ASIIN Seal & EUR-ACE® Label

Accreditation Report

National Engineering Diploma
Computer Engineering
Electrical Engineering

Provided by
Private Higher School of Applied Sciences and Technology of Gabes, Tunisia

Version: 06 December 2024

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Génie Informatique	Computer Engineering	ASIIN, EUR-ACE® Label	/	02, 04
Génie Electrique Automatique (GEA)	Electrical Engineering	ASIIN, EUR-ACE® Label	/	02
Date of the contract: 17.04.2024 **Submission of the final version of the self-assessment report:** 29.05.2024 **Date of the onsite visit:** 18-19.06.2024 **at:** ESSAT Gabes, Tunisia				
Expert panel: apl. Prof. Dr.-Ing. Dipl. Phys. habil Kirsten Weide-Zaage, Leibniz University of Hannover Prof. Dr. Peter Nauth, Frankfurt University of Applied Sciences Prof. Dr. Moncef Tagina, Université de La Manouba Uwe Sesztak, Independent Consultant Islem Agrebi, Student at EPI SOUSSE				
Representative of the ASIIN headquarter: Paulina Petracenko				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of May 15, 2015				

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 04 - Informatics/Computer Science.

ASIIN General Criteria, as of December 07, 2021 Subject-Specific Criteria Technical Committee 02 – Electrical Engineering/Information Technology as of September 23, 2022 Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Computer Engineering	Engineer Diploma in Computer Science	- Software Engineering - Networks and Telecommunications Engineering	7	Full time	/	6 Semester	180 ECTS	September 2019, annual intake
Electrical Engineering	Engineer Diploma in Electrical Engineering	- Automatic and Control systems - Electrical Systems"	7	Full time	/	6 Semester	180 ECTS	September 2019, annual intake

For the Master's degree programme Computer Engineering the institution has presented the following profile in the self-assessment report:

"The purpose of the educational program Computer Engineering (Information technology) is to prepare highly qualified engineers, capable to carry out the following professional activities:

- Design and development of information technology systems.
- Management of IT assets and networks.
- Design and development of computer and electronic systems."

For the Master's degree programme Electrical Engineering the institution has presented the following profile in the self-assessment report:

„The aim of the program is the training of highly qualified engineers on the basis of an effective preparation for the competitiveness in the labour market in a way that they are competent, responsible, fluent in their profession and based in adjacent areas, capable of efficient operation of the specialty to the world standard, able to effective work in specialty, professional development, social and professional mobility."

[3] EQF = The European Qualifications Framework for lifelong learning

C Expert Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, Content & Implementation

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Objective-module-matrix for each programme
- Websites of all study programmes
- Discussion during the audit

Preliminary assessment and analysis of the experts:
The experts refer to the Subject-Specific Criteria (SSC) of the Technical Committee Electrical Engineering and Information Technology as well as the Technical Committee Computer Science as a basis for judging whether the intended learning outcomes of the two programmes correspond with the competences as outlined by the SSCs.

The experts review the intended learning outcomes of the two programmes as presented in the self-assessment report and confirm that their level adequately reflects EQF level 7 (the intended learning outcomes can be found at the end of the report). The experts also agree that they are in line with the ASIIN Subject Specific Criteria (SSC) of the Technical Committee on Electrical Engineering and Information Technology and the Technical Committee on Computer Science.

However, the experts note that the programme's learning outcomes do not describe the professional classification, i.e. the tasks and jobs that graduates are qualified to perform in their professional lives. The industry partners report in the audit that they are satisfied with

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

the engineering skills of the graduates and that they regularly take on students for work placements or employ ESSAT graduates in engineering positions, some even in management positions. In particular, industry partners praise the graduates' problem-solving skills, which are essential in engineering jobs. The experts appreciate that ESSAT graduates are in demand by industry and that industry confirms that ESSAT graduates are well qualified for professional careers in computer and electrical engineering. However, they urge the HEI to include the concrete professional qualifications in the intended learning outcomes so that it is transparent for all stakeholders, especially potential employers of graduates.

Since the university also applied for the EUR-ACE® label, the experts check whether the learning outcomes are aligned with the EUR-ACE® Framework Standards and Guidelines (EAFSG) for engineering programmes. The EUR-ACE® Framework Standards and Guidelines requires that engineering programmes cover the following seven competence areas: Knowledge and Understanding, Engineering Analysis, Engineering Design, Investigations, Engineering Practice, Making Judgements Communication and Team-working, and Lifelong Learning. The self-assessment report and the module descriptions illustrate that the degree programmes under review cover all the required competence areas such as engineering analysis, design, and practice as well as communication and team-working skills. The experts are convinced that the mentioned competences are conveyed in the respective courses. They conclude that the intended learning outcomes of all programmes are aligned with the EUR-ACE® Framework Standards and Guidelines (EAFSG).

During the audit, the experts learn that all programmes at ESSAT are regularly reviewed, including the intended learning outcomes. This process involves all relevant stakeholders such as students (e.g. through surveys), teachers and industry partners. Industry representatives state in the audit that they have regular meetings with ESSAT management to discuss the learning outcomes and curricula of the programmes, as well as their general suggestions. For example, they have recently requested that digital communication and soft skills training be included in the programmes. ESSAT has already confirmed that these suggestions will be incorporated next year. The experts appreciate that ESSAT has these mechanisms in place. However, they point out that there is no documentation of this process, which also makes it impossible for them to assess the concrete development of the programmes. As discussed in Chapter 5, the experts urge ESSAT to document all steps of the internal review process so that it is transparent to internal and external stakeholders.

The experts note, however, that the intended learning outcomes and objectives are only contained in the Self-Assessment Report and published on the website of the two study programmes. The experts point out that, however, they are not included in any official document such as the student handbook or the university regulations. Therefore, the learning

outcomes of both programmes need to be anchored in an official document in a transparent way. Furthermore, the experts find that the learning outcomes presented on the websites are generic and do not give an accurate picture of the qualifications actually obtained by the students. They ask ESSAT to use the learning outcomes presented in the self-assessment report and publish them on the university's website. Furthermore, they require that these outcomes be firmly integrated into an official and binding document, ensuring that they serve as a formal reference for both students and faculty. In addition, they emphasize the importance of instructors clearly explaining the expected learning outcomes to students at the beginning of each module, something that is not consistently done across all courses. This would enhance clarity, transparency, and alignment between the course objectives and students' expectations, improving the overall learning experience.

Criterion 1.2 Name of the Degree Programme

Evidence:

- Self-Assessment Report
- Diplomas

Preliminary assessment and analysis of the experts:
The experts confirm that the English translation and the original French names of the Bachelor's degree programmes correspond with the intended aims and learning outcomes as well as the content of the respective degree programme.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions
- Student Guide
- Internal Rules
- Discussions during the audit

Preliminary assessment and analysis of the experts:
Content & Structure

The two Master's programmes have a duration of three years (6 semesters) each and amount to 180 ECTS credits.

In both study programmes students can choose one of two specializations. The Electrical Engineering programme offers the specializations “Automation and Industrial Computing” and “Electrical Systems”. In the Computer Engineering programme, students can choose between the tracks “Software Engineering” and “Networks and Telecommunications Engineering”. Students in both programmes can also choose two electives in the fifth semester. The sixth and final semester is dedicated to the “End of Study Project”, during which students have to work individually on a project.

The detailed study plans of both study programmes can be found at the end of this report.

In terms of the curricula, the experts are of the opinion that both programmes provide a sound education in the respective technical field at EQF level 7. They also confirm that both curricula are designed to provide students with the engineering competences required by the EUR-ACE® Framework Standards and Guidelines (EAFSG).

However, they note that the content of both programmes is generally rather traditional and follows the traditional canon of content in the respective discipline. As a result, topics that reflect cutting-edge research and industrial practice are only marginally covered in the programmes. For example, in electrical engineering, topics such as advanced power electronics, soft computing and robotics, nanotechnology and microelectronics, and machine learning are lacking. In computer science, the experts miss topics such as artificial intelligence and deep learning, quantum computing, cybersecurity and cryptography, distributed systems and cloud computing, blockchain technology and cryptocurrencies. The experts therefore recommend that teachers keep up to date with the latest developments in their field and include more state-of-the-art topics such as Artificial Intelligence Neural Networks and Image Processing Semantic Segmentation in the curricula.

In this context, the experts also note that both curricula are strongly adapted to the needs of local industry and are very practice-orientated. They observe a project-based learning approach in the programmes, which includes practical internships with industry partners and involves active participation from industry experts in both teaching and mentoring. While the experts welcome the fact that ESSAT maintains close links with industry and aims to prepare its students as well as possible for professional life, they believe that students would benefit if the two programmes included more scientific components. In particular, they suggest that the two curricula should be more closely aligned with the latest scientific and technological developments. They suggest, for example, to integrate computer vision guided robot arm control using inverse kinematics approaches or predictive maintenance.

The experts believe that there is room for improvement in several modules. In the Computer Engineering programme, the experts consider that the title of the module “Advanced

Software Engineering" does not correspond to its content. According to the module descriptions and the teachers' explanations, the focus of the module is more on advanced modelling than on designing programmes, i.e. software engineering. Therefore, the experts suggest that the title of the module should be changed to reflect the focus on modelling.

