الجمهورية الجزائرية الديمقراطية الشعبية
République Algérienne
Démocratique et Populaire
وزارة التعليم العالي والبحث العلمي
Ministère de l'Enseignement
Supérieur
et de la Recherche Scientifique

National Higher School of Autonomous Systems Technology

STATE ENGINEER TRAINING PROGRAM

Academic year: 2025/2026

Institution
National Higher School of Autonomous Systems Technology

Domain	Field	Specialty
Science and Technology	*Electronics*	*Autonomous embedded systems engineering*

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اللجنة البيداغوجية الوطنية
لميدان العلوم و التكنولوجيا
Comité Pédagogique National du Domaine Sciences et Technologies

عرض تكوين
مهندس دولة

السنة الجامعية: 2026/2025

المؤسسة
المدرسة الوطنية العليا لتكنولوجيا الأنظمة المستقلة

الميدان	الفرع	التخصص
علوم وتكنولوجيا	الإلكترونيك	هندسة الأنظمة المدمجة المستقلة

Table of contents

I. Training Context and Objectives 1
1- Background and Strategic Vision of the Training program 1
2- Admission Requirements 1
3- Program Objectives 1
4- Targeted skills and Profiles 2
5- Regional and national employability potential 3
6- Bridges to other specialties 5
7- Program monitoring indicators 6
8- Human resources available 7
a. Enrollment Capacity 7
b. Academic Supervision Team 7
- **Internal Supervision** 7
- **External Supervision** 8
- **Comprehensive Summary of Human Resources** 9
- **Permanent Support Staff** 9

9- Available Material Resources 9
a. Educational Facilities 9
b. Educational Laboratories and Equipment 9
c. Internship and Corporate Training Sites 11
d. Personal Workspaces and Information Technology Resources 11
10- Signatures of teachers involved in the course ..... **Erreur ! Signet non défini.**
a. Internal teaching team for the specialty ..... **Erreur ! Signet non défini.**
b. External teaching team for the specialty ..... **Erreur ! Signet non défini.**
II. Semester-based distribution of modules 13
- **Semester 1** 13
- **Semester 2** 14
- **Semester 3** 15
- **Semester 4** 16
- **Semester 5** 17
- **Semester 6** 18

III - Detailed Syllabus by Subject ..... **Erreur ! Signet non défini.**
a. Module codes ..... **Erreur ! Signet non défini.**
- **Semester 1** ..... **Erreur ! Signet non défini.**
- **Semester 2** ..... **Erreur ! Signet non défini.**
- **Semester 3** ..... **Erreur ! Signet non défini.**
- **Semester 4** ..... **Erreur ! Signet non défini.**
- **Semester 5** ..... **Erreur ! Signet non défini.**

b. Detailed programs for the semester 1 ..... **Erreur ! Signet non défini.**
c. Detailed programs for the semester 2 ..... **Erreur ! Signet non défini.**
d. Detailed programs for the semester 3 ..... **Erreur ! Signet non défini.**
e. Detailed programs for the semester 4 ..... **Erreur ! Signet non défini.**
f. Detailed programs for the semester 5 ..... **Erreur ! Signet non défini.**
g. Detailed programs for the semester 6 ..... **Erreur ! Signet non défini.**
Agreements and conventions ..... **Erreur ! Signet non défini.**
Decisions and Approvals of Administrative and Advisory Bodies ..... **Erreur ! Signet non défini.**

I. Training Context and Objectives

1- Background and Strategic Vision of the Training program

The National Higher School of Autonomous Systems Technology offers a three-year engineering program in Autonomous Embedded Systems for students who have completed their preparatory cycle. This initiative aligns with the institution's mission to develop modern, rigorous engineering programs that respond to current technological needs.

The curriculum was designed in collaboration with academic and industrial partners to ensure both theoretical relevance and practical application. It integrates fundamental electronics principles with specialized knowledge in autonomous systems creating a comprehensive educational framework that prepares graduates for diverse professional paths.

