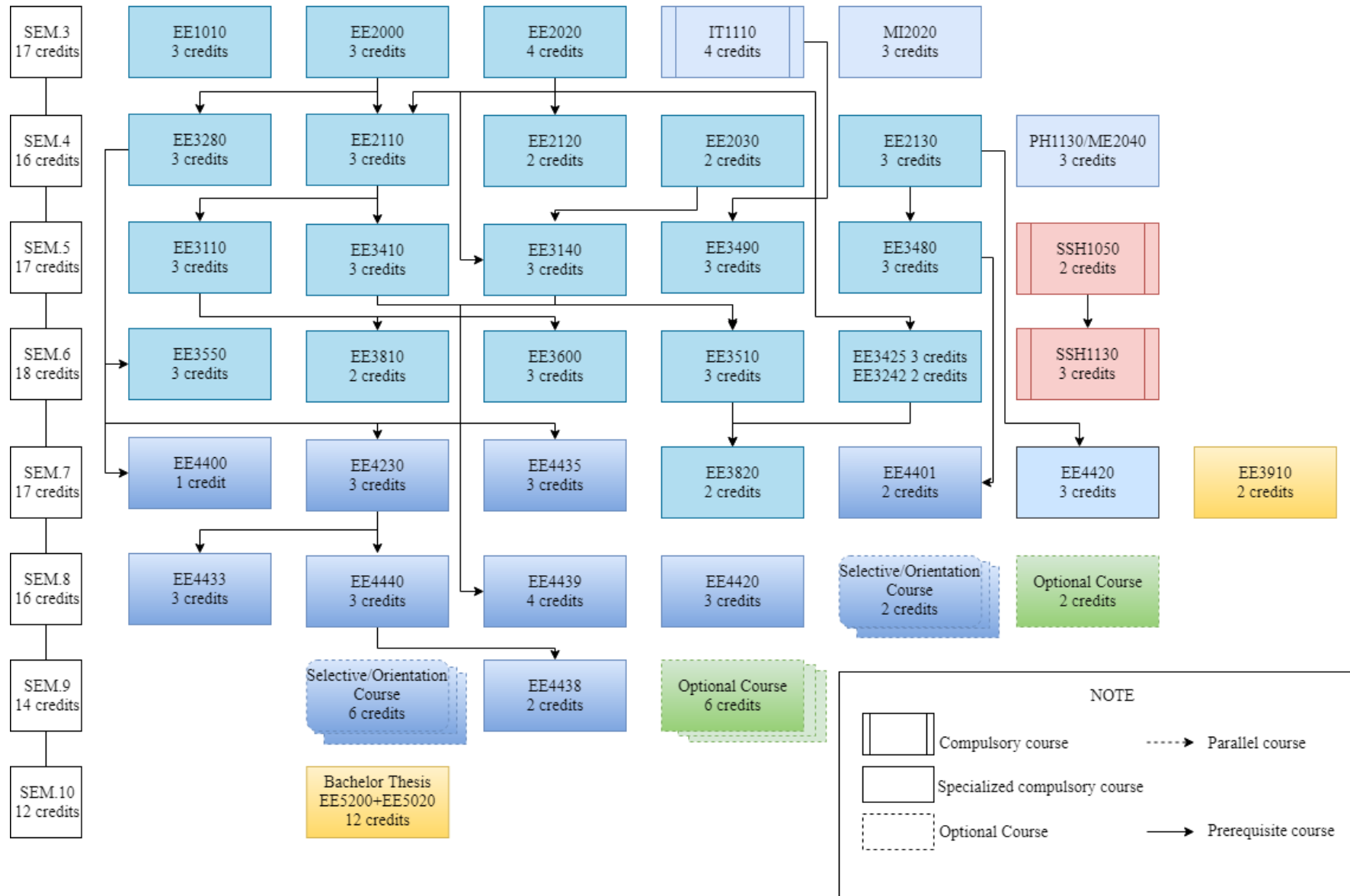
<b>EE3242</b>	Electrical Switchgear and Apparatus	2(2-0-1-4)						2				
<b>EE3510</b>	Electric Drives	3(3-0-1-6)						3				
<b>EE3550</b>	Process Control	3(3-1-0-6)						3				
<b>EE3600</b>	Industrial Measurement and Control Systems	3(3-0-1-6)						3				
<b>EE3810</b>	Project I	2(0-4-0-8)						2				
<b>EE3820</b>	Project II	2(0-4-0-8)						2				
<b>EE4220</b>	Logic Control and PLC	3(3-1-0-6)						3				
<b>III</b>	<b>Technical Practicum</b>											
EE3910	Technical Practicum	2(0-0-4-4)						3				
<b>IV</b>	<b>Free Options</b>	<b>8 credits</b>							<b>2</b>	<b>6</b>		
<b>V-1</b>	<b>Automatic Control</b>	<b>43 credits</b>						<b>9</b>	<b>15</b>	<b>8</b>	<b>12</b>	
	<b>Selective/Orientation Course</b>											
<b>EE4230</b>	Control Theory II	3(3-1-0-6)						3				
<b>EE4435</b>	Digital Control Systems	3 (3-1-0-6)						3				
<b>EE4401</b>	Embedded Control Systems Design	3(3-1-0-6)						3				
	<b>Supplement for Engineer Program</b>											
<b>EE4433</b>	Optimization and Optimal control	3(3-1-0-6)							3			
<b>EE4440</b>	Control Systems Design	3(3-0-0-6)							3			
<b>EE4439</b>	Control of Mechanical-Electrical Systems	4(4-0-1-8)							4			
