ASIIN Accreditation Report

Bachelor's Degree Programme
Mechanical engineering
Standardization, certification and metrology

Master's Degree Programme
Mechanical engineering (profile direction + pedagogical direction)
Standardization and certification (profile direction + pedagogical direction)
Metrology (profile direction + pedagogical direction)

Provided by
Karaganda State Technical University

Version: 27 June 2014

Table of Content

A About the Accreditation Process

Title of the degree Programme	**Labels applied for** [1]	**Previous accreditation**[2]	**Involved Technical Committees (TC)**[3]
Bachelor Mechanical engineering	ASIIN, EUR-ACE® Label	Accreditation of Mechanical engineering by AEER in 2010	01
Bachelor Standardization, certification and metrology	ASIIN, EUR-ACE® Label	n/a	01
Master Mechanical engineering (profile direction + pedagogical direction)	ASIIN, EUR-ACE® Label	n/a	01
Master Standardization and certification (profile direction + pedagogical direction)	ASIIN, EUR-ACE® Label	n/a	01
Master Metrology (profile direction + pedagogical direction)	ASIIN, EUR-ACE® Label	n/a	01
Date of the contract: 05 November 2012			

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

[2] Institutional accreditation in all educational programmes was carried out by the National Accreditation Center of the Ministry of Education and Science of the Republic of Kazakhstan in 2009.

[3] TC: Technical Committee for the following subject areas: TC 01 – Mechanical Engineering/Process Engineering; TC 02 – Electrical Engineering/Information Technology); TC 03 – Civil Engineering, Surveying and Architecture; TC 04 – Informatics/Computer Science); TC 05 – Physical Technologies, Materials and Processes); TC 06 – Industrial Engineering; TC 07 – Business Informatics/Information Systems; TC 08 – Agronomy, Nutritional Sciences and Landscape Architecture; TC 09 – Chemistry; TC 10 – Life Sciences; TC 11 – Geosciences; TC 12 – Mathematics; TC 13 – Physics.

Submission of the final version of the self-assessment report: 02 May 2013 **Date of the onsite visit:** 19.-20. February 2014 **at:** Karaganda State University, main campus Karaganda
Peer panel: Prof. Harald Dallmann, Reutlingen University, Germany Dr. W. Hans Engelskirchen, Kolbenschmidt Pierburg AG, Germany Ms. Irina Gazukina (student), Almaty Technological University, Kazakhstan Prof. Dr. Hanfried W. Hesselbarth, Zurich University of Applied Sciences, Switzerland Prof. Dr. Jürg Keller, University of Applied Sciences and Arts North-western Switzerland, Switzerland
Representatives of the ASIIN headquarter: Dr. Thomas Lichtenberg
Responsible decision-making committee: Accreditation Commission for Degree Programmes
Criteria used: European Standards and Guidelines, version 10.05.2005 ASIIN General Criteria, version 28.06.2012 Subject-Specific Criteria of Technical Committee 01 - Mechanical Engineering/Process Engineering 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	b) Areas of Specialization	c) Mode of Study	d) Duration & Credit Points	e) First time of offer & Intake rhythm	f) Number of students per intake	g) Fees
Mechanical engineering Bachelor of Engineering and Technology	1.Technology of mechanical engineering, metal-cutting machines and tools 2. Technology of mechanical engineering, design-technological provision of production	Full time	8 Semester 254 ECTS credit points	September 1, 1963 Autumn term	N° 100 / year	Grant financing / commerce financing About 2.000 US$ per year
Standardization, certification and metrology Bachelor of Engineering and Technology		Full time	8 Semester 254 ECTS credit points	September 1, 1997 Autumn term	N° 100/ year	Grant financing / commerce financing; About 2.000 US$ per year
Mechanical engineering Master of Engineering and Technology	Profile direction 1. Technology of mechanical engineering, metal-cutting machines and tools 2. Technology of mechanical engineering, design-technological provision of production	Full time	3 Semester (1.5 years) 100 ECTS credit points	September 1, 2003 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year
Mechanical engineering Master of Engineering and Technology	Scientific-pedagogical direction 1. Technology of mechanical engineering, metal-cutting machines and tools 2. Technology of mechanical engineering, design-technological provision of production	Full time	4 Semester (2 years) 161 ECTS credit points	September 1, 2003 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year
Standardization and certification Master of Engineering and Technology	Profile training direction	Full time	3 Semester (1.5 years) 100 ECTS credit points	September 1, 1998 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year
Standardization and certification Master of Engineering and Technology	Scientific-pedagogical direction	Full time	4 Semester (2 years) 161 ECTS credit points	September 1, 1998 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year

a) Name & Final Degree	b) Areas of Specialization	c) Mode of Study	d) Duration & Credit Points	e) First time of offer & Intake rhythm	f) Number of students per intake	g) Fees
Metrology Master of Engineering and Technology	Profile direction	Full time	3 Semester (1.5 years) 100 ECTS credit points	September 1, 2009 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year
Metrology Master of Engineering and Technology	Scientific-pedagogical direction	Full time	4 Semester (2 years) 161 ECTS credit points	September 1, 2009 Autumn term	N° 15/ year	Grant financing / commerce financing About 2.000 US$ per year

For the Bachelor's degree programme Mechanical engineering, the self-assessment report states the following **intended learning outcomes**:

- "- understanding and demonstrating the advanced knowledge in the field of mechanical engineering;
- understanding and using this knowledge at the professional level;
- argumentation and solution of problems in the field of mechanical engineering;
- collecting and interpreting information for forming assertions taking into account social, ethical and scientific considerations;
- transferring information, ideas, problems and solutions to both specialists and non-specialists."

According to the self-assessment report, the Bachelor's degree programme Mechanical engineering shall enable students to acquire the following **intended competences**:

- "**know** the principal equipment of machine building production, facilities, tools; methods of obtaining blanks; modern methods of computation and design; bases of CAD, sanitary-hygienic bases of occupational safety; principal dangers and harmful conditions; methods of preventing and liquidation of accidents; fixed assets and current assets turnover;
- **be able** to design and to construct the principal equipment of machine building production, facilities and tools; to perform technical-economical calculations; to select equipment, facilities and tools; to design a technological process; to use up-to-date automated means of designing;
- be **competent** for executing their functions when designing technological processes in machine building; calculation and designing equipment, facilities and tools; computing a feasibility study of design decisions".