This program is part of a coherent academic structure that includes complementary specializations in autonomous systems technologies:

- Autonomous Embedded Systems Engineering (present program)
- Unmanned Systems Navigation and Control
- Robotics and Autonomous Systems Design

The educational approach emphasizes balanced development of theoretical understanding and practical skills through laboratory work, project-based learning, and industrial internships. The program directly supports Algeria's strategic objectives for technological advancement and economic diversification while maintaining alignment with international standards.

2- Admission Requirements

Candidates for this engineering program are students from the National Higher School of Autonomous Systems Technology who have completed their preparatory cycle. Selection is based on merit ranking according to the overall average of the two preparatory years, subject to available places. Admission to the Autonomous Embedded Systems specialty follows the institution's internal progression protocols.

3- Program Objectives

The **Autonomous Embedded Systems Engineering (AESE)** specialty is designed to develop highly skilled engineers capable of conceiving, designing, and implementing sophisticated embedded systems with autonomous capabilities. This program addresses the growing demand for intelligent systems that can operate independently across various domains including transportation, healthcare, industrial automation, and smart infrastructure.

Our primary objective is to cultivate engineers with deep technical expertise in both hardware and software aspects of embedded systems, complemented by specialized knowledge in autonomy-enabling technologies. Graduates will master the integration of microcontrollers, sensors, actuators, and communication protocols with advanced algorithms for signal processing, control systems, artificial intelligence, and data fusion.

The curriculum balances theoretical foundations with practical implementation skills, preparing engineers to develop systems that can perceive their environment, make intelligent decisions, and execute actions with minimal human intervention. Particular emphasis is placed on critical aspects such as real-time processing, power efficiency, system reliability, and security—all essential for autonomous operations in complex environments.

By completing this specialty, engineers will be equipped to tackle emerging challenges in fields such as robotics, Internet of Things (IoT), smart grids, autonomous vehicles, and industrial automation. They will possess the technical versatility and innovative mindset needed to lead the development of next-generation autonomous systems that enhance productivity, safety, and quality of life across multiple sectors of the economy.

4- Targeted skills and Profiles

The Autonomous Embedded Systems Engineering (AESE) specialty aims to develop engineers with comprehensive technical expertise across both hardware and software domains, complemented by specialized knowledge in autonomy technologies. Our graduates will possess the skills necessary to innovate and lead in the rapidly evolving field of autonomous embedded systems.

Targeted Profiles:

- Embedded Systems Architect: These professionals excel at designing complete autonomous embedded solutions, integrating hardware components with sophisticated software layers. They understand system constraints and can architect solutions that balance performance, power consumption, and reliability requirements.
- Embedded Software Engineer: Specialists who develop optimized code for resource-constrained environments, with expertise in real-time operating systems, device drivers, and middleware. They implement robust algorithms that enable autonomous decision-making while maintaining deterministic behavior.
- Hardware Integration Specialist: Engineers skilled in electronic circuit design, sensor integration, and actuator control systems. They possess the technical knowledge to select, interface, and optimize the physical components required for autonomous functionality.

- Intelligent Systems Developer: Professionals who implement machine learning, computer vision, and data fusion algorithms on embedded platforms. They bridge the gap between theoretical AI approaches and practical embedded implementations with limited resources.
- Embedded Security Expert: Engineers focused on protecting autonomous systems from vulnerabilities, implementing secure communication protocols, and ensuring system integrity through hardware and software safeguards.
- Decision Autonomy Specialist: Engineers who design and implement advanced decision-making frameworks that allow embedded systems to operate independently in complex, uncertain environments. They develop algorithms that enable systems to assess situations, prioritize objectives, and adapt strategies without human intervention.
- Energy Autonomy Engineer: Professionals who specialize in optimizing power management for embedded systems, designing energy harvesting solutions, and implementing intelligent power consumption strategies. They ensure systems can maintain operational longevity through efficient energy utilization or self-sufficiency in diverse deployment scenarios.