The experts also see minor discrepancies in the alignment of the title of the module "Artificial Intelligence", which is taught in both study programmes, and its content. As the sample exams of this module only cover basic aspects of Artificial Intelligence, the experts inquire about the exact course content. The teachers explain that the course focuses on various algorithms. The experts view this as important part of the subject, but only as its foundation. Therefore, advanced content such as deep learning is missing. The experts suggest changing the title of the module to "Introduction to Artificial Intelligence" to clarify that the module only covers the basics of the subject.

Another module that is discussed among the experts is "Microcontrollers and Machine Control" in the Electrical Engineering programme. While the content is satisfactory according to the module descriptions, the sample examinations are rather disappointing in the eyes of the experts. They find that the level of the examinations is below the level of the module content. Therefore, the experts suggest that the level of the examination in this module should be raised and adapted to the level of the module content.

In general, the experts identify a number of other modules in both degree programmes where the module description is vague and/or does not match the content actually taught. For example, the module description of the "Advanced Mobile Development" module in the Computer Engineering degree programme lacks a concrete and detailed description of the module content. In addition, the module description states that students learn the PHP 5 scripting language. As PHP 5 is considered an outdated language, the experts ask the teachers about the use of it the audit and learn that this is an error in the documents, as they actually teach PHP 7 or 8. The experts welcome the fact that students are taught the latest scripting languages. However, they agree that the entire catalogue of module descriptions of the two degree programmes is in great need of revision, as the descriptions do not currently reflect the actual detailed content of the two degree programmes transparently for all stakeholders. Thus, it must be ensured that all information within the module descriptions is precise, consistent and corresponds to the actual teaching.

ESSAT states in the self-assessment report that the practical application of the theoretical knowledge is highly important in all of their study programmes. For this reason, excursions to companies and internships are an integral part of both programmes. In fact, students of the two programmes are required to complete three industrial internships over the course of their studies. In the first and second academic year, students have to carry out a one-

month internship; in the third year (sixth semester), the internship lasts a minimum of three months and a maximum of six months. The university states that the first internship serves as an introduction to the professional life of engineers and an opportunity for the students to apply their theoretical knowledge in practice. In the second internship called the “Engineering internship”, students should deepen their transfer skills by solving a specific technical problem assigned by the advisor from the company. The final internship is undertaken in combination with the End of Studies Project. Students can carry out the internship in the industry or in a research laboratory. However, according to students and programme coordinators, all engineering students usually complete their final project in industry. During the audit discussions, the experts learn that students are satisfied with the internship process and that teachers and administrators support them in finding an internship. They also learn that it is possible for students to do the internship abroad and that teachers help students with the organisation process.

The experts appreciate the different opportunities for students to gain practical experience and that students are satisfied with the process of the internships. However, the experts point out that there are no module descriptions of the internship units, so the exact organisation of the internships is unclear to them. They also lack information about the supervisors and their roles, as well as the form of assessment of the students' performance during the internship. The expert team learns that the university takes responsibility for the work placement and that students can contact their teachers if they need advice. However, no further details on the process of the placement are communicated to the experts. In addition, the experts note that internships are neither included in the curriculum nor awarded credit points – only the Final Project is listed in the study plan and awarded credit points. For these reasons, ESSAT must include the internships in the study plans and award them credit points. Furthermore, the HEI needs to develop module descriptions of the different internship units, including detailed information on the organisation and structure of the internships, the responsibilities of ESSAT and the company, the workload and the credits awarded. The module descriptions must also be made available to all stakeholders.

Student Mobility

According to the self-assessment report, ESSAT promotes international mobility and supports its students in their ambitions to study or work abroad. For example, the university proposes the final internship and/or the final project in the sixth semester as adequate opportunities for students to complete them in a university or company abroad. However, the experts learn that ESSAT does not currently have any official cooperation with other universities or companies, and therefore no systematic mobility programmes. So far, one or two students go abroad each year (e.g. to Comoros and Gabon). These mobility activities

are usually organised by the students themselves. However, students emphasise in the audit that teaching and administrative staff are very supportive and help them with the process. In addition, the programme coordinators state that every few years they send a student abroad for research purposes. In one case, for example, a one-off contract was set up with the University of Toulouse; in other cases, students were sent to African universities or companies, e.g. in Niger. They also report on a conference in Djerba that ESSAT organised with a French university and in which ESSAT students participated.

The experts appreciate that the teaching and administrative staff support students in their mobility endeavours and can understand that, due to the small size and young age of the university, it has not yet managed to develop partnerships with other universities. However, in order to increase student mobility and the overall international network, the experts recommend that ESSAT facilitates cooperation agreements with universities and companies abroad and establishes exchange programmes for students and staff.

As all mobility activities have so far been on an individual basis, the recognition process is also negotiated individually and not defined formally. The experts appreciate that students report that according to their knowledge there has not been any problems in terms of the organisation and recognition of student mobility. Nevertheless, ESSAT must provide official rules for the recognition of qualifications achieved externally (e.g. at other higher education institutions or outside the higher education sector) in accordance with the Lisbon Recognition Convention. It should be made transparent that the recognition is guaranteed unless substantial differences can be proven by the higher education institution.

Periodic Review of the Curriculum

As outlined in Chapter 5 of this report, ESSAT states that a comprehensive review of each programme, including curricula, takes place once a year. The annual review takes into account feedback from internal stakeholders (students, teaching staff and heads of department) and external feedback (alumni and industry partners). Feedback from students is largely collected through questionnaires; feedback from alumni and business partners is obtained through roundtable discussions. All interviewees in the audit confirm their involvement in the regular review process of the degree programmes. However, as will be explained in detail later, the experts point out that ESSAT does not sufficiently document the exact work of quality management, i.e. the specific measures taken in recent years to improve the two curricula are not sufficiently documented. They ask ESSAT to list the quality assurance steps in detail and to record its actions in order to make the development and progress of the programmes more visible.

Criterion 1.4 Admission Requirements

Evidence:

- Self-Assessment Report
- Admission regulations
- Website
- Discussions during the audit

Preliminary assessment and analysis of the experts:
The admission requirements and conditions for the two study programmes are defined in the admission regulations for engineering programmes at ESSAT. In accordance with the provision of Law No. 73/2000, regulating private higher education in Tunisia, two types of admissions are possible: admission through the preparatory cycle and direct admission to the study programs (engineering cycles).

The preparatory cycle is open for all students holding a technical baccalaureate. Students that have completed this two-year preparatory cycle have a right to choose any of the offered engineering programmes at ESSAT.

It is also possible to apply directly to the engineering programme. Any student, whether Tunisian or international, is eligible for the study programme if he or she holds a technology license (EQF 6) matching the chosen engineering course, a Master's degree or has completed a preparatory cycle at a different university. Master's degree students may directly advance to the second year of the programme if they have already achieved the necessary skills and knowledge in their previous degree.

If students apply from outside and have not already taken the preparatory cycle at ESSAT, they need to bring certain prerequisites with them, otherwise they have to complete modules that are fixed by the scientific committee next to the regular modules in the engineering cycle. The students confirm that this mechanism is manageable.

ESSAT selects students on the basis of an application form, which can be downloaded from the website, and an interview. During the interview, the applicant's skills and suitability for the degree programme applied for will be assessed. Each year, the Director of Studies and Internships and the Heads of Department review and, if necessary, adjust the criteria for selecting suitable students. Students in the audit state that the admission and selection process is transparent and appropriate.

In Computer Engineering, on average, around 83% of applicants have been admitted over the last 6 years. Overall, there has been a slight decrease in the number of applicants (and admitted students) from 21 applicants in 2019 to 15 students in 2023.

In Electrical Engineering, an average of around 80% of applicants have been admitted over the last 6 years. Here, however, the number of applicants (and admitted students) has risen from 4 students in 2019 to 16 students in 2023. The experts consider the ratio of applicants to admitted students in both programmes to be reasonable.

In discussions with students, the experts have the impression that students are well informed about the admission requirements and procedures, as all the necessary information is collected on the ESSAT website. As the rules are based on decrees issued by the Ministry, the experts consider them to be binding, transparent and adequate to select the best students for the programmes.

Criterion 1.5 Workload and Credits

Evidence:

- Self-Assessment Report
- Study plans
- Student Guide
- Module descriptions
- Discussions during the audit
- Statistical data

Preliminary assessment and analysis of the experts:
Each of the two Master's programmes comprises 180 credits. According to the study plans, the workload is evenly distributed with 30 ECTS or 480 hours per semester, with the exception of the last semester, in which it amounts to 450 hours. However, when converting the hours of student workload into credits, the experts note that the credit calculation is incorrect, as 480 hours would result in 16 ECTS (if 1 ECTS equals 30 hours) and not 30 ECTS as stated in the study plans.

