ASIIN Seal & EUR-ACE®

Accreditation Report

Master of Science
Computer Engineering
Electrical Engineering

Provided by
Polytech Monastir (POLYTECH)

Version: 24 September 2024

Table of Content

A About the Accreditation Process

Name of the degree program (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®	/	04
Génie Electrique	Electrical Engineering	ASIIN, EUR-ACE®	/	02
Date of the contract: 16.05.2022 **Submission of the final version of the self-assessment report:** 07.03.2023 **Date of the on-site visit:** 05-07 July 2023				
Expert panel: Prof. Dr. Sandro Leuchter, Mannheim University of Applied Sciences Prof. Dr Elmar Griese, University of Siegen Dr. Ali Chibani, Université Libre de Tunis Uwe Sesztak, Independent Consultant Islem Agrebi, Student at EPI Sousse				
Representative of the ASIIN headquarter: Daniel Seegers				
Responsible decision-making committee: Accreditation Commission				
Criteria used: European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015				

[1] ASIIN Seal for degree programs; EUR-ACE® Label: European Label for Engineering Programs; Euro-Inf®: Label European Label for Informatics

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

Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011 Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	

B Characteristics of the Degree Programs

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	M.Sc./Eng.	- Software engineering - Networks and embedded systems - Industrial computing - Big Data and Business Intelligence	7	Full time	/	6 semesters	180 ECTS	Annually; 2014
Electrical Engineering	M.Sc./Eng.	- Mechatronic systems - Biomedical instrumentation - Industrial control and automation	7	Full time	/	6 semesters	180 ECTS	Annually; 2014

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

C Expert Report for the ASIIN Seal[4]

1. The Degree Program: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree program (intended qualifications profile)

Evidence:

- Learning objectives per program
- Objective-module-matrix per program
- Module descriptions per program
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

The Polytech Monastir (POLYTECH) has described program objectives and program learning outcomes for both degree programs. The experts approve that for each program a presentation of learning outcomes is given in combination with learning outcome matrices matching the described learning outcomes with the respective modules of the programs. The experts acknowledge that updating the qualification objectives and learning outcomes is a crucial element of POLYTECH's quality management, which should guarantee that students are trained in conjunction with the demand of the employment market as well as adapt to technological changes. The learning objectives are therefore regularly evaluated by participants of POLYTECH's educational committees, the teaching staff, students, alumni and related institutional stakeholders. The latter include a number of partner companies that work closely with POLYTECH, e.g. by teaching courses, planning industrial visits or supervising end of studies projects. A detailed overview of the defined learning objectives can be found in the appendix of this document.

Although the HEI has formally defined and described learning objectives for both programs, the experts note that they are written in a rather unclear manner and do not reflect the level of academic qualification aimed at. According to the expert assessment, the learning outcomes of the Computer Engineering (CE) program are primarily aligned with bachelor's level qualifications. The program focuses on acquiring and understanding computer science concepts without contextualization, extending the understanding of concepts in a simple topic, and systematically presenting computer science concepts in a manageable context. However, these objectives do not

[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.

specifically target master's level competencies such as independent research and complex problem solving. Similarly, the experts perceive the learning outcomes of the Electrical Engineering (EE) program to be at the bachelor level, lacking highly specialized knowledge and critical awareness of interdisciplinary issues. The lack of research projects at the master's level at Polytech Monastir hinders students' exposure to the research field and practical applications.

Furthermore, the qualification objectives of both degree programs clearly show a professional focus and lack an adequate scientific aspect. This becomes even more apparent when looking closer at the individual modules, where the objectives and learning outcomes do not cover any research skills or methodological competencies. Thus, the qualification objectives indicate a very high level of applied relevance. The experts, however, emphasize the necessity of students being trained to do scientifically sound work, in particular if they aim at obtaining a degree at master's level. The experts are convinced that due to the lack of scientific and methodological knowledge, the graduates of the two programs will not be able to take up appropriate (senior) positions in companies, in particular in direct comparison with graduates of a master's degree of a standard corresponding to EQF level 7. Similarly, the experts do not see the possibility of graduates of the two programs pursuing a research career in the form of a PhD.

Given the very broad orientation of the degree programs, which miss specification in the sense of deepening or broadening knowledge, as well as the lack of scientific nature of the degree programs, the experts conclude that the qualification objectives overall do not fully correspond to EQF level 7. Addressing these limitations could improve the programs and bring them more into line with Master's level qualifications. Consequently, the experts conclude that the learning outcomes presented do not meet the EUR-ACE criteria.

In conclusion, the experts are of the opinion that although POLYTECH has defined qualification objectives for both programs, they need to be rewritten as they are currently not in line with EQF level 7 and lack certain aspects, in particular the scientific nature of the educational programs and the precise employment opportunities of the graduates, but also the precise and program-specific orientation. In addition, the experts stress the need for a comprehensive revision of the curriculum to align it with the revised learning outcomes. This revision should take place at the module level and integrate content corresponding to the Master's level. In particular, the experts stress the importance of addressing infrastructure issues. Improving access to scientific literature and ensuring that the necessary equipment is available to enable students to carry out research at Master's level are crucial steps. These aspects will be discussed further in the following chapters, which outline the measures needed to improve the educational programs and bring them into line with the desired standards at the Master's level.

Criterion 1.2 Name of the degree program

Evidence:

- Ministerial agreements
- Self-assessment report

- Module descriptions per program
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:
The expert panel considers the name of the EE study program to be adequately reflecting the respective aims, learning outcomes, and curricula as well as the course language (in their original French title).

However, experts have raised significant concerns about the name of the CE program, finding it misleading because not all specializations can be appropriately labeled with an engineering degree. In particular, the Software Engineering and Big Data and Business Intelligence specializations appear to be more appropriate for a Master of Science rather than a Master of Engineering. In discussions with the program coordinators, they attributed this discrepancy to the translation of the program name. Nevertheless, the experts urge POLYTECH to rectify this issue by adopting the title "Informatics M.Sc.", as it accurately encompasses all the specializations available in the program. It is important to align the name of the program with the actual qualifications it aims to provide in order to ensure transparency and accuracy for prospective students and the academic community alike.

Criterion 1.3 Curriculum

Evidence:

- Study plan per program
- Module descriptions per program
- Objective-module-matrix per program
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:
The curricula of both programs are designed to comply with the program objectives and learning outcomes, and, according to the self-assessment report, are subject to continuous revision processes. As such, the curricula are reviewed regularly and commented on by students and lecturers as well as by external stakeholders such as alumni or partners from schools and the private sector. Any modification of the study plan must undergo validation by the department council and subsequent approval by the scientific council.

In the CE program, POLYTECH offers a common core year in the first two semesters designed to provide students with foundational skills in mathematics, programming, systems, and networking. The following two years are designed to be more in-depth, with common courses covering the essential technical aspects of development and architecture. In addition, students have the opportunity to choose a specialization from three available options: Software Engineering, Big Data and Business Intelligence, and Networks and Embedded Systems.

Similarly, the EE program begins with a core curriculum during the first two semesters that provides students with a solid foundation. In the third semester, students can choose one of three specializations: Industrial Control Automation, Mechatronics Systems Option, and Biomedical Instrumentation Option.

In the self-evaluation report, POLYTECH emphasizes the critical importance of practical training for engineering students, considering it a cornerstone of the strength of the degree. The current curriculum includes various forms of practical training, including laboratory work, end-of-year projects, mandatory internships, and final projects, with the aim of providing students with a comprehensive learning experience.

As already discussed in criterion 1.1, the experts are not convinced, however, that the study programs are at a level that is appropriate for a master's program (EQF Level 7). When reviewing the study plans as well as the module descriptions, they miss both a deepening and a broadening of the knowledge acquired during the students' previous studies. In the EE program, experts note that the Mathematics for Engineering course offered in semester 1 does not provide a solid foundation for the subsequent engineering curriculum, especially in years 2 and 3, which are equivalent to Master's level studies. The content topics required to achieve EQF7 levels include in-depth linear algebra, various types of series, generalized or improper integrals, convolution integrals, and generalized functions. It is recommended that the Mathematics for Engineering module be delivered in both Semester 1 and Semester 2, with comprehensive and substantive content. Another noteworthy consideration in the Electrical Engineering curriculum is the Power Electronics module. It is advisable to postpone this module to the third semester and at the same time to expand its content. Advanced material, including topics such as Pulse Width Modulation (PWM) control and vector control of converters, should be integrated for both single-phase and three-phase systems. In addition, the labs should be enhanced to include simulators and hardware experiments to ensure a comprehensive learning experience.

The experts find that – although the sequence of courses and the topics chosen do in general follow a clear learning path – many of the modules cover only basic competencies rather than broadening or deepening them, which does not do justice to a level EQF 7. Overall, the programs consist of a very large number of very small courses, which means that most of the topics are discussed only superficially, without conveying sufficient technical and scientific knowledge. Next to the structural issues, the experts also find that a large part of the courses of both programs cover topics that do not correspond with master's level requirements.

In addition, upon closer examination of the available equipment, the experts have raised serious concerns. They doubt that the existing equipment will enable students to carry out projects and practical work at Master's level, thus limiting their ability to deal effectively with complex engineering challenges (cf. criterion 4.3).

Apart from the overall question of the qualification level of the modules, the experts recommend adopting additional content and making key updates to the CE curriculum. This includes incorporating microservices, cloud-native programming, IoT communication protocols, and modern database technologies to meet current industry demands.

Another aspect that was identified as problematic within the EE curriculum was the timing of certain course content. The experts observed that essential prerequisites for certain courses are taught at the same time as the courses themselves, creating a significant challenge for students to acquire the necessary knowledge to understand the material effectively. For example, in the first semester, students learn "TU-1.4.1 Automatics of Continuous Systems" in addition to "TU-1.1.1 Mathematics for Engineers". This is a problem because some students may have difficulty understanding the continuous systems material without the proper mathematical background.In addition, in the third semester, "TU-3.1.2 Embedded Electronics 1" includes hands-on sessions on IoT (Internet of Things), even though students have not yet studied this topic and it will not be covered until the fifth semester in the TU5.3.1 module. This issue poses a serious obstacle to students' academic progress and comprehension, and warrants a timely and strategic adjustment of the curriculum to ensure a more coherent and conducive learning environment. As part of the comprehensive review of the program, POLYTECH is strongly urged to not only assess the scientific level of the content, but also carefully examine the meaningful sequence of courses within the curriculum. This review is critical to identifying and correcting any instances where essential prerequisites overlap with corresponding courses, thereby hindering students' ability to comprehend and effectively engage with the material. By addressing this issue, POLYTECH can ensure a more logical and coherent flow of courses, optimizing students' learning experiences and academic success.

In summary, while POLYTECH emphasizes hands-on training as a fundamental strength of its engineering programs, the experts concluded that the current state of facilities and curriculum may not fully support students' progression to the master's level. Addressing these issues is critical to aligning the practical focus of the institution with the required scientific rigor and academic excellence expected at the advanced level of education. Consequently, the experts strongly advocate a complete redesign of the curricula in both programs to meet the standards of a Master's program (EQF 7). This revision should be carried out in conjunction with the updating of the qualification objectives, as the identified shortcomings are also evident in the curricula. This redesign should not only address the need to deepen or broaden subject-specific knowledge, but also place a strong emphasis on the scientific aspects of education. Currently, students in both programs lack exposure to scientific work or the use of scientific methods, which is essential for a comprehensive and well-rounded education at the master's level.

Criterion 1.4 Admission requirements

Evidence:

- Official admission regulations
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

The admission requirements and conditions are defined for both study programs on POLYTECH'S website. In accordance with the provision of Law No. 2000-73, 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 programs at POLYTECH.

It is also possible to apply directly to the engineering programs. Any student, whether Tunisian or international, is eligible for the study programs 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 program if they have already achieved the necessary skills and knowledge in their previous degree.

After reviewing the documents, the experts notice that the admission requirements are by no means specific. For example, there do not seem to be any subject-specific prerequisites for admission to the degree programs. If students apply from outside and have not already taken the preparatory cycle at POLYTECH, it is not defined what prerequisites these students must bring with them, which means that in theory, a student with previous knowledge in a completely different field could apply for the program and not be rejected.

The differing admission backgrounds present a potential explanation for the need to include bachelor-level courses to standardize students' knowledge, possibly resulting in course repetition. The core issue stems from students coming from two distinct backgrounds: the preparatory cycle and bachelor's programs. As a consequence, many courses appear to be at the bachelor's level, leading to redundancies for students with prior bachelor's degrees and forcing those from the preparatory cycle to cover a substantial amount of content within a constrained timeframe. This situation warrants careful consideration to strike a balance and optimize the learning experience for all students, regardless of their admission background.

In summary, the experts urge POLYTECH to clearly define the admission requirements, thereby focusing particularly on the professional/technical aspects. It must be clear to the different stakeholders, and in particular the potential applicants, what the specific professional criteria are that must be fulfilled in order to be admitted to a specific master's degree program. The experts consider the thorough revision of the admission criteria to be a fundamental cornerstone in order to successfully redesign the curricula so that they eventually correspond to EQF level 7.

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

1.1 & 1.3

EE:

The Higher Education Institution has submitted a revised version of module handbooks along with updated objectives and learning outcomes for the Electrical Engineering (EE) programme. The response from POLYTECH addresses the experts' comments on the curriculum, outlining specific changes to the curriculum and providing adjusted module descriptions. The EE programme has undergone a comprehensive reorganization of modules, introducing new ones such as Antenna Design, Optoelectronics, FPGA, Control & Automation 2, among others. Notably, the module Robot Control, now placed in Semester 5, includes a new section on robot arm manipulator programming. The submission reflects positive progress. However, certain modules, labeled as "Advanced," still contain basic content (e.g., Advanced Digital Electronics, Advanced Manufacturing Technology). The HEI needs to demonstrate how the new content will be implemented in workshops and student projects, ensuring the availability of necessary hardware and software. Additionally, the upgraded Maths for Engineering module is now delivered in both Semester 1 and Semester 2. While some changes are deemed positive by the experts, the HEI must address discrepancies where modules labeled as "Advanced" lack advanced content. To fulfill the criterion, the HEI must showcase, through revised subject content and current master's theses, that the intended qualification goals at level 7 of the EQF are achieved. Confirmation of this can only be made for future cohorts as the upgraded program is implemented, particularly in the second and third years (Master equivalent studies).

CE:

POLYTECH has made significant efforts to refine its program in response to the criticisms raised by the team of experts. However, the changes made are considered to be selective rather than comprehensive. Similar to the EE program, there is a need to demonstrate how new content will be implemented, both in terms of equipment and content, including the quality of master's theses. While the adjustments are generally in a positive direction, it will take more time to manifest these changes and raise the overall scientific level of the program.

One potential improvement is to increase the size of the modules for a greater level of reflection and depth at the Master's level. Concerns arise about the alignment of learning outcomes, module size and content to ensure a sound Master's concept. The experts doubt whether students can achieve the learning outcomes with the proposed workload. Therefore, harmonization of learning outcomes, module size and content is necessary for a well-designed Masters programme.

In terms of new modules aligned with industry recommendations, microservices, cloud-native programming, and IoT communication protocols were added to the curriculum. However, modern database technologies have been omitted. These additions complement rather than replace outdated topics such as Java EE.

While the inclusion of research-oriented modules is commendable, the learning outcomes of "Scientific Writing (Semester 2)" may not align with scientific writing. Nevertheless, the content of the module is satisfactory. Moving Scientific Writing (Semester 1) and Scientific Research (Semester 3) to the latter part of the program could improve effectiveness.

The review suggests that other modules have not undergone substantial content changes, which raises doubts about the achievement of master level objectives with these incremental curriculum adjustments.

The learning outcomes still contain some inconsistencies. Obj 1 for example focuses on Hardward respectively the System layer but with “IoT Frameworks” it addresses a Software-aspect. Obj 2 adresses practical informatics and software development and Obj 3 just seems to be a collection of buzz words without coherence.

Inconsistencies remain in the learning outcomes. Objective 1, which focuses on hardware/system layers, addresses a software aspect with "IoT Frameworks". Objectives 2 and 3 lack coherence, with the latter appearing as a collection of buzzwords. While the EE program's learning outcomes are well differentiated, P1, P2, and P3 for the Computer Engineering program appear as general and redundant characteristics without concrete competencies. P4, P5 and P6, on the other hand, represent actual areas of competence. However, P4 emphasizes "semantic technologies", which may be a remnant of the previous objectives, since curriculum does not mention technologies such as ontology, RDF or OWL.

