ASIIN Accreditation Report

Bachelor's Degree Programmes
Metallurgy
Technological Machinery and Equipment

Master's Degree Programmes
Metallurgy
Transport, Transport Engineering and Technologies
Technological Machinery and Equipment

offered by
East Kazakhstan State Technical University

Last update: 28 March 2014

Basic information about the accreditation procedure

Degree programmes	**Bachelor's Degree Programmes** • Metallurgy • Technological Machinery and Equipment **Master's Degree Programmes** • Metallurgy • Technological Machinery and Equipment • Transport, Transport Engineering and Technologies
Higher Education Institution	East Kazakhstan State Technical University, Ust-Kamenogorsk, Kazakhstan
Seals applied for	The Higher Education Institution has applied for the following seals and labels: • ASIIN Seal for degree programmes • EUR-ACE® Label
Peer panel	Prof. Dr.-Ing. habil. Jürgen Bast, Technische Universität Bergakademie Freiberg Prof. Dr.-Ing. Ulrich Brannolte, Bauhaus-Universität Weimar Irina Gazukina, student at Almaty Technological University Prof. Dr.-Ing. Michael Gehde, Technische Universität Chemnitz (Speaker) Prof. Jochen Happ, Hochschule für angewandte Wissenschaften Hamburg Prof. Dr.-Ing. Michael Klausner, Fachhochschule Kiel
ASIIN Procedure Manager	Mirjam Krug
On-site visit	The on-site visit took place on 29 – 30 November 2013

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A Preliminary Remark

The on-site visit for the above mentioned degree programmes took place on 29 and 30 October 2013.

Prior to the talks with the representatives of the university, the peers met to prepare their questions and to discuss the self-assessment report. Prof. Michael Gehde was asked to act as speaker of the audit team for the aforementioned degree programmes.

The peers had discussions with the following groups: University management, responsible managers of degree programmes, teaching staff, students.

Additionally, the auditors inspected the infrastructure and the technical equipment at Ust-Kamenogorsk.

The following chapters relate to the Self Assessment Report (hereinafter SAR) provided in December 2012 as well as to the discussions and information provided during the on-site visit including samples of exams and final theses

The assessment and the award of the ASIIN-seal are always based on the European Standards and Guidelines (ESG) and the Subject-Specific Criteria of Technical Committee 01 – Mechanical and Process Engineering, 03 – Civil Engineering, Surveying and Architecture, 05 – Physical Technologies, Materials and Process Engineering valid at the time of conclusion of the contract.

As owner of the label ENAEE has authorized ASIIN to award the EUR-ACE® Label based on the „EUR-ACE Framework Standards for the Accreditation of Engineering Programmes". The assessment for the award of the EUR-ACE® Label is based on the General Criteria of ASIIN as well as on the Subject-Specific Criteria (SSC) of the Technical Committee 01 – Mechanical and Process Engineering, 03 – Civil Engineering, Surveying and Architecture, 05 – Physical Technologies, Materials and Process Engineering.

The report has the following structure: Chapter B presents the facts which are necessary for the assessment of the requested seals. The information principally stems for the self-assessment report and related appendices provided by the Higher Education Institution. An analysis and separate assessments of the peers about the compliance with the criteria for the requested seals follow. The assessment of the peers is preliminary and subject to changes based the subsequent information. The statement of the HEI is included with the exact wording. The final recommendation of the peers is drafted after and based on the statement of the HEI (and additional documents, if applicable). The Technical Committees

make a proposal for the accreditation decision (chapter F). The final decision is taken by the Accreditation Commission for Degree Programmes (chapter G).

Any gender-specific terms used in this document apply to both women and men.

B Report of the peers (Accreditation Report)

B-1 Formal specifications

a) Name and awarded degree	b) Study mode	c) Programme Duration & Credit points	d) First & annual enrollment	e) Expected intake	f) Fees per year
Metallurgy Bachelor of Metallurgy	Full time	8 semesters 240 ECTS	Autumn semester	80 per semester	$2350/346600 KZT
Technological Machinery and Equipment Bachelor of Technological Machinery and Equipment	Full time	8 semesters 240 ECTS	Autumn semester	80 per semester	$2350/346600 KZT
Metallurgy Master of Metallurgy	Full time	4 semesters 193 ECTS	Autumn semester	5 per semester	$2860/421000 KZT
Transport, Transport Engineering and Technologies Master of Transport, Transport Engineering and Technologies	Full time	4 semesters 193 ECTS	Autumn semester	5 per semester	$2860/421000 KZT
Technological Machinery and Equipment Master of Technological Machinery and Equipment	Full time	4 semesters 193 ECTS	Autumn semester	5 per semester	$2860/421000 KZT

Analysis of the peers:

The peers ask the university representatives to specify the programme titles. They learn that two of the Master's programmes include special subjects that are mentioned in the programme titles used in the documents as the programmes are only taught with these special subjects: Transport, Transport Engineering and Technologies, special subject – Lift-and-Carry, Construction and Road Machinery and Equipment and Technological Machinery and Equipment, special subject – Mining Machinery Equipment. However the exact programme title consists of the short version only.

Upon request, the university also explains that the final degree does not include the specification of Science or Engineering, but that the grade of Bachelor or Master is supplemented with the programme specification, e.g. Bachelor of Metallurgy. This is compatible with the ASIIN criteria.

The peers discuss the fees with the university. They hear that most of the students receive state grants and only very few pay the fees by themselves. This is confirmed by the students. The programmes are mainly financed through the Ministry of Education and the allocated state grants. Additional grants are given by the Ministry for scientific research and research projects that are conducted at the University.

The peers ask why there are only five students to be enrolled into the Master's programme each year. The university informs that this is due to the requirement of the Ministry that the university cannot affect.

As to the allocation of credit points for the different degree programmes, refer to section 3-2.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 1 Formal specifications

In principal, the peers consider the formal specifications of the degree programmes under review to comply with the criteria. However, the calculation of ECTS should be corrected, see 3-2.

B-2 Degree Programme: content concept & implementation

B-2-1 Objectives of the degree programme

B-2-2 Learning outcomes of the programme

As **objectives and intended learning outcomes of the degree programmes** the institution states the following in the self-assessment report:

Bachelor Metallurgy

- Preparing graduates with natural science, mathematics and basic knowledge underpinning professional scientific activity for productive activities in industry in the sphere of metallurgy.
- Preparing graduates for research in the field of innovative technologies development: the formation of innovative thinking and mastery of methodologies for research
- Preparing graduates for the organizational and management activities to ensure effective functioning of the production
- Preparing graduates for design of metallurgical processes and production of technological equipment of these processes with the use of computer-aided design tools
- Preparing graduates for autonomous learning and acquiring new professional knowledge and skills, continuous professional development in a changing labor market

Master Metallurgy

- Preparing graduates with natural science, mathematics and basic knowledge underpinning professional scientific activity for productive activities in industry in the sphere of metallurgy.
- Preparing graduates for research in the field of innovative technologies development: the formation of innovative thinking and mastery of methodologies for research; make practical recommendations by using scientific researches; carry out scientific researches with using modern methods of science without assistance.
- Preparing graduates for the organizational and management activities to ensure effective functioning of the production; capable to manage by organizations, groups of employees, to analyze substantive forms of management, to model managerial processes, to develop and to base offers for it improvement.
- Preparing graduates for autonomous learning and acquiring new professional knowledge and skills, capable independently by means of informational technologies; and use it in practical activity, capable by development and realization of projects of personality and professional development in a changing labor market.
- Preparing graduates for design of metallurgical processes and production of technological equipment of these processes with the use of computer-aided design tools; choose criterion of optimal designing decisions, capable to formulate technical tasks, to use assets of automation for designing technological projects of metallurgical production and assets technological equipments these projects.

Bachelor Technological Machinery and Equipment

- Knowledge and understanding of the general cultural subjects, based on general secondary education advanced textbooks, but also including some aspects generated by the knowledge in the forward positions of these disciplines; knowledge and understanding of general engineering and professional disciplines associated with the device design and use of mining machines and equipment.
- Apply their knowledge and understanding, pointing to a professional approach to the use and design of mining machinery and equipment; have the competences manifested in the ability to put forward and defend arguments, and solve problems in the use of mining machines and equipment;
- Ability to gather and interpret relevant data in the field of mining machines and equipment for forming opinions containing statements on the relevant social, scientific and ethical issues;
- Communicate information, ideas, problems and solutions on the use of mining machines and equipment to an audience consisting of both professionals and nonexperts;
- Develop skills of application and calculation of mining machinery and equipment necessary to carry out further studies with a high degree of autonomy.