The experts note further anomalies and inconsistencies in the calculation of student workload and credit points in the module handbooks. Thus, most module descriptions include only information on the contact hours. These contact hours are divided into “integrated coure work”, “pratical work”, and “project.” Project modules, on the other hand, include only information on the hours of “out of class activities”. The experts learn in the audit that ESSAT currently uses the coefficient of one credit corresponding to 15 hours of student work. The experts discuss this in detail during the audit, as this ratio differs greatly from the ratio indicated by ECTS (1 ECTS point = 25-30 hours of student workload). The discussions show that these 15 hours only cover contact hours. The programme coordinators explain that ESSAT does not take into account students' self-study time when calculating

credit points, and therefore the entire workload calculation is based on contact hours: Thus, over the entire duration of six semesters, students spend 2700 contact hours at the university, which is approximately 250 hours per semester. Most modules have a contact hour requirement of between 30 and 45 hours, which includes lectures, seminars, tutorials, laboratory work, supervised assignments and project work. The experts therefore request that ESSAT includes student self-study time in the calculation of workload and awards credit points accordingly. They also require that the revised information on the correct number of credits and hours of student workload (including student self-study time) must be reflected in the module descriptions and study plans to ensure transparency for all stakeholders.

The experts also learn that while 1 credit = 15 hours is the standard coefficient, there are variations depending on the importance of the module. For example, the modules "Mini Project" and "English" in semester 4 are only awarded 1 credit point for 22.5 hours each. As this is not in line with ASIIN requirements, the experts urge ESSAT to establish a single coefficient that is applied consistently to all modules.

As there are no module descriptions for the three compulsory internships, the experts enquire about the credits awarded for the internship. They are informed that students do not receive credits for completing the internships. As the internships are a compulsory part of both programmes, ESSAT must ensure that students receive credit for them.

The experts also learn that there is no formal monitoring of student workload. However, in discussion with students, they report that the overall workload is manageable and appropriate. Students report that they spend about six hours a day on face-to-face teaching and on average two or three hours on independent self-study. The experts also consider the workload to be realistic and well balanced over the semesters. However, they agree that in line with the ASIIN criteria ESSAT needs to monitor students' self-study time and make adjustments to the credits awarded if necessary. One way of monitoring the workload is to include questions on the exact amount of time spent on self-study in student surveys.

According to the university's statistics, 92.5% of students in the Computer Engineering programme successfully complete their studies. In Electrical Engineering, the success rate in recent years has been as high as 100%. The average length of study is 3.03 years in computer engineering and 3.05 years in electrical engineering. The experts conclude from the data that the structure of the degree programmes is coherent and enables students to complete their studies within the standard period of study. In addition, the data also reflects the students' statement that the workload is appropriate in practice. Nevertheless, ESSAT must ensure that the formal dimension of workload and credits, i.e. the inclusion of time for students' self-study, a standardised coefficient for the ratio between workload and

credits and the awarding of credits for work placements, is in place and in line with the criteria.

Criterion 1.6 Didactic and Teaching Methodology

Evidence:

- Self-Assessment Report
- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:
ESSAT states in its self-assessment report that the two study programmes use a combination of different teaching methods and didactic tools to ensure the achievement of the intended learning outcomes. In particular, the didactic methodology aims to develop critical thinking, problem-solving skills and the practical application of knowledge. The forms of teaching used in the two degree programmes are lectures, tutorials, practical work/laboratories, individual and group work, case studies, projects and workshops. In addition, compulsory internships and study trips are part of each programme.

All learning material is uploaded to an online platform and is therefore also accessible to the students. The platform also includes voice and video recordings of the lessons, which helps those who were absent not to miss any detail of the class, but also helps students in general to understand the material.

As already mentioned, the experts note that both degree programmes are very practice-oriented, which is reflected, among other things, in the multiple inclusion of projects. Students in both degree programmes must complete at least one “mini-project” each semester. The university specifies in the self-assessment report in which module exactly the students must carry out a project. Most projects must be carried out in small groups; this is also intended to promote students' soft skills such as communication and teamwork. In the discussion with the programme coordinators, the experts learn that the dimension of the projects shifts and becomes more demanding as the programme progresses. The topic of the mini-projects is usually suggested by the teacher, but students can also suggest their own topic. The students report that they once took part in a robotics competition in Tunisia as part of their projects, which they won.

Another element that illustrates the practical relevance of the study programmes is the inclusion of excursions. According to the programme coordinators, they regularly organise excursions so that students can expand their awareness of different organisations, deepen

their knowledge of the professional world and gain practical experience in the professional world. In the Electrical Engineering programme, for example, students visit national organisations in the electricity and gas sector as well as factories in the Gabes area. In the Computer Engineering programme, excursions are made to, for example, satellite transmission stations, radio/TV/FH transmitters, etc.

The experts consider the teaching methods used to be a good mixture in order to offer varied teaching and achieve the intended learning outcomes of the two degree programmes. They particularly praise the inclusion of a large number of projects and the excursions. They agree that the degree programmes prepare students very well for their future work as engineers thanks to their high practical relevance.

On the other hand, the experts recognise only a few elements in the two degree programmes that promote students' independent academic work. Their impression is confirmed in discussions with teachers and students: For example, students report that there is no provision in the degree programme for them to carry out academic research during their studies. All the necessary materials are handed out by the lecturers at the beginning of the course; this also includes projects. Students therefore generally only work with the material in class and do not use the sources from the library. As explained in more detail in the next chapter, the experts note that the lack of academic work is also reflected in the quality of final theses. While the content is adequate, the academic format is clearly in need of improvement. For this reason, the experts suggest increased training in scientific work, especially in scientific research and writing.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 1:

The experts note that ESSAT has revised the educational objectives and learning outcomes so that they do not only describe the academic and subject-specific, but also the professional classification of the qualifications. They find the description of the professional classification clear and adequate. They also welcome the fact that the programme learning outcomes are now also included in the student handbook and published on the university's website. They conclude that the learning outcomes are thus anchored in a transparent manner and are available to all interested parties.

Regarding the rules for the recognition of external qualifications, ESSAT refers to the existing cooperation partners and agreements and claims to follow the Lisbon Convention. However, the university does not provide evidence that it has established central rules for the recognition of qualifications obtained externally (whether from a cooperation partner or elsewhere). For this reason, the experts insist that the requirement be maintained.

Furthermore, the experts acknowledge that ESSAT has revised the module descriptions for the two programmes, which now include detailed and correct information about the content of the modules and the total workload. They also note that the module descriptions are published online and thus made available to all stakeholders. The shortcomings in the module descriptions are therefore removed.

Regarding the credit calculation, the experts appreciate that the module descriptions of all modules now include information on the total student workload, i.e. not only contact hours but also self-study time. They also confirm that the credit calculation takes into account the student's self-study time and that credits have been awarded to all compulsory parts of the programme including the internships. They note that in most modules the credits have been calculated in such a way that 1 ECTS corresponds approximately to 25 hours of total student workload. However, the Diploma Supplement defines that 1 ECTS corresponds to 30 hours of work. In addition, the experts note that each internship of 45 hours is worth 3 ECTS points and the final project of 360 hours is worth 24 ECTS points. This would imply a correlation of 1 ECTS to 15 hours in the internships and the final project. The experts conclude that ESSAT needs to define a single coefficient for the calculation of credits and to award credits on this basis consistently and equally for all modules. In addition, the experts urge the university to include the information on credits for the internship in the module description, as this information is currently only included in the study plans.

Furthermore, the experts take into account that ESSAT does not comment on the issue of workload monitoring. They therefore agree that the requirement to introduce an official monitoring system to check that the workload is in line with the credits awarded for each module should be maintained.

The Criterion is partly fulfilled.

2. Exams: System, Concept and Organisation

Criterion 2 Exams: System, Concept and Organisation

Evidence:

- Student Guide
- Examination Charter
- Internal Rules
- Sample exams and theses
- Self-Assessment Report

- Study plans
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the experts:
All examination-related regulations and policies are set out in the Student Guide. According to the guide, each module is assessed by continuous assessment, a final examination or a combination of both. Continuous assessment may include supervised assignments (group or individual), written and/or oral tests, reports, projects, laboratory work and presentations of practical or synthesis work. The final assessment is usually a written examination. In modules where the assessment consists of a final examination and continuous assessment, the weighting coefficients are 60% for the final examination grade and 40% for the continuous assessment grade. Attendance at ESSAT is compulsory. Students who do not attend at least 80% of the sessions of a module per semester will not be allowed to sit the final examination.

At the beginning of each module, teachers present the syllabus, including the subjects, the examination dates and the assessment forms. The final examination period takes place at the end of each semester, after the lecture period, and lasts one week. If students were unable to attend the original exam session due to illness or other significant reasons, they will be given the opportunity to retake the exam at the end of the semester. ESSAT also has mechanisms in place to support students with special needs. The detailed compensation procedures are set out in the Student Guide.

Students report that they receive all relevant information about the examination at the beginning of the semester. Overall, they are satisfied with the organisation and implementation of the examination system. In particular, they praise the variety of assessment forms and the opportunity to carry out many projects. When asked about the workload and the difficulty of the examinations, students say that both are appropriate and manageable.

After reviewing the documentation and examination samples and conducting the audit interviews, the experts conclude that ESSAT has a sound examination system in place. They confirm that a variety of competence-based assessment forms are used in the two programmes under review, which are adequate to assess the achievement of the course and programme learning outcomes. Furthermore, they consider that the level of the examinations is appropriate and corresponds to EQF level 7.