1.2

POLYTECH has altered the nomenclature of the Computer Engineering program to Computer Science Engineering. This adjustment is deemed non-substantial and, consequently, does not address the initial critique. A suggestion for further refinement is to consider renaming it to Informatics M.Sc. for greater clarity.

1.4

From the experts' point of view, the university has claimed changes in the admission criteria, citing updates to the internal regulation in section IV of the submitted document, which includes rules for admission to both the first and second year of the engineering cycle. Despite this assertion, the absence of documented admission tests and enrollment evaluation sheets in the submission raises concerns. While acknowledging the regulations outlined, the reviewers emphasize the need for the university to provide tangible evidence of their implementation, publication, and accessibility to students.

The experts consider criterion 1 to be **not fulfilled.**

2. The degree program: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Module descriptions per program
- Study plan per program
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

At POLYTECH, each student has to undertake a two-year long preparatory cycle before beginning studying his specialty, which in this case are computer science and electrical engineering. A student is admitted to the preparatory cycle according to the nature of his or her baccalaureate: the technical baccalaureate is oriented towards the Technology preparatory cycle, the baccalaureate in experimental sciences or mathematics is directed either to the preparatory cycle in physics and chemistry or to the preparatory cycle in mathematics and physics. Any student of the preparatory cycle, who has passed his second-year exam, has the right to choose the engineering cycle he prefers (cf. criterion 1.4).

After the preparatory cycle, each study program is spread over five face-to-face semesters during which the engineering students receive the necessary theoretical fundamental knowledge. In addition, the student reinforces and improves his knowledge through practical work, end-of-year-projects, excursions and compulsory internships (s. below). The sixth semester is mainly devoted to the development of the end of study project that is generally carried out at a company.

During the on-site visit, the programs offered at POLYTECH are meticulously structured, comprising distinct modules categorized into professional skills (135 ECTS), soft skills (35 ECTS), and electives (18 ECTS), some of which are tailored to specific specializations. The experts observed that these modules are notably compact, typically ranging from 2 to 3 ECTS-points, and are conveniently organized into Teaching Units (TU) within larger subject areas. In the proposed curriculum reorganization, the experts emphasize the importance of addressing this aspect in order to achieve greater coherence and cohesion in the modules. They suggest creating larger and thematically coherent modules to improve the overall structure of the curriculum.

Mobility

POLYTECH has established partnership agreements with foreign universities, but international student mobility through regular semester exchanges has not been implemented. However, the institution encourages students to do their final projects abroad. During the on-site visit, the experts noted that few students take advantage of this opportunity, which they find regrettable. The low number of students going abroad is attributed to insufficient information on opportunities and funding, limited partner universities and lack of support. The experts strongly recommend increasing the opportunities for students to study or work abroad without extending their studies, and emphasize the need for improved support for those planning to go abroad.

Criterion 2.2 Workload and credits

Evidence:

- Study plan per program
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:
All modules in the programs are assigned ECTS credits. Every semester comprises 30 credits while each credit is valued 30 working hours. The modules usually consist of two to three courses relating to one overarching topic and are thus compiled in a meaningful structure. Feedback concerning the workload is collected through the course evaluation survey at the end of the study year and adaptions are made if necessary. During the on-site visit, the students confirm that the workload is generally well reflected by the number of credits awarded and more or less equally divided through the study years and program. They also emphasize that they have enough time for repetition and self-study and also to work on the side in order to finance their studies. The experts consider the workload to be overall manageable and transparent.

However, the total workload of the study program at POLYTECH seems to be inaccurate. The self-evaluation report states that the total number of supervised hours is about 2047 hours, and the estimated self-study time of the students is about 70% of this, which makes a total of 3480 hours. However, if 25-30 hours are assigned to one credit, the total workload should be between 4500 and 5400 hours. These numbers do not match, and the workload for each module in the descriptions is also incorrect. The experts urge POLYTECH to verify the actual student workload and update the module descriptions with accurate information.

Despite the seemingly below-average workload of the programs within the ECTS framework, a thorough evaluation by the experts reveals a significant oversight: not all parts of the curricula are properly credited. In particular, both internships, which are an essential and compulsory part of the curriculum, are currently treated as extracurricular activities without academic credit. In light of this, the experts urge POLYTECH to recognize the value of these internships and ensure that they receive the credit they deserve.

Criterion 2.3 Teaching methodology

Evidence:

- Module descriptions per program
- Self-assessment report
- Discussions during the on-site visit

Discussions during the audit Preliminary assessment and analysis of the experts:
From the presented material as well as the discussions on-site, it becomes apparent that the pedagogical skills and adequate teaching methodology are highly valued at POLYTECH and in the

programs under review. The pedagogical skills and teaching methods are also part of the evaluations that POLYTECH carries out for each course.

As was already pointed out, the teaching methodology in the programs is strongly attached to practical approaches and the students' ability to find adequate jobs after the completion of the programs. Teaching is usually done in the form of lectures, seminars, tutorials and practical work. To support the practical orientation, both programs contain a large number of mini projects and end-of-year projects, next to the final project which is also aimed at the practical application of the competencies acquired during the studies.

The experts acknowledge that all members of the teaching staff are dedicated and committed to good teaching and are also open to use new/alternative forms of teaching where appropriate. The experts further appreciate that the programs are partly taught by representatives from the industry (who have the necessary qualification to teach in a university program) that only offer one or two courses with a specific professional background. Overall, the teaching methodology is considered up-to-date and adequate in order to convey the contents envisaged by the programs.

Criterion 2.4 Support and assistance

Evidence:

- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:
The aim of POLYTECH is to ensure the provision of a good educational service for all its students. The experts get a comprehensive impression of the offers related to support and assistance of the students. Being a private institution, student groups are small and limited in size and the well-being of the students is very much looked after. They have good opportunities to pursue their projects, and the teaching staff is always open to support if requested. During the discussion with the students, they confirm that they feel greatly supported and supervised. During their studies, students are always in direct contact with their lecturers who are responsible for listening to them and responding to their requests concerning the progress of their studies and the difficulties they encounter. The students also particularly praise the great support they receive when it comes to finding a placement for the internships.

In conclusion, the experts have no doubt that sufficient support and assistance is given to the students, thus ensuring their best possible success. The students report that they rely on direct contact with their teachers. In this regard, the small class sizes and many group works are advantageous, allowing students and staff to form stronger relationships. It appears that the relationship between teachers and students is respectful, helpful and esteeming, and that sufficient resources are available to provide students with individual assistance, advice and support. The students confirm that the POLYTECH teachers are available for them at any time and for any advice and support, even on a personal level.

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

2.1

POLYTECH demonstrates its commitment to enhancing students' opportunities for international mobility, while also outlining understandable limitations. Nevertheless, the assessors are generally satisfied with these descriptions.

2.2

POLYTECH has embarked on a comprehensive workload review, which has led to the definition of the necessary hours per ECTS credit, including the allocation of time for lectures, self-study, and activities like workshops and projects. Additionally, internships have undergone a thorough assessment. By estimating the workload required to attain learning objectives and incorporating feedback from students and industry partners, these internships are now credited to acknowledge both students' efforts and their valuable experience and qualifications. The experts are pleased with these advancements and commend POLYTECH for their swift implementation.

The experts consider criterion 2 to be **fulfilled.**

3. Exams: System, concept and organization

Criterion 3 Exams: System, concept and organization

Evidence:

- Exam regulations
- Examination charter
- Module descriptions per program
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

At POLYTECH, assessment is conducted according to the regulations defined in the examination regulations and the exam charter. The assessment system at POLYTECH has two purposes: a formative and a summative purpose. The formative assessments are used by the lecturer to continuously monitor the progress of achieving the course objectives and usually take place in the middle of the semester. A typical form of continuous monitoring is reporting on a specific topic, an oral presentation or a combination thereof. Laboratory work is assessed through reports and practical work exams. The summative assessments are used to display whether the course objectives have been met at the end of each semester. The panel as well as the students welcome the continuous learning assessment as it not only allows a close monitoring of the students' learning progress but also encourages students' motivation throughout the semester. By way of helping students to consciously assess their actual state of knowledge, the assessment procedure at the same time contributes to an adequate exam preparation.

The rule of progression at the institution is based on achieving an annual grade point average of 10/20 or higher. This average is calculated from the two semesters within each academic year. Examinations are held each semester and progression to the next level is annual. All semesters have the same training and assessment density, following the structure of the modules planned for each semester. In addition to the GPA requirement, there is an additional restriction for Teaching Units (TU). Students must obtain a minimum average of 8/20 for each TU, otherwise the TU will not be validated and students will have to reinforce their knowledge before retaking the corresponding exams.

The organization of the exams guarantees examinations that avoid delay to students' progressions. The relevant rules for examination and evaluation criteria are transparently put into a legal framework, as both students and lecturers confirm in the audit discussions. All final exams take place within a certain timeframe at the end of each semester. This timeframe (exam week) is communicated at the beginning of each academic year. Before each exam week, POLYTECH carries out a revision period of one week for students to prepare intensively for their final exams. A detailed schedule is published in due time that informs about the exact time and date when each exam takes place. The experts confirm that rules have been defined for disability compensation measures, illness and other mitigating circumstances.

The university conducts a "retake session" in addition to the regular end-of-semester exams. This session allows students who faced difficulties or couldn't participate in previous exams due to various reasons (e.g., illness, personal reasons) to retake the exams for all subjects covering each level of their course of study during the current academic year. The retake session offers an opportunity for students to catch up and improve their academic performance.

During the on-site visit, the experts were provided with a selection of exams and final projects to check. The experts note that, as a consequence of the fact that large parts of the curriculum do not correspond to EQF level 7, the requirements and standards of most of the exams presented do not reach master's level either. Although the experts generally get a better impression of the academic standard of the final theses presented, as most of them cover demanding topics, they still lack the necessary scientific and research-oriented approach and instead focus almost entirely on practical application.

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

POLYTECH has committed to addressing the examination standards alongside the programme content. Given the effective functioning of the current examination system and a notable absence of organizational issues, the experts view this particular criterion as a subsequent consideration following the curriculum change.

Consequently, the experts consider criterion 3 to be **fulfilled.**

4. Resources

Criterion 4.1 Staff

Evidence:

- Staff handbook
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

The assessment of the overall staff situation at POLYTECH presented challenges due to the absence of a structured staff handbook and incomplete documentation, making it difficult for the reviewers to gain a complete understanding of the faculty's qualifications and expertise. Moreover, POLYTECH acknowledged that the current documentation lacks information about certain lecturers who could potentially complement the existing staff pool in a valuable way, further limiting the reviewers' ability to make informed judgments solely based on the available documents.

According to the available data POLYTECH's faculty is composed of lecturers, assistant professors, and assistant or associate engineers. Assistants are required to have a Master's degree, while Assistant Professors and Associate Professors are required to have a Ph.D. degree. There are a total of 14 faculty members for both programs. The faculty-student ratio is well suited to the needs of the students and ensures that the faculty is easily accessible most of the time.

Lecturers, whether permanent or temporary, are recruited on the basis of their professional and educational experience, scientific knowledge, reputation and match with the profile of the module to be taught. Temporary teachers are contractually obligated to complete the modules they start, thus ensuring a smooth course for the students. Surprisingly, many contingent faculty tend to stay with POLYTECH for extended periods of time, ensuring consistent teaching of modules and curriculum. This commitment and dedication underlines the seriousness with which all lecturers approach their profession, bringing valuable expertise from their previous teaching or industry backgrounds.

However, one critical concern raised by the experts is that a significant portion of the faculty has only a Master's degree and lacks a significant research record. This limitation casts doubt on their ability to provide quality education at the master's level. The absence of full professors and the reliance on assistant or associate professors may indicate a lack of the necessary expertise and experience to effectively sustain master's education.

The reviewers suggest that the overall qualifications of the staff are insufficient to meet the standards required for successful master's programs. Addressing these deficiencies in faculty

qualifications and research experience must be a priority to ensure that the institution's education maintains its quality and credibility.

Criterion 4.2 Staff development

Evidence:

- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:
During the audit at POLYTECH, staff development processes and support for research engagement were assessed. The institution claimed to organize regular seminars and forums on educational innovation, and the transition to online teaching during the pandemic was managed effectively. However, the experts found that none of the staff had recently participated in didactic training. The lack of didactic training opportunities for faculty was evident, especially for those recruited from industry with limited teaching experience.

In addition to the lack of didactic training, the audit also revealed a worrying lack of support for the scientific development of the staff. The experts observed that there were no structured programs or initiatives to encourage and facilitate research activities. This lack of emphasis on scholarly development raises questions about the institution's commitment to fostering a culture of academic inquiry and scholarly contributions among its faculty members.

While substantive training from external vendors on specific software was available, the overall lack of both didactic and scientific development opportunities is a critical issue that needs to be addressed. The implementation of comprehensive programs to promote research engagement and to provide essential didactic training directly within the institution is essential to enhance the professional growth and overall effectiveness of the faculty at POLYTECH.

Criterion 4.3 Funds and equipment

Evidence:

- Self-assessment report
- Tour through the institution and laboratories during the on-site visit

Preliminary assessment and analysis of the experts:
As a private institution, POLYTECH depends fully on its own resources, as it does not receive financial support from the Tunisian government. POLYTECH is therefore funded mostly through tuition fees and projects with industry partners.

The experts learn that POLYTECH is constantly striving to improve its laboratory equipment, although the different stakeholders emphasize that the current equipment is sufficient in order to carry out the programs adequately. Any lack of material is compensated by agreements with other public or private institutions. The students consider the labs to be satisfactory and confirm

that they get access to some laboratories with the help of their teachers also beyond the regular classes.

During the on-site visit, the experts inspect the different facilities of the faculty, and in particular, the laboratories that are used in the two study programs. While the experts agree that the laboratories might in general be adequate for teaching purposes, they emphasize that the available equipment is not sufficient for research activities, as they do not have any labs with product development, specialized software, hands-on hardware equipment beyond PCs, nor research capabilities, which guarantee the implementation of the study programs at master's level. Students reaching a master's level in higher education should be able to design, develop, and eventually build and test systems in the field of electronics or informatics. The experts, however, conclude that the labs are not adequately equipped for that purpose. Similarly, the experts also emphasize that the library in its current state and with its equipment available is not adequate in order for programs to be taught and implemented at master's level. The library is extremely small and the number of books is not sufficient

Also, students do not have sufficient access to scientific journal articles and other academic and scientific online sources. During the audit, teachers mentioned that students are sometimes able to use their personal licenses to access databases such as IEEE Xplore. While the reviewers appreciate the teachers' efforts to provide such resources, they are skeptical that this approach guarantees universal access for all students.

The experts thus urge POLYTECH to provide adequate access to current scientific literature as well as labs with product development, specialized software, hands-on hardware equipment beyond PCs, and research capabilities in order to allow the implementation of the study programs at master's level.

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

4.1

Initially, concerns were raised about the perceived incompleteness of the staff handbook at POLYTECH, casting doubts on the adequacy of qualified personnel to support a master-level program. In response, the university has submitted a revised list of professors, outlining their respective qualifications. However, a crucial gap exists, as the provided list lacks details on faculty allocation to specific courses. While it is possible that this information is dispersed across the module handbook and CV files, its accessibility poses a challenge for the experts. Consequently, the current evaluation falls short of determining the extent to which each listed staff member is actively involved in teaching at POLYTECH, a critical factor in assessing the availability of adequately qualified teaching staff for the envisaged master's level programs.

4.2

POLYTECH states that it has created a research unit in partnership with the laboratory of Monastir's Faculty of Sciences which shall help to train their staff in scientific research as well as other training themes and workshops both aimed at the didactic and professional development of their lecturers. In Addition, POLYTECH states its commitment to support its lecturers in research and publishing matters to both improve POLYTECHS visibility as well as the development of its staff. The experts are satisfied by the variety of staff development opportunities that have been realized in such a short period of time and underline that they appreciate the further training schedule that will continue to train staff both in teaching and in research.

