ASIIN Seal
Accreditation Report

Bachelor's and Master's Degree Programmes
Automation and Control
Electrical Power Engineering
Heat Power Engineering
Metallurgy

Provided by
Pavlodar State University, Kazakhstan

Version: 23 March 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]
Автоматизация и управление, BA	Ba Automation and Control	ASIIN, EUR-ACE® Label	n/a	02
Автоматизация и управление, MA	Ma Automation and Control	ASIIN, EUR-ACE® Label	n/a	02
Электроэнергетика, BA	Ba Electrical Power Engineering	ASIIN, EUR-ACE® Label	n/a	02
Электроэнергетика, MA	Ma Electrical Power Engineering	ASIIN, EUR-ACE® Label	n/a	02
Теплоэнергетика, BA	Ba Heat Power Engineering	ASIIN, EUR-ACE® Label	n/a	01, **02**
Теплоэнергетика, MA	Ma Heat Power Engineering	ASIIN, EUR-ACE® Label	n/a	01, **02**
Металлургия, BA	Ba Metallurgy	ASIIN, EUR-ACE® Label	n/a	05
Металлургия, MA	Ma Metallurgy	ASIIN, EUR-ACE® Label	n/a	05
Date of the contract: 05.05.2011 **Submission of the final version of the self-assessment report:** 31.10.2014 (updated ver-				

[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; TC 02 – Electrical Engineering/Information Technology; TC 05 – Physical Technologies, Materials and Processes

sion: 14.02.2016) **Date of the onsite visit:** 17./18.02.2016 **at:** Pavlodar, Kazakhstan
Peer panel: Dipl.-Phys. Philipp Dedié, c2 consulting GmbH; Prof. Dr.-Ing. Burkhard Egerer, University of Applied Sciences Nuremberg Georg Simon Ohm; Prof. Dr.-Ing. Ernst Gockenbach, Leibniz University Hannover; Anastassiya Krasnyuk, PhD-Student at Karaganda State University, Kazakhstan; Prof. Dr.-Ing. Reiner Schütt, University of Applied Sciences Westküste; Prof. Dr.-Ing. Helmut Winkel, University of Applied Sciences Cologne.
Representative of the ASIIN headquarter: Dr. Siegfried Hermes
Responsible decision-making committee: Accreditation Commission for Degree Programmes
Criteria used: European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria, as of 12.10.2010 Subject-Specific Criteria of Technical Committee 01 – Mechanical Engineering and Process Engineering as of 09.12.2011 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering and Information Technology as of 09.12.2011 Subject-Specific Criteria of Technical Committee 05 – Physical Technologies, Materials and Processes as of 09.12.2011

In order to facilitate the legibility of this document, only masculine noun forms will be used hereinafter. Any gender-specific terms used in this document apply to both women and men.

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/ unit	h) Intake rhythm & First time of offer
Automation and Control	Bachelor of Technics and Technology	n/a	6	Full time	n/a	8 Semester (Full time)	240 ECTS	Fall semester / 01.09.2004
Automation and Control	Master of Technical Sciences	Research and pedagogical direction	7	Full time	n/a	4 Semester	120 ECTS	Fall semester / 01.09.2008
Electrical Power Engineering	Bachelor of Technics and Technology	n/a	6	Full time	n/a	8 Semester (Full time)	240 ECTS	Fall semester / 01.09.2004
Electrical Power Engineering	Master of Technical Sciences	Research and pedagogical direction	7	Full time	n/a	4 Semester	120 ECTS	Fall semester / 01.09.2008
Heat Power Engineering	Bachelor of Technics and Technology	n/a	6	Full time	n/a	8 Semester (Full time)	240 ECTS	Fall semester / 01.09.2004
Heat Power Engineering	Master of Technical Sciences	Research and pedagogical direction	7	Full time	n/a	4 Semester	120 ECTS	Fall semester / 01.09.2008
Metallurgy	Bachelor of Technics and Technology	n/a	6	Full time	n/a	8 Semester (Full time)	240 ECTS	Fall semester / 01.09.2004
Metallurgy	Master of Technical Sciences Master of Technics and Technology	Research and pedagogical direction Profession-oriented direction	7	Full time	n/a	4 Semester 3 Semester	120 ECTS 90 ECTS	Fall semester / 01.09.2008

According to Self Assessment Report (SAR) the following **objectives** shall be followed by the Bachelor's degree programme Automation and Control:

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

Objective statement
Preparing graduates for the use of natural science and informational knowledge.
Preparing graduates for the application of basic engineering knowledge.
Preparing graduates for settlement and graphic works and research activities.
Preparing graduates for the calculations of processes and devices of automation systems.
Preparing graduates to use a professional approach to the work of automatic control systems
Preparing graduates for the use of communication skills, including foreign languages.
Preparing graduates for self-service and operational activities in the field of operation of automatic, automated and information systems.

Additionally, according to SAR the following **objectives** shall be followed by the Master's degree programme Automation and Control:

Objective statement
Preparing graduates for the collection and interpretation of professional information, using a foreign language.
Preparing graduates for research and teaching activities.
Deepening the personal and professional competences in the field of automation of technological processes.
Preparing graduates for the analysis of the received scientific research.

According to SAR the following **objectives** shall be followed by the Bachelor's degree programme Electrical Power Engineering:

Objective statement
Preparing graduates for the use of natural science and informational knowledge
Preparing graduates for the application of basic engineering knowledge.
Preparing graduates for the calculations and graphic works and research activities.
Preparing graduates for electrical calculations and safety in electrical installations.
Preparing graduates to use a professional approach in various fields of electric power.
Preparing graduates for the use of communication skills, including foreign languages.
Preparing graduates to design activity in various spheres of electricity.

In addition to that, the following **objectives** shall be followed by the Master's degree programme Electrical Power Engineering:

Objective statement
Preparing graduates for the collection and interpretation of professional information, using a foreign language.
Preparing graduates for research and teaching activities.
Deepening the personal and professional competences in the field of automation of technological processes.
Preparing graduates for the analysis of the received scientific research~

According to SAR the following **objectives** shall be followed by the Bachelor's degree programme Heat Power Engineering:

Objective statement
Preparing graduates for the use of natural science and informational knowledge.
Preparing graduates for the application of basic engineering knowledge.
Preparing graduates for settlement and graphic works and research activities.
Preparing graduates for the calculations of processes and devices of automation systems.
Preparing graduates to use a professional approach to the work of automatic control systems
Preparing graduates for the use of communication skills, including foreign languages.
Preparing graduates for self-service and operational activities in the field of operation of automatic, automated and information systems.

In addition to that, the following **objectives** shall be followed by the Master's degree programme Heat Power Engineering:

Objective statement
Preparing graduates for the collection and interpretation of professional information, using a foreign language.
Preparing graduates for research and teaching activities.
Deepening the personal and professional competences in the field of automation of technological processes.
Preparing graduates for the analysis of the received scientific research

According to SAR the following **objectives** shall be followed by the Bachelor's degree programme Metallurgy:

Objective statement
Preparing graduates to use scientific knowledge
Preparing graduates for the application of basic engineering and socio-economic knowledge in their professional activities.
Preparing graduates for settlement and graphic works and professional activities.
Preparing graduates for project activities.
Preparing graduates for settlement and graphic works in the following sectors of steel production: iron and steel, metallurgy, non-ferrous, rare and precious metals, pipe production technology of foundry processes

Preparing graduates for the use of communication skills, including foreign languages.
Preparing graduates for independent production and processing activities in the following sectors of steel production: ferrous metallurgy, metallurgy, non-ferrous, rare and precious metals, pipe production technology of foundry processes

Additionally, the following **objectives** shall be followed by the Master's degree programme Metallurgy:

Profession-oriented direction
Technological solutions in the metallurgy, organizational work and experimental research activity
Research and pedagogical direction
The development of knowledge, skills and competencies of graduates in scientific and pedagogical activity.

C Peer Report for the ASIIN Seal[4]

Preliminary Note:

The SAR has been revised several times over a multiyear period of time. The version being provided for the expert panels' assessment has been submitted in October 2014. By then, key data and, consequently, many figures and tables in the SAR have been outdated. Regarding that, another updated version has been send to ASIIN headquarters just two days before the audit date. Unfortunately, this new version does not consist of a short summarizing section indicating the updated information as compared to its predecessor. With regard to the mass of information gathered in that very version, the peers have not been able to properly take note of it before talking to programme coordinators and representatives of the university. This situation has burdened the onsite visit - which, after all, is an external *quality assurance procedure* - with uncertainties that could have been avoided if the update of the SAR had been delivered in due time before the audit visit.

However, the update itself has been valued as a worthwhile measure providing a more accurate picture of the actual operation of the degree programmes under consideration. Consequently, the updated version of the SAR has been used as the basis for this report. This being so, the university is requested to prepare for a detailed list of modifications concerning the updated self report vis-à-vis the previous version. Also, in order to guarantee the peers' proper understanding of tables and figures, in particular, a list of frequently used abbreviations should be supplemented.

Final assessment of the peers after the comment of the Higher Education Institution:

The short list of modifications implemented in the updated version of the SAR as compared to its older predecessor is welcomed. It is acknowledged as a confirmation of the factual basis already underlying the preliminary assessment of the peers – as stated in the paragraph above.

[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.

1. The Degree Programme: Concept, content & implementation

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

Evidence:

Objectives as well as learning outcomes of the degree programmes; see chapter B and Annexes of this report

For a mapping of the objectives and the learning outcomes of the degree programmes cf. the goal matrices in the SAR

Description of learning outcomes in the respective Diploma Supplement

Employment statistics in the SAR

Audit discussions

Preliminary assessment and analysis of the peers:

Objectives and learning outcomes of the aforementioned degree programmes have been defined in a programme specific manner, by and large. Thereby they also reflect the level of education sought for the respective Bachelor's and Master's programmes. Nevertheless, it should be noted that the objectives are, by way of copy errors, misleading in some instances. Thus, for instance, the objectives stated for the Master's programme Electrical Power Engineering are no different from those defined for the Master's programme Automation and Control. Regarding the objectives announced for the Heat Power Engineering programmes (Bachelor and Master), they are altogether identical with those for the Automation and Control programmes as well. As irritating as such copy errors are, they, at the same time, point to the fact that the programme specification of both study objectives and (though to a lesser extent) learning outcomes has been produced very often through supplementing a generic phrasing with a keyword reference to the programme or specialty like "automation", "automated (control) systems", "in the sphere of metallurgy", "in the area of...", etc.

Otherwise, it is laudable that the SAR (at least the updated version) consists of a set of learning outcomes for each degree programme sufficiently precise and specific to get an idea of the set of competences students are supposed to achieve during their studies. In this context, it should also be positively noted that the learning objectives of the degree programmes are also referred to in the respective Diploma Supplement. However, it can be observed that learning outcomes for the programmes have not been defined consist-

ently throughout the documents (SAR, Diploma Supplement). It might be assumed that the individual study plan of each student tracing back to his individual choice of electives is reflected in the enumeration of achieved competencies of the graduate in the Diploma Supplement. Indications of the programme coordinators do suggest this conclusion which in turn would explain the differences as well. But the samples of Diploma Supplements provided for inspection hardly prove evidence for this assumption. Moreover, individualizing a Diploma Supplement that way might be considered impractical for the administration of the final documents. This, in turn, could be seen somewhat different in case defined specialised study tracks are offered in a degree programme, as for instance in the Bachelor's programme Metallurgy. Referring to the SAR, four different study tracks ("learning trajectories") are identifiable (Metallurgy of ferrous metals, Metallurgy of non-ferrous, precious and rare metals, Pipe production, Foundry engineering technology). Unfortunately, neither the standard curriculum of the programme nor the exemplary Diploma Supplement concerning the programme shed light on these learning trajectories. As a general point of criticism, which will be reminded on several occasions in this report, it turns out that the specification and data in the SAR and its annexes, for instance with a view to the number of ECTS credit points, compulsory and mandatory modules, names of modules etc. are inconsistent in numerous cases which makes it difficult to receive an accurate impression of the actual study conditions and content of the programmes. As this might at least partly be attributed to an inappropriate English translation, it is nevertheless suggested to carefully check this information in major study-related documents and on the internet, and correct inconsistencies, if necessary.

Peers noted that, in principle, the learning objectives are equivalent the exemplary learning outcomes described in the respective ASIIN Subject-Specific Criteria (SSC). Thereby, relevant SSC for the Automation and Control programmes as well as for the Electrical Power Engineering programmes are the SSC of the Technical Committee 02 - Electrical Engineering and Information Technology. In case of the Heat Power Engineering programmes, the SSC of the Technical Committee 01 - Mechanical Engineering and Process Technology are considered supplementary. Concerning the Metallurgy programmes, the SSC of the Technical Committee 05 - Physical Technologies, Materials and Procedures are appropriate. Crossing the boundaries of Technical Committees, the mentioned SSC do have in common certain major engineering competencies in the field of engineering knowledge and understanding, engineering analysis, engineering design, engineering practice as well as so-called transferable skills. Regarding the stated learning objectives (see chapter Annex of this report), the different above mentioned categories of engineering competences have clearly been addressed by one or more of the learning outcomes at the respective Bachelor's or Master's level of qualification. Thus for instance, methodo-

logical and analytical competencies are referred to in Outcomes 3 and 4 of the Bachelor's programmes Automation and Control, Electrical Power Engineering and Heat Power Engineering respectively in the Outcomes 4, 5 and 7 in the Metallurgy Bachelor's programme, and comparable competencies at the Master level are observed in Outcome 2 of the Master's programme Automation and Control, Electrical Power Engineering and Heat Power Engineering respectively Outcomes 8 and 9 of the Metallurgy Master's programme. Along the lines of this, a similar observation can be made with respect to the other categories of engineering competencies. In particular, transferable skills like awareness of ethical issues of the engineering profession have been taken into account in the competence profiles (see, for instance, Outcomes 2 and 6 of the Bachelor's degree programmes Automation and Control, Electrical Power Engineering, Heat Power Engineering or Outcome 3 of the Bachelor's programme Metallurgy respectively).

As peers have been told, general information about the programmes (as, for instance, the study objectives and learning outcomes, the standard curriculum) etc. are available for interested parties on the internet. All information concerning the individual student (like individual study plan, examination achievements etc.) can be traced in the intranet only.

Programme coordinators convincingly proposed that the objectives and intended learning outcomes of the programmes are a frequent issue in meetings with the management of relevant (regional-based) companies, which reportedly take place once a year. These discussions with industry representatives are also said to be helpful in bringing the curricular content in accordance with the demands of the industry and therewith the job market. In addition to that, a structured feedback system between the university and the companies appears to be effectively closed through a questionnaire requesting employers to assess the graduates' qualification for their professional tasks. Thus, along with the students input (in the internal evaluation process, particularly) the companies as a major stakeholder of the qualification process are visibly involved in the process of defining and monitoring the study objectives and learning outcomes of the programmes under review. Principally, the employment rates that have been presented in the SAR seem to bolster this assumption.

In sum, study objectives and learning outcomes have been defined satisfactorily and properly included in the Diploma Supplement. However, inconsistencies in the formulation of the objectives and intended learning outcomes should be resolved, at least if they are not just different wording.

Criterion 1.2 Name of the degree programme

Evidence:

Names of the degree programmes according to the SAR and the related documents in the annexes (standard curriculum and module handbook, in particular)

Correspondent governmental regulations and standards referred to in the SAR (mainly: SES RK (State Educational Standards of the Republic of Kazakhstan) 5.04.019 - 2011. Higher Education. Undergraduate. (Bachelor degree course). Basic provisions; SES RK 5.04.033 - 2011. Postgraduate education. Graduate (Master degree course). Basic provisions; State program of education development of RK for 2011-2020, Higher Education SES (Government Resolution № 1080 of 23.08.2012)

Preliminary assessment and analysis of the peers:

From the peers' point of view, there is no objection whatsoever to the name of the respective degree programmes. Thus, the denomination of the programmes can be considered as properly reflecting the learning objectives as well as the curricular content of the degree programmes.