These competencies are developed throughout the curriculum through:

- Foundational Lectureses in electronics, microcontrollers, and sensor technologies that build hardware expertise
- Software development modules covering embedded operating systems, real-time programming, and system optimization
- Advanced Lectureses in control systems, artificial intelligence, and data processing that enable autonomous capabilities
- Specialized training in decision-making algorithms and energy management systems
- Practical laboratory work and project-based learning that reinforce theoretical concepts with hands-on implementation
- Internships and capstone projects that provide exposure to real-world challenges and industry practices

Graduates will possess both technical depth and breadth, allowing them to contribute immediately in specialized roles while having the versatility to adapt to emerging technologies and cross-disciplinary challenges in sectors including transportation, industrial automation, healthcare systems, and smart infrastructure.

5- Regional and national employability potential

The **Autonomous Embedded Systems Engineering (AESE)** specialty addresses critical workforce needs across multiple strategic economic sectors in Algeria and the broader North African region

and elsewhere. Graduates of this program will be positioned to meet growing demand across several key industry segments that are experiencing rapid technological transformation.

Algeria's economic diversification initiatives, particularly in the technology and industrial sectors, create substantial opportunities for specialists in autonomous embedded systems. The strategic national plans to strengthen digital infrastructure, expand industrial automation, and develop smart city capabilities necessitate engineers with precisely the skill set this program cultivates.

The employability potential for AESE graduates extends across several vital economic sectors:

- **Energy Sector Transformation** The ongoing modernization of Algeria's energy infrastructure—encompassing oil and gas operations, renewable energy integration, and smart grid development—requires embedded systems expertise. AESE graduates will contribute to developing monitoring systems, automated control solutions, and energy management platforms that enhance efficiency and sustainability in this foundational sector of the national economy.
- **Industrial Modernization and Automation** As Algerian manufacturing and processing industries implement Industry 4.0 principles, the demand for engineers who can design and deploy autonomous embedded systems continues to grow. Graduates will find opportunities in developing industrial control systems, automation solutions, and predictive maintenance platforms that increase productivity and competitiveness in national industrial operations.
- **Transportation and Logistics Enhancement** The expansion of intelligent transportation systems and logistics optimization represents another significant employment avenue. AESE engineers will contribute to traffic management systems, fleet tracking solutions, and autonomous vehicle technologies that improve the efficiency and safety of national transportation networks.
- **Agricultural Technology Advancement** Agricultural modernization initiatives create demand for precision farming technologies and monitoring systems. Graduates will find opportunities to develop autonomous irrigation controls, crop-monitoring platforms, and farm management systems that enhance productivity while conserving resources.
- **Healthcare Technology Development** The healthcare sector's digital transformation creates opportunities for embedded systems specialists to contribute to medical device development, patient monitoring systems, and healthcare logistics automation—all crucial elements in strengthening national healthcare delivery capabilities.
- **Telecommunications and Digital Infrastructure** The ongoing expansion of telecommunications networks and IoT infrastructure throughout Algeria and neighboring

countries requires engineers who understand embedded systems integration with network technologies. AESE graduates will support the development of the backbone systems needed for smart city initiatives and digital service expansion.

Beyond direct employment in these sectors, graduates will find opportunities with:

- National research centers and innovation hubs focused on autonomous systems
- Technology startups within Algeria's growing entrepreneurial ecosystem
- Multinational technology firms operating in the region
- Government agencies involved in digital transformation and industrial development
- Academic institutions supporting technological advancement through research and development

The cross-disciplinary skills developed in the AESE program are particularly valuable as Algeria continues to develop its innovation capacity and digital economy. By combining expertise in electronics, software development, artificial intelligence, and system integration, graduates will possess versatile capabilities that remain relevant as technologies evolve, ensuring sustainable career development and contributing to national technological sovereignty.