As neither the self-assessment report nor the examination charter specify the procedure for resitting in the event of failure, the experts request clarification on this point. Students explain that in order to pass a module, they need to achieve a pass mark of at least 10 out

of 20 or above. However, if they achieve less than a passing mark, this does not automatically mean that they have to re-sit the exam in that particular module, as ESSAT has a compensation mechanism that takes into account the student's overall performance. This means that at the end of the academic year an annual average grade is calculated for each student, taking into account the grades of all modules taken during the year. If this annual average grade is below 10/20, students will be required to re-sit the examinations they failed in the 'make-up session' at the end of the academic year. If they pass the make-up exams, they will be allowed to continue their studies. If not, they have to repeat the whole academic year. The experts are surprised by the compensation mechanism, as it means that a failure in one exam/module can be compensated by a grade in any other module. As there seem to be no restrictions on which modules the compensation can or cannot be applied to, the experts conclude that this means that a student could graduate without having acquired certain essential competences and skills. It also suggests that some graduates may not have achieved all the intended learning outcomes of the programme. For this reason, the experts insist that the compensation system must be changed or eliminated so that it is no longer possible to compensate for failure in one exam/module with a grade in another exam/module. Instead, students should automatically retake the examination (e.g. in the form of an oral examination) in which they have failed, in order to ensure that they have achieved the learning outcomes of the module. Overall, it is important to ensure that students achieve all the intended learning outcomes of all mandatory modules, so that they also achieve the programme learning outcomes; a compensation mechanism must not prevent this.

In the last semester, students must complete a final project. The procedure and regulations for the final project are set out in the Study Guide. In the context of the project, students have to find a solution to an engineering problem comparable to those in the professional world. As mentioned before, students have the choice between a practical project in the industry and a more theoretical project in a research institute. Usually though all engineering students decide to carry out their internship and project in the industry sector. As part of the project, it is mandatory for the students to complete an internship of at least three months. It is expected that students write their thesis while carrying out their internship. Students are supervised during their project by two supervisors: one teacher and one responsible staff member of the company or research institution. The academic supervisor meets with the student once every two weeks. After having completed the final project and written the report, students have to defend their results in front of a jury consisting of a chairperson, an examiner, and the supervisor.

The experts review samples of the thesis and find that the content of the projects demonstrates that students are able to work independently on an engineering task at EQF level 7.

They also notice that the thesis samples resemble classical technical projects rather than scientific papers, which is in line with the remaining practically oriented curricula. The experts also point out that the practical nature of the final project does not detract from its quality and that the level of the practical projects still corresponds to EQF 7. However, the experts observe overall a poor level of academic format across all sample theses. This is visible among other things in the following deficits: Missing references and citations, barely readable graphics due to bad quality of images, and a high number of images/graphics which are barely explained, commented or interpreted. Furthermore, the experts note that the sample theses lack a coherent and systematics structure. The experts trace this back to missing academic guidelines provided to the students and the lack of scientific work and writing practiced in the two study programmes. The experts therefore require that ESSAT establishes guidelines for the execution of the Master's thesis and that students are being taught the appropriate standards in academic working and writing. The experts also urge the university to develop a template with instructions for academic writing and creating graphics, citations etc. Overall, the Bachelor theses must include and demonstrate the following components: The student's derivation of a specific research or development problem/hypothesis within the topic (given by the teacher) from the literature review, the explanation and description of the methodology chosen to solve the problem, the presentation of the development/research steps and results, and the verification/validation of the research or development problem/hypothesis. References must be listed in the bibliography and made visible in the text. ESSAT must also present a policy on AI tools such as Chat GPT.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 2:

The experts note that ESSAT has provided a Guide for the Final Project. However, it refers only to formal aspects such as the citation methods and the layout but not to guidelines for actual scientific work. The experts therefore insist that the Guidebook also includes requirements for deriving the specific research or development problem and the hypothesis within the topic (given by the teacher) from literature research. Furthermore, the guide should instruct students on how to select and explain the methodology chosen to solve a specific problem, and how to describe the development/research steps and results. Finally, the Guide has to demonstrate how to verify/validate the hypothesis. They add that policies regarding AI tools such as Chat GPT should be explained as well.

The experts welcome though the inclusion of the new module "Scientific Writing" in the fifth semester of both programmes, which intends to strengthen students' academic working skills.

With regard to the compensation mechanisms of the exams, the experts note that the university's explanation does not differ from the process described above. For this reason, they argue that the requirement should be maintained and that ESSAT should limit the compensation mechanisms so that a failure in one module can only be compensated by another similar module.

Criterion partly fulfilled.

3. Resources

Criterion 3.1 Staff and Development

Evidence:

- Self-Assessment Report
- Staff Handbook
- Study plans
- Module descriptions

Preliminary assessment and analysis of the experts:
According to the staff handbook, in the Computer Engineering as well as Electrical Engineering programme there are 14 teachers of which 10 have a PhD. About one third of the teachers are actually employed at the larger institution ISETGB (Institut supérieur des études technologiques de Gabès) also located in Gabés and work part-time as lecturers for ESSAT. The remaining two third of the teachers are hired full time by ESSAT. The teacher-student ratio is about 1:6.

In the audit discussions, the teachers explain that every full-time teacher has a teaching load of 450 hours per year, which corresponds to approximately 12 to 15 hours per week. Part-time teachers (from ISETGB) have a teaching load of about 1 hour per week. Depending on the position, the full-time teachers at ESSAT might also have additional responsibilities such as the supervision of projects and administrative tasks. The remaining time (1-2 days per week) is used for research, which is according to the teachers sufficient.

The recruitment process involves a thorough assessment and verification of candidates' qualifications based on their CVs and diplomas/certificates. Ongoing assessment is also carried out through student surveys in which students are asked to evaluate the quality of teaching. Students confirm this and report that they are very satisfied with the teaching staff at ESSAT. They also praise the good contact they have with teachers and the support they receive from them.

ESSAT is also committed to supporting its staff in their academic and pedagogical development. The Director of the School and the Director of Studies are responsible for the professional development of the teaching staff. They evaluate teachers' continuous performance and, if necessary, assign more training to specific teachers in order to remedy shortcomings. Teachers can attend internal didactic courses or apply to attend external workshops. For example, several ESSAT staff members attended the ISO 9001 training in Djerba a few years ago. It is also mandatory for newly recruited teachers to undergo training in pedagogy and methodology.

Based on the audit discussions and the review of the staff handbooks, the experts conclude that the composition, professional orientation and qualifications of the teaching staff are appropriate for the successful delivery of the two programmes. They also welcome the fact that ESSAT continuously evaluates and supports its teaching staff with offers for their further development. Furthermore, the experts take can see at the hand of the list of publications that the teaching staff is involved in research activities.

However, as previously mentioned, they observe that the research activities do not engage with cutting-edge or highly contemporary topics, which is reflected in the somewhat traditional nature of the curricula. The issue is compounded by the fact that the permanent faculty members primarily focus on very conventional research subjects, limiting the exploration of more innovative and emerging fields. As a result, students may not be adequately exposed to the latest developments in the industry, which could impact their future readiness and competitiveness. Therefore, the experts encourage the teachers to focus more on in-depth research of open research problems, such as machine decision making under incomplete and conflicting information. The results of research projects should also be incorporated into teaching, so that students also learn about the latest scientific and technological developments.

Criterion 3.2 Student Support and Student Services

Evidence:

- Self-Assessment Report
- Action Plan for Gender Equality
- Gender Plan for Diversity Respect
- Policy for Studnets with Special Needs
- Discussions during the Audit

Preliminary assessment and analysis of the experts:
According to the self-assessment report, ESSAT has a range of provision to ensure adequate student support. For example, students with special needs can receive a reduction in tuition fees or even study completely free of charge. Academic monitoring is carried out collectively by the entire teaching staff, i.e. whenever students have difficulties they can talk to the teacher concerned. If students are unhappy with a particular issue, they can file a complaint online, which is then discussed in a consultation meeting.

ESSAT also offers its students extra-curricular activities and a club for which it provides facilities and equipment.

ESSAT also has a Diversity Action Plan and a Gender Equality Action Plan. These aim to create and maintain an open and inclusive environment that encourages mutual support. As part of this strategy, the university has also organised regular workshops on conflict management and diversity awareness, which are mandatory for all teaching staff.

In the audit, students report that they are very satisfied with the support system at ESSAT. In particular, both students and teachers praise the Director of ESSAT, who takes great care to ensure the wellbeing of staff and students. They also point out that the Director is indeed the main contact person for student support and is always open to new suggestions and requests. The experts note the very familial atmosphere of the university and appreciate the commitment of its staff. They are confident that the support system and the university environment are adequate to ensure that students achieve their learning outcomes and graduate within the intended time.

Criterion 3.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the experts:
ESSAT is a private university that derives its income from tuition fees, capital and funding from industrial partners. In terms of laboratories, ESSAT collaborates with ISETGB in the sense that some practical/lab classes are carried out in ISETGB's laboratories. The campus of the ISETGB is only a few kilometres away from the ESSAT campus, so it is not a problem for the students to get to the other campus in time. The rest of the practical work is carried out in the laboratories of ESSAT. For the teaching of the two courses, ESSAT has a large computer room with all relevant software installed, several classrooms with a blackboard and a projector, and different labs such as Machine Control, Automation, Logic Systems,

Electrical CAD, and Industrial Installations Design. ESSAT also has a small library with print media and access to electronic scientific databases.