Criterion 1.3 Curriculum

Evidence:

Study plan for each programme in the SAR, comprising information about the distribution of modules/courses and student workload per semester (measured in ECTS credit points)

Module matrices illustrating how the different learning outcomes of each study programme shall be acquired in the course of the studies

Module descriptions demonstrating the learning outcomes and content of module

Inspection of laboratories during the onsite visit

Audit discussions

Preliminary assessment and analysis of the peers:

All in all, peers concluded from the study plans and the module descriptions that the proposed learning outcomes for the Bachelor's and Master's programmes could be achieved and in that sense realistically reflect the level of qualification sought at the Bachelor and Master level of the programmes under review. In particular, the engineering-related

competences in the area of knowledge and understanding, methodology and analysis, design, product development and practice, but also transferable skills such as presentation skills, the competence to work well in a team, sense of responsibility etc. are, in principle, plausibly assigned in the respective objectives matrices. That is to say that the content of the modules generally fits the needs of the competences defined for it - a conclusion which is supported by the assent of both students and graduates of the programmes.

Students and graduates consonantly assess that the programmes provide a very sound knowledge of natural sciences and engineering fundamentals. Up to 10% of the elective modules which are at the disposal of the university might be subject to changes annually, according to reports of graduates. Not least, such modifications are obviously used in order to adjust curricula to the needs of the industry and the demands of technological developments.

Regarding the part-time version of the Bachelor programmes, students obviously are supposed to follow a shortened curriculum upon the assumption that they are already holders of a higher education diploma. Since the SAR does not entail any further information about the curricula of the respective part-time study mode, the university is requested to provide, inter alia, a short description or graphic illustration of the curriculum of the part-time version of the Bachelor programmes.

On request, the peers learned that matters of company law, law of contracts and safety law are for the most part treated within the framework of related technical modules of the respective degree programmes. Regarding its proper understanding and use, this is highly appreciable from a didactical point of view.

During their onsite inspection of laboratories which are used in the different degree programmes and particularly in the Bachelor programmes, the expert panel received the impression that students are hardly trained to make practical use of their theoretical engineering knowledge. This applies for the laboratories in the universities and also for those in the companies students are made familiar with and have access to. Yet, while it may be understandable that opportunities of students to practice costly laboratory equipment are strictly restrained in the companies, it is not at all with respect to the narrow scope of experimental experiences students gather during their laboratory units at the university. Primarily these units should be designed to allow for a better comprehension of theoretical knowledge and to get an idea of its practical use in solving realistic engineering-related tasks. This needs to be stressed the more so, since the programmes, at both the Bachelor and Master level, explicitly aim at a *professional qualification* of the graduates. The laboratory work of students therefore must be reorganized in a manner that allows students to acquire those practical competences they need for their professional activity

(for instance, by a design of experiments that serves the needs of both profession orientation and the demands of the engineering qualification).

Criterion 1.4 Admission requirements

Evidence:

Description of admission requirements in the SAR

Reference to the national orders and resolutions governing the admission process (here: Order № 638 dated by 19.12.2007 "On approval of the standard rules of admission to the organization of education, realizing professional education programs of the high education (with alterations and amendments, dated by 30.05.2011)" for the Bachelor's degree programmes; Government Resolution № 109 of 19.01.2012, "Model Rules of admission to the organization of education, realizing professional education programs of postgraduate education" for the Master's degree programmes)

Number of students for the academic years 2010 - 2015 (according to the tables 1.2 and 1.3 of the SAR)

Audit discussions

Preliminary assessment and analysis of the peers:

The expected intake of the programmes depends on the state grants the Kazakh Ministry for Education and Science allocates annually. Additionally, students can enroll on a self-paid basis with the fees measured at a comparable level like the state grants. Discounts for supporting special social situations are available, too.

Peers noticed that the admission to the Bachelor programmes does, principally, depend on passing one of two entrance examination tests ("Unified national testing" or "complex testing"). According to the SAR, either of them refers to four major subjects (Kazakh or Russian Language, Kazakh History, Mathematics, and Physics). In case of the Master programmes, it is rather unusual that the successful completion of a Bachelor's degree in the discipline is considered a necessary but at the same time not sufficient prerequisite for admission to even a Master programme in the same discipline. Here too, applicants are admitted after passing an entrance examination consisting of an examination in one foreign language and, additionally, an examination in the disciplinary specialty.

The discussion with students and graduates did not raise any doubts that they are well aware of the admission requirements. Moreover, with a view to the achievement of the

intended learning outcomes, the established and highly formalized test procedures seem to be reasonable and adequate in ensuring that applicants have the skills and competences to meet the demands of the study and learning objectives.

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

This criterion is considered as *not yet fulfilled satisfactorily*.

It is appreciable that the HEI – on request of the peers – has delivered additional information about the part-time version of the Bachelor programmes. In particular, the attached curricula for the part-time students are considered informative by, inter alia, providing information about the volume of the part-time version in terms of ECTS credit points, the disciplinary content and distribution of modules per semester, the assumed students' workload per semester. However, it still appears difficult to understand from the available information whether part-time students do effectively study a reduced programme and, more to the point, whether they do that in a *part-time* mode. It rather seems that the foreseen workload does not differ at all from the full-time mode of study, thus leading to the assumption that the difference most likely is a reduction of the *overall programme size* in combination with certain didactical elements (e.g. E-Learning / Blended Learning and Study Letter-didactical instruments respectively). Since no detailed assessment of the part-time programmes could have been made during the onsite visit, and since the available information is still insufficient to thoroughly assess this study offer, the peers deem it appropriate to abstain from a final assessment and a recommendation regarding the accreditation of the part-time version of the Bachelor programmes. Henceforward they will focus on the *full-time study programmes* only. Nevertheless, with reference to the reported numbers of part-time students, the peers acknowledge the importance of this offer for the regional and national job market and principally support its offer by the university.

As has been argued above, it is perceived to be necessary that the students' professional competences are significantly strengthened through an adequate reorganisation of the laboratory units in the university. For this purpose, the peers suggest issuing a requirement pertaining to all study programmes under consideration (*see below, chapter F, requirement 1*).

Concerning the inconsistencies of module/course titles and other study-related information presented in the SAR and official study documents, it is strongly suggested to check whether these are due to translation errors. Russian, Kazakh and English versions of

the relevant information need to be consistent. The peers propose to address this issue in a recommendation (*see below, chapter F, recommendation 1*).

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

Study plan for each programme in the SAR, comprising information about the distribution of modules/courses and student workload per semester (measured in ECTS credit points)

Standard curriculum for each degree programme, comprising information about the allocation of Kazakh national credit points to the modules/courses

Module matrices illustrating how the different learning outcomes of each study programme shall be acquired in the course of the studies

Module descriptions demonstrating the learning outcomes and content of module

Rules and regulations governing the process of academic mobility of both students and teaching staff (according to the SAR, p. 126)

Statistical Data about academic mobility in the degree programmes under review (provided in the SAR, p. 71)

Audit discussions

Preliminary assessment and analysis of the peers:

At a first glance, the degree programmes appear to be modularized in a manner which could be characterized as combining teaching and learning units along the line of their discipline-related connectivity. However, at least the English version of the module / course title do vary significantly between the study plans provided in the SAR, the standard curricula and the module descriptions or the module handbook, respectively, which makes it very difficult for the expert panel to identify the modules. It is assumed that these differences are, in the first instance, caused by the translation. Nevertheless, it should be ensured that the inconsistencies are not paralleled in the original Kazakh/Russian version of the naming of modules/courses. In some instances, as for instance concerning the module *Mathematics and Natural Science 2* in the Bachelor programme Metallurgy, the module name directly follows from this generic mode of merging

courses into modules, thus appearing mistakable, since this module does not contain any mathematical content, but rather comprises of the learning units *Physics* and *Chemistry*.

This example of course turns out to be part of a general problem when looking at the concept of modularization adapted by the university. As peers have been told during the onsite-discussion, the concept of modules has been generally understood and carried out as assembling subject-specific courses which could be considered closely related thematically. Thus, to state just one example, the module *Mathematics and Natural Science 1* in the Bachelor programme Metallurgy consists of the courses *Mathematics* and *Physics* according to the respective module description. But referring to the standard curriculum or to the study plan for that programme, there is no such module at all. Rather the mentioned courses *Mathematics* and *Physics* are listed in the standard curriculum, and the related learning units *Mathematics* and *Physics* are illustrated in the respective study plan. Irrespective of inconsistent information about the planned semester of carrying through these courses, it seems that the main point of reference for both students and teaching staff are the courses ("disciplines"), but not modules. This might also be explanatory for the fact that at least in some cases, like the mentioned module *Mathematics and Natural Science 1 and 2* , the overall module consists of parts which are heterogeneous and disparate in content and, consequently, dealt with in separate examinations according to the indication in the respective standard curriculum and study plan, respectively.[5]

However, again, the information regarding the interrelation of courses and their integration in modules, as reflected in the number and extent of examinations, for instance, is inconsistent at best. The expert panel receives the impression that the Bologna concept of modularization as well as the European Credit Transfer System have been superimposed on the nationwide regulated standard curricula and fixed national credit point system for each curriculum's disciplinary content.[6] Thus, the peers consider it necessary that a consistent concept of modules is used throughout all study-related documents (e.g. study plan, module descriptions, standard curriculum), in order to provide for coherent information of both students and teaching staff. Modules should be designed as comprehensive teaching and learning units throughout. In would not be sufficient to formally adjust standard curricula to the requirements of a modularization concept that fits the

[5] For other examples of this kind see modules *Bilingual preparation*, *Expert lingual preparation*, *Economics and Legal Literacy*, *Metallurgical Process Theory* (including Chemistry and colloid Chemistry), *General Engineering Education 1 and 2*, *Theory and Technology of Metallurgical Processes*, *Designing Metallurgical Objects* etc. in the Bachelor programme Metallurgy.

[6] The discussion between the audit team and the responsible staff for university- and programme-management shows that the programmes covered by this report are carried out as "specialities" according to the Kazakh governmental education plan. Autonomy in programme development therefore is more or less limited to elective courses, which can be chosen by students as individual trajectories.

Bologna standard, but continue to proceed in practice along the line of the traditionally prescribed curricula. The standard curricula should reflect the restructuring of the curriculum design and a credit point system that primarily focuses at the students' workload, as well.

Although the ultimate concept of modules remains to be unclear, the sequence of modules/courses with respect to their interdependency and logical progression seems to be plausible, all in all. Moreover it can be positively noted that, apart from the mandatory components of each study programme (so-called "General Compulsory modules" or "Compulsory modules for specialty", respectively), students do have the chance to elect a major number of disciplinary-related modules out of catalogues of modules offered by their faculty or other faculties for the Bachelor's and Master's degree programmes alike. This gives students the opportunity to establish their individual curriculum and thereby follow individual disciplinary interests. Adding to this, it is also acknowledgeable that, reportedly, up to 30% of optional modules in any curriculum might be substituted in a year. And the committee in charge of this revision of the curriculum in the electives' field embraces the teaching staff, representatives of industry and master students, thereby ensuring that not only the most interested stakeholders are involved, but also that the curriculum is kept up-to-date in terms of technological, didactical and other demands on a routing basis.

It is laudable that students are effectively supported in setting up their individual study plan by means of academic advisors (academic tutors of students) as well as a comprehensive information system using, inter alia, distance learning technologies, e-mail and videoconferences students. The twofold counselling and approval procedure for the individual curriculum (counselling by academic advisors and approval by the dean) is considered a reasonable measure to ensure that meaningful individual study plans are developed and followed by the student. The process of defining and establishing each curriculum, which is regulated by the ministry extensively, otherwise guarantees reliable and comparable disciplinary curricula in the higher education institutions (HEI) all over the country.

Due to this regulated market of academic degree programmes, it is very plausible that academic mobility, at least within a specialty - say, for instance "Automation and Control" or "Metallurgy" - does not raise any specific problems, in principle. The academic achievements acquired at university A in a Bachelor programme Metallurgy shall be eligible for recognition in the correspondent Bachelor programme at university B and vice versa. However, the university also claims to foster and support the exchange of students and teaching staff abroad. With respect to the audit discussions it appears that student exchange already depends on a learning agreement between the student and the univer-

sity, arranged with the teaching staff and operated largely by the "Center of Academic Mobility". The procedure is said to be regulated by various orders and provisions which are named in the SAR, but not yet presented in the annexes. In order to get a more precise picture of the actual code of practice of recognition of achievements acquired at other universities, the expert panel asks for either an English translation of the appropriate provisions or a translation of the most important rules governing the process of recognition of academic achievements.

Since internationalization is an outspoken objective in the strategic outlook of the university's policies and, consequently, integrated in the "objective statement" for each degree programme, which - broadly speaking - covers the programmes profile as observed from perspective of the curricular input, it is evident, that the students' and teaching staffs' foreign language skills (particularly English language skills) are the most decisive factor of its successful implementation. As to that, it is noticeable that relatively voluminous foreign language courses are part of the curriculum of both the Bachelor and the Master programmes. However, regarding the verifiable English language skills the expert panel came to the conclusion that the already existing offers to improve these skills could be used more effectively, for instance by means of encouraging students to make use of these offers through appropriate incentives. In a sense this corresponds with the statistical evidence about the mobility of students over the past five years-period which could be described as modest, at best.

Language skills are the most important precondition for any kind of "internationalization" of a university to take place. Based on this prerequisite, a viable international exchange of students (and teaching staff) depends on an appropriate cooperation network of the HEI. In this regard, it is noticed that the university is already involved in long-term cooperation with a number of neighbouring countries. Still, with regard to the international scale the engagement could be fostered, aiming to encompass more HEIs of the Western hemisphere as well. Consequently, it is considered commendable to enhance international cooperation in the proper sense of the word in order to facilitate student and teacher exchange and thus to improve the quality of the programmes.

The practical, profession-oriented components of the degree programmes are considered another major strength of the degree programmes. It is well received that the university closely cooperates particularly with regional companies in the respective fields of the degree programmes. Though differing in name and the exact ECTS credit point load (somewhat between 20 and 26 ECTS credit points), the workplace internship figures as an important element in the curriculum of the Bachelor's degree programmes as well as the profession-oriented type of the Master's degree programme Metallurgy. Integrated in the curriculum on an iterative basis, as it is, the workplace internship can be regarded as a

meaningful instrument of a reasonable combination of theoretical and practical learning and teaching. It is also acknowledged that the internship is duly regulated by the university, supervised by teaching staff of the university as well as supervisors in the companies, and prepared with a view to the specification of engineering tasks students shall fulfil during the internship and the report they are expected to elaborate about their work experience.

In the Bachelor programmes, the university offers a part-time mode of the programmes besides the full time version. The audit talks brought to light that the part-time version is essentially a form of distance learning whose technological infrastructure the university has taken great efforts to build in order to meet the requirements of an increasingly borderless educational landscape and the growing demands of flexibility in the job market. However, the peers found that the information on the structure and organisation of the study course, the conduct of examinations, the didactical concept, the number of students studying in the distance learning mode and the pro rata workload expectations remains largely unclear and imprecise. Therefore, they ask the programme coordinators for a brief description of the organization, didactical concept (e.g. E-learning material), assumed teaching load, and number of students in the part-time version of the Bachelor programmes.