6- Bridges to other specialties

The Autonomous Embedded Systems Engineer specialty offers strong connectivity with related disciplines, facilitating academic mobility and career development. Students may request transfers to other electronics specializations within Algerian universities.

Our program's comprehensive curriculum creates multiple pathways for graduates. Those wishing to pursue academic careers can seamlessly transition into research teams across various domains including robotics, artificial intelligence, IoT systems, and advanced electronics. The foundational knowledge and specialized skills acquired throughout this program prepare students for both industry leadership and scholarly advancement in emerging technological fields in Algeria and beyond.

The interdisciplinary nature of autonomous embedded systems naturally creates bridges to specializations in telecommunications, control systems, computer engineering, and power electronics, allowing graduates to pivot their careers according to technological evolution and personal interest.

7- Program monitoring indicators

The Autonomous Embedded Systems Engineering program employs a comprehensive set of key performance indicators to ensure continuous quality improvement and alignment with industry needs. These metrics enable systematic monitoring of educational outcomes and program effectiveness across multiple dimensions:

Academic Performance Metrics:

- Application rates and selectivity ratios for incoming cohorts
- Program completion rates and graduation statistics
- Average time to graduation and credit accumulation patterns
- Academic performance distribution across core and specialized Lectures

Professional Integration Assessment:

- Employment rate of graduates within six months and one year of program completion
- Sectorial distribution of graduate employment across industries
- Percentage of graduates securing positions in their field of specialization
- Career progression trajectories of alumni over three and five-year periods

Research and Academic Advancement:

- Number of graduates pursuing doctoral studies
- Research publications stemming from capstone projects
- Participation rates in academic conferences and technical competitions
- Intellectual property development from student projects

Stakeholder Feedback Mechanisms:

- Structured evaluations from current students at mid-program and completion stages
- Alumni satisfaction surveys conducted at one and three years post-graduation
- Employer assessments of graduate preparedness and performance
- Industry partner feedback on curriculum relevance and emerging skill requirements

Partnership Development Indicators:

- Growth in industry partnerships for internships and capstone projects
- Expansion of research collaborations with national and international institutions
- Development of exchange opportunities with partner schools
- Engagement levels with the Algerian innovation ecosystem

The program administration conducts annual reviews of these indicators, enabling data-driven refinement of curriculum content, teaching methodologies, and industry alignment to ensure graduates remain at the forefront of autonomous systems engineering practice in Algeria and beyond.

8- Human resources available

a. Enrollment Capacity

The AESE enrollment capacity is 50 students per promotion.

b. Academic Supervision Team

- **Internal Supervision**

Name	Speciality	Rank	Intervention Type
Mourad ADNANE	Instrumentation / Signal Processing	Prof	Course/Tutorials/Lab
Faiza BOUMEDIENE	Mechanics / Robotics	Prof	Course/Tutorials/Lab
Ziane KECHIDI	Physics	Prof	Course/Tutorials/Lab
Ouassila HIOUAL	Informatics	Prof	Course/Tutorials/Lab
Kamel BOUDJIT	Electronics / Embedded Systems	MCA	Course/Tutorials/Lab
Salaheddine AOUDJ	Chemistry / Electrochemistry	MCA	Course/Tutorials/Lab
Tarek CHERIFI	Electronics / Embedded Systems	MCA	Course/Tutorials/Lab
Abdelkader HAMTTAT	Mathematics	MCA	Course/Tutorials/Lab
El Mahdi MEDIA	Physics	MCA	Course/Tutorials/Lab
Yasmine GUERBAI	Electronics / Artificial intelligence	MCA	Course/Tutorials/Lab
SAIB Abdessadek	Mathematics	MCA	Course/Tutorials/Lab
Leila ABBAD	Electronics / Networks	MCB	Course/Tutorials/Lab
Sarah CHENCHE	Computer sciences / Artificial intelligence	MCB	Course/Tutorials/Lab
Mohamed LAIDI	Statistics / Stochastic processes	MCB	Course/Tutorials/Lab
Halima LAMMARI	Mechanics / Robotics	MCB	Course/Tutorials/Lab
Ahmed ZEGLAOUI	Mathematics / Optimization	MCB	Course/Tutorials/Lab
Said REZIG	Mathematics	MAA	Course/Tutorials/Lab
Fatima KADIK	Mathematics	MAA	Course/Tutorials/Lab
ZAIR Mustapha	Informatics	MAA	Course/Tutorials/Lab