The following **curriculum** is presented:

	Competencies, Ba Mechanical engineering											
Module	Making economic and organizational decision	assessment of numerical parameters used in the sections of natural science foundation of safety.	the methods and tools of computer graphics	use the basic techniques of experimental research data	programming and opportunities of computer software	perform their functions in the preparation process in engineering	Calculation and design of equipment, accessories and tools	feasibility study of a project design decisions	knows a foreign language at a level that allows you to work in the international environment with an understanding of the cultural, linguistic, social and economic differences	knowledge and understanding of modern social and political problems	be able to communicate the content and issues in implementing the chosen field of work	able to socialize and work in the industrial and scientific community
History of Kazakhstan	low	low	low	low	low	low	low	low	low	high	high	high
Information science	low	low	high	high	high	low	low	low	mid	high	high	high
Basics of vital functions safety	low	high	low	mid	low	low	low	low	low	mid	mid	mid
Sociology	low	low	low	low	low	low	low	low	low	high	high	high
Ecology and Sustainable Development	low	high	low	mid	low	low	low	low	low	mid	mid	mid
Kazakh (Russian) languages	low	low	low	low	low	low	low	low	high	mid	mid	mid
Basics of Economic Theory	high	low	low	mid	low	low	low	high	low	high	mid	mid

Foreign Language	low	low	low	low	low	low	low	low	high	mid	mid	mid
Basics of Law	high	low	low	low	low	low	low	low	low	high	high	high
Political science	low	low	low	low	low	low	low	low	low	high	high	high
Philosophy	mid	low	low	low	low	low	low	low	low	high	high	high
Chemistry	low	low	low	mid	low	low	low	low	low	low	Mid	Mid
Mathematics	low	low	low	mid	low	low	low	low	low	low	Mid	Mid
Physics	low	low	low	mid	low	low	low	low	low	low	mid	mid
Basics of inter-changeability	low	low	mid	mid	low	high	high	high	low	low	high	high
Professional Kazakh (Russian) language	low	low	low	low	low	low	low	low	high	mid	high	high
Professional Foreign Language	low	low	low	low	low	low	low	low	high	mid	high	high
Engineering graphics and information technologies	low	low	high	high	high	high	high	high	mid	mid	high	high
Mechanics	low	low	mid	mid	low	mid	mid	mid	low	low	high	high
Cutting and cutting tools	low	low	low	mid	low	high	high	high	low	low	high	high
Technological equipment	low	low	low	mid	low	high	high	high	low	low	high	high
Machinery design	low	low	high	mid	mid	high	high	high	low	low	high	high
Computer Aided Design Systems	low	low	high	mid	high	high	high	high	low	low	high	high

Constructive-technological supply of production	low	low	high	mid	high	high	high	high	low	low	high	high
Computer Graphics	low	low	high	mid	high	high	high	high	low	low	high	high
Technological processes of mechanical engineering production	low	low	mid	mid	mid	high	high	high	low	low	high	high
Materials and feedstocks	low	low	mid	mid	low	high	high	high	low	low	high	high
Technology of machine production	low	low	mid	mid	high	high	high	high	low	low	high	high
Design of mechanical engineering production	low	low	mid	mid	mid	high	high	high	low	low	high	high
Automation of production processes	low	low	mid	mid	high	high	high	high	low	low	high	high
Physical education	low	low	mid	mid	low	low	low	low	low	low	high	high
Educational practice	mid	mid	mid	mid	high	high	high	high	low	mid	high	high
Production practice	high	high	mid	mid	high	high	high	high	low	mid	high	high
Pre-graduation practice	high	high	mid	mid	high	high	high	high	low	mid	high	high
State examination on specialty	high	high	mid	mid	high	high	high	high	mid	high	high	high
Writing and defending degree work (project)	high	high	mid	mid	high	high	high	high	mid	high	high	high

For the Bachelor's degree programme Standardization, certification and metrology, the self-assessment report states the following **intended learning outcomes**:

- "**know**: legislative, normative-legal and methodological, materials on standardization, certification, metrology and quality management; the system of supervision and control of the production quality; the main technical and design characteristics of production, technological processes and modes of production; methods and means of controlling the production quality, organization and technology of the production certification; rules of carrying out testing and accepting the production; methods of analyzing the production quality, organization of quality statistical control and technological processes managing; metrological provision of production; rules of carrying out metrological expertise, methods and means of calibration and repair of measuring means; methods of making measurements; the order of developing, conforming and implementing standards, technical requirements and other normative-technical documentation; quality management systems, their developing order, certification, implementation and executing audits;
- **be able**: to use instrumentation for controlling the production quality and metrological provision of production; computer technologies for carrying out operations on standardization, certification and metrology; up-to-date means of calibration, repair and adjustment of measuring means, rules of executing documentation metrological expertise;
- **be competent**: in developing new and reviewing acting standards, technical requirements and other documents on standardization, certification and metrology; performing systematic checking of used at enterprises standards, other documents on standardization, certification and metrology."

Module	Competencies – Ba Standardization, Certification and Metrology										
	economic decision-making and organizational	evaluation of numerical parameters used in the sections of natural science foundation of safety.	the methods and tools of computer graphics	use the basic techniques of experimental research data	programming and use of the capabilities of computer software	developing new and revising existing standards and other documents for Standardization, Metrology and Certification	implementation of a systematic checktion used in the enterprise standards and other documents for Standardization, Metrology and Certification	knows a foreign language at a level that allows you to work in an international environment with an understanding of the cultural, linguistic and socio-economic differences	knowledge and understanding of modern social and political problems	able to communicate to containing zhaniyu and problems in implementing the chosen field of labor activity	able to socialize and work in the industrial and scientific community
History of Kazakhstan	mid	mid	low	low	low	low	low	low	high	high	high
Information science	mid	mid	high	mid	high	high	high	high	high	high	high
Basics of vital functions safety	mid	high	low	mid	low	low	low	mid	mid	mid	mid
Sociology	mid	mid	low	mid	low	low	low	low	high	high	high
Ecology and Sustainable Development	mid	high	low	mid	low	low	low	mid	mid	mid	mid
Kazakh (Russian) language	mid	mid	low	low	low	low	low	high	mid	mid	mid
Basics of Economic Theory	mid	mid	low	mid	low	low	low	mid	high	mid	mid
foreign Language	mid	mid	low	low	low	low	low	high	mid	mid	mid
Basics of Law	mid	mid	low	low	low	low	low	mid	high	high	high
Political science	mid	mid	low	low	low	low	low	mid	high	high	high
philosophy	mid	mid	low	low	low	low	low	mid	high	high	high
chemistry	mid	mid	low	mid	low	low	low	low	low	Mid	Mid