4.3

POLYTECH has submitted an engagement letter and a literature list, though some of the listed literature appears to be dated. However, there is a positive development with the acquisition of a subscription to Springer. The collaboration with Monastir's Faculty of Sciences is a commendable step in the right direction, yet crucial details remain unclear. The expert seeks clarification on the equipment available at Monastir's facilities and the extent of accessibility. Additionally, the partnership convention's one-year validity raises concerns, as it does not align with the accreditation duration of five years. POLYTECH must address this by either providing the necessary equipment itself or extending the partnership convention to five years. If Monastir's Faculty of Science equipment is available for the full duration, a visit to assess the facilities for teaching and research purposes would be essential.

The experts consider criterion 4 to be **not fulfilled.**

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module descriptions per program

Preliminary assessment and analysis of the experts:

POLYTECH presents module descriptions for all modules offered in both programs. The experts note that although most of the necessary categories are included, the module descriptions are in some cases rather unspecific, in particular the description of the qualification objectives and the content taught is often too short and thus does not give a sufficient overview of the expectations and outcomes of the module. In addition, the self-study time and thus the total workload for each module is not indicated correctly (cf. criterion 2.2) and not all module descriptions (final projects, internships, etc.) are included in the module handbook submitted. Furthermore, the types of examinations could be specified more precisely and the descriptions should indicate the person responsible for each module. Since the module descriptions need to be thoroughly revised, the experts also ask POLYTECH to add the date of the last revision to the module descriptions.

The experts ask POLYTECH to standardize the module descriptions and to describe all essential categories precisely, so that students as well as external stakeholders can get a detailed overview of the study programs, also on the website and in English. In addition, the module descriptions should indicate which modules correspond to an EQF level 7. In line with the requested redesign of the curriculum, the module descriptions will of course also have to be completely revised and rewritten.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample diploma for each program
- Sample transcript of record for each program
- Sample diploma supplements for each program

Preliminary assessment and analysis of the experts:
Upon graduation, students in both programs receive a diploma, a transcript, and a diploma supplement. However, the current Diploma Supplement lacks comprehensive and detailed information on educational objectives, intended learning outcomes, program structure, and academic level. In addition, it does not adequately address the student's individual performance throughout the program. It is essential that the Diploma Supplement be enhanced to include these essential elements. This comprehensive approach will promote transparency and allow stakeholders to gain a thorough understanding of the quality and relevance of the program, while enhancing the recognition and comparability of qualifications both nationally and internationally.

Criterion 5.3 Relevant rules

Evidence:

- University website
- Examination regulations
- Admission regulations

Preliminary assessment and analysis of the experts:
The experts confirm that most rights and duties of both the university and the students are defined and binding. In addition, many regulations stem directly from the ministry and are thus authorized accordingly. From the documents provided and the discussions during the on-site visit, the experts learned that POLYTECH follows a policy of transparent and open rules and regulations. All necessary rules and regulations are made available to students (e.g., on campus blackboards).The discussion with the students confirmed that they feel well informed about regulations and comfortable about the access to any information about their degree program.

While current information is available to students through the online learning management system or in printed form on campus, Peers are concerned about how relevant stakeholders, such as prospective students or employers, can access the necessary program information. To address

this, they request that POLYTECH provide clarity on how this information will be made available. The experts recommend that all relevant information, including curricula, module handbooks, intended learning outcomes, and regulations, should be uploaded to program websites to ensure easy access for all interested stakeholders.

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

5.1

The request to provide up-to-date module handbooks and to ensure that all required information was correctly included was successfully addressed. The institution has provided comprehensive and up-to-date module handbooks that accurately include all required details.

5.2

The experts' request for more detailed information in the Diploma Supplement has been successfully met. The submitted supplement now comprehensively covers educational objectives, intended learning outcomes, program structure, academic level, and individual student performance.

5.3

POLYTECH has reported that it has successfully uploaded course syllabi, course handbooks, intended learning outcomes, and regulations to its website. All the pertinent information about the study programme is now readily available on POLYTECH's website.

The experts consider criterion 5 to be **fulfilled.**

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- POLYTECH quality approach
- Sample evaluation questionnaires
- Self-assessment report
- Discussions during the on-site visit

Preliminary assessment and analysis of the experts:

POLYTECH has implemented a quality management system (QMS) aligned with ISO 9001:2015 standards to continuously improve the quality of its engineering education programs and services. The QMS contains documented processes for managing, supporting, and delivering education. Key processes focus specifically on curriculum content and ongoing improvements.

A quality committee leads quality improvement efforts by involving faculty, students, and industry partners in regular evaluations of achievement of program objectives, skills development, pedagogical methods, facilities, surveys, and other aspects. Evaluation findings are analysed to identify potential weaknesses such as redundancies or gaps in the curriculum, which are then addressed through proposals approved by the scientific council.

There is particular emphasis on the process for supporting students through their journey from admission to graduation. This includes a tutoring system to provide individualized support. Relationships with companies are actively managed to align programs with professional requirements and increase stakeholder satisfaction.

The overarching goals of the QMS are to develop an ingrained culture of quality, keep students at the centre of the educational experience with robust support structures, ensure alignment between program objectives, learning outcomes, and assessments, and approximate international quality standards.

While binding external evaluations are not yet broadly established in the Tunisian higher education system, POLYTECH relies on rigorous internal quality processes for continuous improvement. POLYTECH presents itself as open to improvement and eager to undergo this particular review, which is expected to provide valuable external feedback to complement the institution's existing quality efforts. The accreditation process is seen as an opportunity for constructive external evaluation that POLYTECH can use to further improve its engineering programs. Peers appreciate this openness to external quality assurance, which provides fresh perspectives that may be difficult to obtain through internal processes alone. External quality assurance is designed to validate what an institution is doing well and draw attention to potential blind spots, leading to quality improvements.

POLYTECH has established a quality management system that overall appears capable of identifying weaknesses in the institution's engineering programs and services through regular internal evaluations and surveys of stakeholders such as faculty, students, and industry partners. However, the expert group did not receive up-to-date samples of the student surveys used in quality assurance efforts. The provided samples contain slots for students' names as the first field, indicating the questionnaires may not be anonymous. Surveys gathering student feedback must be anonymous to encourage honest input without fear of consequences. Anonymous surveys lead to more constructive feedback that POLYTECH can use to make meaningful quality improvements.

Additionally, while the quality management system seems well-developed on paper, students report not being informed about the results of surveys and the specific actions taken based on their survey feedback. To close the quality loop, it is beneficial for POLYTECH to communicate survey results and corresponding measures to students and other stakeholders. This demonstrates that stakeholder perspectives are valued in quality efforts, builds trust, and enables participants to see the impact of their input. Formal mechanisms for reporting on the outcomes of quality assurance activities can help ensure continuous improvement based on survey findings.

In summary, POLYTECH has established strong foundations for quality management of its engineering programs. As the next step, the institution should implement anonymous student surveys and formalize processes to inform stakeholders of resulting actions so they are empowered to actively contribute to ongoing quality enhancement.

Final assessment of the experts after the comment of the Higher Education Institution regarding criterion 6:

POLYTECH has submitted an updated version of the student satisfaction evaluation questionnaire, now anonymized. As outlined in the Information Meeting summary, student representatives were briefed on the evaluation results and the associated action plan. This step is seen by experts as crucial for advancing the Quality Management System at POLYTECH and maintaining student engagement in the process.

The experts consider criterion 6 to be **fulfilled.**

D Additional Documents

Not applicable.

E Comment of the Higher Education Institution (21.10.2023)

The university has submitted the following statement:

1-The Degree Program: Concept, content & implementation

1.1-Objectives and learning outcomes of a degree program

1.1.1-General objectives

The curriculum design and habilitation committee of Polytech has considered the alignment with EQF Level 7, employment opportunities, and the scientific nature of the program, as well as the focus on independent research and the resolution of complex problems as recommended by the ASIIN experts' evaluators. The following tables presents the new updated version of the general objectives, specific objectives and the list of learning outcomes for each engineering degree program :

Degree Programs	General Objectives
Computer Science Engineering	The objective is to establish a robust foundation in computer science and engineering principles that are intricately linked with industry needs and specific professions. This program aims to equip students with the skills to design, develop, manage, and contribute to scientific research, facilitating effective solutions across a broad spectrum of technological arenas.
Electrical Engineering	The objective is to empower engineers with comprehensive technical expertise in Electrical Engineering, underpinned by research-driven insights, seamlessly integrated with industry- relevant leadership skills and adaptability to navigate emerging technologies, ensuring they become innovative engineers, leaders and researchers ready to address future market demand.

Table 1: General objectives for engineering program degrees

1.1.2-Specific objectives

Degree Program	N°	Specific Objectif	Specific Objectif Details
Computer Science Engineering	Obj1	Mastery in Analyzing, Designing, and Engineering Comprehensive Computer Systems.	Equip students with profound technical expertise and an innovative mindset essential for designing, integrating, and optimizing advanced computer systems across diverse platforms and applications. From the underpinnings of computer architecture to the intricacies of cloud-native development and IoT frameworks, graduates will boast the prowess to propel technological innovation and refine operations across varied sectors.
	Obj2	Proficiency in Software, Web Development, and Collaborative Solutions.	Deliver holistic training in the intricate domain of software, web, and mobile application development. Through deep immersion in hands-on workshops and projects, ranging from foundational web development to sophisticated object-oriented programming and avant-garde paradigms, graduates will be adeptly prepared to pioneer digital solutions aligned with shifting user preferences and industry imperatives.
	Obj3	Excellence in Network Management, Information Systems, and Ethical Conduct.	Cultivate a profound comprehension of network design, administration, and fortification, guaranteeing that graduates are primed to manage and safeguard critical information infrastructures. With tangible expertise in system stewardship, data conveyance, and cybersecurity, graduates will stand ready to uphold information veracity and steer the direction in network advancements and digital metamorphoses.
Electrical Engineering	Obj1	Comprehensive Technical Mastery with Research-Driven Insight	Aim to cultivate deep expertise in Electrical Engineering principles, both at foundational and advanced levels. By intertwining rigorous academic curriculum with cutting-edge research initiatives, the program ensures that students are not just recipients of knowledge but active participants in the discovery and creation of new engineering solutions. Regular collaborations with industry pioneers further guarantee that our research remains relevant, impactful, and aligned with the latest market needs.
	Obj2	Professional Development and Industry-Focused Leadership	Dedicated to producing well-rounded professionals who are not only technically adept but also exhibit strong leadership qualities essential for the modern industry landscape. Emphasizing critical soft skills like communication, ethics, and project management, the curriculum is enriched with real-world case studies, industry-driven projects, and internship opportunities. This synthesis of academic rigor and industry exposure prepares graduates to seamlessly transition into leadership roles within the Electrical Engineering sector.
	Obj3	Navigating Emerging Technologies through Industry Collaborations	Promote adaptability and foresight in the rapidly evolving world of Electrical Engineering technologies. With a curriculum that's continually refreshed based on industry insights, students gain hands-on experience in emergent fields like IoT, AI, and cloud solutions. Partnerships with leading industry players provide unique opportunities for students to work on live projects, attend workshops led by industry experts, and contribute to innovations that directly address market demands.

Table 2: Specific objectives for engineering degree programs

1.1.3-List of programming learning outcomes:

a)-Computer Science Engineering program

Degree Program	PLO	N°	Title	Specific Objectif Details
Computer Science Engineering	Professional Skills	P1	Systems Analysis & Design	Profound competence in deconstructing intricate software requirements, molding them into actionable design blueprints, and employing state-of-the-art design strategies. This ensures that systems are resilient, maintainable, and resonate with the evolving dynamics of the industry.
		P2	Technical Proficiency & Application	Demonstrated command over an extensive suite of technical tools, platforms, and programming languages. This mastery is complemented by the ability to proficiently harness such expertise, addressing multifaceted software challenges and sculpting optimal solutions.
		P3	Innovation and Emerging Technologies	A progressive and anticipatory stance toward the latest software innovations. This ensures solutions not only meet current industry standards but are also equipped to adapt to imminent technological shifts and newly emerging paradigms.
		P4	Web and Software Development	Acclaimed proficiency in crafting sophisticated web and software solutions. By integrating semantic technologies and cutting-edge development methodologies, it is ensured that cohesive, industry-aligned, and scalable applications are produced.
		P5	Network and Information Systems Management	A holistic comprehension of network architectures and information systems, coupled with their intricate interdependencies. This knowledge is fortified by skills in designing, managing, and optimizing these ecosystems within integrated environments.
		P6	Project Management and Leadership	Renowned expertise in piloting software projects from their conceptual phase to tangible completion. By championing industry-best practices and nurturing team synergy, we guarantee that deliverables surpass the rigorous quality and timeline standards that are emblematic of elite software engineering.
	Personal Skills	P7	Analytical and Critical Thinking	Ability to communicate and establish relationships in a computer engineering context, thereby strengthening professional relationships and collaborations within the field.
		P8	Communication and Collaboration	Ability to effectively communicate complex computer engineering concepts, thereby fostering and strengthening professional collaborations within the field.
		P9	Lifelong Learning and Adaptability	Ability to continually refine judgment skills and adapt project planning strategies in response to evolving technological landscapes.
		P10	Ethical Responsibility and Integrity	Ability to uphold stringent ethical standards while embracing and adapting to the dynamic shifts in science and technology.

Table 3 : List of learning outcomes for "Computer Science Engineering program"

b)-Electrical Engineering program

Degree Program	PLO	N°	Title	Specific Objectif Details
Electrical Engineering	**Professional Skills**	P1	Technical Proficiency and Application	Technical skill and application necessary for understanding, formulating, and solving complex Electrical Engineering problems.
		P2	Systems Design and Integration	Ability to design and integrate electrical systems
		P3	Project Management and Leadership	Knowledge of Project Management methodologies and leadership to effectively manage complex projects in various areas of Electrical Engineering.
		P4	Industrial Application and Maintenance	Ability to apply modern technologies for industrial applications and maintenance to maintain, manage and improve industrial electrical and electronic systems
		P5	Innovation in Emerging Technologies	Apply methodologies for innovation in emerging technologies to solve real-world problems, foster technological entrepreneurship and contribute to the progress of society through innovation.
		P6	Control and Automation	Ability to design, implement and manage complex control systems while adhering to ethical standards and contributing to the advancement of the field of Electrical Engineering.
	Personal Skills	P7	Communication and Collaboration	Ability to communicate effectively, collaborate with other professionals, and successfully manage Electrical Engineering projects in an interdisciplinary and global environment.
		P8	Analytical and Critical Thinking	Ability to think analytically and critically, solve complex problems, innovate and make informed decisions in the field of Electrical Engineering.
		P9	Lifelong Learning and Adaptability	Ability to maintain professional relevance by developing skills of self-learning, adaptability and innovation.
		P10	Ethical Responsibility and Professionalism	Ability to uphold stringent ethical standards while embracing and adapting to the dynamic shifts in science and technology.

Table 4 : List of learning outcomes for "Computer Science Engineering program"

Correspondance of the study plan with Program Learning Outcomes

The program's learning outcomes align with the program's courses based on the expected performance levels.

(See Matching Matrix of Study Plan for Computer Science Engineering and PLO in appendix 1)

(See Matching Matrix of Study Plan for Electrical Engineering and PLO in appendix 2).