- **External Supervision**

Name	Specialty	Institution	Rank	Intervention Type
Moufid MANSOUR	Control Eng	USTHB	Prof	Course Responsible
Mohamed TADJINE	Control Eng / Robotics	ENP	Prof	Course Responsible
Abdelhalim ZAOUI	Electrical Eng	ENSTA	Prof	Course Responsible
Malika BOUTERFAS	Electronics / Sensors	ENSTA	MCA	Course Responsible
Tarek CHERIFI	Electronics / Embedded systems	ENSTA	MCA	Course Responsible
Souhila BOUTARFA	- Electronics/ Signal processing	ENSTA	MCB	Course Responsible
Nesrine ISSAAD	Bioinformatics / Artificial intelligence	U. Algiers	MCB	Course Responsible
kheira Lakhdari	Telecommunication / Artificial intelligence	ENSTA	MCB	Course Responsible
Fouad YACEF	Control Eng / Drones	CDTA	Dr	Course Responsible
Rabie Riadh BENREZKI	Navigation and Control	CDTA	Dr	Course Responsible
Abdellah KHELLOUFI	Navigation and Control	CDTA	Dr	Course Responsible
Mohamed ZAOUCHE	Control Eng / UAS	Expert	Dr	Course Responsible
Abdelkader BELAHCENE	Computer Science / Open Source software	ENSTA	MAA	Course Responsible

- **Comprehensive Summary of Human Resources**

Rank	Internal resource	External resource	Total
Professor	**4**	**3**	**7**
MCA	**7**	**2**	**9**
MCB	**5**	**7**	**12**

- **Permanent Support Staff**

Rank	Staff
Laboratory Engineer	**1**
Computer Engineer	**1**
Administrator	**4**
Administrative Assistant	**2**
Total	**8**

9- Available Material Resources

a. Educational Facilities

Location	Seating Capacity	Number	Total Capacity
Lecture Hall	**200**	**4**	**800**
Tutorial Room	**30**	**15**	**450**
Practical Lab	**25**	**15**	**375**
Library	**30**	**1**	**30**
Reading Rooms	**40**	**2**	**80**
Workshop	**10**	**1**	**10**
Computing Center	**40**	**1**	**40**
Internet Room	**40**	**2**	**80**

b. Educational Laboratories and Equipment

The National Higher School of Autonomous Systems Technology prioritizes hands-on learning experiences through well-equipped laboratory facilities. These educational environments are designed to support the practical application of theoretical concepts across all specializations offered by the institution.

As a newly established educational institution, the school is currently in the process of acquiring high-quality pedagogical equipment and materials to outfit its laboratories. This ongoing procurement initiative is strategically aligned with the specific requirements of each specialization and the overall educational objectives of the institution.

The equipment acquisition plan has been carefully developed to ensure that all laboratories will be furnished with state-of-the-art technology that meets international standards for engineering education. This deliberate approach to laboratory development reflects the institution's commitment to providing students with relevant, industry-aligned practical experiences that enhance their technical competencies and professional readiness.

Upon completion, these specialized laboratories will create comprehensive learning environments where students can effectively bridge theoretical knowledge with practical application, developing the hands-on skills essential for success in the autonomous systems sector.