Both students and teachers indicate that they are satisfied with the facilities and equipment, noting that all the necessary tools and software are available. They also point out that the collaboration with ISETGB is very beneficial, as more advanced equipment that is not available at ESSAT can be used at the other institution. Teachers add that the resources available to them allow them to carry out both teaching and research at an appropriate level.

During the audit, the experts visit the facilities and laboratories on the campus and some of the laboratories used at ISETGB. They find that the electrical engineering labs are limited in number and basic in equipment, with the exception of the labs for electrical machines and power engineering. As for the computer science facilities, the equipment is just adequate, but students often rely on their own laptops for their work. Since the equipment at ESSAT is rather rudimentary, the experts appreciate the collaboration with ISETGB, which provides more advanced tools so that the overall quantity and quality of the equipment used in both programmes is sufficient for the students to achieve the programme learning outcomes. With regard to access to scientific publications, the experts note that the library is small and the print sources are limited. However, they are pleased to note that ESSAT provides access to an electronic database. Nevertheless, they learn that students tend to rely more on websites for their research than on credible academic references, which is evident in the bibliographies of their final project reports. As mentioned above, the experts therefore urge ESSAT to train students in bibliographic research and encourage them to use more reliable academic sources.

In conclusion, the experts find that the infrastructure is sufficient to run the two programmes and to achieve the programme objectives. In terms of the funding, the experts believe that there is secure funding and reliable financial planning to ensure that the two programmes continue at the same level for the next five years.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 3:

The experts note that ESSAT does not comment on this criterion. They therefore maintain their assessment as described above.

Criterion fulfilled.

4. Transparency and Documentation

Criterion 4.1 Module Descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Websites of all study programmes

Preliminary assessment and analysis of the experts:

After studying the module descriptions, the experts confirm that they contain almost all necessary information (module title, teaching methods, ECTS credits awarded, intended learning outcomes, content, recommended reading, possible prerequisites, name of responsible teacher, examination methods and information on grade calculation). As indicated in Chapter 1.5, the descriptions also include information on workload, but only in terms of contact hours. The module descriptions must therefore include the total workload of the student, including the time for self-study. In addition, the credit calculation appears to be flawed and needs to be reviewed and revised if necessary. The correct information on the ECTS credits must be displayed in the module descriptions.

Furthermore, as discussed in Chapter 1.3, the module descriptions do contain information on the teaching content but as turned out in the audit discussions this information is often unclear or incorrect. The experts require ESSAT to review and revise the module descriptions so that they reflect the content actually taught and provide detailed information about the content. In addition, the experts request module descriptions for the internships and the final thesis. Ultimately, the experts note that while the module descriptions are available to students, they are not publicly available to all stakeholders. ESSAT must therefore ensure that the revised module descriptions are published online.

Criterion 4.2 Diploma and Diploma Supplement

Evidence:

- Exemplary diploma certificate per study programme
- Exemplary transcript per study programme
- Exemplary Diploma Supplement per study programme

Preliminary assessment and analysis of the experts:

The experts confirm that students on both programmes receive a Diploma/Certificate, a Diploma Supplement and a Transcript of Records on graduation. However, the experts note

that the Transcripts of Records do not include information on the ECTS points awarded for each module. In addition, they remark that the Diploma Supplement lacks some essential information, such as the programme learning outcomes, the graduate's final grade and statistical data, as defined in the ECTS Users' Guide, which allow the reader to assess the individual grade. The statistical data provide an insight into the performance of other graduates in the same cohort, so that external parties can assess and compare the graduate's final grade. In conclusion, the experts require ESSAT to provide a revised and accurate Transcript of Record and Diploma Supplements for each programme.

Criterion 4.3 Relevant Rules

Evidence:

- Self-Assessment Report
- All relevant regulations as published on the university's webpage
- Audit Discussions

Preliminary assessment and analysis of the experts:
The experts confirm that the rights and duties of both ESSAT and the students are clearly defined and binding. All rules and regulations are published on the university's website. Students confirm that they receive the course material at the beginning of each semester and that the course material as well as all other relevant information about the degree programmes (e.g., module handbook, study plan, intended learning outcomes) is available to them via ESSAT's online learning platform.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 4:

As mentioned above, ESSAT has provided revised module descriptions. The experts welcome the inclusion of module descriptions for the internships and the final project. As discussed before, the module descriptions also include all necessary information. Nevertheless, members from ESSAT have to check the credit calculation and verify the information given about the credits in the module description credits.

In addition, the experts note that there have been no changes in the content description of the Advanced Software Engineering module in the Computer Engineering programme, and therefore the requirement should be maintained.

The experts consider the revised Diploma Supplement. They confirm that the new template includes the programme learning outcomes but still lacks the graduate's final grade (and

its ECTS classification), cohort statistics according to the ECTS User's Guide and a description of the Tunisian higher education system, as the document currently only refers to a website which is not permanent. They note though that the Transcript of Records includes information on the ECTS points awarded for each module.

Criterion partly fulfilled.

5. Quality management: quality assessment and development

Criterion 5 Quality management: quality assessment and development

Evidence:

- Self-Assessment Report
- Audit Discussions

Preliminary assessment and analysis of the experts:
ESSAT states that its quality management system follows the ISO 9001_V2015 standard. The quality assurance of teaching is mainly based on the documentation of the course portfolio and is divided into three steps. In the first step, course "artefacts" such as syllabus, timetable/calendar, course description, aims, objectives, course topics and other relevant materials are reviewed on a regular basis. The second step is to review the enactment and outcome artefacts. In this step, members of the teaching and quality management staff review the way the module has been taught, how students have participated in the learning process, and the students' results, which show their achievements and learning growth. In the final step, teachers reflect on their teaching practice, the effectiveness of their strategies and the impact of their actions on student learning, and plan strategies for future improvement.

During the audit, the experts learn that there are monthly meetings between teaching staff and students within the smaller framework of quality assurance to discuss (urgent) problems that affect both teaching staff and students. On a larger scale, ESSAT conducts a comprehensive review of its study programme once a year involving all stakeholders. As part of the review, meetings are held with the university management, teaching staff, part-time lecturers and students. On the external level, there are meetings organised with alumni, industry partners and other external partners. After collecting all the data from the meetings and the student surveys, which are conducted once a semester, the management team draws up a SWOT analysis. Based on this analysis, a strategic plan is developed to address and eliminate the weaknesses

During the audit, students confirm that surveys are carried out regularly and that they are informed of the results of the evaluation shortly afterwards. They state that their feedback is taken into account by the university management and that improvements are usually implemented quickly. The students state that they also have the opportunity to communicate their suggestions and criticism to lecturers and the university management at any time. The industry partners in the audit report that they are also satisfied with the quality of the programmes and that ESSAT regularly asks them for feedback and implements their suggestions.

Following the audit discussions, the experts are convinced that ESSAT has a functioning quality assurance management system that ensures continuous improvement of the study programmes. However, they point out that not all of the aforementioned mechanisms are described in detail in the documents. They miss an official document such as a quality management handbook that describes the entire quality assurance process and the persons responsible. Furthermore, they note that there is no documentation of the actual work of quality assurance in recent years that shows which specific measures have been implemented in the degree programmes. Hence, the documentation should include what the exact causes of previous changes in the study programmes were (e.g. criticism from students or companies) and how the issues have been addressed and solved.

In conclusion, the experts note that the two study programmes are subject to regular internal quality assurance involving all stakeholders and that the results are incorporated into the continuous further development of the programmes. Nevertheless, the experts call for ESSAT to document all procedures and results of its quality management in a transparent and detailed manner, including specific cases and examples.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 5:

ESSAT did not comment on the experts' evaluation with regard to quality management, so the experts' assessment remains as described above.

Criterion not fulfilled.

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

D 1. Detailed List of the Labs used in the two study programmes (both located at ESSAT and ISETGB) (was submitted as part of the appendix).

E Comment of the Higher Education Institution (24.10.2024)

The following quotes the comment of the institution:

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

“Concerning the panel’s remark that the Program Learning Outcomes should be published in an official document (pages 6-7-8), ESSAT has added them to the students’ handbook which is published on the university website (www.essat-gabes.com), taking into account the experts’ recommendations to add the professional qualifications of the Engineers, as one can see it the attached file (appendix 1).

Criterion 1.3 Curriculum

Then, as asked by the experts to edit the syllabuses in pages (8-9-10), ESSAT has added the out of class activities (non-contact hours) and a clear description of the Course Learning Outcomes (CLO) (appendix 2.1 and appendix 2.2). Moreover, all of the teachers devoted the first session of the course to clarify the CLO to their students and their importance in their career once they graduate.

In fact, the suggestions of the panel concerning the innovation of the content of the course and the introduction of new technologies, were taken into consideration when editing the syllabuses.

Furthermore, ESSAT has created new syllabuses for the tutored projects as well as the internships and the End of Studies project, in which they defined their ECTS credits. As a consequence, the study plans (appendix 2.3 and appendix 2.4) of both engineering programs have been changed. Then, ESSAT created an Internship Guide (appendix 3), which is published on the university website. That guide describes the whole process of the internships.