The tables below display the alignment of EUR-ACE Program Learning Descriptors with specific engineering program courses:

Computer Science Engineering		
EUR-ACE Program Learning Descriptors	**PLO**	**Course units that contribute to the achievement of the TC04 Competencies**
Knowledge and comprehension	P1 P2 P4 P5 P7	C-1.1.1: Mathematics for engineers C-1.1.2: Probability and Statistics C-2.1.1: Discrete mathematics (Graph Theory and Operational Research) C-2.1.2: Numerical Analysis C-1.2.1: Algorithms and Data Structures 1 C-2.2.1: Algorithms and data Structures 2 C-2.2.2: Computational Complexity C-1.2.2: Automata Theory C-1.3.1: Computer Architecture C-1.3.2: Operating Systems & Workshop C-2.3.1: Language Theory and Compilation C-3.2.1: Advanced Object Oriented Programming C-3.2.2: Advanced Database and DBMS C-4.2.1: Software Architecture and Design Patterns C-5.2.1: Programming paradigms
Engineering analysis	P2 P3 P5 P7 P10	C-1.2.1: Algorithms and Data Structures 1 C-2.2.1: Algorithms and data Structures 2 C-2.2.2: Computational Complexity C-1.5.1: Data Transmission C-1.5.2: Computing Networks C-3.1.1: Artificial Intelligence C-4.2.2: Machine Learning and Deep learning C-2.1.2: Numerical Analysis C-3.4.2: Information Systems Security C-4.1.1: Virtualization and Cloud Computing C-5.1.1: Cloud-Native Development C-5.1.2: Big Data C-5.3.3: Tests and Quality

Technical design.	P1 P2 P3 P4 P5 P6	C-1.4.1: Python Programming Workshop C-1.4.2: Web Development 1 C-2.4.1: Web Development 2 C-2.4.2: Object Oriented Programming (OOP) C-3.3.1: Web Development 3 Symfony/Laravel C-3.3.2: Natif Mobile Development Android/IOS C-4.3.1: Hybride Mobile Development C-4.3.2: Web Development 4 (ClientSide-ReactJS/Angular) C-5.3.1: Web Development 5 C-5.3.2: Microservices Architecture C-4.1.2: Advanced IoT Systems & Integration SE-C-4.8.1: Collaborative development and E-Commerce SE-C-5.6.1: ERP / CRM
Research and documentation	P1 P2 P3 P4 P5 P8 P7 P6 P9 P10	C-1.6.2: Technical English 1 (Scientific English) C-2.6.2: Technical English 2 (Scientific Writing) C-3.5.3: Scientific Research C-2.7.1: Personal Project C-4.4.3: End of Year Project UE-6.1 Graduation Research Project (4-6 months)
Engineering practices	P1 P2 P3 P4 P5 P6 P7 P9 P10	C-1.3.2: Operating Systems & Workshop C-1.4.1: Python Programming Workshop C-2.3.2: Analysis and Design Methodology C-3.4.1: System and Network Administration C-3.4.2: Information Systems Security C-4.1.1: Virtualization and Cloud Computing C-5.3.3: Tests and Quality C-5.4.2: Quality Management Systems (QMS) SE-C-5.6.2: DevOps NES-C-4.8.1: Routing and Switching NES-C-5.6.1: Next Generation Network (NGN) UE-6.2 Operational Internship 1 (1-2 months) UE-6.3 Technical Internship 2 (1-2 months)
Making judgments	P2 P3 P4 P5 P6 P7 P8 P9 P10	C-1.6.1: Communication Skills C-2.6.1: Engineer's Ethics C-3.4.2: Information Systems Security C-3.5.1: Project Management C-4.2.2: Machine Learning and Deep learning C-5.4.1: Business creation and innovation C-5.4.2: Quality Management Systems (QMS) C-5.5.2: Elective Course 2(Advanced security: Cybersecurity) SE-C-4.8.2: Agile and hybrid methods
Teamwork.	P1 P2 P3 P4 P5 P8 P7 P6 P9 P10	C-2.7.1: Personal Project C-3.5.1: Project Management C-4.4.3: End of Year Project SE-C-4.8.1: Collaborative development and E-Commerce C-4.5.1: Elective Course 1 (Development platforms JAVA EE /ASP CORE) C-4.5.2: Elective Course 2 (Multimedia UI/UX Design) C-5.5.1: Elective Course 1(Preparation for Cloud Certification (AZ-900)) UE-6.1 Graduation Research Project (4-6 months)

Communication	P6 P8	C-1.6.1: Communication Skills C-1.6.2: Technical English 1 (Scientific English) C-2.6.2: Technical English 2 (Scientific Writing) C-3.5.2: English TOEIC 1 C-4.4.2: English TOEIC 2 C-2.7.1: Personal Project C-4.4.3: End of Year Project
Lifelong learning	P2 P3 P4 P6 P9 P10 P8	C-2.6.1: Engineer's Ethics C-4.4.1: Personal Development and Soft Skills C-3.5.2: English TOEIC 1 C-4.4.2: English TOEIC 2 C-5.4.1: Business creation and innovation C-5.5.1: Elective Course1 (Preparation for Cloud Certification (AZ-900)) C-5.5.2: Elective Course 2 (Advanced security: Cybersecurity)

Table 5: EUR-ACE Program Learning Descriptors correspondence with PLO course units of "Computer Science Engineering program"

Electrical Engineering Program		
EUR-ACE Program Learning Descriptors	**PLO**	**Course units that contribute to the achievement of the TC04 Competencies**
Knowledge and comprehension	P1 P2 P4 P5 P6 P8	Mathematics for engineers 1 Mathematics for engineers2 Probability and Statistics Numerical Analysis Microelectronics and Analog Components Electromagnetism and Antenna Theory Circuit Theory Electrotechnics Optoelectronics Power Electronics Advanced Power Electronics Po- wer Transmission Mechanisms Renewable Energy Systems Electrical Machines Ana- tomy/Physiology Biophysics Li- near Control Medical Imaging Techniques Mainte- nance of Biomedical Equipment Biomedical Qualitology Sterilization, Safety and Application
Engineering analysis	P1 P2 P4 P6 P8	Algorithmics and C Programming Advan- ced Object-Oriented Programming (Python) Numerical Analysis Signal Processing Image Processing Operational Research

		Industrial Diagnostics and Maintenance Biophysics Linear Control Control Of Electrical Machines Medical Imaging Techniques Advanced control system
Technical design.	P1 P2 P4 P5 P6	Advanced Digital Electronics Microprocessors and Microcontrollers Computer-Aided Design and Manufacturing Workshop (CAD/CAM) Programmable Logic Controllers (PLC's) FPGA Architecture and VHDL Synthesis Computer-Aided Design (CAD) for Electronics (altium designer) Modeling and Design of Embedded Systems Advanced Manufacturing Technology Advanced Mechanical Systems Modeling Industrial Vision Systems Advanced control system Mechatronic Systems Engineering Cloud and Big Data Web and Mobile Development
Research and documentation	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10	Supervised Personal Project Scientific Research Graduation Research Project End Of Year Project
Engineering practices	P1 P2 P4 P5 P6 P8 P10	Advanced Manufacturing Technology Sensors and Actuators IoT Protocols and Communication Linux Operating Systems Industrial Local Area Networks (ILAN) Embedded Electronics Industrial Supervision Automotive Diagnostics and IATF Automotive Technologies Robotic Control Advanced Automation Systems Control of Mechatronic Systems Mechatronic Systems Engineering RTOS System DSP workshop (STM32) Certification Preparation Test and Validation Design Office Industrial Diagnostics and Maintenance Electrical Machines Anatomy/Physiology Sterilization, Safety and Application Control Of Electrical Machines Maintenance of Biomedical Equipment
Making judgments	P1 P2 P3 P6 P9 P10	Analog and Digital Communication Advanced Mechanical Systems Modeling Control Systems Design Office Project Management Engineer's Ethics

Teamwork.	P1 P2 P3 P4 P5 P6 P7 P8 P9 P10	Communication Skills Personal Development and Soft Skills Business Creation and Innovation Quality Management systems Project Management Operational Internship Technical Internship
Communication	P7 P10	Technical English 1 (Scientific English) Technical English 2 (Scientific Writing) English TOEIC 1 English TOEIC 2 Engineer's Ethics
Lifelong learning	P1 P2 P3 P5 P8	Internet of things (IoT) High-Frequency Electronic Systems Cloud and Big Data Web and Mobile Development Lean Manufacturing Industry 4.0 Artificial Intelligence Business Creation and Innovation

Table 6: EUR-ACE Program Learning Descriptors correspondence with PLO course units of "Electrical Engineering program"

1.2 Name of the degree program

In response to feedback and recommendations from ASIIN experts during their evaluation of the “Computer Engineering program”, the Curriculum Design and Accreditation Committee at Polytech held discussions with the management committee to adapt the program's name. The goal was to enhance transparency for prospective students and the academic community. As a result, after deliberation, Polytech has decided to change the program's name to "Computer Science Eng." in alignment with official authorities' recommendations.

1.3 Curriculum

The Curriculum Design and Accreditation Committee at Polytech has thoughtfully incorporated feedback from auditors regarding program updates to ensure alignment with EQF level 7. The curriculum underwent several revisions based on recommendations from independent university and industry experts, as well as input from alumni and employers. The primary aim of this curriculum design process was to ensure the delivery of a comprehensive and well-rounded program, offering a blend of theoretical knowledge, practical experience, and field-specific training for all learners. Every member of our academic staff played a crucial role in both shaping the curriculum and its successful implementation. *(See handbook Computer Science Engineering in appendix 3)*

(See handbook Electrical Engineering in appendix 4)

Study plan

A-Electrical Engineering

The adjustment of the total credit load (1 ECTS credit = 28 hours), coherence and cohesion, and curriculum revisions within the courses, which has allowed for :

- Adding ASIIN Expert-Recommended Courses.

1	Mathematics for engineers 1 (Semester 1)
2	Mathematics for engineers 2 (Semester 2)
3	Power Electronics 1 (Semester 1)
4	Power Electronics 2 (Semester 3)
5	IoT Protocols and Communication (Semester 3)
6	Others, recommended by The Curriculum Design and Accreditation Committee *(See handbook Computer Science Engineering in appendix 3)*

- **Reorganization & Classification of Courses as Electives**

Elective courses are strategically woven into the curriculum during semesters 4 and 5, allowing students to tailor their education to their specific interests and career goals.

For Computer Science Engineering students, these elective courses in semesters 4 and 5 offer an opportunity to enhance their specialization, granting them the freedom to shape their academic journey. The following table highlights the structure and organization of these elective units and courses:

Elective Unit 1	Elective Courses
C-4.5.1 - Elective Course 1: Development platforms	**JAVA EE**
	ASP CORE
C-4.5.1 - Elective Course 2: MultiMedia	**UI/UX Design**
	Images processing
Elective Unit 2	**Elective Course**
C-5.5.1- Elective Course 1 : Certification	**Preparation for Cloud Certification (AZ-900)**
	Preparation for AI Certification (HCIA-AI)
C-5.5.2- Elective Course 2: Advanced security	**Cybersecurity**
	Blockchain

Table 7 : Elective units and courses for Computer Science Engineering.

B-Computer Science Engineering

The adjustment of the total credit load (1 ECTS credit = 28 hours), coherence and cohesion, and curriculum revisions within the courses, which has allowed for :

- Insertion new courses

1	Microservices Architecture (Semester 5)
2	IoT Protocols and Communication (Semester 3)
3	Cloud-Native Development (Semester 5) and Virtualization et Cloud Computing Foundations (Semester 4)
4	Others, recommended by The Curriculum Design and Accreditation Committee *(See handbook Electrical Engineering in appendix 4)*

- **Reorganization & Classification of Courses as Electives**

Elective courses within the Electrical Engineering program are incorporated into the curriculum in semesters 4 and 5. These courses serve to enrich the students' specialization process and offer them greater autonomy in defining their academic direction. The following table outlines the structure and arrangement of these elective units and courses:

Elective Unit 1	Elective Courses
C-4.5.1 - Elective Course 1: Advanced Topic	**Cloud and Big Data**
	Web and Mobile Development
C-4.5.2 - Elective Course 2: Advanced technologies	**Lean Manufacturing**
	Industry 4.0
Elective Unit 2	**Elective Course**
C-5.5.1 - Elective Course 1: Intelligent Systems	**RTOS System**
	DSP workshop (STM32)
C-5.52 - Elective Course 2: Test and Certification	**Certification Preparation**
	Test and Validation

Table 8: Elective unites and courses for Electrical Engineering.

C-Scientific research integration to the study plans for both engineering programs

In response to the lack of the necessary scientific and research-oriented approach missing at the

level of the graduation project thesis, the scientific and pedagogical committee of Polytech added the number of two courses to integrate the scientific research approach in the curriculum as described in the following table:

Course title	Level	Semester	Learning outcomes
Scientific Writing	1st year	1st semester	1. Introduce themselves both formally and informally to others. 2. Understand different types of written texts and summarize them. 3. Understand graphics, visuals, tables, and diagrams and analyze them orally or transfer them into a written text. Speak fluently and confidently.
Scientific Research	2nd year	3rd semester	1. Understand the fundamental concepts and principles of scientific research methodologies. 2. Formulate research questions and hypotheses. 3. Design research experiments and investigations. 4. Gather and analyze data using appropriate tools and techniques. 5. Present research findings effectively. 6. Demonstrate ethical conduct in research.

Table 9: The description of learning outcomes for the courses concerning the integration of scientific research.

Aiming to back up the scientific oriented approach in addition to the introduced courses, another course entitled "Engineer's Ethics" is proposed in the updated curriculum to encourage students apply the ethic principals in terms of research also. Besides, other management and infrastructure actions and measures to support scientific oriented approach are developed in paragraph ***(4.3 Funds and equipment)*** of the present report.

1.4 Admission requirements

Admission and registration are overseen by Polytech's administrative school service. The general conditions for student admission at Polytech involve a competitive examination process that

assesses qualifications and performance on tests. The nature and structure of these tests, selection interviews, as well as the composition and operational guidelines of the jury, are determined by Polytech's Director in conjunction with the admission committee.

Concerning the admission to the 1st year of the engineering cycle, the students' candidates must fulfil the admission conditions described in the admission regulations document which are:

- 1st admission condition: Students who successfully completed the preparatory cycle for engineering studies.
- 2nd admission condition: Students holding a license (it is essential to have previously obtained a license in a specialty closely related to the desired engineering career. This evaluation is carried out by an internal commission of the establishment, which examines the candidates' files to verify the correspondence of specialties).

For the admission to the 2nd year of engineering, students with a successful 1st year master's degree in the specialty or an equivalent diploma can enroll in the 2nd year in engineering.

The admission procedure is done according to the Choice of specialization, Application file, Admission tests and evaluation's results, Declaration of results and Registration.

All admitted candidates must attend the upgrade courses organized by the Pedagogical Director at the beginning of the first semester.

As the ASIIN experts' evaluators urged POLYTECH to provide a clarification of the admission requirements definition with a particular focus on the professional/technical aspects, Polytech reviewed its Internal Regulations to integrate the admission requirements criteria. Also, to enhance the specification of criteria for admission, Polytech provided an Admission Minutes of Meeting which contains a selected number of criteria according to which candidates' admission will be evaluated.

This improvement helped clarifying the potential of candidates required by professional stakeholders to successfully redesign the curricula so that they eventually correspond to EQF level 7.

*(See Internal Regulations appendix 5)*The degree program: structures, methods, and implementation

2.1-Structure and Courses

Curriculum reorganization

The new updated version of the courses and courses descriptions are available and published

on the Polytech website ***(Direct Link)***.

Internship and mobility

The strategic plan followed by Polytech during the academic year 2022/2023 helped providing students with ample opportunities for internships during the first and the second year with the allocated credits. Polytech has chosen openness to its economic and industrial environment aiming to increase the chances for its students in this thematic by collaborating closely with industry partners, we have secured meaningful internship positions for students that align with their areas of study. In this context a set of collaborations with partners as well as agreements are signed between several industrials and Polytech. Moreover, in response to the specific needs of students in end-of-study project internships, the general management of Polytech has provided financial support for two Electrical Engineering students assigned to end-of-study project internships in a research laboratory in Paris, France.

The supervision of internships and final study projects are in collaboration with industrialists and their opinions are strongly taken into consideration.

Although the actions implemented to develop students' mobility, a few students went abroad during the academic year 2022-2023 due to the cumbersome procedures for obtaining visas for Tunisians with a refusal rate which is increasing more and more because of the socio- economic reality and the refugee crisis.

(See Certificates of financial support for mobility- Appendix 6)

(See List of mobility projects (2022-2023)-Appendix 7)

(See Graduation Project Defense Minutes of meeting – Appendix 8)

2.2-Workload and credits

In adherence to the principles of The European Credit Transfer and Accumulation System (ECTS)[1], our institution places a strong emphasis on ensuring that credit points and workload are revised and recalculated with meticulous precision. In fact, ECTS is widely recognized as a standard for measuring and comparing academic achievements in higher education across European countries, promoting student mobility and facilitating the recognition of qualifications.

Following the recommendations of ASIIN experts' evaluators during the accreditation audit, and drawing upon the feedback from students and teachers, the curriculum design and habilitation committee of Polytech have carried out updates of the courses in alignment with EQF level 7, objectives, and learning outcomes and as a part of Polytech's commitment to ECTS guidelines as it is described in the study Plan for Electrical Engineering and Computer Sciences Engineering.