mathematics	mid	mid	low	mid	low	low	low	low	low	Mid	Mid
physics	mid	mid	low	mid	low	low	low	low	low	mid	mid
Basics of interchange-ability	mid	mid	low	mid	low	low	low	low	low	high	high
Professional Kazakh (Russian) language	mid	mid	low	low	low	low	low	high	mid	high	high
Professional Foreign Language	mid	mid	low	low	low	low	low	high	mid	high	high
Engineering Graphics and Information Tech-nologies	mid	mid	high	high	high	high	high	mid	mid	high	high
Applied mechanics	mid	mid	mid	mid	low	low	low	low	low	high	high
Theoretical Mechanics	mid	mid	mid	mid	low	low	low	low	low	high	high
Standardization	high	mid	mid	high	high	high	high	low	low	high	high
Certification	high	mid	mid	high	high	high	high	low	low	high	high
General theory of measurements	high	mid	mid	high	high	high	high	low	low	high	high
Metrology	high	mid	mid	high	high	high	high	low	low	high	high
Qualimetry	high	mid	mid	high	high	high	high	low	low	high	high
Basics of electric power engineering	high	mid	mid	high	high	high	high	low	low	high	high
Materials Science	high	mid	mid	high	high	high	high	low	low	high	high
Planning of measuring experiment	high	mid	mid	high	high	high	high	low	low	high	high
System analysis and diagnosis of technical	high	mid	mid	high	high	high	high	low	low	high	high

objects											
Production Technology	high	mid	mid	high	high	high	high	low	low	high	high
Methods and means of measuring and control 1, 2	high	mid	mid	high	high	high	high	low	low	high	high
Services technology	high	mid	mid	high	high	high	high	low	mid	high	high
Customs control and inspection	high	mid	mid	high	high	high	high	low	mid	high	high
Data bases and expert systems	high	mid	mid	high	high	high	high	low	mid	high	high
Statistical methods of products and processes quality management	high	mid	mid	high	high	high	high	low	low	high	high
Testing, control and security of products	high	mid	mid	high	high	high	high	low	low	high	high
Constructive-technological supply of production	high	mid	mid	high	high	high	high	low	low	high	high
Metrological provision of production	high	mid	mid	high	high	high	high	low	low	high	high
International standardization and certification	high	mid	mid	high	high	high	high	mid	mid	high	high
Accreditation in the field of conformity evaluation	high	mid	mid	high	high	high	high	low	low	high	high
Quality management systems	high	mid	mid	high	high	high	high	low	low	high	high

Certification of quality systems	high	mid	mid	high	high	high	high	low	low	high	high
Metrological testing of measurement instruments	high	mid	mid	high	high	high	high	low	low	high	high
Organization, planning and production management	high	mid	mid	high	high	high	high	low	low	high	high
Technology of standards and normative documentation development	high	mid	mid	high	high	high	high	low	low	high	high
Occupational safety	high	mid	mid	high	high	high	high	low	low	high	high
Economics of quality, standardization, metrology, certification	high	mid	mid	high	high	high	high	low	low	high	high
Physical education	low	low	low	low	low	low	low	low	low	Mid	Mid
Educational practice	high	mid	high	high	high	high	high	mid	mid	high	high
Production practice	high	mid	high	high	high	high	high	mid	high	high	high
Pregraduation practice	high	mid	high	high	high	high	high	mid	high	high	high
State examination on specialty	high	mid	high	high	high	high	high	high	high	high	high
Writing and defending degree work (project)	high	mid	high	high	high	high	high	high	high	high	high

For the Master's degree programme Mechanical engineering, the self-assessment report states the following **intended learning outcomes**:

Profile Direction:

- **"knows**: international and home standards, decisions, orders of higher and other home organizations, methodological, normative and governing materials relating to the work performed; prospects of technical development and features of the office, organization, enterprise activity; the basic propositions and normative requirements of the RK Constitution and the laws relating to the issues of mechanical engineering branches development; methods and conducting expert assessment in the field of mechanical engineering; standards in the field of quality management of series ISO -9000, 14000 and other; the main requirements to the technical documentation, materials, products; the achievements of science and engineering, the advance home and foreign experience in the field of mechanical engineering;
- is **able**: to formulate and solve the problems occurring in the course of professional activity and requiring deep professional knowledge; to select needed methods of study, to modify the existing and to develop new methods starting from the concrete problems; to process the results obtained, to analyze and perceive them taking in account the existing literature data; to carry out bibliographical work using modern information technologies; to present the results of work in the form of reports, summaries, articles written in accordance with the requirements using information systems of up-to-date means of editing and printing;
- is **competent** professionally in the issues of organization, planning, conducting all types of professional activity; in all aspects of professional work relating design, technology and equipment of machine building complexes."

Scientific-pedagogical direction:

- "possesses **knowledge** in the field of natural sciences (social, human, economic) disciplines assisting to form a highly educated personality with a wide mental outlook and culture of thinking; knows the basics of designing mechanisms, their developing stages; general theorems of dynamics, analytical dynamics, theory of impact; classification of mechanical, thermal-engineering and electric measurements; organizational, scientific and methodological basics of machine building production;
- is able to formulate and **solve** practically the **problems** in the field of mechanical engineering, to use information technologies in the sphere of professional activity, to teach at secondary-special educational institutions, to perform successfully re-

search and organizational activity; to select and to use the needed literature, databases and other sources of information; to plan and to carry out experiments, to interpret the data and to make conclusions; to select and to use the adequate equipment, facilities and tools; to combine theory, practice and methods of solving engineering problems and to understand their application sphere; to use the acquired knowledge for defining, formulating and solving engineering problems using the needed methods;

- - is **competent professionally** in dealing with up-to-date equipment, in acquiring new knowledge necessary for daily professional work and continuing training for a master's degree; understanding the issues of safety and public health, juridical aspects, responsibility for engineering activity, their effect on the social context and environment, the need and ability to study independently and to improve qualification within the complete period of professional activity;
- is **competent socially** in individual work, as well as a team member in interdisciplinary subjects; in ability to know a foreign language at the level permitting to work in an international environment with understanding cultural, linguistic and social-economic differences; in knowing and understanding the modern social and political problems and the code of professional ethics, responsibility and norm of engineering activity."