<b>EE4420</b>	Fuzzy Control and Neural Network	3(3-0-1-6)							3			
<b>EE4438</b>	Project on Control Systems Design	2(0-0-4-4)								2		
<b>EE5200</b>	Pre-graduation Internship	3(0-0-6-6)										3
<b>EE5020</b>	<b>Graduation thesis (Automatic Cotrol)</b>	9(0-0-18-18)										9
	<i>Select 8 credits from following courses</i>	8							<b>2</b>	<b>6</b>		
<b>EE4414</b>	Motion Control	2(2-0-0-4)										
<b>EE4442</b>	Control of Renewable Energy Systems	2(2-0-0-4)										
<b>EE4416</b>	Discrete Event Systems	3(3-1-0-6)										
<b>EE4341</b>	Robot Engineering	3(3-1-0-6)										
<b>EE4240</b>	Electrial-Electronic Equipment of Industrial Machines	3(3-1-0-6)										
<b>EE4550</b>	High-speed Network	3(3-1-0-6)										
<b>EE4502</b>	Sensors and Transducers	3(3-1-0-6)										
<b>EE4241</b>	Power Supply System for Buildings	3(2-1-1-6)										
<b>V-2</b>	<b>Industrial Automation</b>	<b>45</b>							<b>10</b>	<b>14</b>	<b>8</b>	<b>12</b>
	<b>Selective/Orientation Course</b>											
<b>EE4423</b>	Pneumatic and Hydraulic Equipment in Automation	3(3-1-0-6)							3			
<b>EE4240</b>	Electrial-Electronic Equipment of Industrial Machines	3(3-1-0-6)							<b>3</b>			