Master Technological Machinery and Equipment

- Providing a basis or opportunity for originality in development or applying ideas in the context of research on mining machinery and equipment
- Ability to solve problems in new or unfamiliar environments within the broader context of using mining machinery and equipment
- Ability to integrate knowledge and cope with difficulties, to make judgments based on incomplete data in the design process, design and calculation of mining machinery and equipment
- Transfer of findings, as well as the underlying knowledge and considerations (limited coverage), to the audience of specialists and nonspecialists (monologue) on the use of mining machines and equipment
- Allow for further studies with a high degree of autonomy and self-regulation on scientific research in the design of mining machinery and equipment

Master Transport, Transport Engineering and Technologies

- Knowledge and understanding of structures and design of handling devices, road building machinery and equipment, areas of their applications, which form the basis for the manifestation of originality in developing or applying ideas within a research context and stretching beyond the undergraduate course;
- Can apply their knowledge and understanding and ability to solve problems in new and unfamiliar contexts within the broader (interdisciplinary) contexts related to their field of study;
- Able to integrate knowledge, handle complex issues, and formulate judgments with incomplete or limited information on the application or development of new technologies, machine design, taking into account social and ethical responsibilities associated with the use of their knowledge and judgments;
- May report their findings and knowledge used for their formulation and justification in the development of new technologies and designs to specialists and non-specialists machines clearly and unambiguously;
- Have the skills to develop new technologies using materials handling, construction, road machinery, allowing to continue their education to a large extent independently and autonomously.

The intended learning outcomes and objectives as defined above are published on the website of the HEI in Russian and Kazakh language.

Analysis of the peers:

The peers discuss with the university representatives the intended objectives and learning outcomes for the Bachelor's and for the Master's degree programmes. They find that the main intention of the university with regard to the Bachelor's programmes is to prepare the students for operational and experimental tasks, whereas the Master's degree programmes aim at scientific and pedagogic activities. Altogether, the peers gain the impression that the objectives of the programmes are suitable to prepare the graduates for professional careers in their field.

With regard to the programmes in Metallurgy, the peers find the intended learning outcomes in the areas of knowledge and understanding, engineering analysis, engineering design, investigations and assessment, engineering practice and social competences reflected in the programme objectives. They see this in the preparation of graduates with knowledge in natural sciences and mathematics as well as research and management skills. In addition, the programme objectives foresee innovative and design skills and the preparation of graduates for lifelong learning. For graduates of the Master's programme,

additionally the development of research projects and the definition of technical tasks are mentioned in the programme objectives.

For the programmes in Technological Machinery and Equipment, the peers consider the programme objectives to comply with the requirements concerning the areas of knowledge and understanding, engineering analysis, engineering design, investigations and assessment, engineering practice and transferable skills. These are reflected, where graduates are prepared to apply their knowledge in the use and design of mining machinery and equipment, gather and interpret relevant data, develop skill of application and calculation of mining machinery and equipment as well as acquire general cultural knowledge. For the Master's programme, the ability of development, making of judgement and transfer of findings in the field are mentioned.

As to the Master's programme in Transport, Transport Engineering and Technologies, the required skills are reflected in the programme objectives. Here are to mention the knowledge and understanding of structures and design, the formulation of judgements in the field, development and research skills as well as the preparation for continuous educations. The peers therefore find the programme objectives to cover the requirements in the areas of knowledge and understanding, engineering analysis, engineering design, investigations and assessment, engineering practice and transferable skills.

Assessment of the peers

For the award of the ASIIN seal

Criterion 2.1 Objectives of the degree programme
Criterion 2.2 Learning outcomes of the programme

The peers gain a good overall impression of the aims and learning outcomes of the programmes as described by the HEI in the self assessment report and during the discussions. They consider them to correspond to the criteria.

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

The peers deem that the intended learning outcomes of the degree programmes under review as they have been described in the self assessment report and during the onsite visit principally comply with the Subject-Specific Criteria of the Technical Committee 01, 03 and 05.

B-2-3 Learning outcomes of the modules/module objectives

The **objectives of individual modules** are published in the module descriptions.

The module descriptions are available to the students and other interested persons digitally on the internet and in printed form.

Analysis of the peers:

According to the peers, the descriptions of the module objectives (intended learning outcomes) are well accomplished and facilitate the orientation of both teachers and students as to the expectations for the different modules. Nevertheless, they find the subject specific description of the contents of some modules to be too short. For example module "Mechanical Engineering Technology" (TM 3304), module "Material science and fundamentals of construction materials" (MTKM 2212) and module "Computer graphics and computer simulation" (KB 4). Therefore the module description does not give sufficient information about the contents that are taught in each module.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 2.3 Learning outcomes of the modules/module objectives

While finding the module learning outcomes to principally support the achievement of the respective programme objectives, the peers deem it necessary that there should be detailed subject specific descriptions on the contents of each module made available.

B-2-4 Job market perspectives and practical relevance

The HEI mentions the following job perspectives for the graduates:

Ferrous and nonferrous metallurgy, chemical, mining, chemo-mining, mining-metallurgical and mechanical engineering industries; industry research and design institutes, factory laboratories, secondary vocational and higher education institutions.

Fields of professional activities:

- Metallurgical industry technology processes;
- Processing of raw materials and manufacture of metal products with increased consumer properties;
- Technology of production and processing of metals and materials, the study of structure and properties;

- Equipment for mining, metallurgical, and mechanical engineering production;
- Automatic control systems for metal, mining-metallurgical and mechanical engineering production and quality control of finished products.

The HEI expects a high demand for graduates of the above mentioned programmes in Kazakhstan. Mainly, this is due to to the specifics of the region where the main metallurgical, mining-metallurgical and mechanical engineering enterprises of the republic are located.

The HEI provides statistics on the employment of graduates in the labor market which demonstrate that between 80 and 100% of graduates since 2007 have found a job in a relevant section of the labour market.

Practical relevance of the programmes shall be achieved by:

Bachelors enrolled in a degree programme must take the following practice modules: educational practical training, practical training at a production enterprise, technological practical training, and a pre-diploma practice. The number of credits allocated to the practice amounts to 18 credits.

Methodological guidance for the practical elements is carried out by a major subdepartment.

Professors, associate professors and experienced teachers who know the specifics of the profession and enterprises chosen, are appointed as supervisors. They monitor the organization and conduct of the practice of students directly at enterprises, institutions, organizations and check it for compliance with the terms and content.

Analysis of the peers:

During the discussions, the peers learn that the study programmes offered at EKSTU are planned according to the need of the industry in the region. As Ust-Kamenogorsk is situated in a region where mining and metal-working industry has a long tradition, the majority of the graduates find employment immediately after graduation. In the discussion with the students, the peers hear that the students chose their respective study programmes due to their perspectives on the labour market and that they expect to find employment in the region.

The university also explains that work in the industry is mostly started with a Bachelor's degree. Master students most often pursue a PhD programme to then follow an academic

career. Very often, graduates who first started working in the industry return to university to conduct research within the frame of an academic career.

With regard to the internships and practical training in place, the peers see that there are strong links to the local and regional industry and that many graduates seem to be employed in the companies where they accomplished an internship or project before. This is confirmed by the teachers who explain that internships are generally used by students to present themselves to the company. In addition, representatives from the industry are present when future graduates defend their diploma thesis. Thus, it is made sure that the chosen topics are connected to areas of professional activities.

The peers very much appreciate the professional perspectives for graduates as well as the strong connections to the industry.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 2.4 Job market perspectives and practical relevance

The peers estimate that there is a demand on the labour market for graduates and that the training offered is appropriately linked to professional practice.

B-2-5 Admissions and entry requirements

Conditions of admission to the university are regulated by the relevant state regulatory documents. Conditions of access to education for Master's programmes are developed and approved by the university.

Bachelor's degree programmes: Higher education institutions of the Republic of Kazakhstan admit citizens of the Republic of Kazakhstan, foreign nationals and stateless persons who have general secondary, initial vocational (technical and vocational), secondary vocational and higher education.

Admission to Bachelor of Metallurgy and Bachelor of Technological Machinery and Equipment: Admission is by application on a competitive basis in accordance with the number of points stated in the certificate of the approved form, issued in the result of a unified national test or complex testing conducted according to the technologies developed by the National Center for State Education Standards and Testing of the Ministry of Education and Science of Kazakhstan.

Applicants must have knowledge of the secondary school program, confirmed in competitive entrance exams.

Master's degree programmes: Formation of a higher education institutions graduate contingent is by the state request based on the demand for training of scientific and pedagogical staff, as well as by tuition fees at the expense of individuals.

Requirements to the applicants:

- Applicant's prior educational level must be higher education;
- The applicant must have the state document about higher education;
- Admitting to the first year is on the basis of a foreign language (English, French, German) and special discipline entering examinations.