Competencies - Mechanical Engineering												
Module	competence in organizing, planning, conduct all types of professional activities	competent in all aspects of professional activities related to design, technology and mechanical engineering equipment	competence in organizing, planning, conducting all types of research and teaching	competence in aspects of science and teacher education activities related projects tirovaniya, technology and mechanical engineering equipment	owns the system practical knowledge and skills, providing acquisition, development, improvement and strengthening of psychophysical abilities	owned business of a foreign language at a level that allows you to work in an international environment with an understanding of the cultural, linguistic, social and economic differ-	understands the modern social and political problems	competence in organizing, planning, conducting all types of research and teaching	competent in all aspects of research and teaching activities related to design, technology and equipment of machine-building	capable to socialize and work in professional, scientific, research, and teaching environment	ccapable of individual and group work, the organization and implementation of projects	able to communicate the content and issues in implementing the chosen field of work
Foreign language (professional)	low	low	low	low	low	high	mid	low	low	mid	mid	mid
Pedagogics	low	low	low	low	low	low	high	high	high	high	high	high
Psychology	low	low	low	low	high	low	high	low	low	high	high	low
Management	low	low	low	low	low	low	high	low	low	high	mid	mid
Business kazakh language	low	low	low	low	low	mid	mid	low	low	mid	mid	mid
Methodological bases of scientific activity	high	high	high	high	low	low	low	high	high	high	high	high
Methodology of teaching of technical disciplines	mid	mid	low	high	low	low	mid	high	high	high	high	high

Planning and analysis of the experiment results	high	high	high	high	low	low	low	high	high	high	low	mid
Ecology and environment protection	mid	mid	low	mid	low	low	low	low	low	high	high	high
Organization and planning of scientific researches and innovative activity	high	high	high	high	low	low	low	high	high	high	mid	high
Control systems in mechanical engineering	high	high	mid	high	low	low	low	low	low	high	high	high
Qualimetry in mechanical engineering	high	high	mid	high	low	low	low	low	low	high	high	high
Quality management system of machine-building enterprises	high	high	mid	high	low	low	low	low	low	high	high	high
Applicability of modern methods of application coverings *	high	high	mid	high	low	low	low	low	low	high	high	high
Modern equipment and machines of machinical engineering production*	high	high	mid	high	low	low	low	low	low	high	high	high
Mathematic simulation*	high	high	mid	high	low	low	low	low	low	high	high	high
Computer modeling of industrial products **	high	high	mid	high	low	low	low	low	low	high	high	high

Modern aspects of mechanical engineering development**	high	high	mid	high	low	low	low	low	low	high	high	**high**
Processing methods **	high	high	mid	high	low	low	low	low	low	high	high	high
Pedagogical practice	high	high	mid	high	mid	mid	mid	high	high	high	high	high
Research practice	high	high	high	high	mid	mid	mid	high	high	high	high	high
Production practice	high	high	high	high	mid	mid	mid	high	high	high	high	high
Experimental and research work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	high
Research scientific work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	high
Execution and defense of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	High
Integrated examination	high	high	mid	high	high	mid	High	high	high	mid	high	high

* - Modules that are studied by the TM and UNTOC

** - Modules that are studied by the TM and MRS

For the Master's degree programme Standardization and certification, the self-assessment report states the following **intended learning outcomes**:

Profile Direction:

- "**knows**: the laws of the Republic of Kazakhstan, decisions and orders of the RL Government on the issues of standardization and certification; the trends and basic principles of international cooperation in the field of standardization and certification; foreign practice of working at standardization and certification, documents of mutual recognition of the results in the field of standardization and certification; the basic requirements to the normative and technical documentation, products and processes;
- **is able**: to formulate and solve the problems occurring in the course of professional activity and requiring deep professional knowledge; to select needed methods of study, to modify the existing and to develop new methods starting from the concrete problems; to process the results obtained, to analyze and perceive them taking in account the existing literature data; to carry out bibliographical work using modern information technologies; to present the results of work in the form of reports, summaries, articles written in accordance with the requirements using information systems of up-to-date means of editing and printing;
- is **competent** professionally in the issues of organization, planning, conducting all types of professional activity; in all aspects of professional work relating standardization and certification."

Scientific-pedagogical Direction:

- "**knows**: the laws of the Republic of Kazakhstan, decisions and orders of the RL Government on the issues of standardization and certification; the trends and basic principles of international cooperation in the field of standardization and certification; foreign practice of working at standardization and certification, documents of mutual recognition of the results in the field of standardization and certi-fication; the basic requirements to the normative and technical documentation, products and processes; the general principles of building quality management systems and ecological management in accordance with international standards ISO 9000 and ISO 14000; the main requirements to the normative and technical documentation, products, processes and quality management systems;
- is **able**: to formulate and solve the problems occurring in the course of professional activity and requiring deep professional knowledge; to select needed methods of study, to modify the existing and to develop new methods starting from the concrete problems; to process the results obtained, to analyze and perceive them

taking in account the existing literature data; to carry out bibliographical work using modern information technologies; to present the results of work in the form of reports, summaries, articles written in accordance with the requirements using information systems of up-to-date means of editing and printing;

- is **competent** professionally in the issues of organization, planning, conducting all types of professional activity; in all aspects of professional work relating standardization and certification."

Competencies – Ma Standardization and Certification								
Module	competence in organizing, planning, conducting all types of professional activities	competence in all aspects of professional activities related to standardization and certification	competence in the issues of planning, conducting all types of research and teaching	competence in all aspects of the work, in all aspects of research and teaching activities related to standardization and certification	able to socialize and work in professional, scientific, research, and teaching environment	capable of individual and group work, the organization and implementation of projects	able to communicate the content and issues in implementing the chosen field of work	owns business of a foreign language at a level that allows you to work in an international environment with an understanding of the cultural, linguistic, social and economic differences
Foreign language (professional)	low	low	low	low	mid	mid	mid	high
Psychology	low	low	low	low	high	high	high	mid
Pedagogics	low	low	high	low	mid	high	high	low
Management	low	low	low	low	mid	high	mid	low
Business kazakh language	low	low	low	low	mid	mid	mid	mid
Methodological bases of scientific activity	high	high	high	high	high	high	high	low
Methodology of teaching of technical disciplines	mid	mid	low	high	high	high	high	mid
Planning and analysis of the experiment results	high	high	high	high	high	high	low	low
Ecology and environment protection	mid	mid	low	mid	high	high	high	low
Organization and planning of scientific researches and innovative activity	high	high	mid	high	high	high	mid	low