By reviewing and adapting the credit point allocation for each course to reflect the level of learning outcomes, student workload, and the academic rigor involved, Polytech ensured that the credit points conferred represent the amount of students expected work, considering both presence hours and self-study hours. Additionally, the workload for each course is carefully assessed, considering the total time students are expected to spend on lectures, seminars, laboratory work, self-study, exams, and any other learning activities.

This comprehensive evaluation enabled Polytech to establish a balanced and equitable distribution of workload across different courses, ensuring that students have a manageable and fulfilling learning experience. Polytech's dedication to ECTS principles also extends to practical components such as internships, projects, and theses. The credit points for these elements are determined based on their expected learning outcomes and the time students are required to invest in their successful completion.

After having conducted a detailed analysis of the workload associated with internships and having adjusted the credit point allocation accordingly Polytech will ensure that its students receive proper recognition for their efforts during the internship period and allows them to gain valuable practical experience without feeling overwhelmed by additional academic burdens.

The allocation of credits for internships based on workload, feedback from students, and industrial partners' experience. The tables bellow describe et present the internships allocated credits according to ECTS:

STUDY PLAN Computer Science Engineering YEAR 3 (SEMESTER 6)					
	Area of Specialization	**Unit Code**	**Unit**	**Credits Hours**	**ECTS**
Sixth Semester	**Common**	U-6.1	Graduation Research Project (4-6 months)	600	22
		U-6.2	Operational Internship 1 (1-2 months)	120	4
		U-6.3	Technical Internship 2 (1-2 months)	120	4
	TOTAL			**840**	**30**

Table 10: Internship credits hours for Computer Science Engineering program

STUDY PLAN Electrical Engineering YEAR 3 (SEMESTER 6)					
	Area of Specialization	**Unit Code**	**Unit**	**Credits Hours**	**ECTS**
Sixth Semester	**Common**	U-6.1	Graduation Research Project (4-6 months)	600	22
		U-6.2	Operational Internship 1 (1-2 months)	120	4
		U-6.3	Technical Internship 2 (1-2 months)	120	4
	TOTAL			**840**	**30**

Table 11 : Internship credits hours for Electrical Engineering program

The average workload during the internship is 30 hours/week

1 Credit ECTS =28h

The Total Semester ECTS Credits = 30

3 Exams: System, concept, and organization

In respect to the ASIIN experts' evaluators findings and recommendations concerning the presented exams level that do not reach master's level, Polytech is planning that the exams for the actual and following academic years respect the requirements and standards followed. In fact, the updating of the study program as well as the adaptation of the syllabus sheets and the PLO that we have made based on the experts' evaluators remarks will impact this gap especially the syllabus sheet "Graduation Research Project" as described in section ***(1.The Degree Program: Concept, content & implementation)*** in order to comply with ECTS principles as well as the correspondence to the EQF level 7.

4 Resources

4.1 Staff

To meet the standards required for successful engineering programs and following the recommendations of ASIIN experts' evaluators as well, the teaching staff has been enriched by the planification of research trainings and integrating new qualifications through the recruitment of highly qualified professors in scientific research. The recruitment processes ensures that teaching staff have the specific areas of expertise, and the personal qualities, experience, and skills to meet the teaching requirements.

The fulltime teachers in Polytech were recruited because they met the requirements for assuring the adequate lessons in computer Science Engineering. Their number was carefully matched to the number of the students.

The creation of a research unit in partnership between Polytech and the laboratory of Monastir's Faculty of Sciences will provide Polytech's teaching staff with training for scientific research as well as other training themes and workshops on effective teaching and professional development. Added to that, Polytech supported engaged teachers in the scientific research to publish papers and scientific articles.

(See List of professors qualifications and CV - Appendix 9)

(See Partnership convention between Polytech of Monastir and FSM LR18ESls Laboratory- Appendix 10)

(See Scientific published papers with the affiliation of Polytech - Appendix 11)

4.2 Staff development

To enhance the professional growth and overall effectiveness of the faculty, Polytech identified a list of didactic training program to promote research engagement and to provide essential didactic training directly within the institution, and as part of its strategic plan, Polytech allocated a budget for all skills sharing and knowledge dissemination activities.

The professional development activities at Polytech involve attending specialized conferences and specialized workshops. Many experienced faculty members supervised research projects involving the newly recruited assistants to deepen their insight into practical and theoretical work and show them how the supervise and manage research projects. Moreover, Polytech initiated a continuous training program to guarantee the development of teachers' competencies based on training need surveying and assessing form. Trainings are animated by experts and highly qualified trainers in the field of trainings.

(See Minutes of meetings of training workshop and certificates samples - Appendix 12)

(See Training Program including didactic trainings (2023)- Appendix 13)

4.3 Funds and equipment

Enabling the students reaching an engineering level in higher education to design, develop, and eventually build and test systems in the field of electronics or informatics, Polytech is engaged to take in charge the acquisition of the required equipment within its financial capacities and underlings its commitment to provide adequate access to current scientific literature by equipping labs with product development, specialized software, hands-on hardware equipment beyond PCs, and research capabilities to allow the implementation of the study programs at master's level.

The current collection for the computer Science Engineering books is rather satisfactory for the moment. However, it can be always expanded. For this reason, Polytech has identified the need of library resources (paper-based library or a digital library) through survey among teachers, students, and industrial partners. Furthermore, Polytech provided a scientific review access subscription with SPRINGER to its students and teachers supporting the scientific research and bibliographic review activities.

Additionally, Polytech also provided institutional emails to Microsoft for an official means of communication between the institution and students, faculty, administrative staff, and

othermembers. This includes the dissemination of academic information, announcements, policies, important notices, etc. This will enable improved academic collaboration, access to online resources, course registration, and event participation, as well as enhanced security and privacy.

In general, Polytech members are requested to report in their annual reports their opinion about the available resources for library, labs and classrooms.

5 Transparency and documentation

5.1 Descriptions of courses

Following the recommendations of experts, the curriculum design and habilitation committee of Polytech have conducted a comprehensive revision of the curriculum, course descriptors, and the last updated versions are available on the WEB Site.
Also, Polytech standardized the course descriptions and defined all essential categories precisely by indicating as well, which courses correspond to the EQF level 7, so that students as well as external stakeholders can get a detailed overview of the study programs which is also available on the website in both languages: French and English.

5.2 Diploma and Diploma Supplement

According to the ASIIN experts' evaluators findings, the current Diploma Supplement lacks comprehensive and detailed information on educational objectives, intended learning outcomes, program structure, and academic level and does not adequately address the student's individual performance throughout the program.

Through a strategic implementation of a multitude of improvements, the curriculum design and habilitation committee of Polytech enhanced the diploma Supplement to include the updated essential elements such as: curriculum and course descriptors. This comprehensive approach will promote transparency and allow stakeholders to gain a thorough understanding of the quality and relevance of the program, while enhancing the recognition and comparability of qualifications both nationally and internationally.

Due to this continuous improvement, Polytech reoriented its approach to cater to the dynamic needs of the students and align with the ever-evolving international standards which comply with the adoption of the teaching didactic best practices enabling students to thrive academically and professionally.

(See Diploma supplement – Appendix 18)

5.3 Relevant rules

Based on its commitment to transparency and accessibility, Polytech relies on an official website for online promotion of its activities and to keep the large public informed about its achievements and its events. In addition, Polytech relies on social media to communicate with its students, teaching staff and other stakeholders. The Polytech's website is continuously updated with information on its vision, missions, and goals as well as its management system and other relevant information which.

Due to the recommendation of ASIIN experts' evaluators concerning providing clarity on how its relevant information will be made available for the concerned stakeholders including curricula, course handbooks, intended learning outcomes, and regulations, to ensure easy access for all interested stakeholders, Polytech updated its website to upload all the missed and reviewed documents such as curriculum, courses handbooks and admission criteria. Furthermore, it sensitizes potential future students about the employability of its diploma and about the other soft skills and hard skills that can be acquired through its programs.

6 Quality management: Quality assessment and development

Aiming to ensure its alignment to the quality of its engineering education programs and services, Polytech has implemented a quality management system (QMS) aligned with ISO 9001:2015 standard which contains documented processes for managing, supporting, and delivering education focusing specifically on curriculum content and ongoing improvements. Continuously committed to improve the quality of its management system, Polytech migrated to ISO 21001:2018 and has been successfully audited by an external certification body on the 28th and 29th of July 2023 and judged conform to the international standard for the Educational Organizations Management Systems. The following figure presents the Polytech's Management System cartography of process.

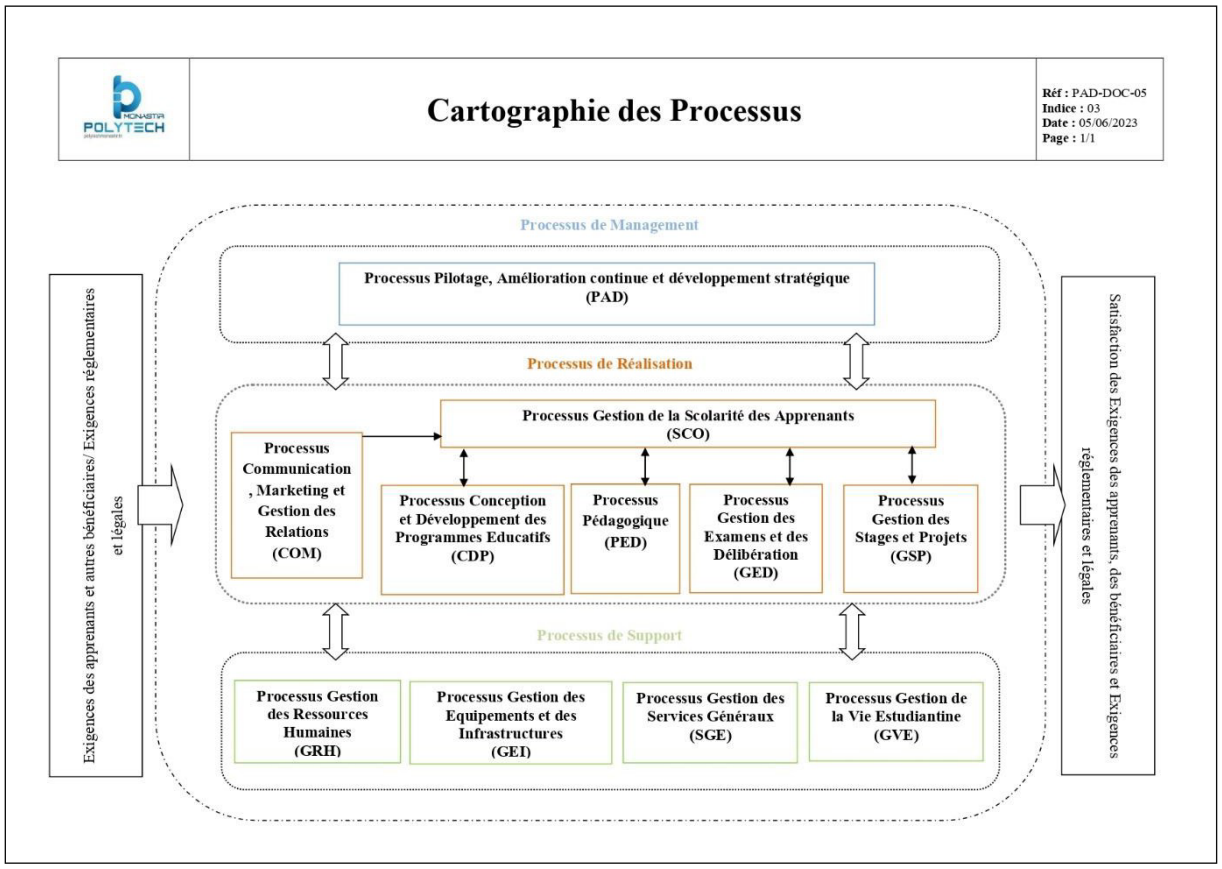

Figure 1 : Cartography of processes

At Polytech, the students contribute by giving their opinion in the surveys. Nevertheless, when the school finds it impossible to meet their needs, the Quality Committee offers explanations

and promises changes in due time. Even the students are involved into the quality management processes, this migration to a more specific educational organizationmanagement system standard helped the Quality Committee of Polytech to focus more on students' satisfaction and the sustainable upgrading of their curriculum opening more opportunities for them.

In the current academic year 2022/2023, the students survey has been updated by adding a section concerning exams regime and conduct. Furthermore, the students survey become anonymous taking into consideration the recommendations of ASIIN experts' evaluators followed by a meeting during which the results and actions are defined and communicated to the concerned stakeholders, so they are empowered to actively contribute to ongoing quality enhancement. Anonymous surveys resulted to enriched feedback which helped to make meaningful quality improvements.

(See List of participants to ISO21001 external audit - Appendix 19) (See Students surveys- Appendix 20)
(See Information Meeting for survey's results- Appendix 21)

F Summary: Peer recommendations (13.11.2023)

Taking into account the additional information and the comments given by POLYTECH, 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
Ma Computer Engineering	Suspension	/	EUR-ACE®	/
Ma Electrical Engineering	Suspension	/	EUR-ACE®	/

Prerequisites

V 1. (ASIIN 1.1, 1.3) Redesign the programmes, especially their scientific focus, so that it adhere to EQF Level 7. In this regard, it is necessary to ensure that the learning outcomes and the curriculum of the programme correspond with each other. Consequently, revised study plans and module descriptions must be provided.

V 2. (ASIIN 4.1) Provide more teaching staff with advanced academic qualifications (above Master degree) and research records.

V 3. (ASIIN 1.4) Define technical admission requirements that reflect the subject-specific focus of the different study programs.

V 4. (ASIIN 4.3) Provide adequate access to current scientific literature as well as labs on the more specialized topics of electrical engineering, hands-on hardware equipment beyond PCs, and research capabilities in order to allow the implementation of the study programs at master's level.

Possible Requirements for all programmes

A 1. (ASIIN 4.3) It is necessary to visit the facilities of the Faculty of Science in Monastir in order to verify whether the available equipment helps to facilitate the teaching and research capabilities of the programs at EQF level 7.

Possible Requirements for Computer Engineering

A 2. (ASIIN 1.2) Ensure that the name of the degree programme, its intended learning outcomes and its content correspond with each other.

Possible Recommendation for all programmes

E 1. (ASIIN 4.2) It is recommended to establish structures to enable staff to engage in research.

G Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering/Information Technology (24.11.2023)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the case and follows the vote of the experts without change.

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

The Technical Committee deems that the intended learning outcomes of the degree programme do not 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
Ma Electrical Engineering	Suspension	–	EUR-ACE®	–

Technical Committee 04 – Informatics/Computer Science (28.11.2023)

Assessment and analysis for the award of the ASIIN seal:

Mr. Sesztak reports on the procedure. The TC discusses the procedure and only proposes a minor editorial correction to prerequisite V1. Otherwise, the TC agrees with the experts' assessment without any changes.

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

The Technical Committee deems that the intended learning outcomes of the degree programme do not comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 04 – Informatics/Computer Science.

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
Ma Computer Engineering	Suspension	–	EUR-ACE®	–

H Decision of the Accreditation Commission (08.12.2023)

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

The Accreditation Commission discusses the procedure and follows the assessment of the experts and the Technical Committees. It considers that a suspension of the procedure is the only way to give the institution enough time to implement the changes that the experts and the Technical Committees consider necessary. The Commission has decided to introducean additional requirement to emphasize that the cooperation agreement with the University of Monastir needs to be extended for at least the duration of the desired accreditation. Some minor editorial changes have been made as well.

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 not comply with the engineering specific parts of Subject-Specific Criteria of the Technical Committee 02 – Electrical Engineering/Information Technology and Technical Committee 04 – Informatics/Computer Science.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Computer Engineering	Suspension	/	EUR-ACE®	/
Ma Electrical Engineering	Suspension	/	EUR-ACE®	/

Prerequisites

V 1. (ASIIN 1.1, 1.3) Redesign the programmes, especially their scientific focus, so that it adheres to EQF Level 7. In this regard, it is necessary to ensure that the learning outcomes and the curriculum of the programme correspond with each other. Consequently, revised study plans and module descriptions must be provided.

V 2. (ASIIN 4.1) Provide more teaching staff relevant to these two programmeswith advanced academic qualifications (above Master degree) and research records.