Criterion 2.2 Work load and credits

Evidence:

Study plan for each programme in the SAR, comprising information about the distribution of modules/courses and student workload per semester (measured in ECTS credit points)

Module descriptions containing information about the student's workload in the respective module/course and allocated ECTS credit points

Standard curriculum for each degree programme, comprising information about the allocation of Kazakh national credit points to the modules/courses

Audit discussions

Preliminary assessment and analysis of the peers:

The university has in the first instance put in place a Kazakh national credit point system, attuned primarily to the attendance time of students during their studies. In the course of Kazakhstan's accession to the Bologna Area, the university has adapted the ECTS credit

point system in order to also adequately account for the student's self study time per module/course and per semester. According to the information in the SAR, the average workload of students per semester in both the Bachelor's and the Master's degree programmes total to 30 ECTS credit points. The size of the courses ("disciplines") which are the de facto reference units (as opposed to the "modules" which comprise two or more thematically interrelated "disciplines") for the most part varies between 3 ECTS credit points and 9 credit points, with the (rare) exception of some courses counting less than 3 ECTS credit points and also some courses, particularly so-called pre-graduation internships in the Bachelor programmes and scientific research courses in the Master programmes, awarded 10 or more ECTS credit points. Basically, 1 credit point seems to be calculated with a student workload of 30 hours. However, in many cases this principle - if rightly assumed - has not been correctly applied in the module descriptions. It is dispensed here with naming exemplary modules/disciplines for incorrect ECTS credit point numbers, because inconsistencies of that kind occur throughout the module descriptions of all degree programmes and thus need not to be highlighted exemplary. Consequently, module descriptions need to be revised with respect to this deficit.

Obviously, there is no fixed conversion factor for Kazakh national credit points to be transferred into ECTS credit points, although a factor of 1.5 to 1.6 is apparently predominant. This leaves room for the individual assessment of the actual student workload, thereby taking into account the complexity of the respective disciplinary content. Consequently, the same amount of Kazakh credit points could result in a different number of ECTS credit points and vice versa, depending on the course content. However, the principle governing the allocation and distribution of ECTS credit points vis-à-vis Kazakh national credit points should be made transparent to all stakeholders (especially in the framework of the Diploma Supplement where both figures are specified). Moreover, the ECTS credit point system needs to be used in a consistent manner in all study-related documents, and in doing so any mixing with the Kazakh credit point system should be avoided.

Neither the SAR nor the audit discussions provide any evidence that the allocation of ECTS credit points is monitored and adjusted, if necessary. Otherwise, only the span of Kazakh national credit points is broadly fixed by the ministry with regard to the compulsory and optional modules. Due to this, the allocation of ECTS credit points might be subject to change, if evaluation results, for instance, should require so. Therefore, it is principally considered commendable establishing mechanisms or processes to monitor the students' workload, and to take appropriate actions in case of significant discrepancies between the calculated workload and the evidence.

Beforehand, it appears to be necessary to make students more familiar with the ECTS credit point system and its underlying focus on student workload assessment. Significant-

ly, the discussion with students provided little evidence that they are able to realistically evaluate their actual workload which could be unexpected, since they are not used to it. Thus, the university should take appropriate measures so as to raise the students awareness of the differences between the Kazakh national and the ECTS credit point system and the student workload focus of the latter.

Criterion 2.3 Teaching methodology

Evidence:

Respective chapter in the SAR

Module descriptions providing some information about the forms of teaching and learning

Audit discussions

Preliminary assessment and analysis of the peers:

The expert panel found that the teaching methods and instruments used are generally supportive for the students' achievement of the intended learning outcomes. Academic staff seems very motivated and eager to professionally instruct, teach and lecture the students. At least, it could be derived from the previously illustrated relation between the Kazakh credit point system and the workload-centered ECTS, that the combination of attendance-based learning and self-study might be suitably balanced to also support students in achieving the learning outcomes of the degree programmes. This might precisely be the case, because there is no pre-defined conversion of Kazakh credit points in ECTS credit points. Irrespective of this possible outcome, it could be proved valid only, if the allocation of ECTS credit points evidently stands the test of time. This is another reason why peers suggest taking appropriate measures or establishing suitable processes for monitoring and adjusting workload allocation.

Reportedly, the differentiation in the SAR and the module descriptions between "practical lessons" on the one side and "lections and laboratory lessons" on the other refers to the fact that laboratory work is conducted individually with methodological instructions by a teacher, while practical assignments are worked on in small groups of two or three students. The peers concluded from the curricula and the module descriptions of the Bachelor's degree programmes that teaching and learning modes conducive to students' presentation skills are small at best. This counts in particular for subject-related project work that offers broad opportunities for students not only to elaborate on their presentation skills but more generally to acquire project management and team competences as well. The expert panel therefore suggests improving the Bachelor students' presentation

and project management skills in the framework of subject-related project work. As to the Master's degree programmes, the peers were told that the Scientific Research courses during the study semesters (with the exception of the Master thesis in the final semester) give ample opportunities to solve more complex engineering tasks within the scope of a student team

As has been discussed already, there is no information whatsoever in the module descriptions and hardly any in the SAR concerning the specific teaching and learning environment of the distance learning students in the part-time mode of the Bachelor programmes. Programme coordinators are requested to provide a short description of the study conditions of this type of Bachelor programmes, including a comment on how interested parties are informed about the characteristics of this study type.

Criterion 2.4 Support and assistance

Evidence:

Relevant chapter in the SAR

Audit discussions

Preliminary assessment and analysis of the peers:

It could be concluded from the information available that there are sufficient resources to provide individual assistance, advice and support for all students. Each student has his own personal academic advisor (mostly assistant professors). Students seem very content with the teacher-student ratio and relationship, depicting an open atmosphere. Furthermore, students benefit from the personalized online system that provides them with all relevant information and supports the students in achieving the learning outcomes within the scheduled time.

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

This criterion is considered *partially fulfilled*.

As the peers have pointed out in their preliminary assessment, one of the most urgent tasks of the university is to clarify and consistently apply its concept of *modules*. Modules should be designed in accordance with the Bologna-inspired meaning of that concept and accurately differentiated against "courses" or "disciplines" in the more traditional sense of curriculum terminology. Modules in this sense are thematically coherent and self-

contained learning units which might – though not necessarily need to – encompass several sub-units of teaching and learning (lectures, exercises and labs, for instance). They should be treated as reference point of the curriculum, of the description of learning outcomes, of the schedule of examinations etc. The related wording and modularization concept must be consistent and comprehendible for both students and teachers. For reasons which have been explained in more detail in the respective chapters above, the peers consider a requirement to this end necessary (*see below, chapter F, requirement 2*).

The university's efforts and measures to encourage students to spend a study period abroad are highly appreciated, as stated earlier in this report. Along with their statement on the audit report, the programme coordinators provided a translation of the main rules governing the recognition of academic achievements acquired at other HEIs, both within and outside from Kazakhstan. These rules largely resemble the peers' assumption that the recognition procedure is based on learning agreements between the student and the home university regarding the content, learning outcomes and credit numbers of respective disciplines. Thus, they seem to be generally fitting the provisions of the Lisbon Convention, though setting an upper quantitative limit to the possible eligibility of courses for recognition does not directly accord with the logic of recognition as implemented in the Lisbon Convention. Otherwise, this kind of limitation is inherently understandable and discussed in other member states of the Bologna process as well (Germany, for instance). In sum, the said rules appear to be reasonable and acceptable; there is no further need for action.

The HEI has plausibly demonstrated that it is pursuing a strategy of deepening the internationalization of teaching and learning. Intensive foreign-language modules in the curricula of the study programmes as well as guest professors of international universities visiting the HEI on a regular basis and teaching staff participating in foreign exchange activities do contribute to the further development of the disciplinary competences and the foreign language skills of both the students and the teaching staff. However, the peers received the impression that at least the English language skills of students could be improved. Consequently, a recommendation is proposed spurring the HEI's efforts in that direction (*see below, chapter F, recommendation 2*).

As foreign language skills are a paramount precondition for any internationalisation policy to come into effect, an intensified exchange of both students and teaching staff, in turn, will contribute to improving those competences. The peers strongly support such a development which presumably will also be conducive to the quality development of the study programmes under review in general (*see below, chapter F, recommendation 3*).

The peers take note of the rules applying to the Kazakh credit point system and its relation to the ECTS credit point system; they appreciate having been equipped with an English translation of those rules in the meantime. Obviously, the relevant provisions in the "Regulation on credit transfer for the ECTS type in S. Toraighyrov Pavlodar State University" confirm the peers' preliminary analysis of the parallel use of the two systems and, in particular, the conversion of Kazakh credit points into ECTS credit points. This is to say that, principally, the university has the necessary means to consistently deal with and demonstrate the use of the ECTS credit point system. However, as asserted previously, a series of related inconsistencies could be identified in the study documents. Accordingly, the peers consider it necessary that the HEI ensures a consistent application of the ECTS credit point system throughout all study-related documents (*see below, chapter F, requirement 3*).

During the audit talks peers also observed that the students' are poorly aware of the ECTS, its purpose and its application. Consequently, they recommend intensifying the efforts of the HEI to make students more familiar with this Bologna instrument. Thus, the focus of the learner/student perspective implied in calculating and measuring the student workload could effectively be brought to the forefront (*see below, chapter F, recommendation 4*). In this context, the expert panel emphatically states that the use of a credit point system as a measuring instrument for the student workload ought not to be an end in itself. In effect, it should be implemented to measure the workload on a regular basis and make appropriate adaptations, if necessary. The peers did not yet observe the university proceeding accordingly in the study programmes under consideration. Practicing particularly the ECTS credit point system as a quality assurance instrument in such manner is therefore regarded as an urgent need (*see below, chapter F, requirement 4*).

As stated in the preliminary assessment, the peers found that the students' presentation skills and project management as well as team competences should be enlarged through appropriate means in the medium term. They therefore confirm a recommendation for this purpose (*see below, chapter F, recommendation 8*).

As to the part-time version of the Bachelor's study programmes it has been stated previously (see final assessment concerning criterion 1), that the peers waive a recommendation on the accreditation of this peculiar study mode because the information retrieved from the SAR, the audit discussions and the additional material of the university in its statement on the audit report does not allow for an examination that meets the applied accreditation standards.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

Standard Curriculum, module descriptions and study plans of the degree programmes, each providing information about the examinations of modules / courses („disciplines“)

“Rules of organization and control of the educational achievements of students in the S.Toraighyrov Pavlodar State University”, 2013

Respective chapter in the SAR

Onsite inspection of exemplary (final) examinations as well as graduate works (Bachelor’s and Master’s) theses

Audit discussions

Preliminary assessment and analysis of the peers:

The threefold assessment procedure, encompassing a continued monitoring of students’ achievements during the semester (“everyday control”), students’ knowledge assessment after studying specific disciplinary topics (“rating control”) and eventually the final assessment students’ knowledge and competences in a module, spans over the semester and in doing this principally ensures a close monitoring of the students’ study progress. As peers were told during the onsite talks, the form of the different assessments, in particular the final assessment, is not regulated in advance, but decided on internally before commencing each individual learning unit in accordance with the intended learning outcomes of the lecture / practical lesson / laboratory lesson. Consequently, neither the module descriptions nor the study plans do provide authoritative and consistent information about the examination method and its correspondence with the respective learning objectives. Moreover, the module descriptions are particularly imprecise in this regard, since, for one thing, the final assessment is addressed only, and for another, no reference is made to the fact that modules spanning over two or even more semesters normally would comprise more than one final assessment. “Disciplines” or courses are, on a regular basis, completed in one semester which does not necessarily count for “modules” too, especially when these are composed of two or more courses ranging over two or more semesters. This could be traced - as has been discussed earlier in this report - to a concept of modules as “container” of thematically interrelated courses.

Thus, in accordance with a clarification of the reference unit of its “modularization”, the “module” descriptions will also have to be revised with a view to the information about the assessment method. Additionally, depending on this clarification each module description should comprise some information on how the examination mark is calculated. As to this, it could be inferred from the SAR and the explanations of programme coordinators that the module mark consists of 60% of the continued assessment during the semester and 40% of the final attestation.

However, as a rule students are informed about the examination schedule, examiners as well as the form of examination at the beginning of the semester in the so-called Syllabus that is accessible for students on the internet. Although the total amount of examinations and testing, including assessments during the semester, appears to be rather high, the number and intensity of (final) examinations (6 - 8 exams on average in a relatively short examination period of 1 to 2 weeks) could be judged reasonable - an assessment the students have agreed with during the onsite visit. This is understandable when seen against the background that the continued monitoring of their study progress during the semester is actually considered by the students as a formidable preparation for the final examinations.

In general, the conception and organisation of exams is thus considered adequate to assess the academic achievements of students in a competence-oriented manner. On request, peers are also told that examiners and lecturers of subject-specific courses would be different persons, though exam items and questions would be defined by the lecturers. As this is primarily labelled as precautionary against any form of corruptive behaviour, it might be considered contributing to a more consistent and impartial assessment of the students’ achievements.

Every study programme has a final thesis, and the peers could inspect the topics of the theses, mostly written in Russian or Kazakh. Final theses in industry are also possible and supervised from teaching staff from the faculty. Peers learned that, usually, students choose their supervisors from the academic staff of the faculty when finishing the third year of the bachelor’s programmes. As for the onsite inspection of exemplary examinations and Bachelor and Master theses, the peers got the impression that they generally could be regarded as proof of evidence that the intended learning outcomes can be acquired at the Bachelor’s and Master’s level, respectively - some noticeable fluctuation in the quality of the sample of works notwithstanding.

In this context the well-founded organization and set-up of the Bachelor thesis should be positively highlighted.

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

The peers considered this criterion to be *fully met* by the HEI.

4. Resources

Criterion 4.1 Staff

Evidence:

Respective chapter in the SAR

Staff handbooks for the study degree programmes

Activities concerning the further development and training of teaching staff in the period between 2010 and 2015 (Annexes M, N, O, P)

Audit discussions

Preliminary assessment and analysis of the peers:

Generally, the peers consider the available staff resources of the involved departments sufficient, quantitatively and qualitatively, to sustain the degree programmes and provide assistance and advice to the students as well as to attend to administrative tasks. The students' favourable assessment of the academic and professional competence of the teaching staff has been appreciated by the expert panel. Concerning the structure of the age distribution between elder and younger staff personnel which is significant per se, programme coordinators argued plausibly that the successive build-up of degree programmes in combination with the requirement of a PhD-degree to gain a professorship led to the actual age structure in the teaching staff.

The staff workload seems to be adequate, while the panel is missing an overview in form of a teaching load matrix. Academic teaching load is, following the interviews, around 650 hours/year (ca. 20 hours/week). Administrative tasks are also fulfilled by staff as well as assisting and advising the students personally. And extra-hours for research work are to be added to that. In order to get a more complete picture of the individual staff workload, the expert panel requests the submission of a teaching load matrix for the departments involved (including Kazakh/Russian teaching hours and additional teaching load for part-time BA programmes).

It is well recognized that the university has been continuously striving for recruiting experts from abroad, mainly for the purpose of fostering the professional development of

its own teaching staff. However, it is also very clear from the information available that the university makes only limited use of external or international expertise for its recruitment of teaching staff, if at all. Thus, in order to avoid a sort of "inbreeding" of its teaching staff and also to open up the degree programmes, in particular the master programmes, for the latest technological and research developments, it is considered commendable integrating external/international expertise in the university's recruitment strategy to a greater extent.

Criterion 4.2 Staff development

Evidence:

Respective chapter in the SAR

Activities concerning the further development and training of teaching staff in the period between 2010 and 2015 (Annexes M, N, O, P)

Audit discussions

Preliminary assessment and analysis of the peers:

The HEI plausibly demonstrates and provides evidence that the staff development is planned and carried through, inter alia, with support of the national programme Bolashak. So every two years a professor can leave for one to four months on a stipend, the salary being paid and the position at the HEI being secured. Since some of the teaching staff is still working on its PhD, it is possible for them to take off one semester to finish their PhD thesis. However, as can be derived from the departments' reports, the respective activities are to a significant degree restrained to an exchange with Russian universities or HEIs of other neighbouring countries. Thus, although peers positively recognized the efforts with regard to the academic and professional development, they at the same time encourage the university to even strengthen and broaden them with a more international scope.

As a major obstacle to international pursuit of academic profiling, the peers analyze the inadequate command of the English language; very few members of academic staff speak or read English on a more than basic level. That is particularly problematic in view of staying informed of current international developments in subject-specific fields. Thus, it is deemed highly important for the teaching staff to more intensively use already existing offers of advice and assistance in oral and written English, especially with regard to publi-

cations in international journals, presentations at international conferences and international professional competition.

