ASIIN Seal & European Labels

Accreditation Report

Professional Technologist in
Heavy Machinery Maintenance

Prepared for
TECSUP, Peru

Version: 09 July 2018

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Mantenimiento de Maquinaria Pesada (Lima and Arequipa)	Heavy Machinery Maintenance. (Lima and Arequipa)	ASIIN, AR, EUR-ACE® Label	28.09.2012 until 30.09.2016, ASIIN	01
Date of the contract: 01.03.2017 **Submission of the final version of the self-assessment report:** 08.06.2017 **Date of the onsite visit:** 16.-19.10.2017 **at:** TECSUP, Campus Lima, TECSUP Campus Arequipa				
Peer panel: Prof. Dr. Wolfgang Müller, Technical University of Berlin Prof. Dr. Hand-Reiner Ludwig, University of Applied Sciences Frankfurt Mr. Erick Bisso, Mechanical Engineering student at UTEC				
Representative of the ASIIN headquarter: Dr. Thomas Lichtenberg				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used: European Standards and Guidelines as of 10.05.2015 ASIIN General Criteria, as of 10.12.2015 Subject-Specific Criteria of Technical Committee 01 – Mechanical Engineering/Process Engineering as of 09.12.2011				

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

[2] TC: Technical Committee for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering.

B Characteristics of the Degree Programme

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Heavy Machinery Maintenance	Professional Technologist in Heavy Machinery Maintenance	/	Level 6	Full time	6 Semester	180 ECTS	Lima 60 students per semester, Arequipa 88/44 students per semester First time offer in 1988 (Lima) and 1996 (Arequipa)

For the Professional Technologist in Heavy Machinery Maintenance programme the institution has presented the following profile in the self-assessment report:

„Our graduates stand out for their professional work in mining, construction and heavy transportation companies, applying their knowledge in maintenance and management of heavy machinery.

Our graduates develop solutions using modern technologies and managing resources efficiently; working as a team and communicating effectively.

Our graduates are committed to the profession and their personal development, performing effectively in a global environment.

Our graduates are identified with quality, ethics and safety at work, committing themselves to the environment and the development of society.“

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

C Peer Report for the ASIIN Seal[4]

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú.
- Appendix "E": Sample certificates and Diploma Supplements
- Website: http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Learning objectives in Spanish: http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/objetivos-y-resultados/ (accessed 14.11.2017)
- Module Handbook: http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/files/2016/02/Module-Handbook.pdf (accessed 30.10.2017)
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The peers welcome that TECSUP published the degree program under scrutiny on its website. However, the website exists only in Spanish. Although so far almost all students come from Peru and speak Spanish, the peers underline that TECSUP wants to gain more international visibility and therefore the peers think that the website must also be available in English. The peers can see that the learning objectives and envisaged learning outcomes

[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.

are clearly outlined on the website. The peers also take positive note of the Diploma Supplement and the "Relevant Regulations" provided by TECSUP; under point 4.2 the learning objectives are described in a concise and comprehensible manner.

The peers refer to the **Subject-Specific Criteria (SSC)** of the Technical Committee Mechanical Engineering / Process Engineering as a basis for judging whether the intended learning outcomes of the Professional Technologist Heavy Machinery Maintenance, as defined by TECSUP, correspond to the exemplary constituted learning outcomes of the Technical Committee. The auditors examine the areas of competence as set forth by the SSC for degree programs and come to the following conclusions:

When looking at the order of the learning outcomes, the peers are wondering why an applied learning outcome like "Innovate, design, manage and maintain heavy machinery mechanical, electrical and electronic systems, applying their engineering knowledge and using modern tools" is followed by a more general learning outcome like "Apply their knowledge of mathematics, science and technology to identify and solve problems". The peers ask if the sequence of the learning outcomes should not be the other way round. TECSUP explains that they pursue an applied approach in the sense that the students are confronted with an engineering problem and in the course of developing a solution to the problem, more theoretical knowledge (like e.g. mathematics) and problem solving tools are introduced. The peers comprehend that this is in line with the educational approach of TECSUP which fosters theoretical knowledge in the light of practical engineering problems; the program responsible highlighted that this practical knowledge must be based on thorough fundamentals. The peers agree that this acceptable.

The learning outcomes state that students shall be able to "apply their knowledge of mathematics, science and technology to identify and solve problems". This generic statement is elaborated in more detail in the report explaining that "mathematical tools such as integral calculus and differential equations are used in courses related to strength of materials, fluid mechanics, thermodynamics, electronics, dynamic analysis of mechanisms and engineering maintenance". The peers confirm that this is in line with the subject specific criteria of ASIIN that graduates shall obtain a broad and *sound knowledge in mathematics, science and engineering.* Furthermore, students shall "innovate, design, manage and maintain heavy machinery mechanical, electrical and electronic systems, applying their engineering knowledge and using modern tools". The peers conclude that students gain competences in the field of *Engineering Analysis*. The learning objectives also claim that students shall be able to "test systems of heavy machinery, analyze and interpret the results to make improvements" and to "produce designs for heavy machinery systems, as well as maintenance management systems and implement them by optimizing available resources". The self-assessment report explains this in more detail by stating that "the program allows

students to acquire the ability to apply designing components of mechanical systems for heavy machinery, consolidating their knowledge, skills and critical ability; seeking effective solutions for specific requirements". The peers understand that the students shall be enabled to acquire *Engineering Design Skills* to solve technical problems in a creative manner. The peers appreciate that graduates shall "know the contemporary aspects of their profession, their impact on society and the environment and practice lifelong learning". The peers agree that this is line with the competence of *Investigations and Assessment* which enables students to identify relevant information sources and make respective use of them for their practical work. The peers highlight the fact that graduates shall also obtain different kinds of *Transferable Skills* like "work with quality, safety and timeliness; are committed to continuous improvement, ethical principles and respect for diversity". Additionally, the students shall "communicate in an oral, written and graphic way" as well as "work effectively in teams". The peers are convinced that *Transferable Skills* are properly considered in the learning outcomes. The peers summarise that the Subject-Specific Criteria of ASIIN are covered in the learning objectives of the Professional Technologist Heavy Machinery Maintenance.