Rules for the recognition of external study attainments/achievements are stipulated in the EKSTU document "Transfer and Restitution of D. Serikbaev EKSTU Students" and regulate that transfers from other Kazakh or foreign institution can be made when no more than five core disciplines differ. This is judged against a transcript of the academic record.

Analysis of the peers:

During the on-site visit, the peers ask for additional explanations on the admission criteria for the degree programmes. They learn that for the Bachelor's degree programmes the completion of secondary education as well as the participation in a unified national test are required. The university accepts only students who achieve a score of at least 50% in this test. For the Master's degree programmes the entrance requirements foresee the completion of a first higher education programme. Additionally, the results of the participation in entrance examinations in a foreign language and a special disciplinary exam must be provided. Students who do not fulfil all necessary entrance requirements have the possibility to attend additional courses in order to fill the gaps. Participation in these courses has to be paid for.

The peers discuss the possibilities to transfer from a Bachelor's programme to a Master's programme with a different main subject area. They hear that this is possible when the number of credit points corresponds and the admission test for the respective Master's programme has been passed successfully. The peers are satisfied that the rules for admission do not principally exclude students from neighbouring subjects.

The peers ask the university to explain how the candidates for the places in the Master's programmes are chosen, as there are only five places. They learn that from those graduates who apply for the Master's programmes at EKSTU, the university simply chooses the applicants with the best overall grades in the previous degree and entry examinations. The peers deem this procedure suitable.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 2.5 Admission and entry requirements

While the university only has limited influence on the national admission rules to higher education, in the opinion of the peers this criterion is fulfilled. Specifically, they find the rules to be sufficiently transparent for applicants in the national higher education system.

B-2-6 Curriculum/content

Bachelor Metallurgy

I – mathematical and science disciplines

II – special disciplines

III – advanced special knowledge

IV – interdisciplinary and other disciplines

Modules		ECTS					Type of assessment
No	Module title	I	II	III	IV	Total	
1	Mathematics	10				10	Test in computer form
2	Computer Science	5				5	Test in computer form
3	Descriptive Geometry and Graphics	5				5	Test in computer form
4	Applied Mechanics	5				5	Test in computer form
5	Physics	10				10	Test in computer form
6	Ecology and Life Protection	7				7	Test in computer form
7	Chemistry	5				5	Test in computer form
	Total	**47**				**47**	
8	Combustion Engineering and Automation		6			6	Test in computer form
9	Electrical engineering, crystallography and metallography		8			8	Test in computer form
10	Standardization and engineering measurements		5			5	Test in computer form
11	Design of metallurgy plants		5			5	Tests in writing form
12	Ore preparation		5			5	Test in computer form

13	Innovation, marketing and management		9			9	Test in computer form
14	Organic and Analytical Chemistry		10			10	Test in computer form
15	Physical Chemistry		5			5	Test in computer form
16	Electrochemistry and Corrosion of Metals		10			10	Test in computer form
17	Material Science		5			5	Test in computer form
18	Main and auxiliary equipment		10			10	Test in computer form
	Total		**78**			**78**	
19	The theory of the processes			5		5	Test in computer form
20	Technology of production 1			5		5	Test in computer form
21	Technology of production 2			5		5	Tests in writing form
22	Heavy non-ferrous metals			10		10	Tests in writing form
23	Precious and rare metals			10		10	Tests in writing form
24	Light Metals			5		5	Test in computer form
	Total			**40**		**40**	
25	History of Kazakhstan				5	5	Oral examination
26	Philosophy				5	5	Test in computer form
27	Kazakh (Russian)				9	9	Test in computer form
28	Foreign Language				9	9	Test in computer form
29	Economic theory and sociology				6	6	Test in computer form
30	Politics and Law				6	6	Test in computer form
31	Economics				5	5	Test in computer form
	Total				**45**	**45**	
32	Practice				**18**	**18**	Report
33	Final state attestation				**12**	**12**	Diploma paper/project
	Total	**47**	**78**	**40**	**75**	**240**	
	Percentage to the number of modules for the period of education	**19,6**	**32,5**	**16,6**	**31,3**	**100**	

Master Metallurgy

I – special disciplines

II – advanced special knowledge

Modules		ECTS			Type of assessment
No	**Module title**	**I**	**II**	**Total**	
1	History and philosophy of science	6		6	Tests in writing form
2	Foreign language	6		6	Tests in writing form
3	Pedagogics	6		6	Tests in writing form
4	Psychology	6		6	Tests in writing form
5	Process Physics and Chemistry	9		9	Tests in writing form
6	Organization and Planning experiment and physical metallurgy	9		9	Tests in writing form
7	Problems of hydrometallurgy and physics and technology of sintering	9		9	Tests in writing form
8	Modelling and optimization of processes	9		9	Tests in writing form
9	Methods of Analysis	9		9	Tests in writing form
	Total	**69**		**69**	
10	Technology for raw materials processing in metallurgy		9	9	Tests in writing form
11	The theory of metallurgical processes		9	9	Tests in writing form
12	Processing of polymetallic raw materials and nuclear fuel		9	9	Tests in writing form
13	Complex processing and production of beryllium		9	9	Tests in writing form
14	Inventive and innovative activity		6	6	Tests in writing form
15	Processing of ore, man-made, and composite materials		6	6	Tests in writing form
16	Statistical methods for quality control		6	6	Tests in writing form
	Total		**54**	**54**	
17	Field practice		18	18	Report
18	Postgraduate research work		34	34	Graduate paper
19	Final state attestation		18	18	
	Total	**69**	**124**	**193**	
	Percentage to the number of modules for the period of education	**35,8**	**64,2**	**100%**	

Master Transport, Transport Engineering and Technologies

I – basic science discipline

II – mathematical and informational disciplines

III – special disciplines

IV – advanced special knowledge disciplines

V – interdisciplinary and other disciplines, optional

Modules		**ECTS**						**Type of assess-ment**
N	**Module title**	**I**	**II**	**III**	**IV**	**V**	**Total**	
1	History and philosophy of science	5					5	Oral examination
2	Foreign language	5					5	Oral examination
3	Psychology and Pedagogics	10					10	Oral examination
	Total	**20**					**20**	
4	Mathematical modeling in engineering processes		5				5	Oral examination
5	Differential integral equalizations		5				5	Oral examination
6	Engineering calculating mathematics		5				5	Oral examination
7	3D modeling and 3D graphics programming		5				5	Oral examination
	Total		**5**				**5**	
8	Mechanical engineering and hydraulics fluid drive of construction and road machinery			10			10	Oral examination
9	Fundamentals of calculating and designing of lift-and-carry machinery			10			10	Oral examination
10	Fundamentals of calculating and designing of construction and road machines			10			10	Oral examination
11	Lift-and-carry machinery			10			10	Oral examination
12	Mechanical equipment of construction materials, producs, and structures enterprises			10			10	Oral examination
13	Construction and road machinery			10			10	Oral examination
	Total			**30**			**30**	
14	Mounting, operating and				5		5	Oral ex-

	repair of machines							amination
15	Lift-and carry machinery production technology				10		10	Oral ex-amination
16	Designing and calculating of pick-and-place machinery				5		5	Oral ex-amination
	Total				**15**		**15**	
17	Durability in mechanical engineering calculating					15	15	Oral ex-amination
18	Fuldamentals of designing					15	15	Oral ex-amination
	Total				**15**		**15**	
19	Practical training			15			15	Report
20	Master's research				28		28	Master's final work
21	Final State attestation				13		13	
	Total	**20**	**5**	**45**	**56**	**15**	**141**	
	Percentage to the number of modules for the period of education	**14**	**3,5**	**32**	**40**	**10,5**	**100%**	

Bachelor Technological Machinery and Equipment

I – mathematical and science disciplines

II – special disciplines

III – advanced special knowledge

IV – interdisciplinary and other disciplines

Modules		**ECTS**					**Type of assess-ment**
No	**Module title**	**I**	**II**	**III**	**IV**	**Total**	
1	Mathematics	6				6	test
2	Computer science	3				3	test
3	Physics	6				6	test
4	Applied disciplines	15				15	test
5	Descriptive geometry and graphics	5				5	test
6	Theoretical mechanics	5				5	test
7	Chemistry	3				3	test
8	Ecology and Life Protection	6				6	test
	Total:	**49**				**49**	
9	Heat engineering and electrical engineering		6			6	
10	Mechanical engineering and material study		8			8	test
11	Hydraulics and fluid drive		5			5	test
12	Computer-aided design (CAD)		5			5	test