On the other hand, peers appreciate that young professors, in particular, are supported by a mentoring programme and that there are seminars on educational methods available where staff can obtain certificates on their pedagogical competences.

Criterion 4.3 Funds and equipment

Evidence:

Respective chapter of the SAR

Library and lab inspections during the onsite visit

Audit discussions

Preliminary assessment and analysis of the peers:

Asking for the programmes' finances the coordinators report that the governmental funding is limited and does not cover the expenses for all required equipment. The students' fees do not cover expenditures sufficiently, either, especially since student numbers are (more or less sharply) declining and many students study on a grant. The HEI reacts by cutting costs (decreasing business trips, lowering the staff bonus and others) and increasing marketing activities.

The programme coordinators' note notwithstanding that there has been a build-up and modernization of the laboratory equipment in response to past accreditation procedures, peers got the impression that the laboratories generally are below the European standard level. They miss a specific up-to-date laboratory environment and equipment for research. With regard to educational research purposes the panel sees the existence and usability of well-equipped research laboratories as necessary in order to introduce students to state-of-the-art technologies – as well as enable them and the academic staff to conduct research. This is especially true for the Bachelor and Master programmes Automation and Control as well as Bachelor and Master programmes Metallurgy. Consequently, from the peers' point of view, it is indispensable that the Automation and Control Department develops and executes a schedule for the modernization of the required laboratory equipment in the university. Similarly, the expert panel considers it necessary that the Metallurgy Department develops and executes a time table for the acquisition of relevant basic equipment for metallography (e.g. cutting machine, grinding machine, polishing machine, metallurgical microscopes, scanning electron microscope). Concerning the

Metallurgy degree programmes, the peers additionally suggest replacing the tensile test equipment in the long run.

With regard to the quality of the programmes in the sense of the achieved learning outcomes of graduates, the departments' research capabilities do matter. And these capabilities largely depend on the suitability of the laboratory infrastructure for research purposes in both the educational and the primarily scientific dimension. Up-to-date laboratory equipment is therefore considered a precondition for any enlargement of the research basis and activities of the departments. The latter, in turn, is seen as recommendable in order to raise the quality of the study programmes.

The close co-operation with regional companies representing those professional branches which are relevant for the programmes under review has been positively acknowledged already. In the audit discussions, representatives of the university emphasized the engagement of the companies in the (further) development and conduct of the degree programmes, in particular concerning the design of its practical components and workplace internships. Peers got the impression that conditions of this cooperation of the university with companies are, on a regular basis, defined within a contractual framework. If so, the expert panel asks for the provision of an exemplary contract between the university and one of the cooperation partners from the industry.

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

The demands of this criterion are *not fully met*.

The peers have asked programme coordinators for further information about the responsible departments' teaching load. Regrettably, the statement and other documents submitted by the university do not provide more detailed information on this issue. However, as already concluded in the peers' preliminary assessment, the staff resources are generally considered to comply with the requirements, quantitatively and qualitatively. The individual teaching load, though considerably high according to the reporting in the audit discussions, appears to be principally bearable. Moreover, the students' very positive opinion about the supervision and support services of the teaching staff does not give immediate cause for doubt with respect to the staff resources.

The peers recognize the exemplary contracts the HEI concluded with relevant industry companies. It is particularly noted that, by way of these contracts, the HEI takes full responsibility for the professional and practical learning units in the company as part of the academic education. It is therefore appreciated that the rights and obligations of both parties are, by and large, fixed in the contract.

As stated repeatedly, it is acknowledgeable that the HEI follows an internationalisation strategy which includes as an important element encouraging the teaching staff to participate in international meetings, conferences, workshops etc. and also, in turn, inviting guest professors from international universities to give lectures at the university. The activities of the HEI in this field notwithstanding, it has been argued that, as a starting-point, the quality management concerning the teaching staff could be further developed by involving external and, wherever possible, international expertise in the HEI's recruitment policy. The peers confirm a recommendation primarily aiming at this objective (*see below, chapter F, recommendation 5*).

As regards the English language skills of both the students and the teaching staff, it has been manifestly demonstrated that the university has taken effective measures to improve the foreign language skills of individual staff members and is pushing on this development. In principle, this is also true for the students, though it appears as if more effective use of the already existing offers could be made to improve the English language skills. The peers consider this to be recommendable (*see below, chapter F, recommendation 2; also the final assessment concerning criterion 2.1*).

During the onsite inspection of the laboratory equipment for the study programmes at the university, the peers have come to the conclusion that a modernization of the required equipment for the Bachelor and Master programmes Automation and Control and a build-up of basic apparatuses for the Bachelor and Master programmes Metallurgy are indispensable. Taking into account the HEI's response to the audit report, this assessment remains essentially unaltered for the Automation and Control programmes. Consequently, the peers suggest imposing a requirement for the purpose of meaningfully enhancing the equipment for these programmes (*see below, chapter F, requirement 6*).

Regarding the Metallurgy programmes, the actual purchase of the lab equipment listed for acquisition in the framework of the "State program of Industrial-Innovative Development for 2016 (SP IID-2)" would trigger at least some progress of facilities in the field of Metallography (cf., notably, Inverted Metallographic Microscope, Stationary Optical-Emission Spectrometer), which have been found particularly deficient. Nevertheless, important basic equipment, as for instance cutting, grinding and polishing machines, is still missing in the acquisition plan. With a view to the intended qualifications of graduates in the Metallurgy programmes, supplementing the basic lab equipment is seen as a high-priority task of the university. The peers therefore confirm imposing a requirement for that purpose as well (*see below, chapter F, requirement 7*). In this context, it has been pointed out and is repeated here that the replacement of the tensile test equipment is thought to be a worthwhile objective with regard to the modernization of the metallurgical lab equipment in the long term.

From the perspective of the peers the modernization of the lab equipment will substantially contribute to enlarging the research basis of the university. Strengthening the research capabilities, in turn, will positively affect the quality of the programmes, in particular the Master's degree programmes. The peers propose supporting this development by means of a recommendation (*see below, chapter F, recommendation 6*).

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

Module descriptions in the module handbooks of the respective programmes (Annexes A, B, C, D of the SAR)

Audit discussions

Preliminary assessment and analysis of the peers:

The module descriptions have been discussed frequently in this report. It becomes very clear from the students' indications in the audit discussions that they are provided with meaningful information about the teaching and learning units of their respective study plans. Moreover, the individual online access to all study related information (from application deadlines to content to academic achievements), which apparently works quite well, should be seen as strength of education and training at the university. However, it remains somewhat unclear whether students have been actually referring to the module descriptions as presented to the peers in the module handbooks, when they propose to be familiar with and even work with those descriptions. This is all the more so, since the "modules" as reference units of the module handbooks do not fit readily into the study plans nor the Standard Curriculum of each degree programme, where, in fact, "disciplines" are the main reference unit. Thus programme coordinators will first have to decide about their guiding concept of "modules" and afterwards adapt the "module" descriptions accordingly (and, for clarification purposes, other study related information like the study plans too).

Some other features of the module descriptions have also been addressed in this report, mostly in connection with the inconsistencies following the specific design of "modules" as opposed to "disciplines" or courses. Thus, meaningful information about the assessment form and the calculation of the assessment mark should be added to the module descriptions, once the general conceptual decision on modules has been made.

Still others do refer to more formal deficiencies, but nevertheless need to be corrected (like erroneous specifications of student workload and numbers of ECTS credit points). In addition to that, peers note that some important information is apparently not given in the module descriptions, most notably the information about the frequency of offer of specific modules or its constitutive components ("disciplines" or courses) and about the teaching methodology. In some cases - as has also been observed already – the denotation of the modules (in English) varies throughout the documents and should be standardized (in the first instance, if applicable, in the Russian/Kazakh original version of the respective study documents). The module descriptions need to be revised with respect each of these aspects.

Finally, whatever concept of "modules" the university chooses to adopt, the module descriptions in their updated version need to be made accessible to students so as to ensure that they can use them as a relevant study guide.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

Samples of programme-specific diploma supplements

Preliminary assessment and analysis of the peers:

Shortly after graduation, a diploma or degree certificate is issued by the HEI including a Transcript of Records.

From the SAR the peers understood that the accompanying Diploma Supplement in English is also handed out *on a regular basis*. In order for graduates to be able to find a job internationally (also later in life, which might not be foreseeable at the time of graduation), this latter requirement is of crucial importance, since the Diploma Supplement contains major information about the study objectives, learning outcomes, structure of stay and level of qualification as well as the individual academic achievements.

Criterion 5.3 Relevant rules

Evidence:

All relevant regulations are published in Russian only on the HEI's website: http://www.psu.kz/index.php?option=com_content&view=article&layout=edit&id=5102&lang=eng (Download: 17 May 2016)

"Rules of organization and control of the educational achievements of students in the S.Toraighyrov Pavlodar State University", 2013 (Annex of the SAR)

Preliminary assessment and analysis of the peers:
The rights and duties of both the HEI and students are clearly defined and binding, including all provisions regarding the admission procedure. They are published in Russian on the HEI's website as well as lists of regulatory legal acts by the Republic of Kazakhstan regarding personnel management, educational work and social affairs and so on.

The peers discuss whether the relevant information should also be available in English or in both languages of the degree programmes but come to the conclusion that, since all Kazakhs speak and read Russian, this one language will suffice for information and transparency as long as the HEI does not intend to inform potential international applicants. Nevertheless, a brief summary in English on the most relevant rules and provisions governing the study and examination process would be considered helpful, especially with regard to the part-time study mode of the Bachelor programmes. According to that, the peers request a respective supplement to the statement of the university.

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

The specifications of the criterion treated in this chapter are met *to a large extent but not fully yet*.

The peers are grateful for the translation of the relevant examination rules submitted along with the statement of the HEI ("Standard regulations of students' academic achievements - current control, intermediate and final certification of students' in higher education institutions"). It can be seen from the translation that forms, processes, conduct and grading of the assessment of the students' academic achievements have been regulated meticulously. Since there is no evidence to the contrary, the peers do not see any further need for action in this regard.

From the peers' perspective, it is necessary to revise the module descriptions of all study programmes due to reasons which have been detailed in this chapter. The revision of the module descriptions should follow the indications given there. A requirement to this end is explicitly confirmed (*see below, chapter F, requirement 5*). Prerequisite condition for doing this is to unmistakably and consistently define and use the concept of *modules* (in contrast to "disciplines" or "courses"), as laid out in section 2.1 of this report.

In this context, the already mentioned inconsistencies of module/course titles (as well as other study-related information) should be removed (for further information cf. chapter 1.2; *see also below, chapter F, recommendation 1*).

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

All relevant information regarding quality management is published on the website: http://www.psu.kz/index.php?option=com_docs&lang=eng (Download: 17 May 2016)

Respective chapter of the SAR

Audit discussions

Preliminary assessment and analysis of the peers:

For the improvement of quality the HEI has introduced a quality management system in 2005. The peers analyze the information given by the HEI on their website and in the SAR, regarding the system – including the documented Quality Policy, the issued quality objectives until 2020, the Strategic Development Plan 2011-2020 and the Quality Manual as well as documented procedures – and come to the conclusion that the quality management is developing well and implemented in the faculty. The programmes are subject to regular internal quality assessment procedures aiming at continuous improvement. All responsibilities and mechanisms defined for the purposes of continued development are binding. Students and (teaching) staff as well as graduates and companies take part in the quality assurance processes.

The intention and evident efforts to establish and maintain a functioning quality assurance system for the degree programmes and to use the information gathered for the further development of these programmes is well recognized. In particular, the satisfaction of students and graduates with the achieved competences and the opportunities to participate in improving the quality of the programmes (not only by means of survey procedures) should be valued.

However, the SAR as well as the audit discussions with the interested parties produced only marginal information about the actual quality development of the programmes during the five-year period 2010 to 2015. In other words: How key quality figures (e.g. regarding work load, student mobility, academic feasibility etc.) could be plausibly traced to the use of quality management methods and processes remains somewhat opaque. Even the students who assess the quality assurance activities of the HEI principally favorable admit that they could hardly attribute modifications in the degree programmes to evalua-

tions or student surveys. Peers do not rule out that this kind of immediate follow-up process is effectively established. However, if so, it has not been evidently proved and might be non-transparent to a certain degree to one of the main stakeholders. In order to get a more accurate picture of how central quality assurance procedures have been practiced, the peers ask for the evaluation questionnaire as well as for exemplary evaluation results (and resulting follow-up measures), if possible. The quality assurance system as a whole might be effectively improved by means of strengthening internal feedback loops so as to make better use of the results for the quality development of the study programmes.

As for the monitoring of the students' workload, is has been stated previously (see above chapter 2.2) that the HEI should define and establish appropriate mechanisms or processes to serve this demand in order to check the viability of the allocation of ECTS credit points.

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

The demands of the aforementioned criterion are considered to be *largely, but not yet fully met*.

The peers took note of the paper regarding methodical and procedural guidelines for the conduct of surveys in the framework of the HEI's quality management system, which has been presented by the HEI (Appendix 5). Unfortunately, neither a questionnaire nor any exemplary results of the evaluation of modules / courses have been added. Since there have been no indicators of manifest deficiencies of the quality management followed by the HEI, and - on the contrary - students and teaching staff voiced general approval of its procedures, peers consider it sufficient to recommend the further consolidation and development of the QM system. Special focus should be attached to effectively closing internal feedback loops (*see below, chapter F, recommendation 7*).

The continual check of the actual workload of students and of the related credit point distribution has to be an integral part of the quality assurance system, as stated earlier. The peers regard this to be an urgent issue (*for more details, cf. chapter 2.2; see below, chapter F, requirement 4*).

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 HEI on the previous chapters of this report:

1. Detailed list of modifications concerning the updated self report compared to the previous version / for the peers' proper understanding please clarify abbreviations ("list of abbreviations")
2. Brief description of the curriculum, organization, didactical concept (e.g. E-learning material), assumed teaching load, and number of students in the part-time version of the BA programmes [ASIIN 1.3, 2.1, 2.3]
3. Rules governing the recognition of academic achievements acquired at other (national or international) universities [ASIIN 2.1]
4. Provision of a teaching load matrix for the departments involved (including Kazakh/Russian teaching hours and additional teaching load for part-time BA programmes) [ASIIN 4.1]
5. Exemplary contract between the university and its cooperation partners from the industry [ASIIN 4.3]
6. Summary of the most relevant rules and provisions governing the study and examination process, particularly with regard to the part-time study mode of the BA programmes [ASIIN 5.3]
7. Questionnaire for evaluation and, if possible, exemplary evaluation results [ASIIN 6]

E Comment of the Higher Education Institution (11.07.2016)

The institution provided a brief statement along with the following additional documents:

- Exemplary study plans for the first study year of the part-time versions of the Bachelor programmes (Appendix 1)
- Rules governing the recognition of academic achievements acquired at other (national or international) universities in English translation (Appendix 2)
- Samples of contracts between the university and industry companies (Appendix 3)
- Most relevant rules and provisions governing the study and examination process, particularly with regard to the part-time study mode of the BA programmes (Appendix 4)
- Questionnaire for evaluation (Appendix 5)
- "List of equipment of laboratories of the State program of Industrial-Innovative development for 2015 (SP IID-2)" concern the Metallurgy programmes (Appendix 7)
- "List of equipment of laboratories of the State program of Industrial-Innovative development for 2016 (SP IID-2)" (Appendix 8)
- Exemplary certificates for participation of teaching staff in training seminars (Appendix 9)

F Summary: Peer recommendations (01.09.2016)

Taking into account the additional information and the comments given by the HEI, 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 accreditation
Ba Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Requirements

For all degree programmes

A 1. (ASIIN 1.3) Make sure that students gain relevant practical competences for their professional activity in the course laboratory work in the university.