Furthermore, TECSUP applied for the EUR-ACE® (European Accredited Engineer) Label. The EUR-ACE® Label is a quality certificate for engineering degree programs and is recognized Europe-wide. During the accreditation process, the reviewers verified whether the engineering degree program complies with the criteria fixed in the EUR-ACE® Framework Standards. The Subject-Specific Criteria (SSC) of the Technical Committee for Mechanical Engineering and Process Engineering are closely linked to the EUR-ACE® Framework Standards; consequently, the analysis of the Subject-Specific Criteria encompasses the EUR-ACE® Framework Standards. The peers confirm that the EUR-ACE® Framework Standards regarding the intended learning outcomes for the First (Bachelor) Cycle Degree Programs are in line with the Bologna Declaration and the qualification descriptors relevant to level 6 (Bachelor) of the European Qualifications Framework for Lifelong Learning.

Employment opportunities for graduates

TECSUP offers the degree program under scrutiny in its campuses of Lima and Arequipa. In both cases the program was developed in very close cooperation with industry. TECSUP describes the employment opportunities for graduates as excellent and provides respective statistics in the self-assessment report. In the discussion, the business representatives stress that they gladly employ graduates from TECSUP as they have made very good experiences and think that they are well prepared for the requirements of the labour market. Statistics provided by TECSUP also show that about 95% of the graduates find an occupation in the different Peruvian economic sectors adequate to their level of education within

a few months after graduation. The peers understand that this specific program was specifically designed for the needs of the labour market and therefore have no doubts that graduates are able to find employment in their profession and work as engineers.

Further development of degree programmes

TECSUP explains that it maintains advisory committees consisting of staff members, alumni and business representatives for all programs. This very close connection to industry enables TECSUP to understand technological developments on the labour market. Business representatives confirm that some of them form part of the advisory committees and they are requested to give systematic feedback on the learning outcomes and the curricula of the programs. They also confirm that this feedback is taken seriously by TECSUP and leads to changes where feasible. Many graduates who start working at a company keep the contact with the university and support their alma mater as far as possible. Many students do internships or final theses at private companies and the business partners give feedback on the performance and competences of the student; this also applies to the development of new programmes or the revision of all programs where businesses can give their input and actively support the further developing of the objectives and learning outcomes and curricular content.

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The peers wonder why the title “Professional Technologist” is awarded instead of “Bachelor of Engineering”; this had already been recommended in the first accreditation to reconsider the professional title of the program in the light of its perception as engineering program. The peers learn that according to Peruvian legislation, the right to award Bachelor Degrees is reserved to universities only. TECSUP has not that particular right and that is why it can only award the title “Professional Technologist in Heavy Machinery Maintenance”. However, the educational system of Higher Education in Peru is in a transitional phase and it is likely that it will change in the near future which would offer more options for the final degree. The peers acknowledge the legal framework of TECSUP and understand that TECSUP will change the title once it will receive the necessary permission. Ac-

cording to TECSUP, the title "Professional Technologist" did not hinder graduates to continue their studies at US American, Canadian or European universities. Even though a Bachelor Degree would be more easily accepted, it is understood that graduates from TECSUP bring the necessary competences to study successfully at international universities. The peers confirm that the name of the program is plausible and in line with the competences and the curriculum of the program.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix "C" Module Handbook Lima – Arequipa; http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú.
- Website: http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

As outlined under criterion 1.1, the auditors understand that the intended learning outcomes are in line with the Subject-Specific Criteria (SSC) of the Technical Committee Mechanical Engineering and the qualification descriptors relevant to level 6 (Bachelor) of the European Qualifications Framework for Lifelong Learning. Given the fact that TECSUP, by law, does not have the mandate to award Bachelor Degrees but to award the "Professional Technologist", the peers analysed the curriculum in great detail to judge as to whether the academic level aimed for corresponds to a Bachelor's level. The peers base their assessment whether the curriculum of the degree program is suitable to achieve the intended learning outcomes on the module descriptions and the study plans. The overall objectives and intended learning outcomes for the degree program are systematically substantiated in modules and it is clear for the peers which knowledge, skills and competences students will acquire in each module.

The peers point out that in the first accreditation TECSUP was encouraged to further develop measures to enable students to specialize according to their individual interests and

capabilities. The peers understand that the degree program under scrutiny is quite specialised already; in order to develop a further specialisation the students can select from different projects they have to carry out. The peers acknowledge that this gives the students an additional opportunity to develop a specialisation according to their specific interests; still they advise TECSUP to consider elective courses in the future to ease international mobility.

The peers comprehend that most modules consist of different "courses" which are taught in different semesters. When analysing the modules-objectives matrix, the peers agree that modules like "Mathematics" and "Physics" as well as "Fluid Mechanics and Thermodynamics" provide a broad and sound knowledge in *Mathematics, Science and Engineering* to understand the complex phenomena of Heavy Machinery. In addition, the students shall learn the basic technical phenomena related to heavy machines which comprises modules like "Fundamentals of Mechanical and Electrical Technology", "Fundamentals of Mechanical Maintenance", "Fluid power and power train", "Electrotechnics of Vehicle", and "Mechatronics for Heavy machinery" or "Diesel combustion Engines". The peers confirm that these modules are suitable to teach competences in the field of *Engineering Analysis*. Furthermore, the peers could also comprehend that some subjects contribute to the development of competences in the field of *Engineering Design* like "Computer Aided Design" or "Mechanical Design". The peers comprehend that competences in the field of *Engineering Practice* are a stronghold of the educational concept of TECSUP. In most technical modules there is a certain proportion of laboratory work involved. Furthermore, the program contains two internships. The first takes at least one month only; the intention of this internship is to give students the first practical experience in a working environment and to have first contact with a company. The students confirm that the duration of the internship is adequate to give students a first experience of an industrial workplace. The second internship, taking three months, is based on competition. The students are ranked according to their grades and it is the companies that select the candidates. The second internship serves the purpose to practically apply the theoretical knowledge and solve a technical problem in a real working environment. The students also have to present their projects in the class and have to report about positive things as well as about weaknesses. The students praise this approach as a very fruitful experience and an opportunity to find a working place. The representatives from business also highlight that from their point of view, especially the last internship has contributed to make the education of the students more relevant and align it to the needs of industry. The peers have no doubts that the students receive sufficient engineering practice. However, they wonder why the internships do not receive any credits and learn that the Ministry of Education of Peru (MINEDU) did not allow awarding any credit points to internships. But the Ministry changed this rule just lately so