- **Laboratory Name: Electricity Lab**

Student Capacity: 25

N°	Equipment	Quantity	Operational Status
1	Amperemeter	13	Excellent state
2	Galvanometer	02	Excellent state
3	Voltmeter	12	Excellent state
4	Multimeter	05	Excellent state
5	Wattmeter	07	Excellent state
6	Power supply	10	Excellent state
7	Power supply module	06	Excellent state
8	Low-Frequency Generator	06	Excellent state
9	Oscilloscope	10	Excellent state
10	Breadboards	20	Excellent state

- **Laboratory Name: Physics Lab 1**

Student Capacity: 25

N°	Equipment	Quantity	Operational Status
1	Force tables	01	Excellent state
2	Free Fall	04	Excellent state
3	Simple Pendulum	05	Excellent state
4	Air track	03	Excellent state
5	PasCars	02	Excellent state
6	Torsion pendulum	02	Excellent state
7	Balance of Coulomb	05	Excellent state
8	electric field strengthmeter	05	Excellent state
9	Tank Rheographic	04	Excellent state
10	Analogic voltmeter	07	Excellent state
111	Analogic Ammeter	07	Excellent state

- **Laboratory Name: physics Lab 2**

Student Capacity: 25

N°	Equipment	Quantity	Operational Status
01	Pohl's Pendulum	1	Excellent state
02	Wave Tank/Ripple Tank	1	Excellent state
03	Vibrating String/Cord	1	Excellent state
04	Kundt's Tube	1	Excellent state
05	Light Polarization (Equipment)	1	Excellent state
06	Light Diffraction (Equipment)	1	Excellent state

- **Laboratory Name: Chemistry Laboratory.**

Student Capacity: 25

N°	Equipment	Quantity	Operational Status
01	Fume hood	01	Excellent state
02	Oven/Incubator	01	Excellent state
03	Distiller	01	Excellent state
04	Ice generator	01	Excellent state
05	Calorimeter	04	Excellent state
06	Heating plates	04	Excellent state
07	Heater with stirrer	01	Excellent state
08	Scale/Balance	02	Excellent state
09	pH meter	04	Excellent state
10	Dosing equipment with pH meter	02	Excellent state
11	Thermometer	15	Excellent state

12	Stopwatch/Timer	06	Excellent state
13	Power supplies for calorimetry	02	Excellent state
14	Voltmeter for calorimetry	02	Excellent state
15	Ammeter for calorimeter	02	Excellent state

- **Laboratory Title: Fluid Mechanics.**

Student Capacity: 25

N°	Equipment	Quantity	Operational Status
01	Digital Hydraulic Bench	01	Excellent state
02	Center of Pressure Apparatus	02	Excellent state
03	Falling Sphere Viscometers	02	Excellent state
04	Venturi Tube	01	Excellent state
05	Notch Discharge Apparatus	01	Excellent state

- **Laboratory Title: Mechanics Laboratory.**

Student Capacity: 25.

N°	Equipment	Quantity	Operational Status
01	Materials Testing Apparatus	01	Excellent state

c. Internship and Corporate Training Sites

Institution	Student Number	Training Duration
Mobilis	**20**	15 days
CRTI	**20**	15 days
CDTA	**20**	15 days
DeepMinds	**5**	15 days
Sonatrach	**20**	15 days
SEAAL	**10**	15 days
SONELGAZ	**10**	15 days

d. Personal Workspaces and Information Technology Resources

The institution provides students with a well-equipped library featuring a spacious reading room designed for academic study. High-speed internet connectivity is available throughout all campus facilities, ensuring continuous access to digital resources.