V 3. (ASIIN 1.4) Define technical admission requirements that reflect the subject-specific focus of the different study programs.

V 4. (ASIIN 4.3) Provide adequate access to current scientific literature as well laboratories for the more specialized topics of electrical engineering and computer engineering, hands-on hardware equipment beyond PCs, and research capabilities in order to allow the implementation of the study programs at master's level.

Possible Requirements for all programmes

A 1. (ASIIN 4.3) It is necessary to visit the facilities of the Faculty of Science in Monastir in order to verify whether the available equipment helps to facilitate the teaching and research capabilities of the programmes at EQF level 7.

A 2. The cooperation agreement with the University of Monastir regarding the joint use of the laboratories should be extended to at least the duration of the accreditation (5 years).

Possible Requirements for Computer Engineering

A 3. (ASIIN 1.2) Ensure that the name of the degree programme, its intended learning outcomes and its content correspond with each other.

Possible Recommendation for all programmes

E 1. (ASIIN 4.2) It is recommended to establish structures to enable staff to engage in research.

I Resumption of the procedure for the Master Programmes Computer Engineering, Electrical Engineering

Comment/opinion of the university (15.07.2024)

The HEI submitted a report on 16/07/2024 commenting on the experts' assessment and outlining the changes that the HEI has implemented so far. The report is supported by evidence. The following is taken from the POLYTECH's report:

"**The Degree Program: Concept, content & implementation**

1.1-Objectives and learning outcomes of a degree program

A-Informatics M.Sc.

In response to the evaluators' review of our Informatics M.Sc. program, we have carefully considered the feedback regarding curriculum content changes, learning outcome inconsistencies, and the overall coherence of our program objectives. Our goal is to ensure that our program aligns with the standards expected at the master's level. This response outlines the specific measures we have taken to address the concerns raised, providing clarity and alignment in our program objectives, and learning outcomes.

In facts, we have refined our program learning outcomes to ensure they are well-differentiated, concrete, and reflective of the competencies expected from our graduates.

A.1-Specific Objectives and Learning Outcome Inconsistencies:

Addressing Specific Objectives and Learning Outcome Inconsistencies, we went through the following actions:

a)- Inconsistency in Objective 1:

The objective has been refined to clearly focus on mastering advanced computer engineering techniques and is driven by research insights. Considering the example of mentioning software aspects like 'IoT Frameworks,' they have been realigned to appropriate objectives to maintain consistency.

b)-Objective 2 and Objective 3 Coherence:

We have refined Objective 2 and Objective 3 to make them more coherent. Objective 2 now clearly focuses on teamwork and leadership, while Objective 3 emphasizes personal and professional development.

c)-Learning Outcomes Differentiation:

We have ensured that each learning outcome (P1-P10) is clearly defined, avoiding redundancy and ensuring they represent concrete competencies. The outcomes now provide a clear path for students to achieve the desired skills and knowledge.

The following tables presents the new updated version of the general objectives, specific objectives, and the list of learning outcomes for Informatics M.Sc. degree program:

Degree Program	N°	Specific Objective	Specific Objective Details
Informatics M.Sc.	**Obj1**	Mastery in Computer Engineering Techniques coupled with research-driven insight	Equip students with profound technical expertise and an innovative mindset essential in mastering advanced computer engineering techniques. Highlight the development of practical skills for comprehending and applying technical concepts. Emphasis is driven by insights gained through research and innovation, preparing graduates to make meaningful contributions in the field of computer science.
	Obj2	Proficiency in Collaborative Teamwork and Leadership	Aim to empower students with deep expertise in collaborative teamwork and leadership. The focus is on practical skills development, ensuring students are well-prepared to excel in both team environments and leadership roles. Through hands-on experiences, participants gain skills into effective collaboration, fostering their capacity for professional success.

	Obj3	Enhancing Personal and Professional Career Development	Focused on enhancing personal and professional career development in the field of computer science engineering, the program emphasizes practical skills and industrial experiences. The curriculum focuses on both personal and professional growth, providing a well-rounded approach to navigating the field of computer science engineering. Participants improve their skills through workshops led by industry experts and actively contribute to innovations that directly meet market needs.

Table 1 : List of specific objectives for Informatics M.Sc. degree program.

By implementing these revisions, we consider that our program now better reflects the master level objectives, provides coherent and comprehensive learning outcomes, and addresses the concerns raised by the ASIIN evaluators.

A.2-Implementation of new content:

To address the evaluators' recommendation, we have adopted a multifaceted approach to demonstrate how new content is implemented in terms of equipment and academic content with an emphasis on the quality of Graduation Research projects (master's theses). In facts, we started by thoroughly reviewing our subjects' contents to ensure their alignment with the advanced standards of the European Qualifications Framework Level 7 (EQF7) underlining the research orientation emphasis. Thus, we have also invested significantly in upgrading our equipment and resources, recognizing the importance of adequate infrastructure which is more detailed in Section 2.2 ("Funds and Equipment") of this report. This step guarantees that students receive robust knowledge along with professional and personal skills which was proved through the end of year projects and Graduation Research Projects for the 2023-2024 academic year.

Evidence: (Samples of subjects for Graduation Research Projects Subjects-Informatics M.Sc. program).

Furthermore, we revised the subject content of Graduation Research projects fostering a culture of scientific inquiry and ensuring that the work produced meets adequate high-quality standards. This revision also concerned the end-of-year project, operational internship and technical internship.

Concerning whether the proposed workload allows students to meet the learning outcomes, we've implemented several measures to align the curriculum with the program objectives. Starting by refining course materials, we aligned subject notes and module structures with the

expected learning outcomes reducing redundant content. In addition, we restructured the curriculum to include more projects and self-study opportunities. This refinement process helps lower the workload burden on students and provides a hands-on learning experience giving students greater flexibility in managing their studies.

Besides, these comprehensive measures are designed to ensure that the implementation of new content not only improves the learning experience, but also maintains the quality and rigor of our master's programs. The updated curriculum reflects these changes and integrates them into the learning outcomes and assessment methods.

The “Scientific Writing” course in the 1st Semester and “Scientific Research” course in the 3rd Semester were moved to the latter part of the program to improve effectiveness as suggested by the ASIIN experts’ evaluators to align better with the program's research-oriented objectives.

In response to the suggestion to include modern database technologies, we have updated the content of Course “C-3.2.2 Advanced Database and DBMS” to ensure alignment with current industry standards. The new curriculum now covers the following parts:

- NoSQL Databases: Exploring the fundamentals and applications of NoSQL databases such as MongoDB and Cassandra.
- NewSQL Databases: Covering advanced databases like CockroachDB and Google Spanner, which blend NoSQL scalability with traditional SQL consistency.
- Graph Databases: Introducing graph databases such as Neo4j, focusing on handling complex relationships and interconnected data.
- Cloud Database Deployment: Providing hands-on experience with cloud-based database services, including Amazon RDS, Azure SQL Database, and Google Cloud SQL, emphasizing deployment, management, and scaling.

Regarding the “Java EE” course, it has been updated to the “Advanced Java Edition (EE/ME)”, ensuring its relevance with up-to-date techniques and alignment with current industry standards. It is also categorized alongside the “ASP CORE” course as “Elective Course 1: Development Platforms” in the Informatics M. Sc., Year 2 (Semester 4) curriculum.

The Table 2 presented below demonstrates the Program Learning Outcomes (PLO) in coherence with the specific objectives which emphasis on the correspondence of the new matching matrix (*see matching matrix Informatics M. Sc. link*). Accordingly, the PLO align with the study plan *(See handbook Informatics M.Sc. link)* based on the expected performance levels.

Degree Program	PLO	N°	Title	Specific Objective Details
Informatics M.Sc.	Professional Skills	P1	Systems Specification and Design Methodologies	Proficiency in employing systematic techniques to cover system specifications and applying design methodologies in the development of IT solutions.
		P2	Implementation Techniques	Proficiency in practical methods and approaches employed to carry out and implement IT solutions. It involves the hands-on application of knowledge to effectively bring theoretical concepts to fruition in real-world scenarios.
		P3	Innovation, Research and Emerging Technologies	Apply innovative technologies to solve real-world problems, foster technological entrepreneurship and contribute to the progress of industry through innovation. This objective also aims to improve scientific research skills.
		P4	Web and Software Development	Acclaimed proficiency in crafting sophisticated web and software solutions by incorporating innovative technologies and development methodologies. It aims to ensure the production of cohesive, industry-aligned, and scalable applications.
		P5	Network and Information Systems Management	A comprehension of network architectures and information systems, coupled with their intricate interdependencies. This knowledge is fortified by skills in designing, managing, and optimizing these ecosystems within integrated environments.
		P6	Project Management and Leadership	Proficiency in piloting software projects from the understanding phase to the delivery phase. By applying industry best practices and fostering team synergy, we ensure that deliverables meet quality standards and requirements of software engineering.
	Personal	P7	Analytical and Critical Thinking	Ability to think analytically and critically, solve complex problems, innovate and make informed decisions in the field of Computer Engineering.

		P8	Communication and Collaboration	Ability to effectively communicate complex computer engineering concepts, thereby fostering, and strengthening professional collaborations within the field.
		P9	Lifelong Learning and Adaptability	Maintaining professional relevance through the development of skills in self-learning, adaptability, and innovation
		P10	Ethical Responsibility and Integrity	Ability to uphold stringent ethical standards while embracing and adapting to the dynamic shifts in computer science and technology.

Table 2 : List of Program learning outcomes for Informatics M.Sc. degree program

B-Electrical Engineering:

In response to the remarks outlined by the ASIIN evaluation experts, we have made all necessary changes to the course descriptions taking significant steps to address the concerns raised regarding the alignment of our advanced modules with their designated labels and the incorporation of new content into our curriculum.

Firstly, we have meticulously revised the content of courses labelled "Advanced" to ensure that they truly embody advanced-level concepts and skills. For instance, in the case of the "Advanced Digital Electronics" course, we acknowledge the feedback regarding the presence of basic content. To rectify this, we have included some new concepts in the final chapter of the course material (and the self-study section), such as a concept introduction for "**ASIC**" and "**FPGA**". These topics are considered advanced technologies in digital electronics. However, we cannot cover these technologies in great depth in this course, as detailed study is already integrated into the "FPGA and VHDL" course.

Besides, in line with the recommendation to ensure the availability of necessary hardware and software for practical application we have enhanced our workshops and lab sessions by integrating the requisite hardware and software for all courses. This ensures that students have hands-on experience with equipment and technologies relevant to their coursework reinforcing theoretical concepts with practical application.

Additionally, some practical sessions are conducted in industry sites, such as Automotive Diagnostics and IATF, and Power Transmission Mechanisms. Therefore, the software and hardware are provided by the industry.

Evidence: (Proof of workshops and presence within the industrial companies for electrical engineering students).

Furthermore, we would like to highlight the significance of our partnership with industrial partners in shaping our curriculum. The involvement of industrial partners in proposing End-of-Year projects and Graduation Research Projects underscores our commitment to ensuring that our Electrical Engineering courses remain aligned with the evolving demands of the job market.

Evidence: (List of subjects for the Graduation Research projects -Electrical engineering program).

In conclusion, the evidence provided in the new study plan for Electrical Engineering demonstrates our concerted efforts to address the feedback provided in the ASIIN report evaluation. Through curriculum revisions, integration of advanced content, enhancement

of practical learning experiences, and collaboration with industry partners, we are confident that our program meets the rigorous standards expected at the master's level and adequately prepares our students for success in their future endeavours.

Evidence: (New study plan Electrical Engineering).

1.2 Name of the degree program

While understanding the need for clarity and alignment with industry standards, we respectfully consider the first adjustment, changing from “Computer Engineering” to “Computer Science Engineering”, as well as your suggestion for further refinement to “Informatics M.Sc.”

In consultation with relevant stakeholders, including faculty members, students, and industry partners, we accept the proposal for additional refinement by adopting the term “Informatics M.Sc.” We believe this nomenclature adequately represents the interdisciplinary nature of our program. However, we remain open to feedback and continuous improvement.

We are committed to ensuring clarity and transparency in the naming and description of our programs.

Evidence: (See Minutes of meeting – Approval for changing Informatics M.Sc. degree name).

J 1.3 Curriculum

The remarks provided by the ASIIN expert evaluators highlight a critical aspect of our institution's responsibility ensuring that our engineering programs degrees (Electrical engineering and Informatics M. Sc.), align with the qualification goals outlined in the EQF Level 7 standards. We fully recognize the importance of this criterion and have taken significant steps to meet and exceed these expectations.

Firstly, the minutes of the meetings conducted after the implementation of the new curriculum provided insight into the rigorous evaluation process, we undergo to ensure that our programs are up-to-date and in line with industry standards. These meetings serve as a platform for our higher institute members to discuss and refine course content, pedagogical approaches, and assessment strategies.

Evidence: (Minutes of meeting for summative and formative evaluation after implementing the new curriculum and changes).

Furthermore, the Graduation Research Projects subjects for the current academic year serves as tangible evidence of our commitment providing students with opportunities to apply their knowledge and skills in real-world. These projects are carefully designed to address complex and problematics relevant to the field, ensuring that students graduate with a deep understanding of the subject matter and the ability to critically analyse and solve practical problems, underlining the research orientation emphasis. Moreover, during this academic year (2023/2024) many students benefited from internships abroad through international mobility.

Evidence: (List of subjects for the Graduation Research projects -Electrical engineering program).

Evidence: (See samples of subjects for End of year projects and Graduation Research Projects Subjects-Informatics M.Sc. program).

In conclusion, while we acknowledge the evaluators' concerns regarding the confirmation of achievement for future cohorts, we are confident that the evidence provided demonstrates our institution's dedication to meeting and exceeding the qualification goals outlined in the EQF Level 7 standards.

1.4 Admission requirements

The evaluated institution vehemently defends its position in response to the remarks made by the ASIIN expert evaluators regarding changes in admission criteria for its engineering programs degrees (Electrical engineering and Informatics M. Sc.). Firstly, POLYTECH of Monastir acknowledges the concerns raised and appreciates the opportunity to clarify its procedures.

The institution indeed implemented changes to its admission criteria, as evidenced by the documented "Evaluation Grid" bellow. This documentation details the discussions and decisions made regarding admission tests and enrolment evaluation sheets. Furthermore, the institution emphasizes that while these documents were not physically included in the submission due to data protection laws, they were made accessible to students via email ensuring compliance with accessibility requirements to ensure transparency and fairness in the admission process. The institution is committed to continuously improving its processes to further enhance transparency and accessibility for all prospective students.

Evidence: (See documented evidence for admission tests and admission results communication for students).

2. Resources

2.1 Staff

The expert evaluators expressed concern about the availability of adequately qualified teaching staff for the proposed Electrical Engineering and Informatics M.Sc. program. They identified a critical gap in the provided staff list, which lacks details on the faculty allocation to specific courses. In response to the evaluators' findings, we have updated the professors' qualification table to include detailed information on their allocation to specific courses. This enhancement ensures that each faculty member's involvement in teaching at POLYTECH Monastir is clearly documented. By providing this level of detail, we aim to facilitate the evaluation process and demonstrate the availability of adequately qualified teaching staff for our programs.

Evidence: (See Professors Qualification Table).

2.2 Funds and equipment

A-Partnership convention with Faculty of Sciences of Monastir (FSM):

We appreciate the thorough evaluation conducted by the ASIIN experts and acknowledge the significance of their observations regarding the collaboration with Faculty of Sciences of Monastir (FSM). We have taken careful note of the concerns raised and provide a set of clarification and proposed actions. In the first place, POLYTECH of Monastir has intervened on **Equipment Availability and Accessibility**. To address this, we have compiled a comprehensive list of equipment available at FSM, as documented in the provided evidence.

Evidence: (See List of equipment available at Faculty of Science Monastir).

Additionally, we will ensure that the accessibility of these facilities is clearly communicated to all stakeholders involved in the collaboration. This will include defining protocols for POLYTECH of Monastir students to utilize the equipment effectively, ensuring optimal access and utilization.

Furthermore, POLYTECH of Monastir considered that The ASIIN report rightly highlights the discrepancy between the one-year validity of **the partnership convention** and the accreditation duration of five years. To rectify this misalignment, POLYTECH of Monastir proposed two potential courses of action by **the extension of the Partnership Convention duration** with FSM to align with the accreditation period of five years. Alternatively, if extending the partnership convention proves to be challenging, POLYTECH of Monastir commits to **the providing of the necessary equipment** itself to ensure that its students have access to the

resources required for their education and research endeavors, thus meeting the standards set forth by ASIIN.