that TECSUP considers changing the curriculum and introducing credit points for internships; the peers take note of this explanation. Most final theses are based on a specific problems identified during the internship in industry. The peers also see that the module "Quality, Research and technological Innovation" and the final thesis shall develop competences in the field of *Investigations and Assessment.* However, the peers are not fully content with the practical implementation of the final thesis (compare criterion 4 "Examinations"). Finally, the peers also comprehend that the curriculum covers *Transferable Skills* in modules like "Values, Health and Safety", "Communication" or "Society and Profession". The business representatives welcome particularly the combined technological as well as managerial competences of TECSUP graduates; this kind of qualification profile is highly sought for as they explain. Apart from this, the peers underline that the English competences of students should be enhanced. Students can take voluntary English conversation classes; however, technical English is not offered which is criticised by the students. It is plausible to the peers that communication skills need to be developed first before technical terminology is introduced; but students should definitely have the opportunity to learn technical English. During the discussion, only a minority of students was able to converse in English. The peers conclude that the curriculum of the Heavy Machinery Maintenance is designed in a way to develop the competences as exemplified in the Subject-Specific Criteria of ASIIN and consequently also fulfil the requirements of the EUR-ACE seal and the level 6 competences of the European Qualification Framework.

Criterion 1.4 Admission requirements

Evidence:

- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú. Section III.
- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

In Section III of the "Admission and Enrolment" regulations of the relevant rules, the admission process is clearly defined and explained. It is the goal of TECSUP to evaluate both knowledge and personal competences of applicants. First of all, applicants need to have a good school score to be able to be admitted to TECSUP. In addition, TECSUP prepares a test

that includes the following areas: Psycho technical test, verbal reasoning, sciences (arithmetic, algebra, geometry, trigonometry, physics and chemistry). Generally speaking, TECSUP underlines that it wants to recruit the best students who are able to successfully carry out the study program. Furthermore, TECSUP prepares an interview, in which personal competences are evaluated. As the peers are not familiar with this kind of the Admission Examination they kindly ask if this Admission Examination could be made available to them. Each semester the admission committee determines the number of admissions per career path; the program Heavy Machinery Maintenance is the largest at TECSUP admitting 40-60 students per semester; the application rate is sometimes about 3 times higher than the number of available places. TECSUP emphasises that applicants come with very different backgrounds depending on the school they are from and harmonisation procedures are required. That is why TECSUP offers preparation courses three times per year. The peers welcome this additional support of TECSUP to assist students to achieve the intended learning outcomes. The auditors confirm that the requirements and procedures for admission are transparent and clear. All applicants are treated according to the same standards and regulations.

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

The peers appreciate the plan of TECSUP to revise the subject-specific website and to include also an English website. Until its implementation, the peers confirm their recommendation. The peers take note of the explanation of TECSUP that some of the courses belonging to the sixth semester are taught in English; however, this had not become transparent during the discussion with the students who had complained about too little technical English. So the peers welcome that technical information in English is used in some of the lab sessions. But still the peers highly recommend increasing the amount of technical English in the curriculum and they appreciate that TECSUP indicates the intention to do so. Apart from this the peers think that this criterion is fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix "C" Module Handbook Lima – Arequipa; http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú. Section III.
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

Modularization:

In Lima, the Heavy Machinery Maintenance Program is managed by the Department of Mechanics and Aviation. In Arequipa, it is managed by the Department of Mechanics. The study program under review is modularized. The peers determine that each module is a sum of teaching and learning whose contents are concerted. Most of the modules of the Professional Technologist Heavy Machinery Maintenance encompass between 5 and 12 ECTS credits; size and duration of modules is no longer than three semesters which poses a challenge to international student mobility (compare respective paragraph under this criterion), most of them are consecutive and require full-time dedication of students. According to TECSUP about 40% of the students finish the program in the anticipated timeframe, 65% of the students finish it one or two semesters later and about a third drops out due to academic problems. TECSUP stresses that it does not compromise on the quality of the education and accepts a certain drop-out rate. From the auditors' point of view, the structure of the degree programmes ensures that the qualification level and the intended learning outcomes can be achieved and that the students can complete the degree programmes successfully without any delay.

Practical Approach/Internships

Internships and the practical approach of the degree programmes are being dealt with under criterion 1.1 and 1.3.

Student mobility and Internationalisation

TECSUP writes in its intended learning outcomes that the graduates shall be able to "work and communicate in national and international contexts". However, the peers hardly find

any measures to support internationalisation; the curriculum is not really designed in a way to foster international mobility. The peers learn that there are very few exchange programs with other countries. The peers are lacking a clear and concise internationalisation strategy to promote international mobility. Additionally, the students admit that there are hardly any support measures in place. The peers stress that TECSUP needs to become more active in this field; especially since Peru has the advantage that a number of Spanish speaking countries are in the neighbourhood.

Recognition of achievements and competences

According to TECSUP Academic Regulations for Regular Education Programs students who have studied at institutions of higher education in Peru or abroad may request a transfer to TECSUP. Course credit may be transferred for courses whose content is equivalent to 80% of the curriculum for the program in which enrollment is requested. The Admission Committee reserves itself the right to accept or deny transfer requests. It does not become fully clear if TECSUP is required to provide the reasons for the rejection of applications of recognition which would be necessary to be in accordance with the Lisbon Recognition Convention; the peers ask TECSUP to clarify this issue. In case of doubt if the competences of the applicant are adequate to pursue the studies, the Admission Committee can require an entry test.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix “C” Module Handbook Lima – Arequipa; http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The Professional Technologist Heavy Machinery Maintenance is designed for 180 ECTS credit points. There is no comprehensive overview of the workload per semester and the different modules that consist of different courses; the peers were able to allocate the different courses to the semesters. The peers were not fully able to judge if the workload is

evenly distributed over the semesters; the peers request to provide an overview of modules and workload per semester. The students indicate that they have to be well organized to be able to manage the workload but once they have found a proper organisation they also have time for sports and leisure activities; in summary they confirm that the workload is fairly evenly distributed over the semesters.