13	Introduction into the speciality		3			3	test
14	Machinery designing technology		10			10	test
15	Computer graphics and technology		5			5	test
16	Mining technology		5			5	test
17	Enterprises economics		5			5	test
18	Electric drive and automation		5			5	test
19	Technological machinery		5			5	test
20	Boring machines and equipment		5			5	test
21	Oil and gas equipment		5			5	test
22	Mine complexes		5			5	test
	Total:		**67**			**67**	
23	Technological machines operations			5		5	test
24	Technological machines production and repair technology			10		10	test
25	Lifting machinery			5		5	test
26	Shipping machinery			10		5	test
27	Mining machinery and complexes			5		5	test
28	Fixed installations			5		5	test
	Total:			**40**		**40**	
29	History of Kazakhstan				5	5	Writing examination
30	Philosophy				3	3	test
31	Kazakh (Russian) language				9	9	test
32	Foreign language				9	9	test
33	Sociology, politology, and law				9	9	test
	Total:				**40**	**40**	
34	Practical trainings			**7**	**11**	**18**	Report
33	Final State attestation				**12**	**12**	Diploma work/project
	Total	**47**	**77**	**42**	**65**	**231**	
	Percentage to the number of modules for the period of education	**25%**	**34%**	**20,5%**	**20,5%**	**100%**	

Master Technological Machinery and Equipment

I – basic science discipline

II – mathematical and informational disciplines

III – special disciplines

IV – advanced special knowledge disciplines

V – interdisciplinary and other disciplines, optional

Modules		**ECTS**						**Type of assessment**
N	**Module title**	**I**	**II**	**III**	**IV**	**V**	**Total**	

o								
1	History and philosophy of science	5					5	Oral examination
2	Foreign language	5					5	Oral examination
3	Psychology and Pedagogics	10					10	Oral examination
	Total	**20**					**20**	
4	Mathematical modeling in engineering processes		5				5	Oral examination
5	Differential integral equalizations		5				5	Oral examination
6	Engineeringcalculating mathematics		5				5	Oral examination
7	3D modeling and 3D graphics programming		5				5	Oral examination
	Total		**5**				**5**	
8	Mechanical engineering and hydraulics fluid drive of construction and road machinery			10			10	Oral examination
9	Fundamentals of calculating and designing mining machinery and equipment			10			10	Oral examination
10	Fundamentals of calculayting and designing shipping machinery			10			10	Oral examination
11	Special course Mine Machinery and equipment			10			10	Oral examination
12	Special course Shipping machinery			10			10	Oral examination
13	Special course Fixed installations			10			10	Oral examination
	Total			**30**			**30**	
14	Mounting, operating and repair of machines				5		5	Oral examination
15	Technology of making technological machinery				10		10	Oral examination
16	Designing and calculating of fixed installations				5		5	Oral examination
	Total				**15**		**15**	
17	Durability calculating in mechanical engineering					15	15	Oral examination
18	Designing fundamentals					15	15	Oral examination
	Total				**15**		**15**	
19	Practical training			15			15	Report
20	Master's research				28		28	Master's

								final work
21	Final State attestation				13		13	
	Total	**20**	**5**	**45**	**56**	**15**	**141**	
	Percentage to the number of modules for the period of education	**14**	**3,5**	**32**	**40**	**10,5**	**100%**	

Analysis of the peers:

In analysing the curriculum of the degree programmes under review, the peers take into account the fact that it is to a certain degree prescribed by the Ministry of Education and that the individual higher education institutions in Kazakhstan have only limited possibilities to change the modules and courses. While they learn that theoretically up to 60% of the curriculum can be developed by the university itself, this part of the curriculum still has to be very closely oriented on standards given by the Ministry so that the real flexibility is indeed limited.

Overall, the peers find the curricula of all degree programmes to be little oriented towards application. This is the case for example in the area of manufacturing in the degree programmes BaMa Technological Machinery and Equipment as well as Master of Transport, Transport Engineering and Technologies and in the area of material processing in the degree programmes BaMa Metallurgy. The peers therefore underline that the curricula contenta could include application areas of the subject in order to better allow for an alignment with modern subject developments. Within this context the peers also find that the students make only limited use of the testing equipment available for the subjects of mechanical engineering, transport and metallurgy.

Also, the peers discuss with the university in how far the curricula suit the achievement of the intended aims, specifically with view to the engineering profession. They question whether all of the contents “Electrical engineering”, “Metallography” and “Cristallography” can be taught within one module. Within this context, the peers also enquire why the module “stress calculation in mechanical engineering” in the Bachelor’s degree programmes is an elective module, as to their opinion this is an important basis of the subject. The university explains that only a very basic knowledge in these topics is taught because the programmes aim at a very specific knowledge for a specific industry and therefore target the specific subjects necessary for these industries, that is mining and metal processing. Furthermore the standards of the Ministry of Education are oriented towards the needs of this industry and therefore especially the Bachelor’s programmes are very specialised. The peers agree with this orientation.

In the discussion with the students, they mention the wish to have more courses in English, particularly with regard to subject specific English. However, in the discussion with

the programme responsibles as well as from the documents, the peers see that a number of courses for English including technical English is already included in the programmes, and therefore they consider the compulsory amount of English language courses sufficient.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 2.6 Curriculum/content

While the peers find the curricular contents to be overall adequate, they consider that the programmes could be enhanced by including application-oriented subjects into the curriculum in order to strengthen the graduates' knowledge of modern subject applications and thus their ability to work as engineers. Also they recommend enabling the students to practically use the testing equipment in the subjects of mechanical engineering, transport and metallurgy to improve theoretical knowledge by practical work.

For the award of the EUR-ACE® Label:

Principally, the peers consider the curricular contents of all programmes to be suitable to reach the intended programme objectives and intended learning outcomes. Nevertheless, they point out that more application oriented subjects could be included into the curricula of all programmes in order to deepen the engineering education of the graduates. Within this context, they also recommend enabling the students to practically use the testing equipment in the subjects of mechanical engineering, transport and metallurgy to improve theoretical knowledge by practical work.

B-3 Degree programme: structures, methods and implementation

B-3-1 Structure and modularity

The modules mainly possess between 5 – 10 Kazakh CP.

Practice accompanied by a report as part of the Bachelor's programmes is allocated 18 Kazakh CP and the Diploma paper counts 12 Kazakh CP.

For the Master Metallurgy, field practice accompanied by a report is allocated 18 Kazakh CP. Postgraduate research work as part of the Graduate paper counts for 34 Kazakh CP, the Graduate paper is calculated with 18 Kazakh CP.

For the Master Transport, Transport Engineering and Technologies and the Master Technological Machinery and Equipment practical training counts for 15, Master's research as part of the final thesis for 28 and the Graduate paper for 13 Kazakh CP.

Analysis of the peers:

The peers assess the modularisation and the structure of the curriculum to allow for the completion of the degree programme in time. In the discussion with the students they learn that they evaluate their programmes as logically structured and all of them expect to be able to finish their studies within the planned period. They do however wish for more possibilities to spend a semester abroad. The limited possibilities here seem, however, to be due to a lack of support and advice and not to the structure of the programmes, see also chapter 3-4.

Additionally, the peers discuss with the university the availability of elective courses. They find that there is only a limited number of elective courses especially in the Bachelor's programmes. They follow the argumentation of the university that this is caused by the standardized curriculum that is decided by the Ministry of Education and also by the fact that the Kazakh education system foresees a very specialized education that leaves little room for modules outside of the standard curriculum (see also chapter 2-6). However, the peers welcome the fact that the industry regularly offers elective courses which students can make count for their programmes.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 3.1 Structure and modularity

Principally, the peers consider the structure and modularisation of the programmes to be coherent and consistent with the criteria. They recommend, however, to increase the amount of elective courses for each program. The availability and procedures for the selection of elective courses has to be made transparent in the programme documentation.

B-3-2 Workload and credit points

The Bachelor's programmes are allocated with an equivalent of 240 ECTS, the Master's programmes with 193 ECTS.

For the Bachelor's programmes, the modules are distributed in a way that roughly between 29 and 39 ECTS are given per semester.

The structure of the Master's programmes allocates a number of credits per semester that varies between 33 and 63 ECTS.

The HEI states that the total workload of educational work per one academic year is 60 ECTS.

Analysis of the peers:

The peers discuss with the university representatives the students' workload, use of credit points and conversion of Kazakh credit points into ECTS. They learn that a Kazakh credit point system is in place and that the number of CP for each module is stipulated by the Ministry of Education for the part of the curriculum that is prescribed by the Ministry. For the part of the curriculum that can be developed by the university, the allocated number of CP is mastered by the respective sub-department. For the accreditation, the calculation of ECTS has only roughly been made by the university. The actual calculation of the work load of the students thus remains unclear and the peers discover some irregularities in the conversion methods used by the university. A work load corresponding to the equivalent of up to 39 or even 63 ECTS in a semester does not seem feasible. Within this context, the peers also question that a Master's programme with the duration of four semesters can be allocated with 193 CP. As it is not clear whether this excessive workload is due only to errors in the conversion system or actually expected, the peers stress the necessity of a reasonable student workload in order to guarantee that the programme can be studied within the planned period.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 3.2 Workload and credit points

The peers deem that a correction of the ECTS calculation is necessary, taking into account the actual and realistic workload of the students. It should be ensured that 1 ECTS credit point represents 25-30 hours of work and that the workload per semester does not exceed 900 hours (equaling 30 ECTS) per semester. The university needs to be in line with the ECTS Users' Guide.