Systems of standardization, metrology and certification	high	high	mid	high	high	high	high	low
Quality management systems	high	high	mid	high	high	high	high	low
External and internal audit	high	high	mid	high	high	high	high	low
Protection of intellectual property	high	high	mid	high	high	high	high	low
Assessment of product quality	high	high	mid	high	high	high	high	low
Quality management economy	high	high	mid	high	high	high	high	low
Modern aspects of standardization, metrology and certification development	high	high	mid	high	high	high	high	high
Production practice	high	high	mid	high	high	high	high	low
Pedagogical practice	high	high	high	high	high	high	high	mid
Research practice	high	high	high	high	high	high	high	mid
Research scientific work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	mid
Experimental and research work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	high
Execution and defense of the master dissertation	high	high	high	high	high	high	high	mid
Integrated examination	high	high	high	high	high	high	high	high

For the Master's degree programme Metrology, the self-assessment report states the following **intended learning outcomes**:

Profile Direction:

- "knows: disciplines defining his professional specialization; modern scientific and applied problems of metrology; step character of metrological provision works and their conducting methodology;
- is able: to use the knowledge acquired in professional activity; to process information including the use of computer technologies;
- is competent professionally: in issues of organization, planning and conducting all kinds of professional activity. "

Scientific-pedagogical Direction:

- "knows: disciplines defining his professional specialization; modern scientific and applied problems of metrology; methodology of conducting scientific-research works; content and methodology of teaching special disciplines; pedagogy and psychology of higher school;
- is able: to use the knowledge acquired in scientific and pedagogical work; to carry out metrological studies; to process metrological information including the use of up-to-date computer technologies;
- is competent professionally: in issues of organization, planning and conducting all kinds of professional activity."

	Knowledge						Skills				Competences				
Module	discipline determining his professional specialization, advanced scientific and applied problems of metrology	Stages of measurement assurance activities and the method of their conducting	current scientific and practical metrology problems	methodology of conducting research and development	content and methods of teaching special disciplines	pedagogy and psychology of higher education	apply this knowledge in professional activities	process the information including with using computer technologies	apply their knowledge to research and teaching	conduct meteorological research	competent in the issues of planning, carrying out all types of professional activities	able to socialize and work activities in the professional, scientific, research, and teaching environment	capable of individual and group work, the organization and implementation of projects	able to communicate the content and problems of mothers chosen profession in the implementation of employment	owns business of a foreign language at a level that allows you to work in an international environment with an understanding of the cultural, linguistic, social and economic differences
Foreign language (professional)	mid	low	low	low	low	mid	mid	Low	mid	low	mid	mid	mid	mid	high
Psychology	low	low	low	low	low	high	mid	low	mid	low	high	high	high	high	mid
Pedagogics	low	low	low	low	low	high	mid	mid	high	low	mid	high	high	low	low
Management	low	low	low	low	low	low	mid	high	mid	low	mid	high	mid	mid	low
Business kazakh language	mid	low	low	low	low	low	mid	low	mid	low	mid	mid	mid	mid	mid
Methodological bases of scientific activity	mid	mid	low	high	high	low	high	mid	high	high	high	high	high	high	low
Methodology of teaching of technical disciplines	low	low	low	low	mid	high	low	low	high	low	high	high	low	mid	low

Planning and analysis of the experiment results	mid	high	high	high	high	low	high	high	high	high	high	high	high	high	low
Ecology and environment protection	low	low	low	low	mid	low	low	mid	mid	low	high	high	mid	high	low
Modern problems of metrology	high	high	high	high	high	low	high	mid	high	high	high	high	high	high	low
Technical and software environment of metrological provision	high	high	high	high	high	low	high	high	high	high	high	high	high	high	low
Protection of intellectual property	high	high	high	high	high	low	high	high	high	high	high	high	high	high	low
Methods of metrological characteristics evaluation of measuring means	high	high	high	high	high	low	high	high	high	high	high	high	high	high	low
Quality management economy	low	low	low	low	mid	low	high	low	high	high	high	high	high	high	low
Assessment of product quality	mid	mid	mid	low	high	low	high	high	high	high	high	high	high	high	low
Legal metrology and technical regulation	high	high	high	high	high	low	high	high	high	high	high	high	high	high	low
Pedagogical practice	mid	mid	mid	low	mid	high	high	mid	high	high	high	high	high	high	low

Research practice	high	high	high	high	high	mid	high	high	high	high	high	high	high	high	mid
Research scientific work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	high	high	high	mid
Experimental and research work of master, including implementation of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	high	high	high	mid
Execution and defence of the master dissertation	high	high	high	high	high	high	high	high	high	high	high	high	high	high	mid
Integrated examination	high	high	high	high	high	high	high	high	high	high	high	high	high	high	mid

* - Scientific Pedagogical

C Peer Report for the ASIIN Seal[4]

1. Formal Specifications

Criterion 1 Formal Specifications

Evidence:

- Self-assessment report
- Discussions with representatives of the university [study fees]

Preliminary assessment and analysis of the peers:

The peers assessed the names of the programmes as appropriate. The Master's degrees differentiate between a "profile direction", which aims at graduates who are going to work in a more application oriented direction and the "scientific – pedagogical direction" which has a stronger research focus. The scientific profile takes one semester longer then the application profile. The peers took note of this differentiation. All programmes are supposed to be studied in full-time. The final degrees, the standard period of time and credit points according to ECTS are clearly defined.

The peers were being explained that there are three different sources of covering the tuition fees: funds from the state, commercial funds referring to students who pay for themselves and industrial funds, more specifically sources from industrial enterprises providing funds to students. The peers understood that according to Kazakh legislations, scholarships are offered to those students applying with the highest grades after completion of high school. In some cases, enterprises cover the tuition fees under the condition that the students work for a specified timeframe for the company after graduation.

In summary, the peers accepted all formal information to be appropriate.

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

The peers agree that appropriate information of the names of the programmes, the type, the final degree, the standard period of study and credit points gained (according to ECTS), the expected intake for the programme, the programme start date within the aca-

[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.

demic year and first time the programme is offered and the amount and type of fees/charges was provided. The peers conclude that this criterion is fulfilled.

2. Degree programme: Concept & Implementation

Criterion 2.1 Objectives of the degree programme

Evidence:

- Self-assessment report
- Discussions with representatives of the university [objectives, classification]

Preliminary assessment and analysis of the peers:

The programmes under review aim at education of mechanical engineers, of professionals dealing with standards and certifications and of metrologists corresponding to the qualifications of the European Qualifications Framework level 6 and 7 respectively. The panel considered this objective to be convincing.