The peers welcome that the module descriptions distinguish between contact hours and time for self studies. However, the workload is difficult to comprehend as the contact time and time for self studies are indicated in hours per week and partly with two decimal digits; furthermore the semester workload and the credit points are indicated. However, the credit points do not sum up to a total amount that is dividable by 30 hours of student workload. After an intensive explanation, the peers finally understood that the workload is assessed and verified regularly following a formula. Two terms of the formula are the workload as estimated by the teachers and the workload assessed by a students survey. The result of the second term is a mean value, calculated on two decimal digits. The rewarded credits follow roughly, but generously on the evaluated work load. Credits remain constant over a longer period, while obviously the workload assessed does vary from year to year. The peers are impressed about this distinguished and detailed calculation of the student work load and conclude that this sets a good example as the student workload does not represent only arithmetical calculation but is based on the empirical data provided by the different student and teacher cohorts. The peers praise this approach; however, the formula for calculation is not made transparent in the module handbook or the website. The peers emphasise that this well-developed workload calculation needs to be published and made available to interested stakeholders.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The peers understand that TECSUP applies a wide range of didactical approaches to achieve the intended learning outcomes. These include “classical” methods like lectures, classroom and laboratory or workshop exercises, computer training, different kind of assignments, seminars and study cases. Courses also involve working in groups or teams in projects to

develop social competences. However, TECSUP explains that the teachers noted a changing learning behaviour of young people who are used to extensive IT applications. Hence, theoretical classes are supported by the use of active methodologies (such as Flipped Learning, Project-Based Learning, Case-Based Learning, etc.); as well as information and communication technologies (ICT), whose goal is to increase the active participation of students during classes, and to improve feedback on achievement of sessions' objectives. The peers appreciate this openness of the teachers to use new didactical methods to accommodate the changing learning behaviour of students.

The teachers further elaborate that they have a class plan where they anticipate each student session in advance. They stress that the whole teaching system is well organised and all teachers work according to the class plan. As a means of quality assurance unexpected and unannounced class visits of colleagues take place regularly; these colleagues provide feedback to the colleague and make recommendations what could be done to further enhance the teaching quality. This collegial advisory system leads to significant efforts of the teachers to be properly prepared for the class at any time. The peers confirm that this system is a sensible quality assurance system. The students also indicate that they are content with the teaching methods. In summary, the peers judge the teaching methods and instruments to be suitable to support the students in achieving the learning outcomes.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- General information: http://www.tecsup.edu.pe/home/nosotros/acerca-de-tecsup/ (accessed 30.10.2017)
- Admission Requirements: http://www.tecsup.edu.pe/home/postulantes/modalidades-de-ingreso/ (accessed 30.10.2017)
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The peers examined the services webpage as well as the subject specific webpage of the Professional Technologist Heavy Machinery Maintenance and gained the impression that all relevant information about the study program and the services of TECSUP are available; however, some pages are still under construction and the website is only available in Spanish. Given TECSUP's ambition to become a more internationally acknowledged institution,

the peers point out that the website should be available in English too. The students indicate that TECSUP is a well-known institution for technological education. TECSUP maintains a “Lab Vehicle” which can go to schools and other places and practically demonstrate some of the technological fields that are being offered at TECSUP; the peers highly welcome this kind of hands-on public relations. Furthermore, the students emphasise that TECSUP is one of the very few institutions that invites interested pupils to its campus to inspect the classrooms, laboratories and teaching equipment. The students also confirm that they found all relevant information on the website; they highlight the professional experiences of the staff members as a significant asset. According to the students the teachers all gained practical experiences in companies and are well networked as well as have a clear understanding of the requirements of the labour market. In case of very demanding modules like “Hydraulics” the teachers offer tutorial videos on you-tube where all issues are explained in detail and the students can study it ad libitum; furthermore, a tutorship system offers additional support. The students point out that the faculty provides different kinds of assistance to the students to support them to successfully complete the modules. The students show a high level of satisfaction with the teachers and the support measures offered at TECSUP and that they appreciate the “open door” policy of the staff members. There are conflict solution processes in place if there are disagreements (compare criterion 6). The auditors conclude that TECSUP makes adequate resources available at both campuses (Lima and Arequipa) to provide individual assistance, advice and support for all students. The peers highlight that the allocated advice and guidance, namely the tutors and advisors, assist the students in achieving the learning outcomes and in completing the course within the scheduled time.

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

The above mentioned recommendation to put a stronger focus on the development of the English competences of the graduates goes along with the requirement of the peers to develop an internationalization strategy and provide support on international mobility opportunities. Given TECSUP’s vision to become internationally more visible and to prepare its students for international working opportunities, the peers underline their point of view that this must be properly reflected in the strategic vision of TECSUP. The fact that TECSUP included in its strategic plan the creation of an area that will be dealing with international issues is a move into the right direction. The peers welcome that TECSUP has established an internationalization committee and stress that this committee needs to develop a clear internationalization strategy.

The peers thank TECSUP for the curricular overview of the workload of the different semesters and can see that the workload is distributed evenly over the different semesters.

The peers thank for the clarification on the recognition of academic achievements obtained at other academic institutions. The peers understand that TECSUP has rules in place to verify as to whether academic achievement can be recognized. However, they do not comprehend what TECSUP does if recognition is withheld. The peers do not see that the Article III.5 of the Convention on the Recognition of Qualifications concerning Higher Education in the European Region[5] is fulfilled. Consequently the peers require that in line with this convention TECSUP needs to state the reasons for the refusal to grant recognition, and information shall be given concerning possible measures the applicant may take in order to obtain recognition at a later stage.

The peers welcome the plans of TECSUP to add to the website a file which will explain the way to calculate the corresponding credits for each course in order to clarify this to the public. Until its implementation the peers stick to their intended requirement.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix “C” Module Handbook Lima – Arequipa; http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)
- Appendix “D” Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú. Section III.
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

[5] https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/090000168007f2c7 (accessed 24.11.2017)

Preliminary assessment and analysis of the peers:

Examination organisation

The peers understand that the staff members of TECSUP pursue a continuous assessment of the development and achieved competences of the students through at least three written examinations per course scheduled along the semester. Most courses end with a final exam which takes place in the last week of each semester. When being asked, the students confirm that they have enough time to prepare for the examinations; the dates and times of examinations are provided in advance, usually at the beginning of the semester. If there are any clashes or very little time between examinations the students can approach the teachers individually and ask for rescheduling the examinations which was always accepted. The students add that the preparations require a lot of efforts but they confirm that the load of examinations can be handled. All professors prepare the examinations under their responsibility, but they are supervised by the Head of Department. Professors must forward the grades to the students, the tutor and the Academic Office for registration, as well as to the academic follow-up system; the peers understand that a grading scheme is available which grants that grades are given in a fair and transparent manner. According to the "Relevant Regulations" a student who failed a course has the opportunity to take a recovery exam in a given time frame. According to the articles 63 and 64 of the Academic Regulation, a student who failed a course must enrol for a second time in that course in the next semester in which it is offered. The student who fails once again a course must take it for the last time in a mandatory form in the next semester. In case of failing it for the third time, the student loses his status. Students have their right to present a request of reviewing their grades in the scheduled date by the Academic Office. The peers conclude that the number and distribution of the examinations is adequate; rules for repetition are clearly defined and transparent for all students.