B-3-3 Educational methods

According to the self-assessment report, the following educational methods are in use:

Lectures, lab classes, practical classes, independent student work with a teacher, independent student's work, course projects, practical training/field practice

For internships and practical work, professors, associate professors and experienced teachers who know the specifics of the profession and the enterprises chosen are appointed as supervisors. They monitor the organization and conduct of the practice of students directly at enterprises, institutions and organizations.

The ratio of contact classes and independent working hours for undergraduates is 1:2, for graduates this ratio is 1:4.

Analysis of the peers:

The peers ask the university teachers to give a short description on each type of teaching. The teachers explain that lectures are either held in the traditional way or as an interactive lecture where a dialogue between teacher and students take place dealing with a problem that is handed out ahead of the lecture. In lab classes, a task is given to the students that they have to solve individually or in microgroups. In workshops and practical classes, students solve problems in cooperation with the teacher. In supervised self-studies, students have to carry out individual or group work after which their notes are collected for control.

The peers mention positively the very small study groups of 5-10 students that they observe during the on-site visit as well as the very good study environment they perceive and which is confirmed by students and teachers alike.

In the discussion with the students, the peers hear that in spite of the amount of practical classes offered, very often the students are not actively using the available testing equipment, but rather have to watch demonstrations done by the teachers. The peers therefore and with regard to the curriculum identify a lack of practical application of theoretical knowledge in all subjects, particularly in the fields of testing and processing.

The peers have a very positive impression of the connections that the university holds with industrial companies. The projects and thesis conducted by the students are related to questions that come up during internships. In addition, Master students are integrated in scientific development and projects that are conducted within the university.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 3.3 educational methods

Overall, the peers find that the educational methods, also with regard to the ratio of contact hours to self-study are adequate to support the achievement of the programme objectives. Nevertheless, as described in chapter 2-6, they recommend enabling the students to practically use the testing equipment in mechanical engineering, transport and metallurgy to improve theoretical knowledge by practical work.

B-3-4 Support and advice

Offers for support and counselling of students are provided as described below:

The HEI offers meeting advisers who help the students of the corresponding speciality to build the trajectory of their education/training (forming individual curriculum) and mastering the academic program during their training as well as online consulting.

The student groups have tutors and advisors. Tutorial work with the students is based on tutorial work plans of the university, faculty and the sub-department; senior tutors are responsible for the sub-department tutors' and advisors' work.

The tutors talk with the first-year students introducing them to daily routine and behavior culture in university. The tutors and advisors control the students' progress and attendance of classes.

Upon receiving the results of exams, fulfillment of the schedule of course and diploma projects and work, the tutors have discussions with the students. If the students' receive poor grades over a longer period of time, the tutors organize meetings with their parents.

Analysis of the peers:

During the discussions with teaching staff and with students, the peer group meets with a high degree of commitment. They learn that the teachers actively support students individually. Also, there are regular round tables for the discussion of papers and thesis.

In the discussion with the students, the only area for improvement mentioned is more information on possibilities to spend a semester or internship abroad. In the discussion with the programme coordinators, the peers note that the university fosters academic mobility and that the Department for International Cooperation counsels students about the available programmes. Master students even have a compulsory internship of two weeks abroad included in their curriculum. For this internship, scholarships are given to students by the Ministry of Education. The peers gain the impression that there are pro-

grammes available for students that facilitate the participation in international exchange programmes, but that students are not sufficiently informed about these possibilities.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 3.4 Support and advice

In the opinion of the peers, the support and advice available to students is suitable. They recommend, however, that the university provides more advice and information for students who would like to participate in an international exchange.

B-4 Examinations: system, concept and organisation

According to the self-assessment report the **exam methods** described subsequently are foreseen:

Student testing is carried out with the help of current, intermediate and final control.

Current control of progress of students is implemented for each theme of learning discipline and includes control of knowledge in auditorium and extracurricular activity. Forms of current control are: laboratory – practical works, individual home works, oral answers at express oral tests at lectures, conducting abstracts of lectures, performance of an academic year project (work), attendance of studies and seminars. The quantity of examinations of students on current control is defined by the teacher.

There are two major forms of students' final control: computer testing and examination using paper question lists.

When the examination session is over, the HEI organises an additional period (usually for 10 days) during which the students who skipped the examination by some reasons are allowed to take the examinations.

Analysis of the peers:

During the on-site visit, the peers discuss the examination system with the university representatives. They find that besides of computer testing which lasts 60 minutes, oral examinations are in place. Oral examinations are conducted with fourth year students in the Bachelor's programmes and with Master students.

The peers discuss with the university the timetable for the examination period. They learn that one semester consists of 15 weeks of teaching and a 3 weeks examination period. Within the examination period, students take 6-7 exams. The exact timetable is published two weeks before the beginning of the examination period.

Upon request, the university also explains that in case of failing an exam it is possible for the students to repeat it during the next semester. However, students have to pay for this repetition. By applying this concept, an exam can theoretically be repeated very often without causing a complete drop-out of the programme. However, if the failed course is a prerequisite for another module this might cause a delay in the studies. Upon request, the university explains that the general drop-out rate for the university is about 10-15%.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 4 Examinations: system, concept and organisation

The peers find the exam methods and system appropriate and thus the criterion to be fulfilled.

B-5 Resources

B-5-1 Staff involved

The implementation of the personnel is provided by the faculty in accordance with the qualification requirements for licensing of educational activities. The faculty is hired in accordance with the rules of entry by competitive examination of the teaching staff and researchers of higher education institutions. The quantitative composition of staff is approved annually by the staffing schedule.

Planning for the annual teaching load is based on "The educational system of the Republic of Kazakhstan. Academic work and teaching load. The main provisions", and “Standards of time for basic types of academic work of the faculty”, approved by the Rector of the University. Load balancing is carried out in accordance with the qualifications of teachers. The specificity of previously taught courses, and primarily the lecture workload is considered.

Research projects and activities of the teaching staff involved in the programmes are described in the self-assessment report and the CVs provided. Furthermore, during the on-site visit an exposition of recent research project results is shown.

The university gives a detailed description on the number of staff and the percentage of employment for each programme in its self assessment report.

Analysis of the peers:

The peers discuss whether the teaching staff at the university has experience in the industry. They are informed that about 20% of the teachers have worked in the industry before and returned to the university as a teacher and to conduct research. Additionally, there are some lectures each semester that are carried out by industry representatives or guest professors from universities abroad. These are very often taught as a block course for practical reasons. The peers find that the link to the industry is sufficiently given by these mechanisms.

The peers discuss with the university representatives the way to become a university professor. They learn that after completing a PhD programme, a number of scientific works has to be published. It then takes a minimum of 5 years to become an associate professor and another minimum of 5 years to become a professor. On average however, these periods are longer. The Ministry of Education decides on the title of a professor mainly by taking into account one's publications and research activities. In the case of intensive research activities and publications, the step of associate professor may be skipped.

The peers discuss the research activities with the teaching staff and also analyze the results of recent projects at an exposition shown during the on-site visit. The peers find these to be adequate to support the teaching and learning in the programmes under review.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 5.1 Staff involved

The peers consider the composition and qualification of the teaching body as appropriate and therefore the criterion to be fulfilled.

B-5-2 Staff development

The institution reported on the following measures to subject-related and didactical further training for staff:

The academic staff of the sub-department participates in the following activities for their professional development: take professional development training courses; take graduate

and post-graduate courses; become trainees at the leading higher educational institutions of the Republic, at research institutes, organizations, and enterprises.

The sub-departments have a yearly plan and a perspective plan for professional development of the academic staff for a few years ahead. The sub-department teachers are to take professional development courses once every five years according to the plan.

Analysis of the peers:

The peers find that the teachers actively participate in the offered courses for professional development. They emphasize the very high idealism and commitment shown by the teaching staff.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 5.2 Staff development

The peers consider the staff development opportunities that are available as sufficient to demonstrate compliance with this criterion.

B-5-3 Institutional environment, financial and physical resources

The scientific library of the HEI includes 17 sub-departments: 6 reading halls for 425 seats, 2 computer halls for 17 seats and a catalogue hall for 7 automated seats.

There are 650.000 of books and other types of publications.