A 2. (ASIIN 2.1) Use a consistent concept of modules throughout all study-related documents (e.g. study plan, module descriptions), and adapt yours accordingly, in order to provide for coherent information of both students and teaching staff. Modules should be designed as comprehensive teaching and learning units throughout.

A 3. (ASIIN 2.2) Make sure that the ECTS credit point system is used in a consistent manner in all study-related documents, thereby avoiding any mixing with the Kazakh credit point system.

A 4. (ASIIN 2.2, 6) Establish mechanisms to monitor the students' workload and to take appropriate actions in case of significant divergences between the calculated workload and the evidence.

A 5. (ASIIN 5.1) Revise the module descriptions with regard to the calculation of student workload and allocation of ECTS credit points, specification of the assessment form and assessment mark, composition of the module, frequency of offer, teaching methodology, and denotation of modules. Make sure that the current version of the module descriptions is publicly available.

For the Bachelor's and Master's programmes Automation and Control

A 6. (ASIIN 4.3) Develop and execute a schedule/time table for the modernization of the required laboratory equipment in the university.

For the Bachelor's and the Master's programme Metallurgy

A 7. (ASIIN 4.3) Develop and execute a schedule/time table for the acquisition of relevant basic equipment for metallography.

Recommendations

For all degree programmes

E 1. (ASIIN 1.2, 5.1) It is strongly recommended to check inconsistencies of module/course titles as well as other study-related information and correct errors, if necessary.

E 2. (ASIIN 2.1, 4.2) It is recommended to make more effective use of the already existing offers to improve the English language skills of students.

E 3. (ASIIN 2.1) It is recommended to enhance international co-operation in order to facilitate student and teacher exchange and thus to improve the quality of the programmes.

E 4. (ASIIN 2.2) It is recommended to take appropriate measures to make students more familiar with the ECTS credit point system.

E 5. (ASIIN 4.1) It is recommended to make better use of external/international expertise in the frame of the university's recruitment policy.

E 6. (ASIIN 4.3) It is recommended to enlarge the research basis and activities of the departments in order to raise the quality of the study programmes.

E 7. (ASIIN 6) It is recommended to implement and further develop the quality assurance system. Particularly, internal feedback loops should be strengthened so as to make better use of the results for the further development of the study programme.

For the Bachelor's programmes

E 8. (ASIIN 2.3) It is recommended to improve students' presentation skills as well as project management and team competences in the framework of subject-related project work.

G Comment of the Technical Committees

Technical Committee 01 – Mechanical and Process Engineering (06.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee accepts the suggestions of the peers without changes.

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

The Technical Committee confirms that the intended learning outcomes of the degree programmes do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01.

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Technical Committee 02 – Electrical Engineering and Information Technology (16.09.2016)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee agrees with the assessment and recommended resolution of the peers without any modifications.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering-specific part of its Subject-Specific Criteria, and,

in addition to that for the Heat Power Engineering programmes, with the Subject-Specific Criteria of the Technical Committee 01 - Mechanical Engineering.

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

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Technical Committee 05 – Physical Technologies, Materials and Processes (20.09.2016)

Assessment and analysis for the award of the ASIIN seal:

In terms of transparency the Technical Committee sees it as a serious problem that module-/course-titles and other study relevant information are obviously often incorrect and inconsistent. The Technical Committee deems it necessary to fix this issue in a medium term and recommends stating a respective requirement. In all other aspects the Technical Committee judges the assessment of the peers as well as the proposed requirements and recommendations to be adequate.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes Ba/Ma Metallurgy do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 05.

The Technical Committee 05 – Physical Technologies, Materials and Processes recommends the award of the seals as follows:

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Suggested Modification according to TC 05 (turning recommendation 1 to a requirement 6):

A 6. (ASIIN 1.2., 5.1) Check inconsistencies of module/course titles as well as other study-related information and correct errors, if necessary.

~~E 1. (ASIIN 1.2, 5.1) It is strongly recommended to check inconsistencies of module/course titles as well as other study-related information and correct errors, if necessary.~~

H Decision of the Accreditation Commission (30.09.2016)

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

The Accreditation Commission discusses the procedure and makes some minor editorial changes in requirements 2 (module descriptions) and 4 (monitoring of students workload). Concerning recommendation 1 (inconsistencies), it follows the assumption of the peers, that it cannot be ruled out but, on the contrary, is very likely that inconsistencies regarding course titles as well as other study-related information are due to translation errors and, in fact, only occur in the English-language documentation. The Commission therefore denies the proposal of the Technical Committee 05 to turn this recommendation into a requirement.

Apart from this, the Accreditation Commission fully accepts the judgment and recommended resolution of the peers and Technical Committees.

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

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do comply with the engineering specific parts of the Subject-Specific Criteria of the respective Technical Committees.

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

Degree Programme	**ASIIN-seal**	**Subject-specific label**	**Maximum duration of accreditation**
Ba Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Automation and Control	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Electrical Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Heat Power Engineering	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ba Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022
Ma Metallurgy	with requirements for one year	EUR-ACE® with requirements for one year	30.09.2022

Requirements

For all degree programmes

A 1. (ASIIN 1.3) Make sure that students gain relevant practical competences for their professional activity in the course laboratory work in the university.

A 2. (ASIIN 2.1) Use a consistent concept of modules throughout all study-related documents (e.g. study plan, module descriptions), and adapt them accordingly, in order to provide for coherent information of both students and teaching staff. Modules should be designed as comprehensive teaching and learning units throughout.

A 3. (ASIIN 2.2) Make sure that the ECTS credit point system is used in a consistent manner in all study-related documents, thereby avoiding any mixing with the Kazakh credit point system.

A 4. (ASIIN 2.2, 6) Establish mechanisms to monitor the students' workload and to take appropriate actions in case of significant differences between the calculated workload and the evidence.

A 5. (ASIIN 5.1) Revise the module descriptions with regard to the calculation of student workload and allocation of ECTS credit points, specification of the assessment form and assessment mark, composition of the module, frequency of offer, teaching methodology, and denotation of modules. Make sure that the current version of the module descriptions is publicly available.

For the Bachelor's and Master's programmes Automation and Control

A 6. (ASIIN 4.3) Develop and execute a schedule/time table for the modernization of the required laboratory equipment in the university.

For the Bachelor's and the Master's programme Metallurgy

A 7. (ASIIN 4.3) Develop and execute a schedule/time table for the acquisition of relevant basic equipment for metallography.

Recommendations

For all degree programmes

E 2. (ASIIN 1.2, 5.1) It is strongly recommended to check inconsistencies of module/course titles as well as other study-related information and correct errors, if necessary.

E 3. (ASIIN 2.1, 4.2) It is recommended to make more effective use of the already existing offers to improve the English language skills of students.

E 4. (ASIIN 2.1) It is recommended to enhance international co-operation in order to facilitate student and teacher exchange and thus to improve the quality of the programmes.

E 5. (ASIIN 2.2) It is recommended to take appropriate measures to make students more familiar with the ECTS credit point system.

E 6. (ASIIN 4.1) It is recommended to make better use of external/international expertise in the frame of the university's recruitment policy.

E 7. (ASIIN 4.3) It is recommended to enlarge the research basis and activities of the departments in order to raise the quality of the degree programmes.

E 8. (ASIIN 6) It is recommended to implement and further develop the quality assurance system. Particularly, internal feedback loops should be strengthened so as to make better use of the results for the further development of the degree programme.

For the Bachelor's programmes

E 9. (ASIIN 2.3) It is recommended to improve students' presentation skills as well as project management and team competences in the framework of subject-related project work.

I Fulfilment of Requirements (29.09.2017)

Analysis of the peers and the Technical Committees (FA 01: 11.09.2017; FA 02: 20.09.2017; FA 05: 21.09.2017)

Requirements

For all degree programmes

A 1. (ASIIN 1.3) Make sure that students gain relevant practical competences for their professional activity in the course laboratory work in the university.

First treatment	
Peers	fulfilled Statement: Annex 1 regulates the laboratory work related to "Dual Studies", which are carried out in the company. Annex 1 is therefore not very helpful. However, Annexes 5 and 6 describe how the equipment is expanded in the university's own laboratories. As it will last up to five years to improve the laboratory equipment, this should be a special topic in reaccreditation procedure.
TC 01	fulfilled Statement: The TC agrees with the assessment of the peers.
TC 02	fulfilled Statement: The TC agrees with the assessment of the peers.
TC 05	fulfilled Statement: The TC agrees with the assessment of the peers.

A 2. (ASIIN 2.1) Use a consistent concept of modules throughout all study-related documents (e.g. study plan, module descriptions), and adapt them accordingly, in order to provide for coherent information of both students and teaching staff. Modules should be designed as comprehensive teaching and learning units throughout.

First treatment	
Peers	fulfilled Statement: The HEI has done a lot of work to fulfill this requirement and has also delivered a consistent concept of modules in an English version.
TC 01	fulfilled Statement: The TC agrees with the assessment of the peers.

TC 02	fulfilled Statement: The TC agrees with the assessment of the peers.
TC 05	fulfilled Statement: The TC agrees with the assessment of the peers.

A 3. (ASIIN 2.2) Make sure that the ECTS credit point system is used in a consistent manner in all study-related documents, thereby avoiding any mixing with the Kazakh credit point system.

First treatment	
Peers	fulfilled Statement: According to the majority of the peers, the revised module handbooks demonstrate a consistent use of ECTS, even if the spelling in the different handbooks is different. One peer considers the requirement *not* fulfilled because of a still inconsistent use of the ECT system. According to his opinion, the HEI did not change anything in the calculation of ECTS based on working hours. There are a lot of modules with 135 h and 5 ECTS, which means 27 h/ECTS. On the other hand there are modules with equal workload, but different ECTS, e.g. 270 h equated to 10, 8, and 5 ECTS, 180 h equated to 5, 6, 7, and 10 ECTS.
TC 01	*not fulfilled* Statement: The TC thinks that the requirement is not fulfilled as the ECTS system should be applied consistently.
TC 02	*not fulfilled* Statement: The TC thinks that the requirement is not fulfilled as the ECTS system should be applied consistently.
TC 05	fulfilled Statement: As the calculation of the ECTS Workload is at least in most module descriptions consistent, the TC considers the requirement to be fulfilled.

A 4. (ASIIN 2.2, 6) Establish mechanisms to monitor the students' workload and to take appropriate actions in case of significant differences between the calculated workload and the evidence.

First treatment	
Peers	*not fulfilled* Statement: The answer of the university is an explanation about the meaning of ECTS and the calculation of the workload instead of a description of an established mechanism to monitor and, if necessary, adapt the workload calculation and relating credit point

	allocation.
TC 01	*not fulfilled* Statement: The TC concludes that the concern of the peers is justified.
TC 02	*not fulfilled* Statement: The TC follows the assessment of the peers.
TC 05	*not fulfilled* Statement: The TC follows the assessment of the peers.

A 5. (ASIIN 5.1) Revise the module descriptions with regard to the calculation of student workload and allocation of ECTS credit points, specification of the assessment form and assessment mark, composition of the module, frequency of offer, teaching methodology, and denotation of modules. Make sure that the current version of the module descriptions is publicly available.

First treatment	
Peers	*not fulfilled* Statement: It remains unclear whether and how the revised module handbooks are made available to the students. Additionally, one auditor considers that the requirement is not sufficiently fulfilled regarding the workload/ECTS ratio (see above A 3.).
TC 01	*not fulfilled* Statement: The TC follows the assessment of the peers.
TC 02	*not fulfilled* Statement: The TC follows the assessment of the peers.
TC 05	*not fulfilled* Statement: The TC follows the assessment of the peers.

For the Bachelor's and Master's programmes Automation and Control

A 6. (ASIIN 4.3) Develop and execute a schedule/time table for the modernization of the required laboratory equipment in the university.

First treatment	
Peers	fulfilled Statement: The HEI has delivered a list of equipment and a time schedule for purchasing it. The compliance must be checked during reaccreditation procedure.
TC 01	fulfilled Statement: The TC agrees with the assessment of the peers.
TC 02	fulfilled Statement: The TC agrees with the assessment of the peers.
TC 05	fulfilled Statement: The TC agrees with the assessment of the peers.

For the Bachelor's and the Master's programme Metallurgy

A 7. (ASIIN 4.3) Develop and execute a schedule/time table for the acquisition of relevant basic equipment for metallography.

First treatment	
Peers	*not fulfilled* Statement: The relevant Annex 6 does not demonstrate a meaningful concept for the build-up of the laboratory equipment and, even worse, illustrates an implausible acquisition and purchasing strategy with regard to basic metallography epuipment. Purchasing new equipment according to the indications in the report in itself does not suffice. There should be a careful planning of the establishment, equipment and curricular implementation of new laboratory spaces, also adequately reflected in the acquisition schedule. None of this could be seen in annex 6.
TC 01	*TC takes no decision* Statement: The Technical Committee leaves the decision about the fulfillment of this requirement to the responsible TC.
TC 02	*TC takes no decision* Statement: The Technical Committee refrains from assessing the fulfillment of requirement 7 referring to the Metallurgy degree programmes (laboratory equipment). However, the Technical Committee points out that the negative assessment of the metallurgy expert in the panel - although obviously substantiated - might go beyond the strict wording of the requirement and thus disadvantage the HEI without a due cause at least formally.
TC 05	*not fulfilled* Statement: The TC fully agrees with the assessment of the metallurgy expert in the peer panel.

Decision of the Accreditation Commission (29.09.2017)

The Accreditation Commission fully embraces the assessment of the peers and the relevant Technical Committees. Concerning the requirement 7 for the Metallurgy programmes (laboratory equipment), it thoroughly takes into account the substantial assessment of the expert peer and the relevant Technical Committee but comes to the conclusion that the resulting negative vote would overstretch the wording of this requirement and its apparent meaning. With a view to the lab equipment, it generally assumes that the HEI is following a meaningful acquisition strategy. Consequently, the Accreditation Commission considers the requirement to be sufficiently fulfilled.

Apart from that, the Accreditation Commission agrees with the peers and the responsible Technical Committees that requirements 3 (consistent use of the ECTS), 4 (monitoring mechanism regarding student workload) and 5 (module descriptions) are not fulfilled yet.

The Accreditation Commission decides extending the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	duration of accreditation
Ba Automation and Control	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ma Automation and Control	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ba Electrical Power Engineering	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ma Electrical Power Engineering	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ba Heat Power Engineering	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ma Heat Power Engineering	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ba Metallurgy	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation
Ma Metallurgy	requirements 3, 4, and 5 not fulfilled	EUR-ACE®	six months prolongation

Statement concerning the requirements deemed not fulfilled:

Requirement 3

Looking at the module descriptions, it is hardly observable whether the HEI did change anything with regard to the calculation of ECTS based on working hours. There are a lot of modules with 135h and 5 ECTS, which means 27 h/ECTS. On the other hand, there are modules with equal workload, but different ECTS numbers, e.g. 270h equated to 10, 8, and 5 ECTS, 180 h equated to 5, 6, 7, and 10 ECTS.

Requirement 4

The answer of the university basically results in an explanation about the meaning of ECTS and the calculation of the workload instead of describing an established mechanism to monitor and, if necessary, adapt the workload calculation and relating credit point allocation.

Requirement 5

It still remains unclear whether and how the revised module handbooks are made available to the students. Additionally, the requirement can hardly be considered fulfilled regarding the workload/ECTS ratio (see above A 3.).

J Fulfilment of Remaining Requirements (23.03.2018)

Analysis of the peers and the Technical Committees (13.03.2018)

Requirements

For all degree programmes

A 1. (ASIIN 1.1, 1.3) Draft a lean competence profile focusing on the academic, discipline-related, and professional qualifications of graduates of each programme. Make it available to both, students and teaching staff, so that they may refer to it, for instance in the course of internal quality assurance procedures. Make sure that it is consistently communicated and include it also in the respective Diploma Supplement.