Examination methods

Based on the module descriptions the peers can see that the form of examination is communicated; however, in all module descriptions appear the same type of examination "Practical / laboratory: preparations with review, functional projects, laboratory reports and for the lecture partial quizzes and final written examination". Even modules like "Communications" where the students shall acquire "Oral and Written Expression Techniques" states the same kind of examination as mentioned above; this needs to be changed (compare criterion 3). During the discussion with teachers and students the peers find out that different kinds of examinations like written examinations and oral tests in classes, laboratory and workshop activities, reports and homework as well as quizzes are applied. The students confirm that different kinds of examinations, also oral tests, are being applied, group as well as individual examinations. The peers analyzed the presented examinations

and concluded that they are of an adequate, at least minimum academic standard. Hence, the peers gain the impression that the examinations are indeed competence oriented; however, this does not become transparent to interested stakeholders. Consequently, the peers see a need to revise the module descriptions accordingly and state clearly which kinds of examinations are applied in each module and also the weighing factors because the peers understand that the final examination counts only 10-15% into the final grade of the course. Furthermore, the duration of the examinations should also be mentioned.

In article 55 of the "Relevant Regulations" students can request "Extraordinary Examinations" due to verified and accredited sickness by means of medical certificate or another justified reason. If a student is not able to take the in-class examination in the foreseen way, the student will enter to an extraordinary exam for that course. The peers accept this as adequate compensational measures.

Final Thesis

The peers understand that the students write the final thesis at the sixth semester; normally they form groups of students who work jointly on a task connected to a relevant topic from industry. Prior to the thesis, the Department Head meets the students in order to explain the guidelines required for the thesis and the corresponding schedule for presenting it. The thesis profile is defined by students with the support of one teacher as advisor. After approval, they must defend their work in a public presentation facing a jury of three examiners. The students of a working group do not receive all the same grade as the grade differs according to the individual contribution and performance of the students. Also the questions about the presentation differ from student to student. TECSUP explains that the students are closely monitored when writing the thesis to give them proper guidance. Even though the peers appreciate the project oriented approach which prepares the students for the working methods of the labour market, they think that too much guidance is given to the students. The peers confirm that the final thesis they analysed are of appropriate standard but they emphasise that the students should learn to work more independently and should be more exposed to academic thinking. The peers agree that the students are fit for the professional field and that the achieved competences correspond to level 6 of the European Qualification Framework but the topics and the approach seem to be very focused on the practical application. In the first accreditation it was recommended that TECSUP should take measures to strengthen the scientific aspiration of the program; the peers do not see that this recommendation has been fully implemented. The peers understand that TECSUP follows the philosophy of preparing students for their professional field and that the modules are arranged around this focal area but the peers encourage TECSUP to critically reflect its vision in terms of applied education and also consider to give general academic thinking, which allows students to understand their applied knowledge in the

broader picture of their profession, more space. Hence, it is recommended that students implement final projects more independently to foster the competence to work autonomously on research projects and develop solutions using scientific engineering methods.

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

The peers understand that the printed copies of the examinations show the students the duration of the examination. However, the different kinds of examinations and the weighing factors applicable for the final grade of a module need to be communicated clearly in the module descriptions and therefore the peers confirm their requirement that the module descriptions need to revised.

The peers take note of the explanation of TECSUP how students select the topic of their final theses and appreciate that TECSUP intends to reinforce the link between these problems' solutions with scientific aspects. The peers confirm their recommendation that students should implement final projects more independently to foster the competence to work autonomously on research and develop solutions using scientific engineering methods.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix "A" Proof of Sufficient Teaching Capacity
- Appendix "B" Staff Handbook Lima - Arequipa
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:

The peers welcome the Appendix A "Proof of Sufficient Teaching Capacity" which demonstrates clearly which teaching obligations need to be fulfilled in which semester and who of the available staff members is responsible for the teaching. Based on the information provided in the self-assessment report and Appendix A, the peers are convinced that the number of staff members is sufficient to successfully implement the programmes under review. Regarding the qualification of the staff members, the peers point out that in the

first accreditation it had been recommended to strengthen the qualification of the faculty members. TECSUP responds that it has enhanced the overall qualification profile of the teaching staff, not only through financial support but also in terms of pursuing higher degrees (especially Master). Many professors come from industry with an appropriate academic background; for TECSUP it is important to have professors who have been working in industry to have a good notion of what is needed on the labour market. The professors are involved in applied research and that is why the number of PhD holders is comparatively small. But TECSUP maintains a program to assist teachers in their educational skills. Before new staff members are hired they have to provide a test lecture to see how they approach the audience and only if they have a thorough basis for teaching they are employed receiving additional didactical training. Regular evaluation of teaching including quality assurance measures like unannounced class visits grant a high level of satisfaction among the students and ensure a good quality of teaching. In addition, the teaching is supported by modern IT equipment and reference persons in case of technical questions. The students also confirm that by and large they are very satisfied with the quality of teaching. In addition, TECSUP underlines that staff members are actively pushed and supported to improve their academic qualification at least to a Master's degree; those who pursue academic advancement get a reduction of the teaching load and other kinds of support. The peers acknowledge TECSUP's close connection to the business world and are aware that academic development is a time-consuming process; they get the impression that the existing staff members are skilled to provide particularly applied engineering competences. Furthermore, the peers can see some progress since the last accreditation for the Lima as well as for the Arequipa Campus and appreciate the quality measures of TECSUP to grant proper performance of teaching. Still the peers think that the academic progression of staff members, at least to Master level, needs to be pursued further; hence, they strongly renew the recommendation to further to strengthen the academic qualification of the faculty members.