II. Semester-based distribution of modules

- **Semester 1**

Teaching Unit TU	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF1.1.1	**4h30**	**3h00**	**4h30**	**12h00**	**7h15**	**12**	**12**			
Fundamental Electronics	1h30	1h30	1h30	4h30	2h30	4	4	20%	20%	60%
Instrumentation and Sensors	1h30	1h30	1h30	4h30	2h30	4	4	20%	20%	60%
Microprocessors	1h30	0	1h30	3h00	2h15	4	4	20%	20%	60%
UEF1.1.2	**4h30**	**3h00**	**4h00**	**11h30**	**5h15**	**9**	**9**			
Introduction to Signal Processing	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Operating Systems Essentials	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Networking fundamentals	1h30	1h30	1h30	4h30	1h45	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM1.1.1	**3h00**	**1h30**	**2h00**	**6h30**	**3h30**	**6**	**6**			
Introduction to artificial intelligence	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Database Essentials for Embedded Systems	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET1.1.1	**0**	**0**	**1h00**	**1h00**	**1h15**	**2**	**2**			
Reverse Engineering & PCB Design	0	0	1h00	1h00	1h15	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED1.1.1	**1h00**	**0**	**0**	**1h00**	**0h45**	**1**	**1**			
Engineering Ethics and Safety	1h00	0	0	1h00	0h45	1	1	100%		0%
Total Semester S1	**13h00**	**7h30**	**11h30**	**32h00**	**18:00**	**30**	**30**			

- **Semester 2**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF1.2.1	**4h30**	**1h30h**	**4h00**	**10h00**	**3h45**	**9**	**9**			
Electronics Functions	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Microcontrollers	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced sensors and Actuators	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
UEF1.2.2	**4h30**	**3h00**	**4h00**	**11h30**	**3h45**	**9**	**9**			
Stochastic Processes and Estimation	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Operating Systems for Programmers	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced Networking	1h30	1h30	1h30	4h30	1h15	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM1.2.1	**4h30**	**1h30**	**2h30**	**8h30**	**3h30**	**9**	**9**			
Control Systems	1h30	1h30	1h00	4h00	1h15	3	3	20%	20%	60%
Machine Learning	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Regulations & Standards for Unmanned System	1h30	0	0	1h30	1h00	3	3	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET1.2.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project I	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED1.2.1	**0**	**0**	**0**	**0**	**6h00**	**1**	**1**			
Training Internship	/	/	/	/	6h00	1	1	100%		0%
Total Semester S2	**13h30**	**6h00**	**11h30**	**31h00**	**19h00**	**30**	**30**			

- **Semester 3**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF2.1.1	**6h00**	**1h30**	**4h30**	**12h00**	**6h15**	**11**	**11**			
Power Electronics	1h30	0h45	1h00	3h15	1h45	3	3	20%	20%	60%
Industrial Networks and Communication Protocols	1h30	0h45	1h30	3h45	1h45	3	3	20%	20%	60%
Digital Signal Processors	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Multi-Sensor Data Fusion	1h30	0	1h00	2h30	1h00	2	2	20%	20%	60%
UEF2.1.2	**4h30**	**0**	**3h30**	**8h00**	**4h30**	**8**	**8**			
Introduction to Real-Time Operating Systems	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Digital Filtering	1h30	0	1h00	2h30	1h45	3	3	20%	20%	60%
Human-Machine Interface for Embedded Systems	1h30	0	1h00	2h30	1h00	2	2	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM2.1.1	**4h30**	**3h00**	**3h30**	**11h00**	**4h45**	**8**	**8**			
Digital Control Systems	1h30	1h30	1h00	4h00	1h45	3	3	20%	20%	60%
Deep Learning	1h30	0	1h30	3h00	1h45	3	3	20%	20%	60%
Operations Research	1h30	1h30	1h00	4h00	1h15	2	2	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET2.1.1	**1h00**	**0**	**0**	**1h00**	**1h00**	**2**	**2**			
Introduction to embedded systems security	1h00	0	0	1h00	1h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED2.1.1	**2h00**	**0**	**0**	**2h00**	**0h30**	**1**	**1**			
Project Management for Engineers	1h00	0	0	1h00	0h30	1	1	100%		0%
Total Semester S3	**17h00**	**4h30**	**11h30**	**33h00**	**17h00**	**30**	**30**			