Secondary Treatment	
Peers	fulfilled Justification: As mentioned in the report, the competence profiles have been defined and can be downloaded for the Bachelor level and for the Master level. For the Bachelor level, the profiles comprise socio-personal, economic, organizational, managerial and professional competences. Interestingly, there are apparently no scientific competences on a Bachelor level. Correspondingly, at the Master level, there are 'general scientific and professional competences', but no economic competences anymore. Still, the listed competences follow the general Bologna approach so that the requirement can be considered fulfilled.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

A 2. (ASIIN 5.1) Rewrite the module descriptions so as to include necessary information about the qualification objectives, usability in other degree programmes, exams and grading, workload (in relation to Kazakh and ECTS credits), frequency of offer, and

duration of each module. Provide completed module handbooks and ensure the accessibility of the updated module descriptions for students and lecturers.

Secondary Treatment	
Peers	fulfilled Justification: The updated versions of the module handbooks can be downloaded for the different programmes. In spite of minor issues concerning the clarity of certain parts of the module handbooks (e.g. it is rather obscure what is meant by 'Knowledge of the courses of the curriculum of the secondary school' under 'Recommended prerequisites' in the Bachelor module handbook 'Electrical Power Engineering'), the requirement can be considered fulfilled.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

A 3. (ASIIN 5.2) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives, intended learning outcomes ("qualification profile"), structure and level of the degree, as well as about the individual performance. It must also explain the educational system of Kazakhstan in order to foster comprehensibility and comparability between the educational systems. In addition to the final degree, statistical data according to ECTS-Users guide have to be shown.

Secondary Treatment	
Peers	fulfilled Justification: The diploma supplements have been provided and can be downloaded. The exact definition of, the grades ('Bachelor of engineering and technology' and 'Master of Technical Sciences') correspond to the aforementioned competence profiles so that the requirement can be considered fulfilled.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

For the Master's degree programmes

A 5. (ASIIN 4.1) Provide a concept for the further development of the teaching staff towards an international research profile (international publications, projects etc.) so as to acquire the intended research-oriented objectives. Provide evidence for initial steps towards its implementation.

Secondary Treatment	
Peers	fulfilled Justification: It goes without saying that a long-term and sustainable development of teaching staff towards an international research profile requires far more than a concept. The latter can be at most a necessary, not a sufficient condition to develop such a profile. The necessary activities to provide the profile have indeed been started and are evidenced by the supporting actions and partners mentioned in the report. Thus, the requirement can be considered fulfilled.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

For the Master's degree programme Electrical Engineering

A 7. (ASIIN 1.3) Complement the curriculum with regard to the student's competences in core areas like Power Electronics, Smart Grids etc.

Secondary Treatment	
Peers	fulfilled Justification: On the Bachelor and Master levels, there are different appearances of power electronics. The only module containing certain aspects of smart grids is 'Controlled AC transmission systems in electric power engineering' on the Master level. The requirement clearly addresses only an initial introduction of concepts in the field of power electronics and smart grids. Therefore, the requirement can be considered fulfilled.
TC 02	fulfilled Justification: The Technical Committee agrees with the assessment of the peers.

Decision of the Accreditation Commission (23.03.2018)

The Accreditation Commission discusses the procedure. It agrees with the dissenting opinion of one of the peers that the HEI apparently has introduced a kind of monitoring process regarding the workload of students. Moreover, it takes into account that significant problems to this regard have not been surfaced during the onsite-visit.

All in all the commission concludes that the remaining requirements have been fulfilled satisfactorily. Regarding requirement 4 (monitoring of student workload), it holds that the

HEI should be indicated that its workload evaluation mechanism will be thoroughly observed during the reaccreditation procedure.

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

Degree Programme	ASIIN-seal	Subject-specific label	duration of accreditation
Ba Automation and Control	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ma Automation and Control	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ba Electrical Power Engineering	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ma Electrical Power Engineering	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ba Heat Power Engineering	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ma Heat Power Engineering	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ba Metallurgy	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022
Ma Metallurgy	requirement 3, 4* and 5 fulfilled	EUR-ACE®	30.09.2022

* 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 process of surveying and assessment of student workload will be reviewed in the context of the re-accreditation of the Bachelor and Master degree programmes.”

Annex: Learning Outcomes and Curricula

According to the SAR the following **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Automation and Control:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Ability to apply mathematical device, the physical laws, information technology, based on a coherent philosophical system of scientific knowledge about the world for complex engineering.	Mat(I) 1201, Mat(II) 1202, Inf 1104, Fiz(I) 1203, Fiz(II) 2204, Fil 2106
Outcome 2	Demonstrate the ability to use electrical calculations based on the rules of measurement and electronic theory; to know the implications of the impact of production factors on safe living conditions and the environment; be able to carry out an economic analysis taking into account the legal provisions in order to solve engineering problems.	TOE(I) 2206 , TOE(II) 2207, MI 2208, Ele 2209, OET 1109, OP 2108, EUR 2105, OBZh 2111, EOP 3205
Outcome 3	Know the basic methods of mathematical analysis and modeling, methodological basis of theoretical and experimental research in the field of automation and control; able vypolnenyat typical settlement and graphics, coursework and project work.	TLSAR 3301, TNSAU 3302, TP 1211, OPIS 2202, PBDSAU 2203, MZOA 3204
Outcome 4	To be able to apply this knowledge to calculate the elements and units of the automatic control systems	CTMS 4206, TEO 3207, PEVMRIS 3208, TPP
	using microprocessor.	3301, PTI 3303, MKSU 3304, MIOU 3305, NSU 3303
Outcome 5	Demonstrate knowledge of design automation of technological processes and production, knowledge of installation procedures and commissioning of automation systems.	SAPRSA 4209, TIP 4302, ATTPP 4306, MNSA 4304
Outcome 6	Ability to apply knowledge of the historical, social and cultural aspects of integrated engineering activities using the means of communication.	IK 1101, K(R)Ya 1102, , IYa 1103, Soc 1110, Pol 1107
Outcome 7	Know documentation introduced new equipment, check the technical condition and residual life of existing equipment automation systems, know the stages of the repair work at the production sites of the enterprise; draw up technical documentation, respectively, standards, specifications and other normative documents for writing the graduate work	POIya 2213, PKYA 2212, OPD 1201, EUA 2210, IM 3205

The following **curriculum** is presented:

0 Annex: Learning Outcomes and Curricula

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
History of Kazakhstan 2 Lect. 1 Pract. ECTS 5	**Sociology** 1 Lect. 1 Pract. ECTS 3	**Philosophy** 1 Lect. 2 Pract. ECTS 5	**Politology** 1 Lect. 1 Pract. ECTS 3	**Linear Systems of Automatic Regulation** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**Non-Linear Systems of Automatic Regulation** 1 Lect. 0,5 Pract. 0,5 Lab. ECTS 3	**Automation CAD Systems /Designing in P-CAD Systems** 2 Lect. 1 Pract. ECTS 5	**Work experience internship** ECTS 7
Kazakh (Russian) language 3 Pract. ECTS 4	**Kazakh (Russian) language** 3 Pract. ECTS 5	**Law Basics** 1 Lect. 1 Pract. ECTS 3	**Professionally-oriented foreign language** 2 Pract. ECTS 3	**Applied Information Theory/ Theory of Algorithm** 1,5 Lec. 1 Pract. 0,5 Lab. ECTS 5	**Economics and industrial engineering/ Industrial Engineering** 2 Lect. 1 Pract. ECTS 5	**Typical Workflow and Production Automation/ Automation of Technological Complexes** 2 Lect. 1 Pract. 1 Lab. ECTS 6	**Pre-graduation internship** ECTS 10
Foreign Language 3 Pract. ECTS 4	**Foreign Language** 3 Pract. ECTS 5	**Physics 2** 1 Lect. 1 Pract. 1 Lab. ECTS 5	**Informational Systems Designing Basics/ Automation Systems Designing** 1,5 Lect. 1,5 Pract. ECTS 5	**Micropocessor-based Complexes in Control Systems/ Micropocessor-based Control Systems** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**Experiment Technics and Processing/ Automation Systems Data Processing Methods** 1,5 Lect. 1,5 Pract. ECTS 5	**Automation Systems Assembling and Setting Up/Installation Work Methods and Industrial Control Setting Up Foundations** 2,5 Lect. 1,5 Pract. ECTS 7	**Final state assessment** ECTS 4
Mathematics I 1 Lect. 2 Pract. ECTS 4	**Mathematics II** 1 Lect. 2 Pract. ECTS 5	**Electrical Engineering Theory** 2 Lect. 1 Pract. 1 Lab. ECTS 6	**Metrology and Instrumentation/ Information Measuring Equipment** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**Mathematical Problems and Automation Basics/ Algorithms and Automation Programs** 1,5 Lect. 1,5 Pract. ECTS 5	**Engineering Procedures and Production/ Automation of Technological Objects** 1,5 Lect. 1,5 Pract. ECTS 5	**Technological Metrology and Automatic Control Systems Devices of Technological Processes at an Industrial Enterprise** 2,5 Lect. 1,5 Pract. ECTS 7	**Degree paper writing and presentatition** ECTS 9
Informatics 1 Lect. 1,5 Pract. 0,5 Lab. ECTS 5	**Ecology and Sustainable Development** 1 Lect. 1 Pract. ECTS 3	**Database Design of automated control systems/ TP Datebase Design** 1,5 Lect1,5 Pract. ECTS 5	**Electronics/ Industrial Electronics** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**The Use of Computers in the Information Systems Calculation/The use of computers in Automation Systems** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**Control of Automation Systems Executive Mechanisms / Automation Mechanisms and Drives** 2 Lect. 1 Pract. 1 Lab. ECTS 7	**Control of Systems Safety/ Management Automation Systems Safety Theory** 2 Lect. 1 Pract. ECTS 5	
Life Safety Basics 1 Lect. 1 Pract. ECTS 3	**Physics I** 1 Lect.1 Pract. 1 Lab. ECTS 4	**Elementary Economics** 1 Lect. 1 Pract. ECTS 3	**Automation Elements and Devices/ Automation Elements and Resources** 2 Lect. 1 Pract. 1 Lab. ECTS 6	**Digital Technology and Microprocessor Means / Microprocessor Means, Software and Hardware Complexes** 2 Lect. 1 Pract. ECTS 5	**Control of Modelling and Identification Objects / Contol of Modelling and Software Systems** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5		
Fundamentals of Professional Activity/ Specialty Introductory Course: Information Technologies 3 Lect. ECTS 5	**Programming Technology/ Programming in Engineering** 1 Lect.1 Pract. 1 Lab. ECTS 4	**Professional Kazakh** 2 Pract. ECTS 3	**Work experience internship** ECTS 3				
	Study practice ECTS 1						
∑=8 Lect. + 11,5 Pract.+ 0,5 Lab. = 20	∑=5 Lect.+ 12 Pract.+ 2 Lab. = 19	∑=7,5 Lect.+ 9,5 Pract. + 2 Lab. = 19	∑=7,5 Lect+ 7,5 Pract. + 2 Lab. = 17	∑=9,5 Lect.+ 6,5 Pract. + 2 Lab. = 18	∑=9,5 Lect.+ 6,5 Pract. + 2 Lab. = 18	∑=11 Lect.+ 6 Pract. + 1 Lab. = 18	
30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS
7 examinations	7 examinations	7 examinations	6 examinations + 2 course projects /course papers	6 examinations + 1 course project /course paper	6 examinations	5 examinations + 2 course projects /course papers	

According to the SAR the following **learning outcomes** shall be achieved by the Master's degree programme Automation and Control:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Know the major historical and philosophical aspects of the development of science and be able to keep records in the state language, speak a foreign language at a professional level for research.	IFN5201, IYa 5202, DKYa 6201
Outcome 2	Analyze current scientific and technical problems of design automation and control systems; be able to use educational methods for teaching.	STMSSSAU 5301, SPRSA 5202, Ped 5203, Psi 5204, MPDATP 5303
Outcome 3	Increased knowledge on innovative developments for the automated systems of technological processes, automated control systems and information processing	SAUER 6304, SSAOE 6203, UDAO 6204, MSSA 6301
Outcome 4	The ability to independently apply the methods and research techniques to be used in an unfamiliar environment, or in the broader contexts; be able to execute and defend research results.	AUP 5302, AETU 6305

The following **curriculum** is presented:

Semester 1	Semester 2	Semester 3	Semester 4
Science History and Philolosophy 1 Lect. 1 Pract. ECTS 4	**Foreign Language** 2 Pract. ECTS 4	**Business Kazakh** 2 Pract. ECTS 4	**Scientific research** ECTS 9
Psychology 1,5 Lect. 0,5 Pract. ECTS 4	**Automated Production Control/ Modern Automation Systems** 3 Lect. 1 Pract. ECTS 7	**Electrotechnics Objects Automation Means and Systems / Logical Automated Systems Construction Basics** 1 Lect. 1 Pract. ECTS 4	**Research internship** ECTS 8
Pedagogics 1,5 Lect. 0,5 Pract. ECTS 4	**Technological Processes Automation Teaching Methods/ Automated Management Systems Teaching Methods** 2 Lect. 1 Pract. ECTS 5	**Devices of Discreet Automation Objects / Automation of Smelting Plants Electricity Consumption** 1 Lect. 1 Pract . ECTS 4	**Comprehensive examination** ECTS 3
The Structure of Control Systems Design Solutions / Computer-aided Design of Automation Systems 1 Lect. 1 Pract. ECTS 4	**Scientific research (continuous)** ECTS 8	**Microprocessor Tools and Automation Systems / Neuronic Regulation Systems** 2 Lect. 1 Pract. ECTS 5	**Master's degree paper compilation and defense** ECTS 10
Contemporary Theory, Methods and Means of Automation and Control Systems Construction 1,5 Lect. 0,5 Pract. ECTS 4	**Educational internship (continuous)** ECTS 2	**Automation of Electrical Installations / Electrical Equipment of Automation Systems** 2 Lect. 1 Pract. ECTS 5	
Scientific research ECTS 10	**Research** ECTS 4	**Control System for Automation of Electric Modes /** 2 Lect. 1 Pract. ECTS 5	
		Teaching internship (continous) ECTS 1	
		Scientific-research ECTS 2	
∑= 6,5 Lect. +3,5 Pract.= 10	∑= 5 Lect. + 4 Pract. = 9	∑= 8 Pract. + 7 Pract.= 15	
30 ECTS	**30 ECTS**	**30 ECTS**	**30 ECTS**

According to the SAR the following **learning outcomes** shall be achieved by the Bachelor's degree programme Electrical Power Engineering:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Ability to apply mathematical device, the physical laws, information technology, based on a coherent philosophical system of scientific knowledge about the world for complex engineering activity	Mat(I)1203, Mat(II)1204, Inf 1102, Fiz 1205, Fil 2111
Outcome 2	Demonstrate the ability to use electrical calculations with the use of engineering and computer graphics;	TOE I 2206, TOE I 2207, PE 2302, EUR
	to know the implications of the impact of production factors on safe living conditions and the environment; be able to carry out an economic analysis taking into account the legal provisions in order to address electrical engineering tasks.	1105, OBZh 1103, EO 4202, OP 2109,OET 2107, IKG 1204
Outcome 3	Know the basics of electrical installations of control theory, mathematical analysis and modeling, modern power stations, networks, renewable energy, be able to apply electrical current to perform settlement and graphics, coursework.	VSONI 1205, EMI 2301, MES 3207, OTUCU 2206, MZKME 2203, NVIE 3302, ESP 3208, Ele 3210
Outcome 4	To be able to apply this knowledge to calculate the design of electrical machines, electric elements and industrial electro-technological installations.	EM 3301, Ele 3303, OTTBEU 2201 , OTEA 3305, EPU 4212
Outcome 5	Demonstrate knowledge of installation, commissioning and operation of electrical, to make calculations on transients, overvoltage, relay protection and automation for the optimization of operating modes of power supply systems.	MNEEU 4306, PISE 3211, PPSE 3209, RZASE 4213
Outcome 6	Ability to apply knowledge of the historical, social and cultural aspects of integrated engineering activities using the means of communication.	IK 1101, Soc 2104, Pol 2110, IYa 1108, KYa 1106
Outcome 7	Ability to use standard methods for calculating the elements and components of power supply systems, execute the design and technological documentation, respectively, standards, specifications and other normative documents for writing the graduate work	PSEO 4307, PVEOEO 3304