The teachers are used according to their interests and affinity. This means teachers who have a stronghold in teaching fulfil the maximum teaching load of 23 hours whereas those who have specific research interests can pursue research activities and get a decrease in their teaching load. Research and publications in indexed journals are actively encouraged by the management of TECSUP through public appreciation and a bonus. A number of teachers are actively involved in research activities and attend conferences and publish papers. Sabbatical semesters are not common at TECSUP but there is hope that this may be introduced at TECSUP in the near future. Students are also involved in research activities and results from research are being used for teaching purposes. In summary, the staff members are convinced the peers that the research and development activities carried out

by the teaching staff are in line with and support the level of academic qualification aimed at.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:
As indicated under criterion 4.1 the peers understand that TECSUP puts a lot of efforts into the development of the teaching staff. All newly hired staff members receive special preparation before starting with their teaching obligations. Furthermore, all staff members (full time and part time) participate in an annual program for enhancing their teaching capabilities which include several courses, workshops, forums. These are offered in campus or via the virtual platform. At the end of each year, the human resource officer meets each head of academic department to identify the needs to improve the teaching skills of each staff member. This defines the necessary budget for the next year. Depending of the total budget and the requirements of each department, the teachers can pursue higher academic degrees, partake in special programs (including certification ones) or congresses (in Peru or abroad) giving a conference or presenting a paper. Activities in a company (for example an internship) are also possible; teachers can also take specific English programs (also abroad). The peers conclude that the teachers are being offered support mechanisms to further develop their professional and teaching skills and that these offers are also used actively by the staff members.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report for the program: “Heavy Machinery Maintenance”, May, 2017, TECSUP, Lima-Arequipa, Perú
- Visit of laboratories at Lima and Arequipa Campus

- Discussions during the audit with representatives of the management, program responsible, staff members, students and business representatives

Preliminary assessment and analysis of the peers:
TECSUP is a non-profit private educational institution established in 1984 with the objective of contributing to increase industrial productivity by providing graduates to fulfil real needs of Peruvian companies. The peers learn that financial sources for TECSUP originate primarily from tuition fees but also from industry. TECSUP added that the financial situation is very stable and that sufficient reserve funds are available to cover unexpected expenses. The peers have no doubt that the available funds and equipment form a sound and solid basis for the degree programmes.

The learning facilities and the teaching equipment are described in detail in the self-assessment report. During the on-site visit the peers took a tour over the campus at Lima and at Arequipa to get a first-hand impression of the availability and the condition of the equipment. In the first accreditation the equipment of the library was criticized; now the peers noted fully-equipped libraries, which include platforms such as Cengage, Librisite, Pearson, etc. in order to support e-learning. The students also confirm that the library is well equipped and the online library is updated and provided with state of the art equipment; the schedule for the library is very good and goes along with lecture hours. The peers highly appreciate the progress made but also encourage TECSUP to further improve the access to scientific papers. The students also mention the wish to have more learning space. The peers support this request but they are also informed that new library buildings are about to be built. The students explain that computer labs are well equipped but the access to specific software like CAD is limited. There are free versions with limited usability; even though the students find solutions on their own, the peers stress that TECSUP should provide sufficient engineering software licenses for students. The peers are satisfied with the laboratory and technical equipment of TECSUP and are impressed about the equipment provided as gifts from industry. In summary, the peers gained the impression that the equipment in Arequipa was even more inspired by new technologies conclude that the available equipment forms a sound and solid basis for the degree program.

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

The peers are pleased to read that the directory of TECSUP is aware that the overall qualification of the staff members needs to be enhanced and wants to establish a plan in order to strengthen the academic qualification of the faculty members. The peers confirm their respective intended (corresponding?) recommendation.

Furthermore, the peers stick to the recommendation that TECSUP should further improve the access to scientific papers and to technical standards, the learning space for students and to make engineering software licenses available for students.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Appendix "C" Module Handbook Lima – Arequipa; http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-de-planta/ (accessed 30.10.2017)

Preliminary assessment and analysis of the peers:
The peers positively note that the full set of module descriptions is published for the Professional Technologist Heavy Machinery Maintenance. Hence, the module descriptions are available for all interested stakeholders. The peers examine the module descriptions and note that the modules have comprehensible names and code numbers. Each module consists of different courses which are sub-topics of the more general name of the module. Each course has a name of its own, an individual identification number and an indication of the semester when it is taught. The peers assess the subdivision of modules into courses as sensible. The name of the person responsible for the module and the names of the different teachers are provided. The language und the relation to the curriculum are also mentioned. The peers note that all modules are taught in Spanish and encourage TECSUP to introduce also modules in English language with technical terminology to contribute to the development of English language competences. If requirements Requirements according to the examination regulations as well as recommended prerequisites for the successful participation in a module are necessary, this is clearly stated. The credit points, the overall time commitment and the contact time are properly subdivided into lectures, practical, laboratory; also the different types of teaching method become transparent in this section. The workload distinguishes between contact time and private study. Even though the indicated workload looks odd by first sight, the peers examined the calculation in detail (compare criterion 2.2) and conclude that this is a very thorough and realistic approach. The leaning outcomes are subdivided into knowledge, skills, and competences which are positively judged by the peers. Additionally, the content of the different courses is explained in a separate paragraph. The type of examination is mentioned but it is the same for all mod-

ules. Moreover, the weighing factor and calculation of the final grade as well as the duration per examination are lacking. The peers stress that this needs to be described for each module individually and the competence orientation of the modules needs to become transparent (compare criterion 3). The same uniform mentioning is being done for the media employed; the peers highlight that the media and the teaching methods must be aligned to the learning outcomes. A reading list is provided in the subject descriptions. The peers are by and large content with the quality of the module descriptions; however, they require some revision as stated above.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report for the program: "Heavy Machinery Maintenance", May, 2017, TECSUP, Lima-Arequipa, Perú
- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú.
- Appendix "E": Sample certificates and Diploma Supplements

Preliminary assessment and analysis of the peers:
The peers thank TECSUP for submitting the sample of certificates and the Diploma Supplement which are issued after graduation. The documents provide information on the student's qualifications profile. The individual performance as well as the classification of the degree programme with regard to its applicable education system is properly outlined. Statistical data as set forth in the ECTS User's Guide is clearly outlined to allow readers to categorise the individual result/degree.