Criterion 2.2 Learning Outcomes of the Programme

Evidence:

- Self-assessment report
- Discussions with representatives of the university [objectives, classification]

Preliminary assessment and analysis of the peers:

The peers acknowledged that the self-assessment report put considerable effort into the definition of aims, intended learning outcomes and competences. There is a clear differentiation between the different degree programmes as well as between the "profile direction" and the "scientific – pedagogical direction" of Master's programmes. All descriptions of the educational programmes follow the same pattern; namely "knowledge", "abilities" and "competences". The peers praised this consistent approach to shape a clear and distinct profile for each individual programme. The presentation of the Master's degree Metrology is put together with the Master's degree Standardisation and certification. As these are supposed to be two different programmes the peers requested to also present the fields of competences for each degree programme individually.

It was appreciated by the peers that students, lecturers and businesses had been involved in the formulation of the aims and learning outcomes as KSTU explained. But the peers took note that the intended learning outcomes as they were written in the self-assessment report were not accessible in any formal documents, on the website or the

draft diploma supplement. The intended learning outcomes should be available to all relevant stakeholders in a clear and concise manner so that the stakeholders can refer to them; the peers strongly advised to make the intended learning outcomes publically accessible.

The peers agreed that the areas of competence as set forth by the Subject-Specific Criteria are largely met for the two Bachelor's degree programmes.

Bachelor degree programme Mechanical Engineering: In the field of knowledge and understanding students shall achieve a scientific basis for their work and possess a system of natural-scientific, mathematical and engineering knowledge, namely modern methods of computation and design. In the field of competence of engineering analysis student shall apply methods for carrying out experiments, use principal equipment of machine building production, facilities, and tools and apply corresponding programmes like bases of CAD, sanitary-hygienic bases of occupational safety; principal dangers and harmful conditions; methods of preventing and liquidation of accidents. The category Engineering Design is covered by skills in the designing of technological processes in machine building; calculation and designing equipment, facilities and modelling systems accordingly; means of designing; design-computation results; means of operation and maintenance. Engineering practice is to be acquired during the internships and laboratory experiments. Transferable skills are stipulated for example in the understanding of moral values, the consequence of professional activities or the ability to work in teams on interdisciplinary subjects. Foreign languages and intercultural communication are also part of the curriculum which contributes to the development of transferable skills.

Bachelor degree programme Standardization, certification and metrology: In the field of knowledge and understanding students shall reach a scientific basis for their work and obtain competences of legislative, normative-legal and methodological and materials on standardization, certification, metrology and quality management relevant to their profession. The field of competence of engineering analysis is covered by intended learning outcomes like student shall apply methods for the main technical and design characteristics of production, technological processes and modes of production, methods and means of controlling the production quality, organization and technology of the production certification. Engineering design is included in the order of developing, conforming and implementing standards, technical requirements and other normative-technical documentation; quality management systems, their developing order, certification, implementation and executing audits.

Engineering practice is to be acquired during the internships and laboratory experiments. Transferable skills are obtained for example in the understanding of moral values, metro-

logical provision of production, social and ecological activity or the ability to work in teams on interdisciplinary subjects. Foreign languages and intercultural communication are also part of the curriculum which contributes to the development of transferable skills.

As to the Master's degree programmes, the peers praised that the learning outcomes clearly differentiate between the two directions (Profile and Scientific-pedagogical Direction) but when looking at the different profiles of the Master's programmes Mechanical engineering and Standardisation and certification it turned out that the profile descriptions are fully alike. Hence, it did not become clear at all where the difference lies between the 3 and 4 semester programme. The peers concluded that this needs to be specified to give all stakeholders a clear indication which different competence profiles are to be achieved. For the Master's programme Metrology, this distinction has been made. The peers confirmed the areas of competence as set forth by the Subject-Specific Criteria are largely fulfilled for the three Master's degree programmes.

Master's degree programme Mechanical Engineering: With regard to knowledge and understanding the students should properly know general theorems of dynamics, analytical dynamics, theory of impact; classification of mechanical, thermal-engineering and electric measurements; organizational, scientific and methodological basics of machine building production. The field of competence of engineering analysis the students have to prove that they are competent to formulate and solve practically the problems in the field of mechanical engineering, to use information technologies in the sphere of professional activity, to combine theory, practice and methods of solving engineering problems and to understand their application sphere; to use the acquired knowledge for defining, formulating and solving engineering problems using the needed methods. The competence field of engineering design is covered through knowledge of designing mechanisms, their developing stages; organizational, scientific and methodological basics of machine building production. Engineering practice is to be acquired during the internships and laboratory experiments. Transferrable skills are obtained in individual work, as well as a team member in interdisciplinary subjects; in the knowledge of foreign languages to work in an international environment with an understanding of cultural, linguistic and social-economic differences; in knowing and understanding the modern social and political problems and the code of professional ethics, responsibility and norm of engineering activity.

Master's degree programme Standardization and certification: The competence field of knowledge and understandings is supposed to be achieved through measurements classification, mathematical models of measured values and means of measuring; legal bases of ensuring the unity of measurements. Engineering analysis shall be gained through FMEA-analysis (method of analyzing types and consequences of failures), QFD-analysis

(deployment of quality functions), methods of revealing causes of the product defects; the model of quality management system according to the international standard of ISO 9000 series, technology of developing and implementing quality management system at en enterprise. Engineering design shall be obtained through knowing methodologies of detecting and eliminating errors in design and technological documentation and organizing the production. Engineering practice is to be acquired during the internships and laboratory experiments. Transferrable skills are covered through intended learning outcomes like knowledge of a foreign language at the level permitting to work in the international environment with understanding cultural, linguistic and social-economic differences; knowledge and understanding of modern social and political problems. The students are able to communicate on the content and problems of the specialty selected when performing professional activity.

Master's degree programme Metrology: The peers could understand that "standardisation, certification and metrology" are summarised in one bachelor programme and need to be separated into two different master programmes to strengthen the specific features of the two topics. The competence field knowledge and understanding shall be covered through intended learning outcomes like organizational, scientific and methodological approaches of metrology. Competences in engineering analysis are reached through conditions of mutual recognizing the tests, tests certification, and information, metrological and organizational provision of tests. Competences in engineering design are supposed to be acquired through intended learning outcomes like modern scientific and applied problems of metrology and process information including the use of computer technologies because modeling, filter design and frequency domain methods are basic tools of modern metrology. These are realized with computers, also statistics and data warehousing and data mining is a key knowledge in quality control. Engineering practice is to be acquired during the internships and laboratory experiments. Transferrable skills are supposed to be achieved like in the Master's programme Standardisation and certification. The self-assessment report explains the differences between the Profile direction and the Scientific-pedagogical direction, and the peers understand that the Profile direction focuses on the practical application of metrological competences whereas the scientific-pedagogical profile puts an additional emphasis on content and methodology of teaching special disciplines; pedagogy and psychology of higher school. These additional competences require one more semester of studies.