Evidence: (See Partnership convention between POLYTECH of Monastir and FSM LRl8ESls Laboratory).

B-Equipment and infrastructure:

B.1-Informatics M.Sc. degree program:

Hard Equipment Enhancement: To enhance workshop capabilities, we have focused on acquiring new high-performance computing machines. This upgrade will greatly improve our students' ability to conduct complex simulations, analyze data, and process information, thereby enriching their practical learning experiences. Furthermore, we are in the process of purchasing a server (BC) to strengthen our computing infrastructure, providing robust support for research activities and collaborative projects.

Evidence: (See Invoice for computing station - server).

Soft Equipment and Resources Expansion: Recognizing the importance of industry-standard software proficiency in today's technological landscape, we have invested in a range of soft resources. This includes access to leading platforms such as Certyport, Huawei, IBM, Microsoft Academy, AWS (Amazon Web Services) and others. These resources offer our students hands-on experience with cutting-edge technologies.

Evidence: (See the list of certifications).

Library Enrichment: We understand the pivotal role of a well-equipped library in facilitating research, innovation, and academic excellence. Therefore, we've expanded our library resources to provide comprehensive support for scientific research and scholarship

B.2-Electrical engineering program:

In the realm of Electrical Engineering, we place significant emphasis on bridging theoretical knowledge with practical application. The incorporation of industry-relevant workshops, such as Automotive Diagnostics and IATF (International Automotive Task Force) standards, as well as Power Transmission mechanisms, serves as a cornerstone of our curriculum. These exercises provide students with invaluable hands-on experience in real-world scenarios, allowing them to apply theoretical concepts to practical challenges encountered in the field. Moreover, the provision of both software and hardware by industry partners un-

derscores the authentic nature of these exercises, exposing students to the latest technologies and industry standards and enhancing not only their technical skills but also develop problem-solving abilities, critical thinking, and collaborative teamwork.

Also, POLYTECH of Monastir enriched students of Electrical Engineering by a new equipment to reinforce practical exercises.

Evidence: (See List of equipment for electrical engineering).

B.3-Establishment of a new multidisciplinary research unit at POLYTECH of Monastir:

POLYTECH of Monastir has established a new multidisciplinary research unit under the LR18ES15 Algebra, Number Theory, and Intelligent Systems Laboratory aiming to support and encourage scientific research engagement fostering an environment where faculty can publish papers and scientific articles. Thus, recent scientific published papers with the affiliation of POLYTECH of Monastir are produced.

Evidence: (See Creation of Polytech research unit and Affiliation Researcher Profile).

Evidence: (See recent Scientific published papers with the affiliation of POLYTECH of Monastir).

In conclusion, these improvement initiatives demonstrate our commitment to providing students with the resources and support needed to excel in their practical and scientific activities. Through strategic investments, collaborative partnerships, and ongoing improvement initiatives, we aim to create a dynamic learning environment that enables individuals to thrive in the constantly evolving fields of engineering and technology.

Assessment of the experts (23.08.2024)

The experts assess the quality development of the Master's degree programmes on the basis of the above-mentioned written documentation. They note that the documentation is unfortunately not very precise and conclusive and does not fully address all aspects of the experts' criticism set out in the accreditation report. Furthermore, they note that POLYTECH did not take the entire period for submitting the documents for reaccreditation (15 months), but instead applied for resumption after just 6 months, which makes the experts doubt that the university took enough time to address all deficits.

The following gives an account of the experts' assessment of the programme's development.

Conditions for resumption of the procedure

V 1. (ASIIN 1.1, 1.3) Redesign the programmes, especially their scientific focus, so that it adheres to EQF Level 7. In this regard, it is necessary to ensure that the learning outcomes and the curriculum of the programme correspond with each other. Consequently, revised study plans and module descriptions must be provided.

The experts observe a certain degree of improvement as the curricula of both programmes have been gradually revised to address the experts' criticisms and some changes are considered to be in the right direction. However, at the core of both curricula there is still a lack of in-depth master level content in some subjects, especially in semesters 3-5. For example, some modules only use the label "advanced", but the content is on a basic level:

Examples from Electrical Engineering: "C-1.3.2 Advanced Digital Electronics": It is indicated that part 2, 3, 5 of the module is "advanced", but in fact this is basic content in digital electronics and can be found in bachelor programmes. C"-3.4.2 "Advanced Power Electronics": The introduction of different types of converters is a basic content in power electronics. The advanced level could be, for example, vector control, system modelling for controllers.

Examples from Computer Engineering (now Computer Science): The content of the module "C-3.2.2 Advanced Database and DBMS" has been rightly updated. However, it seems redundant to start the module with the basics of relational databases, which is a prerequisite for this module. The module description also needs to be revised as the learning outcomes and assessment methods do not match.

In addition, the experts note that the upgrading of curricula is not validated by the HEI through final examinations and master's theses. The experts therefore insist that the HEI

must demonstrate through sample exams and dissertations that the programmes now correspond to EQF level 7. In addition, the experts would like to see a more detailed explanation, accompanied by solid evidence, of how the curricula have been updated in such a way that students will achieve an EQF 7 (Master's) qualification in their discipline.

In conclusion, although the prerequisite has not yet been sufficiently fulfilled, the experts appreciate the progress that has been made so far. Therefore, they consider it possible to transform this condition into a requirement.

V 2. (ASIIN 4.1) Provide more teaching staff relevant to these two programmes with advanced academic qualifications (above Master degree) and research records.

The experts review the matrix of teaching staff presented, but cannot find any information on the recruitment of new permanent teaching staff (with doctoral degrees) at the university. There is still only one full-time faculty member with a PhD who also performs administrative duties; all other faculty members holding a position of assistant professor or higher have only part-time status. However, the experts agree that the role of permanent doctoral teaching staff is crucial for teaching advanced courses and supervising students. As POLYTECH has not provided any evidence of additional permanent teaching staff, they do not consider this requirement to be met.

V 3. (ASIIN 1.4) Define technical admission requirements that reflect the subject-specific focus of the different study programs.

The experts note that in addition to slightly more precise subject-specific admission requirements, which state that applicants must have a recognised degree in a subject related to the Master's programme in question in order to be admitted to the programmes, POLYTECH also provides samples of assessment grids from interviews. That is, after the review of their documents, applicants must also complete an interview conducted by POLYTECH's internal committee. According to the HEI, the members of the committee check whether the applicant's previous knowledge is sufficient for the degree programme applied for. The experts welcome the proof of the admission interviews. However, it is not clear from the assessment grids which exact technical skills are required for the degree programmes and are asked about in the interviews. In addition, the experts believe that there should also be an admissions test that transparently documents what knowledge and skills students are being tested on. The experts are therefore of the opinion that the requirement is only partially met.

V 4. (ASIIN 4.3) Provide adequate access to current scientific literature as well laboratories for the more specialized topics of electrical engineering and computer engineering,

hands-on hardware equipment beyond PCs, and research capabilities in order to allow the implementation of the study programs at master's level.

POLYTECH states that they have purchased some new high performance computers (invoice as proof). In addition, the university intends to purchase a server (BC) to strengthen its computing infrastructure and provide solid support for research activities and collaborative projects. In terms of software, the university says it has gained access to platforms such as Certyport, Huawei, IBM, Microsoft Academy, AWS (Amazon Web Services) and others. In addition, POLYTECH claims to have taken into account the experts' observation that the university had signed an agreement with the FSM for the laboratories for only one year and extended it to five years. Finally, POLYTECH states that they have expanded their library resources. The experts recognise the efforts and progress made by the higher education institution. However, they still cannot find evidence that POLYTECH has secured access to relevant digital libraries such as ACM DL, IEEE Explore and Springer Link, which is still a significant shortcoming. In addition, the reviewers require proof of the new equipment in the form of photos, videos or a tour and not just an invoice. For these reasons, the experts consider the condition to be partially fulfilled.

Requirements

A 1. (ASIIN 4.3) It is necessary to visit the facilities of the Faculty of Science in Monastir in order to verify whether the available equipment helps to facilitate the teaching and research capabilities of the programmes at EQF level 7.

As the experts have not yet visited the laboratories, they cannot assess this requirement.

A 2. The cooperation agreement with the University of Monastir regarding the joint use of the laboratories should be extended to at least the duration of the accreditation (5 years).

As already mentioned, the experts welcome the fact that PLOYTECH has signed a letter of intent that states a validity of 5 years. However, the document unfortunately does not specify the date of signature by both parties, nor does it contain detailed information on the scope of the collaboration. For this reason, the experts do not consider the requirement to be fully met.

For the Ma Computer Engineering

A 3. (ASIIN 1.2) Ensure that the name of the degree programme, its intended learning outcomes and its content correspond with each other.

POLYTECH has changed the name of the programme to 'Computer Science' (as suggested by the experts) and has also revised the curricula and the intended learning outcomes. The experts welcome the change in the programme title and find that the title, ILOs and content are now consistent with each other. Nevertheless, the experts identified some shortcomings in the programme's module descriptions. For example, the module 'C-4.6.1 Advanced Java Edition (EE/ME)' contains serious errors and needs to be revised. In particular, the literature recommended in this module is outdated or there are no longer any sources to which reference is made (e.g. projects).

Recommendations

E 1. *(ASIIN 4.2) It is recommended to establish structures to enable staff to engage in research.*

As the experts cannot find sufficient information on the implementation of this recommendation, they call for it to be retained.

Taking into account the additional information and the comments given by POLYTECH, the peers summarize their analysis and **final assessment** for the award of the ASIIN certificate as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
Ma Computer Engineering	Refusal	/	EUR-ACE®	Refusal
Ma Electrical Engineering	Refusal	/	EUR-ACE®	Refusal

Prerequisites

V 1. (ASIIN 1.1, 1.3) Redesign the programmes, especially their scientific focus, so that it adheres to EQF Level 7. In this regard, it is necessary to ensure that the learning outcomes and the curriculum of the programme correspond with each other. Consequently, revised study plans and module descriptions must be provided.

V 2. (ASIIN 4.1) Provide more teaching staff relevant to these two programmeswith advanced academic qualifications (above Master degree) and research records.

V 3. (ASIIN 1.4) Define technical admission requirements that reflect the subject-specific focus of the different study programs.

V 4. (ASIIN 4.3) Provide adequate access to current scientific literature as well laboratories for the more specialized topics of electrical engineering and computer engineering, hands-on hardware equipment beyond PCs, and research capabilities in order to allow the implementation of the study programs at master's level.

Requirements for all programmes

A 1. (ASIIN 4.3) It is necessary to visit the facilities of the Faculty of Science in Monastir in order to verify whether the available equipment helps to facilitate the teaching and research capabilities of the programmes at EQF level 7.

A 2. The cooperation agreement with the University of Monastir regarding the joint use of the laboratories should be extended to at least the duration of the accreditation (5 years).

Recommendation for all programmes

E 1. (ASIIN 4.2) It is recommended to establish structures to enable staff to engage in research.

Assessment of the Technical Committees (05.09.2024)

Technical Committee 02 – Electrical Engineering/Information Technology (28.08.2024)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the procedure and agrees with the experts that the programmes have not meet the prerequisites sufficiently and that there are still fundamental deficiencies in the two programmes. They therefore propose that the two programmes be rejected.

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

The Technical Committee deems that the intended learning outcomes and the curricula of the degree programmes do not 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
Ma Computer Engineering	Refusal	/	EUR-ACE®	Refusal
Ma Electrical Engineering	Refusal	/	EUR-ACE®	Refusal

Technical Committee 04 – Informatics/Computer Science (13.09.2024)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the procedure and follows the assessment of the experts. They also find that the remaining deficits in the NED programme Computer Engineering are still too severe in order to award an accreditation. They therefore recommend a refusal of the degree programme.

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
Ma Computer Engineering	Refusal	/	EUR-ACE®	Refusal

Decision of the Accreditation Commission (24.09.2024)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission discusses the procedure and follows the vote of the expert group and the Technical Committees. They also consider the remaining deficiencies to be too serious to grant accreditation and therefore decide to reject the two study programmes.

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

The Commission deems that the intended learning outcomes and the curricula of the two degree programmes do not 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
Ma Computer Engineering	Refusal	/	EUR-ACE®	Refusal
Ma Electrical Engineering	Refusal	/	EUR-ACE®	Refusal

Appendix: Program Learning Outcomes and Curricula

According to the self-assessment report the following learning outcomes shall be achieved by the National Diploma Computer Engineering:

Skills	Code	**Programme Learning Outcome**
Professional skills	**P1**	Demonstrate a strong knowledge of mathematics, basic computer science, and other closely related multidisciplinary sciences enabling them to understand, identify, formulate, and accurately solve complex engineering problems and its related requirements, in order to convert them into appropriate data structures and efficient algorithms.
	P2	Demonstrate a thorough knowledge of the fundamental concepts associated with databases, programming, networks and systems in order to identify and model any IT solution from different perspectives.
	P3	Select appropriate methods or approaches to analyze, design and evaluate IT solutions while considering static, dynamic, architectural and security aspects.
	P4	Apply modern computer engineering technologies to the development of approaches or systems that meet specific requirements and needs.
	P5	Recognize ethical and professional responsibilities in engineering situations and make informed judgments that consider the impact of engineering solutions in global, economic, environmental and societal contexts.
	P6SE	**SE.** Define, model, investigate and apply a set of modern engineering techniques and technologies to develop software solutions capable of meeting the new challenges imposed by the current and continuously evolving technological environment.
	P6 BDBI	**BDBI.** Define, model, investigate, and apply a set of modern engineering techniques and technologies to develop software solutions capable of meeting the significant challenges associated with collecting, processing, and analyzing massive amounts of current and historical data in a continuously evolving business context.

	P6 NES	**NES.** Define, model, investigate and apply a set of modern engineering techniques and technologies to implement and improve the performance and security of a computer network or system by ensuring the adaptation of hardware, embedded or not, and software to meet the new challenges imposed by the complex and continuously evolving technological context in terms of needs.
Personal Skills	**P7**	Communicate effectively to share ideas, solutions or problems with a good oral and written proficiency in French and English.
	P8	Demonstrate the ability to operate effectively in a team in which members ensure leadership by creating a collaborative environment.
	P9	Define precise objectives and plan appropriate tasks to achieve to manage complex projects.
	P10	Acquire and independently apply new knowledge if needed, using appropriate learning strategies to cope with technological change.