- **Semester 4**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF2.2.1	**6h00**	**1h30**	**5h30**	**13h00**	**4h30**	**12**	**12**			
Internet of Things (IoT)	1h30	0h45	1h30	3h45	1h00	3	3	20%	20%	60%
Electric Machines	1h30	0h45	1h00	3h15	1h00	3	3	20%	20%	60%
FPGA and Hardware Design	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
Advanced Real-Time Operating Systems	1h30	0	1h30	3h00	1h15	3	3	20%	20%	60%
UEF2.2.2	**4h30**	**1h30**	**3h30**	**9h30**	**2h45**	**8**	**8**			
Cryptography	1h30	0h45	1h30	3h45	1h00	3	3	20%	20%	60%
Embedded Vision and Intelligent Image Processing	1h30	0	1h00	2h30	0h45	2	2	20%	20%	60%
Regulation and Control	1h30	0h45	1h00	3h15	1h00	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM2.2.1	**3h00**	**1h30**	**3h30**	**8h00**	**3h15**	**8**	**8**			
Fundamentals of Robotics	1h30	0h45	1h00	3h15	1h15	3	3	20%	20%	60%
Wireless Communication Essentials	1h30	0h45	1h00	3h15	1h15	3	3	20%	20%	60%
Embedded AI	0	0	1h30	1h30	0h45	2	2	100%	0%	
Cross-disciplinary Teaching Unit (UET)										
UET2.2.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project II	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED2.2.1	**0**	**0**	**0**	**0**	**6h00**	**1**	**1**			
Training Internship II	/	/	/	/	6h00	1	1	100%		0%
Total Semester S4	**13h30**	**4h30**	**13h00**	**31h30**	**18h30**	**30**	**30**			

- **Semester 5**

Teaching Unit (UE)	Semester hourly volume (15 weeks / Semester)					Coefficients	Credits	Module average		
	Lectures (h)	Tutorials (h)	Laboratory Work(h)	Total (h)	Personal work (h)			Continuous assessment		Final exam
								Tests	Practical Work	
Core Teaching Unit (UEF)										
UEF3.1.1	**6h00**	**0**	**5h30**	**11h30**	**8h15**	**12**	**12**			
Program Optimization and System Performance	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
Power Supply and Auxiliary Peripherals	1h30	0	1h00	2h30	2h15	3	3	20%	20%	60%
Parallel Computing on GPUs	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
Embedded Operating Systems	1h30	0	1h30	3h00	2h00	3	3	20%	20%	60%
UEF3.1.2	**4h30**	**0**	**3h00**	**7h30**	**6h00**	**9**	**9**			
Systems Security	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Network security	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Reliability and Safety of embedded systems	1h30	0	1h00	2h30	2h00	3	3	20%	20%	60%
Methodology Teaching Unit (UEM)										
UEM3.1.1	**4h30**	**0**	**3h30**	**8h00**	**4h00**	**6**	**6**			
Distributed Computing for Embedded Systems	1h30	0	1h30	3h00	1h15	2	2	20%	20%	60%
Fundamentals of Autonomous Navigation	1h30	0	1h00	2h30	1h15	2	2	20%	20%	60%
Introduction to quantum computing	1h30	0	1h00	2h30	1h30	2	2	20%	20%	60%
Cross-disciplinary Teaching Unit (UET)										
UET3.1.1	**0**	**0**	**1h00**	**1h00**	**2h00**	**2**	**2**			
Capstone Project III	0	0	1h00	1h00	2h00	2	2	100%		0%
Discovery Teaching Unit (UED)										
UED3.1.1	**1h00**	**0**	**1h00**	**2h00**	**0h45**	**1**	**1**			
Entrepreneurship and Startup Development	1h00	0	0	1h00	0h45	1	1	100%		0%
Total Semester S1	**16h00**	**0h**	**13h00**	**29h00**	**21h00**	**30**	**30**			

- **Semester 6**

Internships in companies or research laboratories culminating in a thesis and an oral defense.

		Semester Hourly Volume	Coefficients	Credits
Internship and Final Year Project	14 Weeks	420 hours	30	30
Total	14 Weeks	420 hours	30	30