Concerning students’ mobility, ESSAT has always been willing to establish partnerships that would facilitate students exchange. In this respect, they would mention the internship of one of the students at the University of Toulouse III (appendix 4), as well as, the partnership with ISTEC Business School of Paris (appendix 5).

For the recognition of student mobility, ESSAT adopts the Lisbon Recognition Convention.

Being certified ISO 21001: 2018, ESSAT applies the ISO standards requirements and thus le Roue de Deming (plan, do, check, act) is adopted. Moreover, they have clear complaint process (appendix 6), actions plan paper (appendix 7), as well as periodic review procedures (appendix 8).

On page 15, it is mentioned that ESSAT has 250 hours per semester, which is not correct. In one semester, however, they have 450 hours.

Criterion 1.6 Didactic and Teaching Methodology

Since the experts noted that the lack of academic work is reflected in the quality of final theses, ESSAT added a course in the fifth semester called “Scientific Writing” in which they learn how to write theses and scientific paper. Moreover, ESSAT prepared a guide for writing the End of Studies Project Paper (appendices 9.1 ; 9.2).

Criterion 2 Exams: System, Concept and Organisation

Passing from a year to another is made solely by getting 54 ECTS out of 60. If the student does fulfil that requirement, he/she retake an examination session for the module in which he/she did not get a mark of 10/20. If again he/she fails to get that number of credits (54 ECTS), he/she repeats the whole academic year.

Criterion 4.2 Diploma and Diploma Supplement

Concerning the experts’ suggestion about the Transcripts of Records (appendix 10), they have taken them into account by adding the ECTS.

Furthermore, ESSAT reformed the Diploma supplement in accordance with the ECTS User’s Guide (appendix 11).”

F Summary: Expert recommendations (14.11.2024)

Taking into account the additional information and the comments given by ESSAT the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
NED Computer Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
NED Electrical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Requirements

For all study programmes

A 1. (ASIIN 1.3) Define the rules for the recognition of qualifications achieved externally (at other higher education institutions or outside the higher education sector) in accordance with the Lisbon Recognition Convention.

A 2. (ASIIN 1.5) Establish formal monitoring of students' total workload, including both contact hours and self-study time, and award ECTS credits accordingly. Ensure that a single coefficient is consistently applied when calculating credits for all modules.

A 3. (ASIIN 2.0) The grading system must not allow students to compensate for failure in one examination/module by passing another examination/module. It must be ensured that students achieve the intended learning outcomes of all compulsory modules.

A 4. (ASIIN 2) Establish academic guidelines for the execution of the Master's thesis in line with scientific standards.

A 5. (ASIIN 4.2) Ensure that the Diploma Supplement is in line with the ASIIN criteria.

A 6. (ASIIN 5) Ensure that the process and outcomes of quality management are documented. In particular, the documentation must reflect the programme review process, including the evaluation by those involved, so that the development of the study programmes can be tracked and managed in the long term.

For the National Engineering Diploma programme Computer Engineering

A 7. (ASIIN 1.3, 4.1) Ensure that the title of the “Advanced Software Engineering” module matches its content.

Recommendations

For all study programmes

E 1. (ASIIN 1.3) It is recommended to increase cooperation with other institutions and to establish exchange programmes with universities abroad.

E 2. (ASIIN 1.3, 3.1) It is recommended that lecturers keep themselves more up to date with the latest developments in the field and incorporate their findings into teaching. Overall, the module content should not only reflect the expectations of the industry but also the latest scientific and technological developments.

E 3. (ASIIN 1.3, 4.1) It is recommended that the title of the module "Artificial Intelligence" be changed to "Introduction to Artificial Intelligence".

For the National Engineering Diploma programme Electrical Engineering

E 4. (ASIIN 1.3) It is recommended that the examination level of the “Microcontrollers and Machine Control” module be raised and matched to the level of the course content.

G Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering/Information Technology (22.11.2024

Assessment and analysis for the award of the ASIIN seal:

The technical committee discusses the procedure and agrees with the assessment of the experts.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
NED Computer Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
NED Electrical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Technical Committee 04 – Informatics/Computer Science (21.11.2024)

Assessment and analysis for the award of the ASIIN seal:

Mr. Sesztak reports on the procedure. The TC discusses the procedure and proposes minor editorial changes to requirement A4 and to recommendation E2. Otherwise, the TC follows the assessment of the experts without any changes.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
NED Computer Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

Requirements

For all study programmes

A 1. (ASIIN 1.3) Define the rules for the recognition of qualifications achieved externally (at other higher education institutions or outside the higher education sector) in accordance with the Lisbon Recognition Convention.

A 2. (ASIIN 1.5) Establish formal monitoring of students' total workload, including both contact hours and self-study time, and award ECTS credits accordingly. Ensure that a single coefficient is consistently applied when calculating credits for all modules.

A 3. (ASIIN 2.0) The grading system must not allow students to compensate for failure in one examination/module by passing another examination/module. It must be ensured that students achieve the intended learning outcomes of all compulsory modules.

A 4. (ASIIN 2) Establish academic guidelines for the completion of the Master's thesis in line with scientific standards.

A 5. (ASIIN 4.2) Ensure that the Diploma Supplement is in line with the ASIIN criteria.

A 6. (ASIIN 5) Ensure that the process and outcomes of quality management are documented. In particular, the documentation must reflect the programme review process, including the evaluation by those involved, so that the development of the study programmes can be tracked and managed in the long term.

For the National Engineering Diploma programme Computer Engineering

A 7. (ASIIN 1.3, 4.1) Ensure that the title of the “Advanced Software Engineering” module matches its content.

Recommendations

For all study programmes

E 1. (ASIIN 1.3) It is recommended to increase cooperation with other institutions and to establish exchange programmes with universities abroad.

E 2. (ASIIN 1.3, 3.1) It is recommended that lecturers keep themselves up to date with the latest developments in the field and incorporate them into teaching. Overall, the module content should not only reflect the expectations of the industry but also the latest scientific and technological developments.

E 3. (ASIIN 1.3, 4.1) It is recommended that the title of the module "Artificial Intelligence" be changed to "Introduction to Artificial Intelligence".

For the National Engineering Diploma programme Electrical Engineering

E 4. (ASIIN 1.3) It is recommended that the examination level of the “Microcontrollers and Machine Control” module be raised and matched to the level of the course content.

H Decision of the Accreditation Commission (06.12.2024)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The commission discusses the accreditation procedure and follows the vote of the experts and the suggestions made by the TC 04.

Assessment and analysis for the award of the EUR-ACE® Label:

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation*
NED Computer Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030
NED Electrical Engineering	With requirements for one year	30.09.2030	EUR-ACE®	30.09.2030

*Subject to the approval of the ENAEE Administrative Council

Requirements

For all study programmes

A 1. (ASIIN 1.3) Define the rules for the recognition of qualifications achieved externally (at other higher education institutions or outside the higher education sector) in accordance with the Lisbon Recognition Convention.

A 2. (ASIIN 1.5) Establish formal monitoring of students' total workload, including both contact hours and self-study time, and award ECTS credits accordingly. Ensure that a single coefficient is consistently applied when calculating credits for all modules.

A 3. (ASIIN 2.0) The grading system must not allow students to compensate for failure in one examination/module by passing another examination/module. It must be ensured that students achieve the intended learning outcomes of all compulsory modules.

A 4. (ASIIN 2) Establish academic guidelines for the completion of the Master's thesis in line with scientific standards.

A 5. (ASIIN 4.2) Ensure that the Diploma Supplement is in line with the ASIIN criteria.

A 6. (ASIIN 5) Ensure that the process and outcomes of quality management are documented. In particular, the documentation must reflect the programme review process, including the evaluation by those involved, so that the development of the study programmes can be tracked and managed in the long term.

For the National Engineering Diploma programme Computer Engineering

A 7. (ASIIN 1.3, 4.1) Ensure that the title of the "Advanced Software Engineering" module matches its content.

Recommendations

For all study programmes

E 1. (ASIIN 1.3) It is recommended to increase cooperation with other institutions and to establish exchange programmes with universities abroad.

E 2. (ASIIN 1.3, 3.1) It is recommended that lecturers keep themselves up to date with the latest developments in the field and incorporate them into teaching. Overall, the module content should not only reflect the expectations of the industry but also the latest scientific and technological developments.

E 3. (ASIIN 1.3, 4.1) It is recommended that the title of the module "Artificial Intelligence" be changed to "Introduction to Artificial Intelligence".

For the National Engineering Diploma programme Electrical Engineering

E 4. (ASIIN 1.3) It is recommended that the examination level of the "Microcontrollers and Machine Control" module be raised and matched to the level of the course content.

Appendix: Programme Learning Outcomes and Curricula

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Computer Engineering:

- "Development of skills in the field of automation.
- In-depth understanding and mastery of real-time process control approaches.
- Deployment of intelligent, predictive, and robust control in the industrial sector.
- Optimization of control systems in industrial settings to improve efficiency and quality while considering energy and environmental constraints.
- Analysis and processing of digital and analog signals.
- Power electronics and electrical engineering.
- Analog and digital electronics.
- Embedded applications and IoT.
- Supervision and remote control in Industry 4.0.
- Integration and management of human-machine interactions for Industry 5.0.
- Micro-computing and microelectronics.
- Innovation and creativity."