In the computer halls of the library there is a media library with the stock of e-textbooks, audio and video cassettes, training/educational programs on CDs, abstract journals on floppy disks, CD-supplement for journals and textbooks, what makes up to 2.714 units in total. There is a full text electronic data base containing 304.205 documents.

Educational laboratories and special classrooms: mathematics, computer science, physics, chemistry, analytical chemistry, physical and colloid chemistry, organic chemistry, descriptive geometry and engineering graphics; Electrical Engineering, Corrosion and Protection of Metals, Electrochemistry, standardization, certification and technical measurements, auxiliary facilities, maintenance and repair of equipment, application mechanics, ecology and sustainable development; labor protection and life safety, production processes and devices; metallurgical heat engineering, the theory of metallurgical processes, technology of metallurgical production, automation of metallurgical production, crystallography and metallography, materials science, metallurgy of light metals, precious

metals and steel, metallurgy of rare and dispersed metals, metallurgy of copper, nickel and cobalt, beryllium technology of tantalum and niobium; Metallography.

There are 20 computer, 28 multi-media and 2 specialized tutor classrooms available in EKSTU. Simultaneous testing can be done in 15 classrooms. Connecting to the Internet is with the canal capacity of 26 Mbit/sec. Fiber optic and WiFi technologies are used in the work of the corporative network.

In the course of achieving strategic goals an important part is played by the research part of the university and the department of international cooperation. There are also auxiliary services and peripheral units inherent to an innovative university:

- "Altai" Technopark
- Institute for Postgraduate Education and New Educational Technologies
- Department of Quality Management System
- Department for R & D and Innovation Activity

The HEI lists a number of strategic partners in its self assessment report including international HEIs and industrial companies.

Analysis of the peers:

During the onsite visit, the peers visit the facilities used for teaching and learning of the degree programmes under review as well as some research laboratories from different fields. They notice that the laboratories for material analytics are well equipped while the peers miss some basic equipment for the subject of mechanical engineering. A laboratory working place for material testing is shown, however, the peers deem it to be of very old standard and it seems not to be in use.

The peers appreciate the comprehensive cooperation the university maintains with industrial corporations. They learn that an exchange between certain companies and the university exists, involving lecturers from the industry coming to the university as well as the placement of students within the companies for internships and diploma thesis. Also, there is a number of graduates working for these companies who built up these connections during their studies.

Finally, the peers appreciate the availability and access to electronic literature also in the English language.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 5.3 Institutional environment, financial and physical resources

While the peers find the resources available to be generally adequate in order to fulfil the requirements, they encourage the university to complete and modernize the laboratory equipment for material testing, processing and manufacturing in order to improve the students' theoretical knowledge in these fields by practical work.

B-6 Quality Management: further development of degree programmes

B-6-1 Quality assurance and further development

At the university there are a number of departments whose work is aimed at improving the effectiveness of education. One of them is the department of practical training and employment, which conducts market research on graduates' employment and career growth. The analysis of this data is used to take action to correct, modify and modernize educational programs, including program goals and learning outcomes.

Analysis and evaluation of the effectiveness of the management of the university and its departments are carried out periodically. Assessment is divided into external and internal evaluations. External evaluation is based on the ranking of higher educational institutions at regional and international levels, the rating of educational programs, procedures of certification and accreditation of the university, quality management systems certification. Internal evaluation is carried out by a public hearing of reports of department heads at meetings of collegial management bodies (Academic Council, the Coordinating Council for the QMS, university administration, faculty councils, training and coordinating councils, etc.), internal audits, staff rating, administration and management personnel, subdivisions, departments and faculties, as well as through various surveys of customer satisfaction.

Analysis of the peers:

The peers find several elements of quality management in place. In particular, they gain the impression that student surveys are regularly used with high participation rates among the students.

In addition, there are regular round tables with the participation of students, where decisions for the further development of the university and the respective departments are discussed. In the discussion with the students, those confirm that they can take influence on university politics through these round tables. Additionally, they explain that outside of the surveys which are conducted by the quality management department, they have the possibilities to address any issue directly to a teacher. Typically, solutions are quickly found in a non-bureaucratic manner. Finally, there are weekly meetings of the teachers within the frame of the chair where any kinds of problems are discussed and solutions are sought for. The peers consider these direct means of quality management through discussions and regular meetings as suitable and effective mechanisms.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 6.1 Quality assurance and further development

The peers find the quality assurance mechanisms to be suitable to allow for a continuous improvement of the teaching and learning situation at the university. They thus deem the criterion to be fulfilled.

B-6-2 Instruments, methods & data

The aims of internal audits of QMS are:

- assessment of compliance of the whole QMS or its separate processes and subdivisions activity to the requirement of the current ISO standard, the university mission, policy and goals, determined in the area of quality;
- determining the opportunities and ways of improving QMS and its processes;
- checking the results of the effectiveness of correcting actions upon the results of previous audits.

The basic criteria of internal audit is the correspondence of factual status of audited process of QMS or the activity of the sub-division reflected in corresponding documentation to the demands and planned parameters of QMS processes and the activity of the subdivisions correspondingly.

An effective instrument of assessing the activity of the university and its sub-divisions, as well as the degree of the satisfaction with the management system by the faculty, employees and students is conducting different surveys.

The HEI has worked out a documented procedure “Collection and Analysis of the Information about Customer Satisfaction” in which kinds of surveys conducted in the university are specified.

The results of the survey "Teacher - through the eyes of students," suggests that EKSTU faculties are objective in assessing the academic achievement of students, respect them, are tactful, and comply with standards of teaching ethics. No negative trends have been identified. The introduction of new educational technology does not cause negative reactions among students.

Every year during the “Graduate Fair” employers are interviewed. In 2011, 50 representatives of enterprises and organizations took part in the survey. The analysis of the information revealed that, in the opinion of employers, EKSTU graduates have considerable knowledge and skills to autonomously deal with professional challenges without a long adaptation period (36.6%).

Analysis of the peers:

The peers find that the university collects data about several aspects of the degree programme, including students’ progress, grades and mobility. This data is considered relevant for the university with regard to staff planning and the further development of the programmes.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 6.2 Instruments, methods & data

The peers find that the data collection methods are suitable for the aims of the university with regard to the degree programmes, in particular the monitoring of student numbers and progress as well as the achievement of the intended programme objectives. Therefore, they deem the criterion to be fulfilled.

B-7 Documentation and transparency

B-7-1 Relevant regulations

The regulations mentioned below have been provided for assessment:

- EKSTU DP 807-II-2012 “Students’ Progress Midterm Control”,

- EKSTU DP 808-II-2012 "Final Control and Students' Progress Assessment",
- EKSTU DP 704-I-2011 "Research and Scientific Production Activity",
- EKSTU DP 705-I-2012 "Forming of the Contingent for Master's and Doctor PhD Courses",
- EKSTU DP 706-II -2012 "Transfer and Restitution of D. Serikbaev EKSTU Students",
- EKSTU P 702.02-I-2011 "Regulations about Practical Training",
- EKSTU P 702.03-I-2012 "Regulations about School Laboratory" (appendix R),
- EKSTU R 708.01-I-2012 "Regulations about Organization of Masters' Scientific In-Depth Training".

Analysis of the peers:

The peers find that all aspects of admission, assessment, progress and graduation of the students are regulated. All necessary information is available to teachers, students and applicants.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 7.1 Relevant regulations

The peers consider the criterion to be fulfilled.

B-7-2 Diploma Supplement and qualification certificate

Samples of the Diploma Supplement in English language are available.

Analysis of the peers:

Samples of the Diploma Supplements are provided to the peers as additional information to the self-assessment report before the on-site visit. They provide information about the study aims and learning objectives, nature, level, context, content and status of the studies, the success of the graduates as well as the composition of the final grade.

Assessment of the peers:

For the award of the ASIIN seal

Criterion 7.2 Diploma Supplement and qualification certificate

The peers consider the criterion to be fulfilled.

C Additional Information

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

not necessary

D Comment of the HEI (14.01.2014)

The institution provided the following statement:

B-2-3 Learning outcomes of the modules /module objectives

The university teachers have taken into account ASIIN peers recommendations and now they are doing corrections of the modules content. As an example, the following is the renewed modules content for the mentioned in the recommendations courses: “Mechanical Engineering Technology”, “Material Science and Fundamentals of Construction Materials”, “Computer Graphics and Three-Dimensional Modeling”.