Criterion 5.3 Relevant rules

Evidence:

- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú.
- http://www.tecsup.edu.pe/home/mantenimiento-de-maquinaria-pesada/ (accessed 30.10.2017)

Preliminary assessment and analysis of the peers:
The peers verify that policies and procedures of TECSUP can be found in the Policy Library website. The website is open to all interested stakeholders. The peers confirm that the

rights and duties of both the higher education institution and students are clearly defined and binding. All relevant course-related information is available in the language of the degree program and accessible for anyone involved; the peers underline that the information should also be provided in English to foster the internalisation of TECSUP (compare criterion 1.3).

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

The peers take positive note of TECSUP's plan to revise the module descriptions and stick to their intended requirement as indicated under criterion 3. Apart from this criterion is fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Appendix "D" Relevant Regulations: TECSUP Academic Regulations for Regular Education Programs. 2017 – Perú, SECTION IV EVALUATION, PROMOTION AND DEGREE CERTIFICATION
- Appendix "J" Statement of the students' point of view Lima - Arequipa

Preliminary assessment and analysis of the peers:

In the Relevant Regulations under section IV an outline of the evaluation procedures, the promotions as well as measures to improve the teaching are presented. In addition, the peers welcome that TECSUP maintains a "Continuous Improvement Plan" (CIP) in order to guarantee quality standards of the educational and administrative processes. This "Continuous Improvement Plan" (CIP) includes assessment, evaluation and improvement actions. TECSUP implements a number of regular quality assurance measures like a Students' Survey on Outcomes, Students' Survey on Courses, Interview with Students as well as Internship Performance. In addition, TECSUP also collects systematically data from the "Survey to Graduates" and "Survey to Employers". The peers confirm that TECSUP has a number of distinguished tools in place to measure the quality of its program on different levels and from different perspectives. The data is being analysed and presented to different committees. Improvement actions are implemented by each Department Head. All actions defined for continuous improvement purposes are stated in minutes by the different committees,

which discuss the necessary steps for that. These include the responsible and the dates for accomplishing those steps. Depending on the level of the decision, the head of the department and part of the staff, directors, or even members of the consulting technical committee are involved. The committee that consists of students, graduates, faculty and companies, proposes actions verifies its application and results. Based on the results of the different surveys presented in the self-assessment report the peers understand that there is a high level of satisfaction with the quality of the program among students but also among graduates and employers. This is also underpinned in the discussions the peers held with students and business representatives. The students indicated that they see hardly any reason for complaints and the high rate of employment shortly after graduation shows that the competences they acquire are sought for on the labour market. The same applies to the business representatives who highlight the high level of relevant competences among the graduates and the specific competence profile which combines management skills with technical skills which is needed by the companies.

In summary, the peers come to the conviction that TECSUP maintains a very sophisticated quality assurance system and a number of quality assurance procedures covering different stakeholders groups; feedback mechanisms are in place to improve the quality of its procedures and programs. The peers are convinced that this quality assurance system is appropriate to critically reflect the quality of the program and to be able to gradually improve it.

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

The peers conclude that this criterion is fulfilled.

D Additional Documents

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

1. Admission examination
2. Overview of modules and workload per semester
3. Clarification if Admission Regulations are in line with Lisbon convention

Documents have been provided.

E Final Assessment of the Peers

The peers summarize their analysis and final assessment for the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Heavy Machinery Maintenance	With requirements for 1 year	EUR-ACE	30.09.2024

Requirements and recommendations for the applied labels

Hint by the ASIIN office: grey writing indicates a standard wording

Requirements

A 1. (ASIIN 1.3) TECSUP needs to develop an internationalization strategy and provide support on international mobility opportunities.

A 2. (ASIIN 2.1) Define the rules for the recognition of credits acquired at other higher education institutions in accordance with the Lisbon Recognition Convention. It should be made transparent that the recognition is guaranteed unless substantial differences can be proven by the higher education institution (change of burden of proof).

A 3. (ASIIN 2.2) The calculation of ECTS credit points must be published and made available to the public.

A 4. (ASIIN 3, 4.3) Rewrite the module descriptions so as to include information about the teaching formats, type and duration of examinations and weighing factors for the final grade.

Recommendations

E 1. (ASIIN 1.1) It is recommended to publish the subject-specific website also in English.

E 2. (ASIIN 1.3) It is recommended providing technical English courses to the students.

E 3. (ASIIN 3) It is recommended that students should implement final projects more independently to foster the competence to work autonomously on research and develop solutions using scientific engineering methods.

E 4. (ASIIN 4.1) It is recommended to strengthen the academic qualification of the faculty members and encourage more staff members to obtain at least a Master's Degree.

E 5. (ASIIN 4.3) It is recommended to further improve the access to scientific papers and to technical standards, the learning space for students and to make engineering software licenses available for students.

F Assessment of Technical Committee 01- Mechanical Engineering / Process Engineering (27.11.2017)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee agrees to requirements and recommendations suggested by the peers; only in recommendation 4 it should be unlined that the enhancement of staff qualification is an urgent matter. The Technical Committee suggests a slight change in the wording.

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

The Technical Committee judges that the intended learning outcomes of the degree programme(s) do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01.

The Technical Committee 01 – Mechanical Engineering / Process Engineering recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Heavy Machinery Maintenance	With requirements for 1 year	EUR-ACE	30.09.2024

E 4. (ASIIN 4.1) FA 01 suggests adding this word to underline the urgency of this recommendation. It is urgently recommended to strengthen the academic qualification of the faculty members and encourage more staff members to obtain at least a Master's Degree.

G Decision of Accreditation Commission (08.12.2017)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission thinks that TECSUP has to decide in how far it further develops its internationalization and therefore, it cannot be a requirement that TECSUP needs to develop an internationalization strategy. The Commission changes the requirement into a recommendation. Apart from this, the Commission accepts the requirements and recommendations as suggested by the peers and the Technical Committee.

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

The Technical Committee judges that the intended learning outcomes of the degree programme(s) do [not] comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01.

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Heavy Machinery Maintenance	With requirements for 1 year	EUR-ACE	30.09.2024

Requirements

A 1. (ASIIN 2.1) Define the rules for the recognition of credits acquired at other higher education institutions in accordance with the Lisbon Recognition Convention. It should be made transparent that the recognition is guaranteed unless substantial differences can be proven by the higher education institution (change of burden of proof).