The following **curriculum** is presented:

FIRST SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
First Semester	UE-1.1	Applied Mathematics 1	UE-1.1.1	Mathematics For engineers	2h15		31h30	1h30	3	6
			UE-1.1.2	Probability and Statistics	2h15		31h30	1h30	3	
	UE-1.2	Fundamental Computing 1	UE-1.2.1	Algorithms and data structures	3h00	1h30	63h	1h30	4	7
			UE-1.2.2	Web programming	1h30	3h00	63h	1h30	3	
	UE-1.3	Architecture	UE-1.3.1	Computer architecture	1h30	1h30	42h	1h30	3	6
			UE-1.3.2	Introduction to Multimedia		3h00	42h	1h30	3	
	UE-1.4	Networks and Systems 1	UE-1.4.1	Operating systems	3h00	1h30	63h	1h30	4	7
			UE-1.4.2	Computer Networks	1h30	1h30	42h	1h30	3	
	UE-1.5	Transversal Unit 1	UE-1.5.1	Communication techniques I	1h30		21h	1h30	2	4
			UE-1.5.2	English TOEIC I	1h30		21h	1h30	2	
	Total						420 h	15h00	30	

SECOND SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Second Semester	UE-2.1	Applied Mathematics 2	UE-1.2.1	Graph Theory and Operations Research and queues	1h30	1h30	42h	1h30	3	5
			UE-1.2.2	Numerical analysis	3h00		42h	1h30	2	
	UE-2.2	Fundamental Computing 2	UE-2.2.1	Advanced Alghorithmics and Complexity	1h30	1h30	42h	1h30	3	9
			UE-2.2.2	Advanced Web Programming	1h30	1h30	42h	1h30	3	
			UE-3.2.3	Object Oriented Programming	1h30	1h30	42h	1h30	3	
	UE-2.3	Metodology and databases	UE-2.3.1	Analysis and Design Methodology	1h30	1h30	42h	1h30	3	6
			UE-2.3.2	Data bases	1h30	1h30	42h	1h30	3	
	UE-2.4	Networks and Systems 2	UE-2.4.1	Language theory and compilation	1h30	1h30	42h	1h30	3	6
			UE-2.4.2	Internet and Protocols	1h30	1h30	42h	1h30	3	
	UE-2.5	Transversal Unit 2	UE-2.5.1	Communication techniques I	1h30		21h	1h30	2	4
			UE-2.5.2	English TOEIC 2	1h30		21h	1h30	2	
	Total						420h	15h	30	

THIRD SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Third Semester	UE-3.1	Programming	UE-3.1.1	Artificial Intelligence	1h30	1h30	42h	1h30	3	6
			UE-3.1.2	Cryptography	1h30	1h30	42h	1h30	3	
	UE-3.2	Advanced Development I	UE-3.2.1	Advanced Object oriented programming	1h30	1h30	42h	1h30	3	8
			UE-3.2.2	Framework 1		3h00	42h	1h30	2	
			UE-3.2.3	Native Mobile Development	1h30	1h30	42h	1h30	3	
	UE-3.3	Fundamental Computing 3	UE-3.3.1	System and Network Administration	1h30	1h30	42h	1h30	3	6
			UE-3.3.2	Advanced databases and DBMS	1h30	1h30	42h	1h30	3	
	UE-3.4	Option 1 : Software Engineering	UE-3.4.1	Advanced software Engineering Workshops	1h30	1h30	42h	1h30	3	6
			UE-3.4.2	.Net Workshops	1h30	1h30	42h	1h30	3	
		Option 2 :Big Data and Business Intelligence	UE-3.4.3	Analysis and Reporting	1h30	1h30	42h	1h30	3	6
			UE-3.4.4	Business Intelligence	1h30	1h30	42h	1h30	3	
		Option 3 :Networks and Embedded Systems	UE-3.4.5	Local Area Networks	1h30	1h30	42h	1h30	3	6
			UE-3.4.6	Service Administration	1h30	1h30	42h	1h30	3	
	UE-3.5	Transversal Unit 3	UE-3.5.1	Project management	1h30		21h	1h30	2	4
			UE-3.5.2	English TOEIC 3	1h30		21h	1h30	2	
	Total						420 h	16h30	30	

0 **Appendix: Program Learning Outcomes and Curricula**

FOURTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Fourth Semestre	UE-4.1	Architecture	UE-4.1.1	Software Architecture	1h30	1h30	42h	1h30	3	5
			UE-4.1.2	Full Stack 1	1h30	1h30	42h	1H30	2	
	UE-4.2	Advanced Development 2	UE-4.2.1	JAVA EE	1h30	1h30	42h	1h30	3	9
			UE-4.2.2	hybride mobile development	1h30	1h30	42h	1h30	3	
			UE-4.2.3	EYP		3h00	42h	-	3	
	UE-4.3	Fundamental Computing 4	UE-4.3.1	Deep Learning-Machine learning	1h30	1h30	42h	1h30	3	6
			UE-4.2.2	Big Data	1h30	1h30	42h	1h30	3	
	UE-4.4	Option 1 : Software Engineering	UE-4.4.1	Développement Collaborative development and E-Commerce	1h30	1h30	42h	1h30	3	6
			UE-4.4.2	Agile and hybrid Methods	0	3h00	42h	1h30	3	
		Option 2 :Big Data and Business Intelligence	UE-4.4.3	data mining 1	1h30	1h30	42h	1h30	3	6
			UE-4.4.4	BI tools	1h30	1h30	42h	1h30	3	
		Option 3 :Networks and Embedded Systems	UE-4.4.5	Routing and switching	1h30	1h30	42h	1h30	3	6
			UE-4.4.6	Antenna and propagation	1h30	1h30	42h	1h30	3	
	UE-4-5	Transversal Unit 4	UE-4.5.1	personnal Developement and Soft Skills	1h30		21h	1h30	2	4
			UE-4.5.2	English TOEIC 4	1h30		21h	1h30	2	
	Total						420h	13h30	30	

FIFTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Fifth Semester	UE-5.1	Réseaux et Services	UE-5.1.1	Information Systems Security	1h30	1h30	42h	1h30	3	6
			UE-5.1.2	Virtualization and Cloud Computing	1h30	1h30	42h	1h30	3	
	UE-5.2	Intelligence Informatique	UE-5.2.1	Personalized Professional Project PPP		1h30	21h	-	1	7
			UE-5.2.2	Programming Paradigm	1h30	1h30	42h	1h30	3	
			UE-5.2.3	IoT	1h30	0h45	31h30	1h30	3	
	UE-5.3	Environnements	UE-5.3.1	Tests et validation	1h30	1h30	42h	1h30	3	8
			UE-5.3.2	Full stack 2	1h30	1h30	42h	-	2	
			UE-5.3.3	Entrepôts de données	1h30	1h30	42h	1h30	3	
	UE-5.4	Option 1 : Software Engineering	UE-5.4.1	ERP	1h30	1h30	42h	1h30	3	6
			UE-5.4.2	Décision Making Support System	1h30	1h30	42h	1h30	3	
		Option 2 :Big Data and Business Intelligence	UE-5.4.3	Data Mainig 2	1h30	1h30	42h	1h30	3	6
			UE-5.4.4	Big Data NoSQL	1h30	1h30	42h	1h30	3	
		Option 3 :Networks and Embedded Systems	UE-5.4.5	NGN	1h30	1h30	42h	1h30	3	6
			UE-5.4.6	Embeddeb Systems	1h30	1h30	42h	1h30	3	
	UE-5.5	Transversal Unit 5	UE-5.5.1	Business creation and innovation	1h30		21	1h30	2	3
			UE-5.5.2	professional Integration	0h45		10h30	-	1	
	Total						420h	13h30	30	

SIXTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Sixth Semester	UE-6.1	End of Study Projects							30	

According to the self-assessment report the following learning outcomes shall be achieved by the National Diploma Electrical Engineering:

Skills	Code	**Programme Learning Outcome** (Résultats d'apprentissage du Programme)
Professional skills	P1	Demonstrate a solid knowledge of mathematics, physical sciences, information technology and the fundamental concepts of electronics, electricity, automation and signal processing, enabling them to understand the complex electrical engineering phenomena.
	P2	Select appropriate methods to identify, formulate, conduct research, analyze electrical phenomena, solve problems and provide scientific conclusions in electrical engineering.
	P3	Select appropriate methods to identify, formulate, conduct research, analyze electrical phenomena, solve problems and provide scientific conclusions in electrical engineering.
	P4	Design and develop electrical products (software and hardware), classic and advanced approaches, processes to implement solutions that meet predefined performances while taking into account international standards and regulations in the fields of biomedical instrumentation, mechatronics systems and industrial automation.
	P5	Evaluate and make appropriate business decisions, while taking into account the ethical principles of social and environmental responsibilities.
	P6	**P6-ICA**: Apply acquired techniques and resources, appropriate engineering tools, and new technologies to the resolution of complex engineering problems and the development of new systems and

		processes for the command, control, and supervision of industrial systems. **P6-MS** : Apply acquired techniques and resources, appropriate engineering tools and new technologies for the resolution of complex engineering problems and the development of new processes for the diagnosis, maintenance and control of robotic, automotive and mechatronic systems. **P6-BIOMED** : Apply acquired techniques and resources, appropriate engineering tools and new technologies for the resolution of complex engineering problems and the development of new systems and processes in the field of biomedical, medical imaging and diagnostic and maintenance of equipment.
Personal Skills	P7	Be proficient in French and English and communicate effectively and comprehensively with a wide audience (specialists or neophytes).
	P8	Be able to integrate, lead and motivate a multidisciplinary and diverse team and be committed to achieving common goals using good teamwork skills.
	P9	Demonstrate an understanding of project management and develop leadership and entrepreneurial skills in a multidisciplinary environment.
	P10	Be able to learn and study independently and be aware of the need for continuous improvement or expansion of abilities and skills in the context of innovation and technological developments.

The following **curriculum** is presented:

FIRST SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
First Semester	UE-1.1	Mathematics and Computer Science Applied 1	UE-1.1.1	Mathematics for engineers	3h00		42h	1h30	2	5
			UE-1.1.2	Computer Development Tools 1	1h30	1h30	42h	1h30	3	
	UE-1.2	Engineering Sciences 1	UE-1.2.1	Renewable Energies	1h30	1h30	42h	1h30	3	6
			UE-1.2.2	Mechanical Systems Modeling	1h30	1h30	42h	1h30	3	
	UE-1.3	Electrics Electrotechnics Automatic (EEA 1)	UE-1.3.1	Electrical Circuits	1h30	1h30	42h	1h30	3	9
			UE-1.3.2	Electrical Schematics and Standardization	1h30	1h30	42h	1h30	3	
			UE-1.3.3	Electronic Engineering	1h30	1h30	42h	1h30	3	
	UE-1.4	Automatic 1	UE-1.4.1	Continuous System Automation	1h30	1h30	42h	1h30	3	6
			UE-1.4.2	Programmable Logic Controllers	1h30	1h30	42h	1h30	3	
	UE-1.5	Transversal 1	UE-1.5.1	French 1	1h30		21h	1h30	2	4
			UE-1.5.2	English TOEIC 1	1h30		21h	1h30	2	
	Total						420h	16h30	30	

SECOND SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Second Semester	UE-2.1	Mathematics and Computer Science Applied 2	UE-1.2.1	Numerical Analysis	3h00		42h00	1h30	2	5
			UE-1.2.2	Computer Development Tools 2	1h30	1h30	42h	1h30	3	
	UE-2.2	Engineering Sciences 2	UE-2.2.1	Manufacturing Technology	1h30	1h30	42h	1h30	3	6
			UE-2.2.2	Thermal Transfer	1h30	1h30	42h	1h30	3	
	UE-2.3	Electrics Electrotechnics Automatic (EEA 2)	UE-2.3.1	Analog Electronics	1h30	1h30	42h	1h30	3	9
			UE-2.3.2	Power Electronics	1h30	1h30	42h	1h30	3	
			UE-2.3.3	Supervised Personal Project		3h	42h	-	3	
	UE-2.4	Automatic and Signal Processing 2	UE-2.4.1	Analog Signal Processing	1h30	1h30	42h	1h30	3	6
			UE-2.4.2	Industrial Regulation	1h30	1h30	42h	1h30	3	
	UE-2.5	Transversal 2	UE-2.5.1	French 2	1h30		21h	1h30	2	4
			UE-2.5.2	English TOEIC 2	1h30		21h	1h30	2	
	Total						420 h	15 h	30	

0 **Appendix: Program Learning Outcomes and Curricula**

THIRD SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Third Semester	UE-3.1	Mathematics and Computer Science Applied 3	UE-3.1.1	Data Bases	1h30	1h30	42h	1h30	3	6
			UE-3.1.2	Embedded Electronics 1	1h30	1h30	42h	1h30	3	
	UE-3.2	Engineering Sciences 3	UE-3.2.1	CAO	1h30	1h30	42h	1h30	3	6
			UE-3.2.2	Industrial Sensors and Actuators	1h30	1h30	42h	1h30	3	
	UE-3.3	Engineering 1	UE-3.3.1	Digital Electronics	1h30	1h30	42h	1h30	3	8
			UE-3.3.2	Industrial Supervision	1h30	1h30	42h	1h30	3	
			UE-3.3.3	P.P.P		3h00	42h	-	2	
	UE-3.4	Option1: Industrial Control and Automation	UE-3.4.1	Diagnostic and Industrial Maintenance	1h30	1h30	42h	1h30	3	6
			UE-3.4.2	Electrical Machines	1h30	1h30	42h	1h30	3	
		Option2: Mechatronic Systems	UE-3.4.3	Automotive Technologies	1h30	1h30	42h	1h30	3	6
			UE-3.4.4	Design Office	1h30	1h30	42h	1h30	3	
		Option3: Biomedical Instrumentation	UE-3.4.5	Anatomy/Physiology	1h30	1h30	42h	1h30	3	6
			UE-3.4.6	Biophysics	1h30	1h30	42h	1h30	3	
	UE-3.5	Transversal 3	UE-3.5.1	Project Management	1h30		21h	1h30	2	4
			UE-3.5.2	English TOEIC 3	1h30		21h	1h30	2	
	Total						420h	15 h	30	

FOURTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Fourth Semester	UE-4.1	Mathematics and Computer Science Applied 4	UE-4.1.1	Operating Systems	1h30	0h45	31h30	1h30	2	5
			UE-4.1.2	Image Processing	1h30	1h30	42h	1h30	3	
	UE-4.2	Engineering Sciences 4	UE-4.2.1	Industrial Local Area Networks	1h30	1h30	42h	1h30	3	6
			UE-4.2.2	Discrete Sysytem Automation	1h30	1h30	42h	1h30	3	
	UE-4.3	Engineering 2	UE-4.3.1	Microprocessors et Microcontrolers	1h30	1h30	42h	1h30	3	9
			UE-4.3.2	Robotics Control	1h30	1h30	42h	1h30	3	
			UE-4.3.3	End Of Year Project		3h00	42h	1h30	3	
	UE-4.4	Option1: Industrial Control and Automation	UE-4.4.1	Linear Control	1h30	1h30	42h	1h30	3	6
			UE-4.4.2	Control Of Electrical Machines	1h30	1h30	42h	1h30	3	
		Option2: Mechatronic Systems	UE-4.4.3	Automotive Diagnostics and IATF	1h30	1h30	42h	1h30	3	6
			UE-4.4.4	Power Transmission Mechanisms	1h30	1h30	42h	1h30	3	
		Option3: Biomedical Instrumentation	UE-4.4.5	Medical Imaging Techniques	1h30	1h30	42h	1h30	3	6
			UE-4.4.6	Maintenance of Biomedical Equipment	1h30	1h30	42h	1h30	3	
	UE-4.5	Transversal 4	UE-4.5.1	Personal Development and Soft Skills	1h30		21h	1h30	2	4
			UE-4.5.2	English TOEIC 4	1h30		21h	1h30	2	
	Total						420h	16 h 30	30	

0 **Appendix: Program Learning Outcomes and Curricula**

FIFTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Fifth Semester	UE-5.1	Signals and Vision	UE-5.1.1	Digital Signal Processing	1h30	1h30	42h	1h30	3	9
			UE-5.1.2	Machine Vision	1h30	1h30	42h	1h30	3	
			UE-5.1.3	DSP Workshop	1h30	1h30	42h	1h30	3	
	UE-5.2	Embedded systems	UE-5.2.1	VHDL Synthesis	1h30	1h30	42h	1h30	3	9
			UE-5.2.2	Co-Design and SoC	3h00		42h	1h30	3	
			UE-5.2.3	Modeling and Design of Embedded Systems	1h30	1h30	42h	1h30	3	
	UE-5.3	New technologies	UE-5.3.1	Internet Of Things (IoT)	1h30	0h45	31h30	1h30	2	3,5
			UE-5.3.2	Artificial Intelligence	1h30		21h	1h30	1,5	
	UE-5.4	Option1: Industrial Control and Automation	UE-5.4.1	Advanced Control	1h30	1h30	42h	1h30	3	6
			UE-5.4.2	Mechatronics Systems Engineering	1h30	1h30	42h	1h30	3	
		Option2: Mechatronic Systems	UE-5.4.3	Control of Mechatronics Systems	1h30	1h30	42h	1h30	3	6
			UE-5.4.4	Mechatronics Systems Engineering	1h30	1h30	42h	1h30	3	
		Option3: Biomedical Instrumentation	UE-5.4.5	Biomedical Qualitology	1h30	1h30	42h	1h30	3	6
			UE-5.4.6	Sterilization, Safety et Application	1h30	1h30	42h	1h30	3	
	UE-5.5	Transversal 5	UE-5.5.1	Business creation and innovation	1h30		21h	1h30	1,5	2,5
			UE-5.5.2	Professional Integration	0h45		10h30	-	1	
	Total						420 h	16h30	30	

SIXTH SEMESTER

	Units Coded	Units	Code Matters	Subject	Weekly hourly volume		Semestriel Total	Examen duration	ECTS	
					Course/ Tutorials	practical work			EC	UE
Sixth Semester	End of Study Projects								30	