Content of the module “Mechanical Engineering Technology”	
Former	Renewed
The main types of workpieces, methods for their preparation and their characteristics. Types of production, necessary process equipment and tooling, especially casting method. Heat treatment of castings made of different metals. The essence of accurate methods of casting technology: the shell molds, investment casting, gravity die casting, die casting, centrifugal casting, electroslag casting, semi-continuous and continuous casting. Rules for drawing casting - workpiece machining parts under the rules of design drawings of the finished part, testing a drawing for manufacturability, allowances, overlaps, and other technical requirements Technology of production of parts made of different kinds of metal, necessary process equipment and tooling, the application of different methods of obtaining products, calculating the size of parts, features of design drawings, cut-	1 Major types of work pieces, methods of making them, and description. Introl metods for single-piece mass production. 2 Machine part cutting on metalcutters: lathe processing, cutting mode determining, tool selecting, control methods, peculiarities of NC working; cutting on vertical-drilling tools: cutting modes determining, tool selection, control methods, peculiarities of deep boring (ratio of boring depth and drill diameter is more than 5); broacher processing; processing on grinding and honing machines, cutting modes determining, tool selecting, control methods, automated lines for mass production on the example of internal combustion engine barrels; processing on milling machines, peculiarities of down and up cutting, cutting modes, whirling thread cutting, comb cutting. 3 Heat treatment of castings from different metals. Modes of heat treatment of carbon, alloyed steels. Ways of internal stress decreasing (natural and artificial ageing), peculi-

ting metal, rationing consumption. Methods and processes for the preparation of standard parts: shafts, bushings, gears, pulleys, levers, cases, depending on their size and type of production. Mechanical treatment, depending on the type of production, assembly, types of assembly, quality control checks.	arities of heat treatment in salt baths and vacuum, chemicothermal processing (carburizing treatment, nitriding, carbonitriding). 4 Part processing on standard-unit type machines, cutting modes, ways of supporting processing modes synchronization. 5 Technology of making parts drom different metal-roll parts, used technological equipment and tooling. 6 Using industrial robots in flexible production systems of part processing.
Content of the module "Material Science and Fundamentals of Construction Materials" (MTKM 2212)	
Former	Renewed
Structure of metals, the theory of alloys, carbon-iron and non-ferrous alloys based on aluminum, copper and titanium. Technological ways metalworking casting, pressing, welding and cutting.	Material science and metal thermal treatment: Metal crystal structure; Metal structure formation during crystallization; Iron and its alloys; Phase transformations in iron alloys (Theory of steel thermal treatment); Steel thermal treatment technology; Chemical and thermal treatment of steel; Construction and tool steels; non-ferrous metals and alloys state diagram; Nonmetal materials: Plastics; Composite materials; Adhesives; Rubber materials; methods of getting them, use, issues of durability increase. Peculiarities of getting materials on the basis of glass-reinforced plastic. The use of composite materials in mechanical engineering (self-lubricating bearings, bearings for food industry).
Content of the module "Computer Graphics and Three –Dimensional Modeling" (KB 4)	
Former	Renewed

Introduction to the KOMPAS-Graphic interface, document types. Creating, opening and saving documents in KOMPAS-Graphic. Control of the image in the document window. Basic practices. Parameter input. Advanced editing. Contour setup. Color gamma adjustment in "Compass-Graphic." Control panel settings. Graphic editor setup. Working with the applied libraries (general information). Techniques for working with the specification. Familiarization with automation drafting work based on three-dimensional modeling.	1. Introduction to the KOMPAS-Graphic interface. Document types KOMPAS-Graphic. Creating, opening and saving documents in KOMPAS-Graphic. Control of the image in the document window. Basic practices. Parameter input. Advanced editing. Contour setup. Color gamma adjustment in "Compass-Graphic." Control panel settings. Graphic editor setup. 2. Modeling objects of 2-d graphics in KOMPAS graphics system. KOMPAS system start up and completion. Complex straight line drawing. Straight relative position. Dimensioning in COMPAS graphics software. Image face in complex drawing. Section hatching. Plane position in space. Orthogonality of straight and plane. Mathematical problems solution. 3. 3d-modeling in KOMPAS graphic media. 4. Kinematic surface modeling in COMPAS system. 5. Work with applied libraries (general data). Work with specification. 6. COMPAS CAD tools use for designing shafts and gearing. 7. Familiarization with drawing automation based on 3-d modeling. 3-d primitives development. 3-d primitives processing. 8. Applied design objective packets control. CAD connection with control systems of mechanical engineering production. 9. Workflow general data and the systems connected with them.

B-2-6 Curriculum/Content

Having the objective of advancing engineering education of all the graduates by strengthening their theoretical knowledge with practical skills we will increase the number of hours for their work on testing equipment. This concerns all presented academic programs.

Besides, to orient the academic programs to be used in definite areas the university will more actively use the practical bases at the regional industrial enterprises: LSP “Kazzink” (www.kazzinc.com); Kazakhmys (www.kazakhmys.com); JSC „Ulbinskiy Metallurgical Plant“ (www.ulba.kz); JSC “Ust-Kamenogorsk Titanium and Magnesium Plant” (www.tmk-group.com); Financial-Investment Corporation „Alel“ (www.ao-fik-alel.satu.kz); (LSP “Kazzink-Remservis”, Ust-Kamenogorsk (remservice.interesnet.kz), LSP „STC Vostoktekhservis“, Ust-Kamenogorsk, and others.)

To get additional practical skills and to strengthen the graduates’ ability to work as engineers we will also improve the curricula content by including applied courses.

B-3-1Structure and modularity

Currently, the university is working to increase the number of elective courses for each educational program by including disciplines with practical value. Developed curricula will be posted on the University portal that ensures the availability and transparency of the elective courses selection.

B-3-2 Workload and credit points

In accordance the "Rules of the educational process for the credit technology of study", which are approved by order of the Minister of Education and Science of the Republic of Kazakhstan from 20.04.2011y. № 152, recalculation of Kazakh credits into credits ECTS is based on conversion coefficients depending on the types of educational techniques:

A) theoretical training (including classroom training and self-study) – 1,5 – 1,8;

B) pedagogical practice – 1,0-1,2; research - 4,0-4,8; scientific-research work of a Master’s student - 4,0-4,8;

C) final attestation – 3,0-4,5.

During the visit ASIIN peers expressed the wish recalculation of Kazakh credits to be corrected into credits ECTS.

Corrected curriculum on the specialty 6M070900 "Metallurgy" was presented to the ASIIN peers during their (Appendix A). Distribution of hours per semester in accordance with the corrected curriculum is:

1- semester 900 hours (30 ECTS)

2- semester 900 hours (30 ECTS)

3- semester 900 hours (30 ECTS)

4- semester 900 hours (30 ECTS)

Corrected curriculum on the specialty 6M071300 «Transport, Transport Engineering and Technologies» was presented to the ASIIN peers during their (Appendix B). Distribution of hours per semester in accordance with the corrected curriculum is:

1- semester 900 hours (30 ECTS)

2- semester 900 hours (30 ECTS)

3- semester 900 hours (30 ECTS)

4- semester 900 hours (30 ECTS)

Corrected curriculum on the specialty 6M072400 «Technological Machinery and Equipment» was presented to the ASIIN peers during their (Appendix C). Distribution of hours per semester in accordance with the corrected curriculum is:

1- semester 900 hours (30 ECTS)

2- semester 900 hours (30 ECTS)

3- semester 900 hours (30 ECTS)

4- semester 900 hours (30 ECTS)

B-3-3 Educational methods

In accordance with the recommendations of ASIIN peers to strengthen theoretical knowledge of the students and to intensify practical directivity of engineers preparation the number of hours for work on testing equipment will be increased for all the presented educational programs. Carried out work in more details is described above in Section 2-6.

B-3-4 Support and advice

Information about the possibility of students' participation in international exchange programs is posted at the University portal (http://www.ektu.kz/media/135715/tab.pdf), and is sent to the corresponded dean’s office.

To increase the information awareness of students about the international exchange programs the University activates work on finding new international academic exchange programs and existing programs: International Association for the Exchange of student in-

ternships engineering specialties - IAESTE (according this program annually about 10 university students are sent and received), and all the students wishing to participate in international exchange programs will be identified and informed personally by phone or by e-mail.

In addition, it is planned to open additional courses of foreign languages to all comers.

B-5-3 Institutional environment, financial and physical resources

To improve the theoretical knowledge of the students in the area of its practical application, the University plans to increase funds for procurement and upgrading the laboratory equipment for testing materials, processing and manufacturing.

In December 2013 the University purchased new teaching laboratory complex with numerical software for laboratory and practical work of the students.

E Final Assessment of the peers (12.02.2014)

Taking into account the comments given by HEI the peers summarize their analysis and **final assessment** as follows:

For the award of the ASIIN Label:

Criteria 2.3 Learning outcomes of the modules/module objectives

The peers take note of the revision of the content of some modules as described in the above comment of the HEI. However, the peers do not see that it has already been changed in the module description and not been revised for the all relevant modules. Therefore, they confirm their assessment regarding criteria 2.3 and adhere to their originally intended requirement.