A 2. (ASIIN 2.2) The calculation of ECTS credit points must be published and made available to the public.

A 3. (ASIIN 3, 4.3) Rewrite the module descriptions so as to include information about the teaching formats, type and duration of examinations and weighing factors for the final grade.

Recommendations

E 1. (ASIIN 1.1) It is recommended to publish the subject-specific website also in English.

E 2. (ASIIN 1.3) It is recommended that TECSUP develops an internationalization strategy and provides support on international mobility opportunities.

E 3. (ASIIN 1.3) It is recommended providing technical English courses to the students.

E 4. (ASIIN 3) It is recommended that students should implement final projects more independently to foster the competence to work autonomously on research and develop solutions using scientific engineering methods.

E 5. (ASIIN 4.1) It is strongly recommended to strengthen the academic qualification of the faculty members and encourage more staff members to obtain at least a Master's Degree.

E 6. (ASIIN 4.3) It is recommended to further improve the access to scientific papers and to technical standards, the learning space for students and to make engineering software licenses available for students.

H Fulfilment of Requirements (29.06.2018)

Decision of the Accreditation Commission (29.06.2018)

The Accreditation Commission decides to prolong the award of the seals as follows:

Degree programme	ASIIN-label	Subject-specific label	Accreditation until max.
Ba Heavy Machinery Maintenance	All requirements fulfilled	EUR-ACE®	30.09.2024

The Accreditation Committee for Degree Programmes decides to include the following reference into the notifying letter to the HEI:

“The HEI is being indicated that the weighing factors of modules for the final grade shall be included in the module handbook. This will be reviewed in the context of the re-accreditation of the Bachelor degree programmes Heavy Machinery Maintenance.”

Appendix: Programme Learning Outcomes and Curricula

According to the self-assessment report the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Heavy Machinery Maintenance:

OBJECTIVES OF THE DEGREE PROGRAM

The Program Educational Objectives (PEOs) of the Heavy Machinery Maintenance program are broad statements that describe it and the professional accomplishments that graduates achieve during the first few years following graduation and as a consequence of their professional practice. PEOs (listed from “A” to “D”) reflect the mission of Tecsup and integrate the academic, technical and professional characteristics of the qualification.

Mission of Tecsup is: "To form globally competitive, ethical and innovative professionals with a deep technological knowledge; Also, to support the companies to increase their productivity and value ". With regard to this mission, the Heavy Machinery Maintenance program builds graduates with technical and managerial skills, necessary to develop innovation, design, evaluation and maintenance of Heavy Machinery systems as well as in its maintenance management.

PEOs formulation and review are performed regularly in meetings attended by directors, the Head of the Department, teaching staff, and coordinator of the Educational Quality area, as well as by graduates and representatives of companies (Consultant Technical Committee). PEOs are accessible to all students, staff members and all other interested groups on Tecsup website, furthermore in our Virtual Campus and the Department offices.

LEARNING OUTCOMES OF THE DEGREE PROGRAM

Learning outcomes describe what students are expected to know and are able to do upon completion of the learning process. These relate to the knowledge, skills and competences that students attain as they progress through the program. Learning Outcomes (LOs) are accessible to all students and staff members in Virtual Campus and on Tecsup´s web site. Head of the Department and teaching staff have participated in the definition of LOs. Labor market requirements are transmitted by the members of the Consultant Technical Committee.

Students of the Heavy Machinery Maintenance Program, at the time they have completed their studies, will be in the capability of:

1. Innovate, design, manage and maintain heavy machinery mechanical, electrical and electronic systems, applying their engineering knowledge and using modern tools.
2. Apply their knowledge of mathematics, science and technology to identify and solve problems.
3. Test systems of heavy machinery, analyze and interpret the results to make improvements.
4. Produce designs for heavy machinery systems, as well as maintenance management systems and implement them by optimizing available resources.
5. Work effectively on teams.
6. Communicate in an oral, written and graphic way.
7. Know the contemporary aspects of their profession, their impact in society and the environment and practice lifelong learning.
8. Work with quality, safety and timeliness; are committed to continuous improvement, ethical principles and respect for diversity.

The following **curriculum** is presented:

		Courses					
Code	**Module**	**Semester 1**	**Semester 2**	**Semester 3**	**Semester 4**	**Semester 5**	**Semester 6**
C3-01	**Mathematics**	Calculus	Calculus and Statistics Applications				
C3-02	**Physics**	Waves and Heat	Waves and Heat				
C3-03	**Communication**	Oral and Written Expression Techniques	Texts Comprehension and Production				
C3-04	**Values, Health and Safety**	Personal Development	Occupational Health and Safety				
C3-05	**Quality, Research and technological Innovation**			Quality and Continuous Improvement	Research and Technological Innovation		
C3-06	**Innovation and Entrepreneurship**					Innovation Projects Design	Entrepreneurship
C3-07	**Society and Profession**						Professional Development
							Society and Sustainable Development
C3-08	**Fundamentals of Mechanical and Electrical Technology**	Electricity					
		Electromechanical Workshop					
C3-09	**Fundamentals of Mechanical Maintenance**	Heavy Equipment Technology	Mechanical Maintenance and Welding				
C3-10	**Computer Aided Design**		Drawing and Design				
			Applied Informatics				
C3-11	**Fluid Power and Power Train**			Hydraulics	Power Train	Hydraulic Systems Analysis	
C3-12	**Electrotechnical of Vehicle**			Vehicle Electricity	Vehicle Electronics		
C3-13	**Fluid Mechanics and Thermodynamics**			Fluid Mechanics	Applied Thermodynamics		
C3-14	**Productivity and Maintenance**			Heavy Equipment Productivity	Maintenance Management		
C3-15	**Mechanical Design**			Materials Mechanics	Heavy Equipment Components Design		
C3-16	**Mechatronics for Heavy Machinery**					Heavy Equipment Electronic Control	Mechatronic Control Systems
C3-17	**Diesel combustion Engines**					Internal Combustion Engines	Diesel Engines Analysis and Evaluation
C3-18	**Maintenance Managment and Reliability**					Maintenance Engineering	Heavy Equipment Management
							Condition Monitoring and Failure Analysis
C3-19	**Vehicle Mechanisms**					Mechanisms Dynamic Analysis	Vehicle Engineering