The following **curriculum** is presented:

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed
S1	TU.1: Fundamentals Sciences for Engineer I	Math for engineer I	30	15	0	45	3	6	3	6		X
		Numerical analysis and optimization	15	15	15	45	3		3			X
	TU.2:Fundamentals sciences for development 1	Fundamental algorithms 1 & 2 (C)	15	15	30	60	4	10.5	4	10.5		X
		Computer and scientific computing workshop	0	0	30	30	2		2			x
		operating systems : Linux	15	15	15	45	3		3			x
		Mini project 1	0	0	22,5	22,5	1.5		1.5		x	
	TU.3 : fundamentals sciences for Network 1	Logical Systems	15	15	0	30	2	10.5	2	10.5		x
		Signal Processing	15	15	0	30	2		2			x
		Transmission technology	15	15	15	45	3		3			x
		Information Theory	15	15	0	30	2		2			x
		Mini project 2	0	0	22,5	22,5	1.5		1.5		x	
	TU.4 : Human Sciences and Engineer Culture1	Initiation and Introduction to economics	0	22,5	0	22,5	1.5	3	1.5	3	X	
		English1	0	22,5	0	22,5	1.5		1.5		X	
135	150	165	450	30	30	30	30					

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed
	TU.5:Fundamentals Sciences for Engineer II	Math for engineer II	15	15	0	30	2	4	2	4		x
		Optimization	15	0	15	30	2		2			x
		Java 1& 2	15	15	30	60	4		4			X

S 2	TU.6:Fundamentals sciences for Developmentll	Database	15	15	15	45	3	10	3	10		X
		Coding C++	0	0	30	30	2		2			X
		Mini project 3	0	0	22,5	22,5	1		1		x	
	TU.7 : Fundemantals sciences for Network II	Network architecture and protocols (CCNA1)	15	15	15	45	3	13	3	13		x
		Micro-Proc& Micro-Control	15	15	15	45	3		3			x
		Artificial intelligence	15	0	30	45	3		3			x
		Digital and analog electronics	15	15	15	45	3		3			x
		Mini project 4	0	0	22,5	22,5	1		1		x	
	TU.8 : Human Sciences and Engineer Culture II	Communicational techniques	0	22,5	0	22,5	1	3	1	3	X	
		English2	0	22,5	0	22,5	1		1		X	
		Enrepreneurial Culture	0	22,5	0	22,5	1		1		X	

120	157,5	210	487.5	30	30	30	30

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			Cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed
S3	TU.9 : Fundamentals Sciences for Development III	Pythonprogramming	0	0	45	45	3	9.5	3	9.5	x	
		Web development	0	0	45	45	3		3		x	
		Programming Mobile	0	0	30	30	2		2		x	
		Mini project 5	0	0	22,5	22,5	1.5		1.5		x	
	TU.10 : Design and Linux	Design Methodology	15	15	0	30	2	9	2	9		x
		Network Design (CCNA2)	15	15	15	45	3		3			x
		Embedded C	15	0	15	30	2		2			x
		Advanced Linux	15	0	15	30	2		2			x
	TU11:optionRéseaux et Telecom1	Analogue and digital transmission	15	15	15	45	3	6,5	3	6.5		x
		Antennas and Propagation	15	15	0	30	2		2			x
		Mini project 6	0	0	22,5	22,5	1.5		1.5		x	
	TU.11: Software Engineering1	Software Engineering	15	15	15	45	3	6,5	3	6.5		x
		Advanced database	15	0	15	30	2		2			x
		Mini Project 6	0	0	22,5	22,5	1.5		1.5		x	
	TU.12 Human Sciences and Engineer Culture 3	English 3	0	22,5	0	22,5	1.5	5	1.5	5		x
		Method problem solving	0	30	0	30	2		2			x
		Quality management	0	22,5	0	22,5	1.5		1.5			x
90	135	225	450	30	30	30	30					

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed

S 4	TU.13 : Computer administration and security	Network & System Administration	15	15	30	60	4	11	4	11		x
		Advanced Web development	0	0	30	30	2		2			
		Cryptography	15	0	15	30	2		2			x
		Security	15	0	30	45	3		3			x
		Mini project 7	0	0	22,5	22,5	1		1		x	
	TU.14: Networks and Telecom Engineering2	Mobile communication network 1	30	0	0	30	2	7	2	7		x
		Access Methods of Networking	15	15	0	30	2		2			x
		Network Packet (CCNA3)	15	15	15	45	3		3			x
	TU.14: Software Engineering2	J2EE	0	0	30	30	2	7	2	7		x
		DataMining	15	0	15	30	2		2			x
		Advanced Mobile development	15	0	30	45	3		3			x
	TU.15:Human Sciences And Engineer Culture 4	Leadership and communications	0	22, 5	0	22,5	1	2	1	2		x
		English 4	0	22, 5	0	22,5	1		1			x
	TU.16:Project	EYP end-of-year project	0	120	0	120	3	3	3	3	x	

105	210	142. 5	457 .5	3 0	30	30	30

Telecommunication Network engineering

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cour s	DW	PW	Total	CE TU	TU	CET U	T U	Continu ous control	Regime Mixed
	U.E.17 : New system	CloudComputing	0	0	30	30	2	7 .5	2	7.5		x
		BigData	0	0	30	30	2		2			x
		IOT	0	0	30	30	2		2			x
		Mini-project 8	0	0	22,5	22,5	1.5		1.5		x	

S 5												
	U.E.18 : Networks and Engineering	Mobile networks 2	30	0	0	30	2	9.5	2	9.5		x
		Sensor networks	15	15	15	45	3		3			x
		Optical Networks	15	15	15	45	3		3			x
		Mini project 9	0	0	22,5	22,5	1.5		1.5		x	
	U.E.19: Telecom Engineering	Network planning and metrology	15	0	15	30	2	8.5	2	8.5		x
		QoSand Wireless communication	15	0	15	30	2		2			x
		Prepare for huaweiCertification	0	0	45	45	3		3		x	
		Mini project 10	0	0	22,5	22,5	1.5		1.5		x	
	U.E.20 : Human Sciences and Engineer Culture	Labor law	0	22,5	0	22,5	1.5	4.5	1.5	4.5	X	
		Prepare for English certificate B2	0	22,5	0	22,5	1.5		1.5		X	
		Business creation	0	22,5	0	22,5	1.5		1.5		X	
90	97.5	262.5	450	30	30	30	30					

Software engineering

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed
	U.E.17:New system	CloudComputing	0	0	30	30	2	7.5	2	7.5		x
		BigData	0	0	30	30	2		2			x
		IOT	0	0	30	30	2		2			x
		Mini project 8	0	0	22,5	22,5	1.5		1.5		X	

S 5	U.E.18: Advenceddevelopment	Advanced Softawareengeign	15	0	30	45	3	9.5	3	9.5		x
		Knowledge engineering	15	0	15	30	2		2			x
		Prepare for MERN Certification	15	0	30	45	3		3		X	
		Mini-projet 9	0	0	22,5	22,5	1.5		1.5		X	
	U.E.19:Software Engineering3	Distributed system	0	0	30	30	2	8.5	2	8.5		x
		Formal development tool	15	0	30	45	3		3			x
		.net	0	0	30	30	2		2			x
		Mini-projet 10	0	0	22,5	22,5	1.5		1.5		X	
	U.E.20 : Human Sciences and Engineer Culture	Labor law	0	22,5	0	22,5	1.5	4.5	1.5	4.5	X	
		Prepare for English certificate B2	0	22,5	0	22,5	1.5		1.5		X	
		Business creation	0	22,5	0	22,5	1.5		1.5		X	

60	67.5	292.5	420	30	30	30	30

Semester	Teaching Unit	Constitutive Element (CETU)	Hourly volume				Number of credits awarded		Coefficients		Evaluation method	
			cours	DW	PW	Total	CETU	TU	CETU	TU	Continuous control	Regime Mixed
S 6	U E2 5	Graduation project	0	0	450	450	30	1,5	30	1,5	X	

According to self-assessment report, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Electrical Engineering:

- "§Skill 1: General ability for accurate and intelligent synthesis and analysis of encountered problems.
- § Skill 2: Administration of systems and networks.
- § Skill 3: Design of computer systems.
- § Skill 4: Capacity to anticipate changes in the field of computer science.
- § Skill 5: Ability to succeed in complex projects, taking into account the intricacies of new projects and client needs.
- § Skill 6: Entrepreneurial and leadership skills, and the ability to integrate into an organization, animate it, and drive its evolution.
- § Skill 7: Understanding of industrial, economic, and professional challenges in terms of competitiveness and productivity.
- § Skill 8: Competence in software development.
- § Skill 9: Aptitude to work in an international context: mastery of one or several foreign languages and cultural openness."