Criteria 2.6 Curricula

The peers acknowledge the HEI's intentions to increase the number of hours for the work on testing equipment. Moreover, they welcome the objective of the HEI to include application oriented subjects in the curriculum. However, as the HEI has not yet changed the curricula, the peers maintain their originally intended recommendations regarding criteria 2.6.

Criteria 3.1 Structure and modularity

The peers welcome the HEI's intentions to increase the number of elective courses for each programme. However, as no list of elective courses is presented, the peers adhere to their originally intended recommendations regarding criteria 3.1.

Criteria 3.2 Workload and credit points

The peers take note of the fact that a formal ministry regulation rules the conversion of Kazakh credit points into ECTS credit points. However, the peers have not received the cited regulation and therefore cannot confirm the regulation. Even though, they can basically follow the calculation, they do not see the originally intended requirement fulfilled due to the fact that the official regulation is missing as evidence. Thus, the peers consider it necessary to keep up the originally proposed requirement regarding criteria 3.2.

Criteria 3.4 Support and advice

The peers welcome the overview of options for a stay abroad. Nevertheless, the students seemed to have a demand not only on information about possibilities but also on support for finding a place to spend a semester at a university abroad. Due to the stated demand, the peers still keep up their originally stated recommendation.

Criteria 5.3 Institutional environment, financial and physical resources

The peers appreciate the HEI's efforts to increase the funds for the laboratory equipment as well as their actions taken by purchasing new teaching laboratory. The peers see their recommendation as a long-term task for the HEI in order to complete and modernize the laboratory equipment. The development of the HEI's efforts should be reviewed in the process of the reaccreditation.

For the award of the EUR-ACE® Label:

The peers deemed that the intended learning outcomes of the degree programme(s) under review do basically comply with the engineering specific part of Subject-Specific Criteria of the Technical Committees 01 – Mechanical Engineering / Process Engineering, 03- Civil Engineering, Surveying and Architecture and 05- Physical technologies, Materials, and Processes. Therefore, they do recommend the award of the EUR-ACE® label.

The comments from the institution entail no further changes to the assessment of the peers.

Taking into account 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 Metallurgy	With requirements	EUR-ACE®	30.09.2019
Ma Metallurgy	With requirements	EUR-ACE®	30.09.2019
Ba Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Transport, Transport Engineering and Technologies	With requirements	EUR-ACE®	30.09.2019

Requirements

A 1. (ASIIN 3.2) The calculation of ECTS credits must be corrected. It must be ensured that 1 credit point represents 25-30 hours of work and that the workload per semester does not exceed 900 hours (equaling 30 ECTS) per semester in line with the ECTS Users' Guide.

A 2. (ASIIN 2.3) Module descriptions have to give a detailed subject specific description on the contents of each module.

Recommendations

E 1. (ASIIN 2.6) It is recommended to include application-oriented subjects into the curriculum (e.g. plastics and rubber, manufacturing) in order to strengthen the graduates' ability to work as engineers.

E 2. (ASIIN 2.6) It is recommended to enable the students to practically use the testing equipment in the subject of Mechanical engineering, Transport and Metallurgy to improve theoretical knowledge by practical work.

E 3. (ASIIN 5.3) Laboratory equipment (material testing, processing, manufacturing) should be completed and modernized.

E 4. (ASIIN 3.1) It is recommended to increase the amount of elective courses for each program. The procedures for the selection of elective courses should be made transparent in the programme documentation.

E 5. (ASIIN 3.4) It is recommended to support students to find a possibility to spend a semester at a university abroad.

F Comments of the Technical Committees

F-1 Technical Committee 01- Mechanical Engineering / Process Engineering (06 March 2014)

Fachausschuss 01 (06.03.2014)

The assessment and the analysis for the award of the ASIIN seal:

Der Fachausschuss schließt sich dem Votum der Gutachter vollumfänglich an.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes under review do basically comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01 – Mechanical Engineering / Process Engineering. Therefore, they do recommend the award of the EUR-ACE® label.

The Technical Committee 01 recommends the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Transport, Transport Engineering and Technologies	With requirements	EUR-ACE®	30.09.2019

F-2 Technical Committee 03- Civil Engineering, Surveying and Architecture (12 March 2014)

The assessment and the analysis for the award of the ASIIN seal:

The Technical Committee follows the review of the peers without any changes.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes under review do basically comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 03- Civil Engineering, Surveying and Architecture. Therefore, they do recommend the award of the EUR-ACE® label.

The Technical Committee 03 recommends the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ma Transport, Transport Engineering and Technologies	With requirements	EUR-ACE®	30.09.2019

F-3 Technical Committee 05- Physical technologies, Materials, and Processes (04 March 2014)

The assessment and the analysis for the award of the ASIIN seal:

Der Fachausschuss schließt sich grundsätzlich dem Votum der Gutachter an, nimmt allerdings an der Auflage 1 zum besseren Verständnis eine redaktionelle Änderung vor.

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

The Technical Committee deems that the intended learning outcomes of the degree programmes under review do basically comply with the engineering specific part of Subject-Specific Criteria of the Technical Committees 01 – Mechanical Engineering/Process Engineering and 05- Physical technologies, Materials, and Processes. Therefore, they do recommend the award of the EUR-ACE® label.

The Technical Committee 05 recommends the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Metallurgy	With requirements	EUR-ACE®	30.09.2019

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ma Metallurgy	With requirements	EUR-ACE®	30.09.2019
Ba Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Transport, Transport Engineering and Technologies	With requirements	EUR-ACE®	30.09.2019

Requirements

A 1. (ASIIN 3.2) The calculation of ECTS credits must be corrected. It must be ensured that 1 credit point represents 25-30 hours of work and that the workload per semester does not exceed 900 hours (average 30 ECTS) per semester in line with the ECTS Users' Guide.

A 2. (ASIIN 2.3) Module descriptions have to give a detailed subject specific description on the contents of each module.

Recommendations

E 1. (ASIIN 2.6) It is recommended to include application-oriented subjects into the curriculum (e.g. plastics and rubber, manufacturing) in order to strengthen the graduates' ability to work as engineers.

E 2. (ASIIN 2.6) It is recommended to enable the students to practically use the testing equipment in the subject of Mechanical engineering, Transport and Metallurgy to improve theoretical knowledge by practical work.

E 3. (ASIIN 5.3) Laboratory equipment (material testing, processing, manufacturing) should be completed and modernized.

E 4. (ASIIN 3.1) It is recommended to increase the amount of elective courses for each program. The procedures for the selection of elective courses should be made transparent in the programme documentation.

E 5. (ASIIN 3.4) It is recommended to support students to find a possibility to spend a semester at a university abroad.

G Decision of the Accreditation Commission (28 March 2014)

Taking into consideration the assessments of the expert panel and the relevant Technical Committees, the Accreditation Commission took the following decision

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ba Metallurgy	With requirements	EUR-ACE®	30.09.2019
Ma Metallurgy	With requirements	EUR-ACE®	30.09.2019
Ba Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Technological Machinery and Equipment	With requirements	EUR-ACE®	30.09.2019
Ma Transport, Transport Engineering and Technologies*	With requirements	EUR-ACE®	30.09.2019

* "The Accreditation Committee strongly recommends revising the current name of the Masters Programme "Transport, Transport Engineering and Technologies" as the notion "transport" suggests some kind of reference to transport and traffic issues. Examining the curriculum it becomes evident though that this Master's programme has a strong focus on issues like "Lift and Carry". In order to prevent misunderstandings the name should properly reflect the contents of the programme."

Requirements

A 1. (ASIIN 3.2) The calculation of ECTS credits must be corrected. It must be ensured that 1 credit point represents 25-30 hours of work and that the workload per semester does not exceed 900 hours (average 30 ECTS) per semester in line with the ECTS Users' Guide.

A 2. (ASIIN 2.3) Module descriptions have to give a detailed subject specific description on the contents of each module.

Recommendations

E 1.(ASIIN 2.6) It is recommended to include application-oriented subjects into the curriculum (e.g. plastics and rubber, manufacturing) in order to strengthen the graduates‘ ability to work as engineers.

E 1. (ASIIN 2.6) It is recommended to enable the students to practically use the testing equipment in the subject of Mechanical engineering, Transport and Metallurgy to improve theoretical knowledge by practical work.

E 2. (ASIIN 5.3) Laboratory equipment (material testing, processing, manufacturing) should be completed and modernized.

E 3. (ASIIN 3.1) It is recommended to increase the amount of elective courses for each program. The procedures for the selection of elective courses should be made transparent in the programme documentation.

E 4. (ASIIN 3.4) It is recommended to support students to find a possibility to spend a semester at a university abroad.