The following **curriculum** is presented:

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
History of Kazakhstan 2 Lect. 1 Pract. ECTS 5	**Kazakh (Russian) Language** 3 Pract. ECTS 5	**Philosophy** 1 Lect. 2 Pract. ECTS 5	**Sociology** 1 Lect. 1 Pract. ECTS 3	**Local Electric Network Systems/ Power Converter Installations /Heat-Mechanic Equipment of Electric Power Stations/ Parametres and Calculations of Electric Network Systems / Elemental Base of Relay Protection and Automation** 2 Lect. 1 Pract. ECTS 5	**Power Supply/ Distributive Network Operation Modes/ Relay Protection of Electric Stations/ Relay Protecrion Basics** 2,5 Lect. 1 Pract. 0,5 Lab. ECTS 6	**Economics of the Field** 1 Lect., 1,5 Pract., 0,5 Lab. ECTS 5	
Kazakh (Russian) Language 3 Pract. ECTS 5	**Foreign Language** 3 Pract. ECTS 5	**Politology** 1 Lect. 1 Pract. ECTS 3	**Industrial Electronics** 1 Lect. 1 Pract. ECTS 3	**Electric Power Stations and Substations/ Electric Part of Electric Power Stations/ Electric Equipment of Electric Power Stations and Substations/ Microprocessor-Based Units and Systems** 2,5 Lect. 1 Pract. 0,5 Lab. ECTS 7	**Overvoltage and Isolation in Electric Power Supply Systems/High Voltage Equipment/ Equipment Isolation Coordination at Electric Power Stations/ Electric Operation Modes of Power Equipment in Electric Power Systems/ Modelling in Electric Drive** 2 Lect., 1 Pract., ECTS 5	**Electrotechnological Full-scale Plants/ Automation and Regulation in Power Supply Systems/Special issues of Electric Power Stations/ Relay Protection of Analog and Digital Equipment Elements/ Microprocessor-Based Control of the Electric Drive** 2 Lect., 0,5 Pract., 0,5 Lab. ECTS 5	

Foreign Language 3 Pract. ECTS 4	**Mathematics II** 1 Lect. 1,5 Pract., 0,5 Lab. ECTS 5	**Law Basics** 1 Lect. 1 Pract. ECTS 3	**Professionally Oriented Foreign Language** 2 Pract. ECTS 3	**Nonconventional and Renewable Energy Sources** 2 Lect., 1 Pract. ECTS 5	**Intrashop Electric Power Supply Design and the basics of Electric Light/ Power Supply Systems Exploitation/ Operation Modes of Electric Equipment at Electric Stations /Automated Machinery of Electric Power Systems / Automated Electric Drive Theory** 2 Lect., 2 Pract. ECTS 7	**Ralay Protection and Automated Machinery in Electric Power Supply Systems/Electromagnetic Compatibility in Electric Systems/ Dispatch Devices of Electric Power Stations/ Relay Reliability / Control Systems of Automated Electric Drive** 2 Lect., 0,5 Pract., 0,5 Lab. ECTS 5	
Mathematics I 1 Lect. 1,5 Pract., 0,5 Lab. ECTS 5	**Ecology and Sustainable Development** 1 Lect. 1 Pract. ECTS 3	**Electrical Engineering** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	**Labour Protection and Safety Measures in Electricity Generating Plants** 1 Lect. 2 Pract. ECTS 4	**Electric Drive** 1,5 Lect., 1 Pract., 0,5 Lab. ECTS 5	**Ellectric Devices Theory Basics/Electrical Energy Transmission Modes/ Control and Regulation Automated Units at Electric Stations/ Electromagnetic compatibility in Power Engineering/ Electrical Appliance and units of automated electric drive** 2,5 Lect., 1,5 Pract. ECTS 6	**Installation, commissioning and operation of power plants / Relay protection of networks and systems / Exploitation of electric equipment from electric stations/ Installation, setting up, and diagnostics of relay protection and automation / Typical Technological Complexes Automation** 2 Lect., 2 Pract. ECTS 7	

Information Science 1 Lect. 1,5 Pract. 0,5 Lab. ECTS 4	**Physics** 1 Lect. 2 Pract. 1 Lab. ECTS 6	**Electrotechnical Materilas Science and Metrology** 3 Lect., 1 Lab.ECTS 7	**Electrical Engineering** 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 4	**Transients In Electric Supply systems / Transients in Electric Machines and Units/ Transients in Electric Power Systems/ Electric Drive Shield and Diagnostics/ Transients in Current Circuits of Relay Protection** 1 Lect., 0,5 Pract., 0,5 Lab. ECTS 3	**Transients in Electric Power Supply Systems/Transients in Electric Machines and Units/ Transients in Electric Power Systems/ Electric Drive Shield and Diagnostics/ Transients in Current Circuits of Relay Protection** 1 Lect., 0,5 Pract., 0,5 Lab. ECTS 3	**Sectional Electric Power Supply Systems Designing / Designing, Assembling and Repair of Electric Power Networks Equipment/ Electric Power Stations Designing/ Relay Protection Designing/ Automated Electric Drive Of Typical Full-Scale Plants** 2 Lect., 3 Pract. ECTS 8	**Pre-graduation internship** ECTS 18
Life Safety Basics 1 Lect. 1 Pract. ECTS 3	**Engineering and Computer Graphics** 1,5 Lect., 1 Pract., 0,5 Lab. ECTS 5	**Economics Basics** 1 Lect. 1 Pract. ECTS 4	**Mathematical Tasks and Computer Modelling in Power Engineering** 2 Lect., 2 Pract. ECTS 6	**Electrical Machines** 1,5 Lect., 1 Pract., 0,5 Lab. ECTS 5			**State examination in speciality** ECTS 4
Profession Oriented Course and Scientific Research Basics 3 Lect. ECTS 4	**Practical Training** ECTS 1	**Professional Kazakh** 2 Pract. ECTS 3	**Management Theory and Digital Devices Basics** 2 Lect. 1,5 Pract. 0,5 Lab. ECTS 6		**Work experience internship** ECTS 3		**Writing and presenting degree paper** ECTS 8
			Work experience internship ECTS 1				
∑=8 Lect. + 11 Pract. + 1 Lab. = 20	∑=4,5 Lect. + 11 ,5 Pract. + 2 Lab. = 18	∑=8,5 Lect. + 8 Pract. + 1,5 Lab. = 18	∑=8,5 Lect. + 10,5 Pract. + 1 Lab. = 20	∑=10,5 Lect. + 5,5 Pract. + 2 Lab. = 18	∑=10 Lect. + 6 Pract. + 1 Lab. = 17	∑=9 Lect. + 7,5 Pract. + 1,5 Lab. = 18	
ECTS 30	ECTS 30	ECTS 30	ECTS 30	ECTS 30	ECTS 30	ECTS 30	ECTS 30

According to the SAR the following **learning outcomes** shall be achieved by the Master's degree programme Electrical Power Engineering:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Know the major historical and philosophical aspects of the development of science and be able to keep records in the state language, speak a foreign language at a professional level for research.	IFN5201, IYa 5202, DKYa 6201
Outcome 2	Analyze the current scientific and technological challenges of electric power, to know the methodology of science and methods of scientific research, to be able to use educational methods for teaching.	MNMNI 5203, NTPE 5301, Psi 5203, Ped 5204, MPED5204
Outcome 3	Know the specific issues of power supply, electric technologies and modern energy-saving technologies, to be able to use innovative science and engineering technology for the task, and optimize the operation of the equipment.	ITNT 6202, SVE 6304, SVET 6305, CTMU 6301, SVE 5302, SVIE 5303, SET 5306
Outcome 4 Preparing	The ability to independently apply the methods and techniques of research in	Iya5202, DKYa6201, NTPE5301
graduates in the field of research	their professional activities; be able to execute and defend research results.	

The following **curriculum** is presented:

Semester 1	Semester 2	Semester 3	Semester 4
Science History and Philosophy 1 Lect., 1 Pract. ECTS 4	**Foreign Language (Professional)** 2 Pract. ECTS 3	**Business Kazakh** 2 Pract. ECTS 4	**Research** ECTS 5
Psychology 1,5 Lect., 0,5 Pract. ECTS 4	**Methodology and Methods of Scientific Research / Basics of projects and international grants on innovative technologies** 3 Lect., 1 Pract. ECTS 5	**Innovation Technologies in Science and Engineering/ Information Technologies in Science and Education** 2 Lect., 1 Pract. ECTS 6	**Scientific research (continuous)** ECTS 12
Pedagogics 1,5 Lect., 0,5 Pract. ECTS 4	**Special Issues of power industry / Special issues of automated electric drive** 2 Lect., 2 Pract. ECTS 5	**Digital Equipment and Microcontrollers/ Mathematical Models in Power Industry** 2 Lect., 1 Pract. ECTS 5	**Complex exam** ECTS 3
Teaching methodology of electrical disciplines / Methods of specialized subjects teaching 2 Lect., 1 Pract. ECTS 5	**Modern energy-saving technology / energy saving and energy efficiency in the electricity industry** 2 Lect., 2 Pract. ECTS 5	**Special Issues of Power Supply/Electrical safety in Power Industry** 2 Lect., 1 Pract. ECTS 5	**Master's Degree Paper Writing and Presentation** ECTS 10
Modern renewable energy/Modern technologies of conservation of energy2 Lect.2, 1 Pract. ECTS 5	Scientific research ECTS 4	Special topics in electrical technology/Electricdrive of General industrial machinery Lect.2, 1 Pract. ECTS 6	
Scientific and technical problems of power industry 2 Lect., ECTS 4	**Scientific research** ECTS 4	**Scientific research(continuous)** ECTS 4	
Scientific research (continuous) ECTS 4	**Teaching practice (continuous)** ECTS 4		
∑= 10 Lect. + 4 Pract. = 14	∑= 7 Lect. + 7 Pract. = 14	∑= 8 Lect. + 6 Pract.= 14	
ECTS 30	ECTS 30	ECTS 30	ECTS 30
6 examinations	**4 examinations**	**5 examinations**	**1 examination**

According to the SAR the following **learning outcomes** shall be achieved by the Bachelor's degree programme Heat Power Engineering:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Ability to apply mathematical device, the physical and chemical laws, information technology, based on a coherent philosophical system of scientific knowledge about the world for complex engineering.	Mat(I) 1203, Mat(II) 1204, Inf 1102, Fiz 1205, Him 1207, Fil 2111
Outcome 2	Demonstrate the ability to use electrical calculations with the use of engineering and computer graphics; to know the implications of the impact of production factors on safe living conditions and the environment; be able to carry out an economic analysis taking into account the legal provisions in order to address problems of thermal engineering.	EE 1201, OET 2107, OP 2109, EUR 2105, OBZh 2103, IKG 2209, EO 4305
Outcome 3	To know the basic theoretical laws in the field of gas and fluid mechanics, heat and mass transfer processes, fuel combustion laws; be able to use test equipment to perform settlement and graphics, coursework and project work.	TOT 2206, TIK 2212, MSZG 2202, TM 2205, TTG 2206, UIRS 4306
Outcome 4	To be able to apply this knowledge to calculate the elements and units of heat and power systems, thermal engines, boiler plants using the technology of preparation of water and fuel.	NTD 3302, TOTES 3210, KUPG 3301, VTPU 3203, TPT 3203, FHMPVTESPP 3207, TSE 3204, SPRE 3208
Outcome 5	Demonstrate knowledge of district heating systems, water chemistry, corrosion processes to calculate their impact on the environment and energy saving technologies.	TTS 3211, OOSETO 3302, KKEO 3213, VHRTESK 4303, ETETT 4308
Outcome 6	Ability to apply knowledge of the historical, social and cultural aspects of integrated engineering with the use of means of communication.	IK 1101, Soc 1104, Pol 2110, IYa 1108, , K(R)Ya 1106,.
Outcome 7	To be able to operate the main and auxiliary thermal power plant equipment, inspect and evaluate the	PKYA 2201, POIya 2202, EKO 3301,
	technical condition of heat and power systems in order to determine the reliability of the existing equipment. Draw up technical documentation, respectively, standards, specifications and other normative documents for writing the graduate work	SU 3304, ETO 4307, OTKTP 4309, IGA

The following **curriculum** is presented:

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	7 семестр	8 семестр
History of Kazakhstan 2 Lect. 1 Pract. ECTS 5	**Sociology** 1 Lect. 1 Pract. ECTS 3	**Philosophy** 1 Lect. 2 Pract. ECTS 5	**Elementary Economics** 1 Lect. 1 Pract. ECTS 3		**Superchargers and Heat-Engines** 1 Lect. 1 Pract. ECTS 3	**Economics of the Branch** 2 Lect. 1 Pract. ECTS 5	**Work Pre-graduation Practice** ECTS 20
Kazakh (Russian) language 3 Pract. ECTS 5	**Kazakh (Russian) language** 3 Pract. ECTS 5	**Ecology and Regions Sustainable Development** 1 Lect. 1 Pract. ECTS 3	**Professionally-oriented foreign language** 2 Pract. ECTS 3	**Boiler Plants and Steam Generators** 2 Lect. 1 Pract. ECTS 5		**Thermoelectric Power Stations and Boiler-Houses Water-Chemistry** 2 Lect. 1 Pract. ECTS 5	Final State Assessment ECTS 3
Foreign Language 3 Pract. ECTS 5	**Foreign Language** 3 Pract. ECTS 4	**Fluid and Gas Mechanics** 2 Lect. 1 Pract. 1 Lab. ECTS 6	**Law Basics** 1 Lect. 1 Pract. ECTS 3	**Heat Power Engineering Systems and Energy Usage** 2 Lect. 1 Pract. ECTS 5	**Environment Protection when Heat Power Engineering Equipment Usage** 2 Lect.1 Pract. ECTS 5	**Teaching research** 3Pract. ECTS 5	**Degree paper writing and defense** ECTS 7
Mathematics I 1 Lect. 1,5 Pract. 0,5 Lab. ECTS 5	**Mathematics II** 1 Lect.1,5 Pract.0,5 Lab. ECTS 5	**Heating Engineering Theoretical Basics** 2 Lect. 0,5 Pract. 0,5 Lab. ECTS 5	**Life Safety Basics** 1 Lect. 1 Pract. ECTS 3.	**Energy Carriers Production and Distribution Systems** 2 Lect. 1 Pract. ECTS 5	**Power Equipment Corrosion and Conservation** 2 Lect. 2 Pract. ECTS 6	**Heat Processes Technological Control Basics** 2 Lect. 1 Pract. ECTS 5	