The following **curriculum** is presented:

Semester	Teaching Unit	Modules	Nature	Type	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					Course	TD	TP	Total	ECTS	UE	ECTS	UE	Continuous Assessment	Blended Assessment
S 1	T.U.1: Fundamental sciences for engineers I	advanced math I	Fundamental	Presential	15	7.5	0	22,5	2	8	2	8		x
		Numerical analysis	Fundamental	Presential	15	15	15	45	3		3			x
		Algorithms and programming	Fundamental	Presential	15	15	15	45	3		3			x
	T.U.2: Electrotechnics	Electrical Grid I	Fundamental	Presential	15	15	15	45	3	10	3	10		x
		DC Machine	Fundamental	Presential	15	15	15	45	3		3			x
		Industrial electricity	Fundamental	Presential	15	0	30	45	3		3			x
		Tutored Project I	Fundamental	NOT Presential	0	0	22,5	22,5	1		1		x	
	T.U.3: Measurements and Systems I	Continuous Linear System	Fundamental	Presential	15	15	15	45	3	9	3	9		x
		Measurement and Instrumentation	Fundamental	Presential	15	0	15	30	2		2			x
		Analog Electronics	Fundamental	Presential	15	15	15	45	3		3			x
		Tutored Project II	Fundamental	NOT Presential	0	0	22,5	22,5	1		1		x	
	U.E.4 : Human Sciences and Corporate culture I	Introduction to economics and business management	Transversal	Presential	0	22,5	0	22,5	1	3	1	3	x	
		Communication Skills	Transversal	Presential	0	22.5	0	22.5	1		1		x	
		English1	Transversal	Presential	0	22,5	0	22,5	1		1		x	
					135	165	180	480	30	30	30	30		

Semester	Teaching Unit	Modules	Nature	Type	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					course	TD	TP	total	ECTS	UE	ECTS	UE	Continuous Assessment	Blended Assessment
S2	T.U.5 : Fundamental sciences for engineers II	advanced math II	Fundamental	Presential	15	15	0	30	2	8	2	8		x
		Probability and Statistics	Fundamental	Presential	15	15	0	30	2		2			
		Process Analysis	Fundamental	Presential	15	15	0	30	2		2			
		Objected oriented programming 1	Fundamental	Presential	15	0	15	30	2		2			x
	TU.6 Electrotechnics II	Electrical Grid II	Fundamental	Presential	15	15	15	45	3	7	3	7 .		x
		DC Output Converter	Fundamental	Presential	15	15	15	45	3		3			x
		Tutored Project III	Fundamental	Not Presential	0	0	22,5	22,5	1		1		x	
	T.U.7 : Measurements and Systems s II	Sequential control of systems based on API	Fundamental	Presential	15	15	15	45	3	13	3	13		x
		Sampled linear systems	Fundamental	Presential	15	15	15	45	3		3			x
		Digital electronics	Fundamental	Presential	15	15	15	45	3		3			x
		Introduction to embedded systems	Fundamental	Presential	15	15	15	45	3		3			x
		Tutored Project IV	Fundamental	Not Presential	0	0	22,5	22,5	1		1		x	
	TU.8 Human Sciences and Corporate culture I II	English2	Transversal	Presential	0	22,5	0	22,5	1	2	1	2		
		Entrepreneurial Culture	Transversal	Presential	0	22,5	0	22,5	1		1		x	
					150	180	150	480	30	30	30	30		

Semester	Teaching Unit	Modules	Nature	Ty pe	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					Cours	TD	TP	Total	ECTS	UE	ECTS	UE	Continuous Assessment	Blended Assessment
S3	T.U.9: Fundamental sciences for engineers III	Advanced Programming	Fundamental	Presential	15	0	15	30	2	5	2	4		x
		Operation and optimization	Fundamental	Presential	15	15	15	45	3		2			x
	T.U.10 : Electronics and microelectronics I	microprocessor based Systems	Fundamental	Presential	15	15	15	45	3	6	3	6		x
		data Acquisition and transmission	Fundamental	Presential	15	15	0	30	2		2			x
		tutored Project V	Fundamental	Not Presential l	0	0	22,5	22,5	1		1		x	
	T.U .11: Signals and Systems I	Optimal filtering	Fundamental	Presential	15	15	0	30	2	8	2	9		x
		Signal processing	Fundamental	Presential	15	0	15	30	2		3			x
		Analysis and Identification of processes	Fundamental	Presential	15	15	15	45	3		3			
		Tutored Projet VI	Fundamental	Not Presential	0	0	22,5	22,5	1		1		x	
	T.U.12 : Electrotechnics and power electronics	AC Machine	Fundamental	Presential	15	15	15	45	3	8	3	8		x
		Switching Electronics	Fundamental	Presential	15	15	15	45	3		3			x
		AC Output Converter	Fundamental	Presential	15	15	0	30	2		2			x
	T.U.13: Human sciences and engineering culture III	English3	Transversal	Presential	0	22,5	0	22,5	1	3	1	3	x	
		Problem Solving Method	Transversal	Presential	0	22,5	0	22,5	1		1		x	
		Quality management	Transversal	Presential	0	22,5	0	22,5	1		1		x	
					150	187,5	150	487.5	30	30	30	30		

Semester	Teaching Unit	Modules	Nature	Type	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					Course	TD	TP	Total	ECTS	UE	ECTS	UE	Continuous Assessment	Blended Assessment
S4	T.U.14: : Fundamental sciences for engineers III	Database management system	Fundamental	Presential	15	0	15	30	2	4	2	4		x
		programmable logic system	Fundamental	Presential	15	0	15	30	2		2			x
	T.U.15 : Electronics and microelectronics II	Embedded operating system	Fundamental	Presential	15	0	15	30	2	9	2	9		x
		microcontroller systems	Fundamental	Presential	15	15	15	45	3		3			x
		Local networks and communication for embedded systems	Fundamental	Presential	15	15	15	45	3		3			x
		Tutored Project VII	Fundamental	Presential	0	0	22,5	22,5	1		1		x	
	T.U .16: Signals and Systems II	optimal control	Fundamental	Presential	15	15	15	45	3	8	3	8		x
		nonlinear systems	Fundamental	Presential	15	15	0	30	2		2			
		Digital and analog controller synthesis	Fundamental	Presential	15	0	15	30	2		2			
		Tutored Project VIII	Fundamental	Not Presential	0	0	22,5	22,5	1		1		x	
	T.U.17: Intelligent technologies	Artificial intelligence	Fundamental	Presential	15	0	15	30	2	6	2	6		x
		Image processing and machine vision	Fundamental	Presential	15	0	15	30	2		2			x
		Digital simulation techniques	Fundamental	Presential	15	0	15	30	2		2			x
	T.U.18: Human sciences and engineering culture IV	English4	Transversal	Presential	0	22,5	0	22,5	1	3	1	3	x	
		Study tours	Transversal	Presential	0	22,5	0	22,5	1		1		x	
		Leadership and communication	Transversal	Presential	0	22.5	0	22.5	1		1		x	
					165	127,5	195	487,5	30	30	30	30		

Semester	Teaching Unit	Modules	Nature	Type	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					Course	TD	TP	Total	ECTS	UE	ECTS	UE	Continuous Assessment	Blended Assessment
S5	T.U.19 : Controls and Systems	Adaptive Control	Fundamental	Presential	15	15	15	45	3	8	3	8		x
		Embedded Systems Diagnostics and monitoring	Fundamental	Presential	15	0	15	30	2		2			
		Control chain implementation techniques (Robust Control, Predictive….)	Fundamental	Presential	15	0	15	30	2		2			
		Tutored Control IX	Fundamental	Not Presential	0	0	22.5	22.5	1		1		x	
	T.U.20 : Industrial systems	Real time systems	Fundamental	Presential	15	0	15	30	2	8	2	8		x
		Interfacing techniques	Fundamental	Presential	15	15	15	45	3		3			
		Internet of things	Fundamental	Presential	15	0	15	30	2		2			x
		Tutored Project X	Fundamental	Not Presential	0	0	22,5	22,5	1		1		x	
	T.U.21 : Human sciences and engineering culture V	Labor law	Transversal	Presential	0	22.5	0	22.5	1	3	1	3		x
		Preparation for English level B2 Certification (diploma requirement)	Transversal	Presential	0	22.5	0	22.5	1		1			x
		Company Start-ups	Transversal	Presential	0	22.5	0	22.5	1		1			x
	T.U.22 : Electrical systems	Smart Grid	Fundamental	Presential	15	15	15	45	3	7	3	7		
		Renewable energies	Fundamental	Presential	15	0	15	30	2		2			
		Machine Control	Fundamental	Presential	15	15	0	30	2		2			
	T.U. 23 : Optional	Two opening modules	Optional	Presential	10	10	10	30	2	4	4	4		x
		Robot Modeling and Control												
		Industry 4.0												
		Industrial computing applied to agriculture												
		Electrical vehicle architecture and composition												
					155	147.5	185	487.5	30	30	30	30		

Semester	Teaching Unit	Modules	Nature	Type	Hourly volume				Number of Credits		Allocated Coefficients		Evaluation method	
					Course	TD	TP	Total	MP	UE	MP	UE	Continuous Assessment	Blended Assessment
S6	T.U.24	End-of-Studies Project (ESP)	Fundamental	NOT Presential	0	0	450	450	30	1,5	30	1,5	X	