Criterion 2.3 Learning outcomes of the modules/module objectives

Evidence:

- Module descriptions / module handbook

Preliminary assessment and analysis of the peers:

The peers were impressed by the extensive documentation presented. The module descriptions themselves presented the knowledge, skills and competences to be gained by the students as well as information about credit allocation, exams, teaching staff, extensive list of literature etc. in a detailed manner. Some modules had not been translated into English which still needs to be done. Regarding the credit points, it was not clear if they referred to ECTS credit points; this must be clarified. Finally, the type of examination should be clarified for all modules (written, oral, project work, etc.). In summary, the module descriptions should be presented in a consistent manner (module CADS23 is a good example).

For each programme three different tables had been provided correlating the "competences", the "knowledge" and the "skills" with the modules of the degree programmes. The peers underlined that these tables enable all stakeholders to easily comprehend how envisaged competences and the respective modules are aligned. The only challenge they saw is that the tables do not differentiate between the Bachelor and Master's programmes.

Looking at the modules, the peers noticed that a number of modules are very specific for the Kazakh learning environment but as the Bachelor's degree programmes stretch over a period of 4 years this does not pose a problem. The learning outcomes are aligned with the modules in the following manner:

Bachelor degree programme Mechanical engineering: Competences in field of knowledge and understanding like natural-scientific, mathematical and engineering knowledge are aligned to modules like Chemistry, Physics and Mathematics and in addition theory of mechanics, Mechanics of liquids and gases and strength of materials. The field of competence of engineering analysis student is supposed to be covered through modules like Module Technological processes of mechanical engineering production, Theory of mechanisms and machines, Dimensional analysis, Basics of the cutting theory and cutting tools, Metal-cutting machines, Basics of electric power engineering, Engineering graphics, Information technologies in mechanical engineering. Engineering design is included in modules like Design basics and machine details, Mathematical modelling of technological processes, CAD/CAM/CAE basics, Technological preparation of production, Basics of technological equipment design. Engineering practice is to be acquired through modules like Module Educational practice, Module Production practice, and Module Pregraduation practice. Transferable skills are cross-cutting topics covered in different modules like Philosophy, Sociology, English as a foreign language, and Basics of law. In addition to this four electives are offered like Module Materials and feedstock, Module Technology of

machine production, Module Design of mechanical engineering production, and Module Automation of production processes.

Bachelor degree programme Standardization, certification and metrology: In the field of knowledge and understanding the learning outcomes are supposed to be reached through modules like Module Chemistry, Module Mathematics 1 + 2, Module Standardization, Module Physics 1 + 2, Basics of law, and Module Materials science. The field of competence of engineering analysis comprises modules like Module Engineering graphics, Module General Theory of measurements, Module Basics of electric power engineering, Module Certification, Module Theoretical mechanics, Module Metrology, and Module Qualimetry. Engineering design is being taught in modules like Module Statistical methods of products and processes quality management, Data bases and expert systems, Module Testing, control and security of products, Module Metrological provision of production, and Module Quality management systems. Engineering practice is to be acquired through modules like Module Educational practice, Module Production practice, and Module Production Pregraduation practice. Transferable skills are supposed to be cross-cutting skills to be obtained in different modules, these modules like Ecology and sustainable development, Political science, Philosophy, and Sociology contribute to it specifically.

Master's degree programme Mechanical Engineering: With regard to knowledge and understanding the following modules are supposed to further deepen the knowledge acquired in the bachelor's degree like Module Methodological bases of scientific activity, Module Planning and analysis of the experiment results, and Hardening of details in mechanical engineering. The field of competence of engineering analysis is supposed to be covered through modules like Module Organization and planning of scientific researches and innovative activity, Module Control systems in mechanical engineering, Progressive processing methods and Module Qualimetry in mechanical engineering. The competence field of engineering design is covered through modules like Module Quality management system of machine-building enterprises, Module Computer modelling of industrial products, and Modern aspects of mechanical engineering development. Engineering practice is to be acquired through the Module Production practice and Module Experimental and research work of master. Transferrable skills are inter alia obtained in modules like Module Foreign language (professional) and Module Psychology. Even though the peers are generally satisfied with the module-competence alignment they strongly recommend offering the possibility for students to deepen their theoretical basis in some relevant fields (e.g. partial differential equations, mathematical system theory for optimizing, modelling of dynamic systems, etc.).

Master's degree programme Standardization and certification: The competence field of knowledge and understandings is supposed to be obtained through modules like Module

Methodological bases of scientific activity, Module Planning and analysis of the experiment results, and Module Organization and planning of scientific researches and innovative activity. Engineering analysis shall be gained through modules like Module Systems of standardization, metrology and certification, and Module Quality management systems. Engineering design shall be obtained through modules like Module External and internal audit, Module Quality management economy, and Module Modern aspects of standardization, metrology and certification development. Engineering practice is to be acquired in the Module Production practice. Transferrable skills are cross-cutting issues covered in several modules like Module Foreign language (professional) and Module Psychology.

Master's degree programme Metrology: The competence field knowledge and understanding shall be covered through modules like Module Methodological bases of scientific activity and Module Planning and analysis of the experiment results. Competences in engineering analysis are reached through modules like Module Modern problems of metrology and Module Technical and software environment of metrological provision. Competences in engineering design are supposed to be acquired through modules like Planning and analysis of the experiment results and Methods of metrological characteristics evaluation of measuring means. Engineering practice is to be acquired in the Module Production practice and Module Experimental and research work of master. Transferrable skills are supposed to be achieved like in the Master's programme Standardisation and certification.

The difference between the Profile direction and the Scientific-pedagogical direction lies in the deepening of scientific and pedagogical qualifications. For the 4 semester Master the following modules are taught in addition: Module Methodology of teaching of technical disciplines and Module Pedagogical practice.