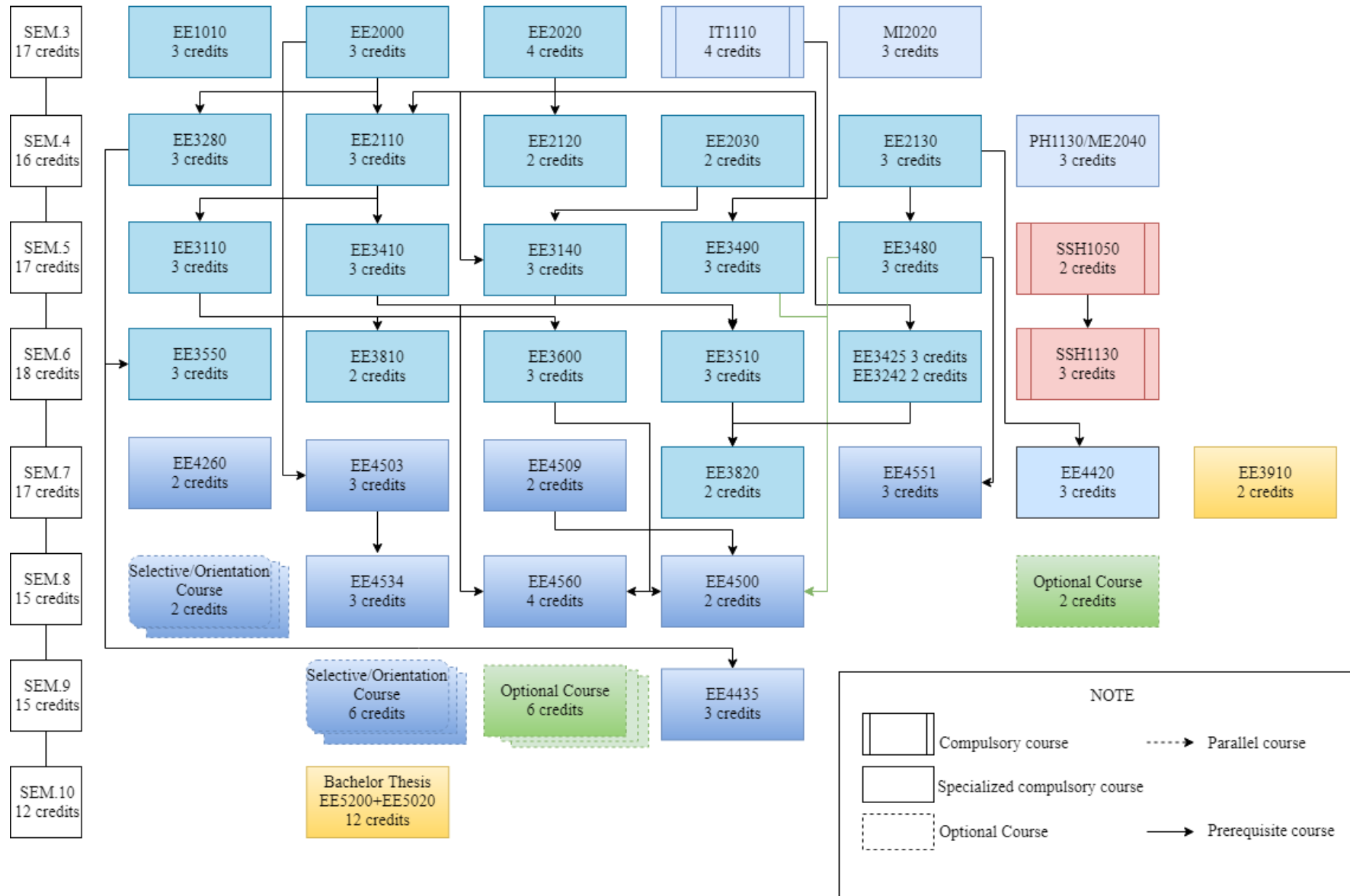


<b>EE4524</b>	Non-destructive Testing and Measurement	2(2-0-0-4)											
<b>EE4513</b>	Industrial Management	2(2-1-0-6)											
<b>EE4521</b>	Industrial Robot Control	2(2-1-0-4)											
<b>EE4241</b>	Power Supply System for Buildings	2(2-1-0-4)											
	<b>Total</b>	<b>162</b>	<b>16</b>	<b>17</b>	<b>17</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>17</b>	<b>15</b>	<b>15</b>	<b>12</b>	

### AUTOMATIC CONTROL PROGRAM



INSTRUMENTATION AND INDUSTRIAL INFOMATICS PROGRAMS



INDUSTRIAL AUTOMATION