Information Science 1 Lect. 1,5 Pract. 0,5 Lab. ECTS 5	**Practical and work practice** ECTS 2	**Heat Engineering Metrology and Control** 2 Lect. 0,5 Pract.0,5 Lab. ECTS 5	**Heat-Mass Exchange** 2,5 Lect. 1 Pract. 0,5 Lab. ECTS 6	**Thermoelectric Power Stations Theory** 2 Lect. 1 Pract. ECTS 5	**Boiler Equipment Exploitation** 2 Lect. 1 Pract. ECTS 5	**Energy Saving in TT and TE** 2 Lect. 1 Pract. ECTS 5	
	Physics 1 Lect.2 Pract. 1 Lab. ECTS 6	**Politology** 1 Lect. 1 Pract. ECTS 3	**Fuel Burning Theory** 2 Lect. 1,5 Pract. ECTS 6	**Introduction of a Heating System and Heat Networks** 2 Lect. 1 Pract. ECTS 5	**Firing Devices** 2 Lect. 1 Pract. ECTS 5	**Turbine Equipment Exploitation of Thermoelectric Power Stations** 2Lect. 1Pract. ECTS 5	
Chemistry 1 Lect. 1Pract. 1 Lab. ECTS 5	**Electrical Engineering and Electronics** 1,5 Lect.1 Pract. 0,5 Lab. ECTS 5	**Professional Kazakh** 2 Pract. ECTS 3	**Physical and Chemical Methods of Water Preparation at Thermoelectric Power Stations** 2 Lect. 1,5 Pract. ECTS 6	**Engineering and Computer Graphics** 1,5 Lect. 1Pract. 0,5 Lab. ECTS 5	**Technology of Fuel Preparation at Thermoelectric Power Stations** 2,5 Lect. 1 Pract. 0,5 Lab. ECTS 6		
∑=5 Lect. + 11 Pract. + 2 Lab. = 18	∑=4,5 Lect. + 11,5 Pract. + 2 Lab. = 18	∑=9 Lect. + 8 Pract. + 2 Lab. = 19	∑=9,5 Lect. + 9 Pract. + 0,5 Lab. = 19	∑=11,5 Lect. +6 Pract. +0,5 Lab. = 18	∑=11,5 Lect. +7 Pract.+0,5 = 19	∑=10 Lect. + 8 Pract. = 18	
30 ECTS	**30 ECTS**	**30 ECTS**	**30 ECTS**	**30 ECTS**	**30 ECTS**	**30 ECTS**	**30 ECTS**
6 examinations	**6 examinations**	**6 examinations**	**6 examinations + 2 course projects /course papers**	**6 examinations + 1 course project /course paper**	**6 examinations + 2 course projects /course papers**	**6 examinations + course projects /course papers**	

According to the SAR the following **learning outcomes** shall be achieved by the Master's degree programme Heat Power Engineering:

Outcome code	Outcome statement	Elements of curriculum
Outcome 1	Know the major historical and philosophical aspects of the development of science and be able to keep records in the state language, speak a foreign language at a professional level for research.	IFN5201, Iya5202, DKYa201
Outcome 2	Analyze current scientific and technical problems heat power and heat technologies using modeling techniques; be able to use educational methods for teaching.	Psi5204, Ped5203, MPUET5202, NTPTT5301, MPTD5205
Outcome 3	Know the processes of original and non-standard devices for the implementation of water-chemical mode of heat and power equipment, its reliable operation; be able to use the waste energy with minimal impact on the environment. be used to identify problem areas, solving tasks and optimizing the operation of the equipment.	PTRTU6304, NRVA6301, IVE5304, SVHR6303
Outcome 4 Prepare graduates for work in the field of scientific research.	The ability to independently apply the methods and research techniques to be used in an unfamiliar environment, or in the broader contexts; be able to execute and defend research results.	NIRM, IGA

The following **curriculum** is presented:

Semester 1	Semester 2	Semester 3	Semester 4
Science History and Philosophy 1 Lect. 1 Pract. ECTS 4	**Foreign Language** 2 Pract. ECTS 4	**Business Kazakh** ECTS 4	
Psychology 1,5 Lect. 0,5 Pract. ECTS 4	**Waste Energy Usage** 3 Lect. 1 Pract. ECTS 7	**Environment Saving Technologies while Heat Power Engineering Equipment Usage** 4 Lect. 1 Pract. ECTS 9	
Pedagogics 1,5 Lect. 0,5 Pract. ECTS 4	**Methods of Teaching Heat Power Engineering Disciplines** 2 Lect. 1 Pract. ECTS 5	**High Temperature Units Reliability** 3 Lect. 1 Pract. ECTS 7	**Scientific research** ECTS 17
Scientific and technical problems of Heat Power Engineering and Thermotechnology 1 Lect. 1 Pract. ECTS 4		**Special Issues of Water Chemistry** 2Lect. 1 Pract. ECTS 5	
Modelling Processes and Plants in Heat Power Engineering and Thermotechnology 2 Lect. 1 Pract. ECTS 5	**Teaching Practice** ECTS 1	**Scientific research** ECTS 3	**Comprehensive assessment** ECTS 3
Teaching Practice ECTS 3	**Research internship** ECTS 5	**Research internship** ECTS 2	**Master's Degree Paper Writing and Presentation** ECTS 10
Research internship ECTS 6	**Scientific research** ECTS 8		
∑= 7 Lect. +4 Pract. = 11	∑= 5 Lect. + 4 Pract. = 9	∑=9 Lect. + 5 Pract.=14	
30 ECTS	30 ECTS	30 ECTS	30 ECTS

According to the SAR the following **learning outcomes** shall be achieved by the Bachelor's and Master's degree programme Metallurgy:

Outcome code	Outcome statement	Elements of curriculum (modules)
5B070900 «Metallurgy»		
Outcome 1	Ability to implement basic and special knowledge in the sphere of mathematical, natural, humanitarian and economic sciences for complex engineering work within the overall system of scientific	Inf 1105, Him 2201, Fiz 2203,PKYa 2204, , Fil 2102, Pol 2107, FKH 2203, Ele 2206, PM 2204.

	knowledge about the world	
Outcome 2	Perform the ability to collect, keep and implement the information data to make conclusions in the solution of communicative tasks of modern technical equipment and IT	PM 2204, Mat 2205, SSTI 2207
Outcome 3	Know judicial, social, ecological and cultural aspects of complex engineering work to observe healthcare, life and labour security in industry	KPMOIS 3213, AMP 3301, OTM 4214
Outcome 4	To communicate inside professional and social sphere in general, including in a foreign language, to provide clear understanding of the information, idea, problem and decision among professionals and non-professionals; to carry out autonomous analysis of the present and recent/new technical documentation, and to protect and to communicate the results of complex engineering work in the solution of problems in the sphere of metallurgy.	POIya 2205
Outcome 5	Ability to observe the main laws of natural sciences, methods of mathematical analysis and modeling, fundamentals of theoretical and experimental research, which is based on recent achievements in the study of complex engineering work in the sphere of metallurgy.	TepMP 3302, TehMP 3301, PM 3212
Outcome 6	Ability to put new equipment into operation, do repair works, check and assess technical state of thermal power systems on the industrial site which is aimed at determination of equipment resources and reliability in further operation.	OPPMO 4308
Outcome 7	Ability to autonomously make preliminary technical and economical based-on-fact analysis of project decisions, make organization and planning calculations in foundation or reorganization of industrial sections, plan staff work and labour payment resources, apply advanced methods of equipment operation at metallurgy enterprises.	EUP 4309

6M070900 «Metallurgy»		
Profession-oriented direction		
Outcome 8	To be able to apply the latest research achievements for the development of technological solutions to the steel mills, to perform drawing, designing and research	Men 5202, Psi 5203, AYa (P) 5201, OUPBOTM 5202, EMSKOP 5201, MKhM 5306, SAMS 5307, FKhMIM 5308, MISSMS 5201,
Research and pedagogical direction		
Outcome 9	To be able to use the latest achievements of the metallurgical science, pedagogy basics of psychology in the scientific and educational activities, organize the work of the students.	IFN 5201, Ped 5204, MPTMP 5202

The following **curriculum** is presented for the Bachelor's degree programme:

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Informatics 1 Lect., 1,5 Pract. 0,5 Lab. ECTS 5	History of Kazakhstan 2 Lect. 1 Pract. ECTS 5	Philosophy 1 Lect. 2 Pract. ECTS 5	Life Safety Basics 1 Lect. 1 Pract. ECTS 3	Crystallography and Mineralogy 1 Lect. 1 Pract. 1 Lab. ECTS 5	Powder Metallurgy 2 Lect. 1 Pract. ECTS 4	Labour Protection in Metallurgy 2 Lect. 1 Pract. ECTS 5	Pre-diploma internship ECTS 16
Sociology 1 Lect. 1 Pract. ECTS 3	Elementary Economics 1 Lect. 1 Pract. ECTS 3	Chemistry 1 Lect. 1 Pract. 1 Lab. ECTS 5	Ecology and Sustainable Development 1 Lect. 1 Pract. ECTS 3	Ore Pretreatment and Dressing / Flatting Theory/ Founding Processes Theory and Modelling 2 Lect. 1 Pract. 1 Lab. ECTS 7	Construction and Design of Metallurgical Equipment with the Help of CAD 2 Lect. 1 Pract. ECTS 4	Technology of Non-Ferrous Metals Production/ Technology of Ferrous Metals Production/ Pipe Production Technology / Technology of Non-Ferrous Metals Production 2 Lect. 1 Pract. ECTS 5	State examination in speciality ECTS 5
Kazakh (Russian) Language 3 Pract. ECTS 5	Kazakh (Russian) Language 3 Pract. ECTS 5	Professionally Oriented Foreign Language 2 Pract. ECTS 3	Politology 1 Lect. 1 Pract. ECTS 3	Metals Shaping 2 Lect. 1 Lab. ECTS 5	Heat Power Engineering of Metallurgical Processes 1 Lect. 2 Pract. ECTS 5	Rolled Production / Heavy Non-Ferrous and Precious Mettallurgy/ Product Quality and Qualimetry / Continous Metals Casting 2 Lect. 1 Pract. ECTS 5	Degree paper (project) writing and defense ECTS 9
Foreign Language 3 Pract. ECTS 4	Foreign Language 3 Pract. ECTS 4	Electrical Engineering 1,5 Lect. 1 Pract. 0,5 Lab. ECTS 5	Professional Kazakh (Russian) 2 Pract. ECTS 3	Foundry 2 Lect. 1 Lab. ECTS 5	Ferrous Metals Production Technology / Ferrous Metals Production Technology / Rolling Production Technology / Ferrous Metals Production Technology 2 Lect. 1 Pract. ECTS 4	Out-of-furnice Flux Processing / Less-Common Metals Metallurgy / Metals Corrosion and Defense / Casting of Non-Ferrous Alloys 1 Lect. 2 Pract. ECTS 5	
Law Basics 1 Lect. 1 Pract. ECTS 3	Physics 1 Lect. 0,5 Pract. 0,5 Lab. ECTS 3	Physics 1 Lect. 0,5 Pract. 0,5 Lab. ECTS 3	Metallurgical Processes Theory 2 Lect. 0,5 Pract. 0,5 Lab. ECTS 4	Metallurgical Processes Tehnology 1 Lect. 1 Pract. ECTS 3	Steel Electrometallurgy / Metallurgy of Light Metals/ Thermal Treatment of Rolled Metal and Pipes / Founding Production of Cast Iron and Steel 1 Lect. 2 Pract. ECTS 4	Design Principles and Metallurgic Objects Designing / Design Principles and Metallurgic Objects Designing /Rolling and Pipe Shops Designing/ Foundry Designing 2 Lect. 1 Pract. ECTS 5	
Mathematics 1 Lect. 2 Pract. ECTS 5	Mathematics 1 Lect. 2 Pract. ECTS 4	Standardization, Certification, and Technical Metrology 2 Lect. 0,5 Pract. 0,5 Lab. ECTS 5	Applied Mechanics 2 Lect. 1 Pract. ECTS 4	Metallurgic Production Automation 2 Lect. 1 Pract. ECTS 5	Ferroalloy Electrometallurgy / Alumina and Aluminium Production/ Machinary for Metals Shaping/ Foundry Equipment 2 Lect. 1 Pract. ECTS 4	Economics and Production Control 1 Lect. 2 Pract. ECTS 5	
Speciality Introductory Course and Construction Materials Technology 2 Lect. 1 Pract. ECTS 5	Descriptive Geometry and Engineering Graphics 1 Lect. 2 Pract. ECTS 4	Physical Chemistry and Colloid Chemistry 1 Lect. 1 Pract. 1 Lab. ECTS 4	Material engineering 3 Lect. 1 Lab. ECTS 5				
	Eduactional Internship ECTS 2		Practical Internship ECTS 5		Practical Internship ECTS 5		
∑=6 Lect. + 12,5 Pract. + 0,5 Lab. = 19	∑=6 Lect. + 12,5 Pract. + 0,5 Lab. = 19	∑=7,5 Lect. + 8 Pract. + 3,5 Lab.. = 19	∑=10 Lect. + 6,5 Pract. + 1,5 Lab. = 18	∑=10 Lect. + 4 Pract. + 4 Lab. = 18	∑=10 Lect. + 8 Pract. = 18	∑=10 Lect. + 8 Pract. = 18	
30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS	30 ECTS
7 examinations	7 examinations	7 examinations	6 examinations + 1 course project	6 examinations	6 examinations + 1 course project	6 examinations + 1 course project	

The following **curriculum** is presented for the Master's degree programme:

Table 2.26 – Curriculum for 6M070900 «Metallurgy» (research and pedagogical direction) undergraduate students

Semester 1	Semester 2	Semester 3	Semester 4
Science History and Philosophy 1 Lect. 1 Pract. ECTS 4	**Technical Objects Diagnostication** 1 Lect. 1 Pract. ECTS 4	**Business Kazakh** 2 Pract. ECTS 4	**Research Internship** ECTS 5
Psychology 1,5 Lect. 0,5 Pract. ECTS 4	**Modern and Prospective Technologies for Processing Raw Material Resources of Ferrous and Non-Ferrous Metallurgy** 1,5 Lect. 0,5 Pract. ECTS 4	**Technical Objects Diagnostication** 1 Lect. 1 Pract. ECTS 4	**Scientific Research (continuous) Internship** ECTS 13
Pedagogics 1,5 Lect. 0,5 Pract. ECTS 4	**Special Issues of Metallurgic Processess Theory** 2 Lect. 1 Pract. ECTS 5	**Prospective Technologies of Metals and Alloys Pouring** 3 Lect. 1 Pract. 1 Lab. ECTS 7	**Comprehensive assessment** ECTS 3
Teaching Methods of Metallurgical Processes Theory 1,5 Lect. 0,5 Pract. ECTS 4	**Professionally Oriented Foreign Language** 2 Pract. ECTS 4	**Ferrous Metallurgy Present State and Ways of Development** 3 Lect. 2 Pract. ECTS 7	**Master's Degree Paper Writing and Defense** ECTS 9
Metallurgical Processes Mathematical Modelling 2 Lect. 1 Pract. ECTS 5	**Teaching Internship (continuous)** ECTS 3		
Scientific research (continuous) ECTS 9	**Research Practice** ECTS 10	**Scientific research (continuous)** ECTS 8	
∑= 7,5 Lect. + 3,5 Pract. = 11	∑= 4,5 Lect. + 4,5 Pract. = 9	∑= 4 Lect. + 4 Pract. + 1 Lab.= 9	∑= 3 Lect. + 2 Pract. = 5
30 ECTS	**30 ECTS**	**30 ECTS**	**30 ECTS**

Table 2.27 – Curriculum for 6M070900 «Metallurgy» (field-specific) undergraduate students

Semester 1	Semester 2	Semester 3
Management 0,5 Lect. 0,5 Pract. ECTS 2	**Foreign Language (Professional)** 2 Pract. ECTS 4	**Current State and Ways of Development for Ferrous Metallurgy** 3 Lect. 1 Pract. ECTS 7
Psychology 1,5 Lect. 0,5 Pract. ECTS 4	**Business Kazakh** 2 Pract. ECTS 4	**Experemental research** ECTS 5
Technical Objects Diagnostication 2 Lect. 1 Pract.	**Theory of Mass and Heat Exchange in Metallurgical Processes**	**Comprehensive assessment** ECTS 4
ECTS 5	2 Lect. 1 Pract. ECTS 5	
Prospective Technologies of Metals and Alloys Pouring 3 Lect. 1 Pract. ECTS 7	**Modern Processes and Hardware in Ferrous and Non-Ferrous Metallurgy, and their Development Tendencies** 3 Lect. 1 Pract. ECTS 5	**Master's Degree Paper Writing and Defense** ECTS 14
Metallurgical Processes Mathematical Modelling 3 Lect. 1 Pract. ECTS 7	**Work experience internship** ECTS 9	
Experemental research ECTS 5	**Experemental research** ECTS 3	
∑= 10 lec. + 6 pr. = 16	∑= 5 lec. + 4 pr. = 10	∑= 3 lec. + 1 pr. = 4
30 ECTS	**30 ECTS**	**30 ECTS**