Criterion 2.4 Job market perspectives and practical relevance

Evidence:

- Analysis of graduates employment in terms of numbers and market sector
- Overview of jobs and companies of graduate employment
- Overview of companies for practical training
- Description of expected learning outcomes

Preliminary assessment and analysis of the peers:

KSTU explained that the Karaganda State Technical University maintains close linkages to the regional economy. Due to the specific industrial environment, a number of educational programmes had been developed to provide professionals needed by the local

economy. Tracer studies which are being carried out on a yearly basis show that graduates from these programmes are absorbed up to a 100% by the local economy. This underlines the need for skilled labour force and the relevance of these educational programmes. But in the medium term perspective, KSTU expects more international companies to settle down in Kazakhstan with a growing demand for well trained professionals. Hence, KSTU aims at internationalising and broadening the educational programmes to become internationally more competitive and capacitate graduates to also work for international companies.

KSTU maintains a network with more than 80 partner companies (Karaganda machine building consortium) from which students can select professional practices. There is an agreement between KSTU and the partner companies in place defining issues like safety regulations and supervision by a professional from the partner institution; a research project is defined which has to be carried out by the student. Supervision is granted by KSTU as well as by the partner company. After completion of the external practice, the students have to present the results of their practice to a university committee which determines whether the project has been successful; in case the professional practice does not comply with the standards and expectations, the practice has to be repeated. This link to the local economy explains the high absorption rate of graduates. The peers agreed that the external practice is well organised and of relevance for the qualification of the students.

Criterion 2.5 Admissions and entry requirements

Evidence:

- Rules of admission to the organization of education, implementing professional training programs in higher education, approved by the Government Resolution, January 19, 2012 No 111 (with amendments of April 19, 2012 No 487)

Preliminary assessment and analysis of the peers:
The requirements to applicants to educational programmes in Bachelor programmes are defined by the laws of the Republic of Kazakhstan and the typical regulations of admission to the higher school institutions. In order to gain access to the Bachelor's level programmes the completion of secondary education as well as passing a nation-wide general test is required. For the Master's level programme the completion of a first cycle programme as well as an English language test and a subject-related exam have to be passed. The main aim of this additional exam is to test the qualifications gained through the previous Bachelor's degree.

Regarding international student exchanges, the peer group was told that a number of exchange programmes exist. For example Indian and Iraqi students come to KSTU to

study. Prior to admittance all documents must be sent to the Ministry of Education first and the certificates must be approved. Once the certificates have been approved, the applicants have presented themselves to a special University Commission which takes the final decision on admittance on an individual basis. In case of a special exchange programme with a foreign university, the admittance is granted on the basis of a transcript of records.

Qualifications gained from other experiences than Higher Education institutions can be accepted for the practical courses, for example, which means that the overall timeframe of the studies can be reduced.

In summary, the rules for admission to the Bachelor's and to the Master's degree programmes respectively were considered to be overall adequate by the peer group.

Criterion 2.6 Curriculum/Content

Evidence:

- Curricular structures
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The peers assessed the curricula of the programmes under review against the programme objectives provided in the self-assessment report as well as against the stipulations of the Subject-Specific Criteria. They concluded that the objectives and content of the individual modules are coordinated in a way to avoid unintended overlaps.

During the discussions with the students, the peer group noted that not all of them found it easy to converse in English despite the fact that mandatory English modules are included in the curricula. While the peers considered general English to be a first important step, they are convinced that command of subject-relevant English was necessary in order to keep up with current developments of the subject which are mostly published in English and also in order to allow student exchange with non-Russian speaking countries. The peer group therefore recommended that also parts of the subject-specific modules or projects should be taught in English. In consequence, the language capacities of the teaching staff would also need to be enhanced to some extent.

Regarding the achievement of the intended learning outcomes by the time the degree is completed the peer group made a few critical remarks regarding the content:

Bachelor Mechanical Engineering: The peers pointed out that Mechanical Engineering is very focused on metal cutting and construction; the peers recommended broadening the topics of electives in other fields to broaden the scope of mechanical engineering which

must also be reflected in the equipment available at KSTU. Namely, the peers strongly encouraged KSTU considering components like automation, robotics, feedback control, sensors and actuators, including engine technology as these are important aspects for an engineer. Also engineering with synthetic materials should be incorporated into the studies according to its world-wide relevance.

Master Standardisation and certification: As indicated under criterion 2.3 the peers recommended offering the possibility for students to deepen their theoretical basis in some relevant fields (e.g. partial differential equations, mathematical system theory for optimizing, modelling of dynamic systems, etc.).

Master Metrology: For this specific programme the peers strongly encouraged KSTU including components like multivariate analysis, advanced methods of statistics or strengthening the component of Design of experiments and to incorporate also well-known methods for filter design, frequency domain analysis.

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

The peers appreciated the differentiation of the educational programmes particularly the Master's degree Metrology and the Master's degree Standardisation and certification provided by the university. The overall aims of each educational programme as well as the learning outcomes became more transparent and understandable. The updated objectives matrixes allowed a more easy distinction between the different profiles, namely the "profile direction" and the "scientific – pedagogical direction" of the Master's programmes.

The publication of the intended learning outcomes and rules and regulations dealing with admission, examinations, final thesis, etc. remains a requirement as all relevant stakeholders must have the opportunity to refer to it. The same applies to regulations dealing with admission, examinations, final thesis, etc. which must also be made publically available.

The peers positively acknowledge that the module descriptions were revised and translated into English throughout; ECTS points were provided. The presentation of the examinations provided more information on the kind of testing that was taking place but still the peers would like to understand if tests are written, oral, a presentation etc. The duration of each exam would also be required.

The peers understood the plans of the university to include components like multivariate analysis, advanced methods of statistics or strengthening the component of Design of

experiments and to incorporate also well-known methods for filter design, frequency domain analysis as a step into the right direction. Still the recommendation remains valid as it will be required to properly assess how these additional components will have been integrated into the curricula.

Furthermore, the peers encouraged the university to continue the extension of English-taught classes as announced

Besides, the peers pointed out that Mechanical Engineering was very focused on metal cutting and construction; the peers recommend broadening the topics of electives in other fields to widen the scope of mechanical engineering which must also be reflected in the equipment available at KSTU. Namely, the peers strongly encourage KSTU considering components like automation, robotics, feedback control, sensors and actuators, including engine technology as these are important aspects for an engineer. Also engineering with synthetic materials should be incorporated into the studies according to its world-wide relevance.

All other aspects of the criterion were considered to be fulfilled.

3. Degree Programme: Structures, Methods & Implementation

Criterion 3.1 Structure and modularity

Evidence:

- Curricular structures
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The programme is modular. The peers agreed that each module is a coherent and consistent package of teaching and learning in itself. The teaching staff of KSTU confirmed that it is possible to commence the programme in every semester when admissions take place. The peer group understood that the programme concept allows for mobility to another higher education institution or on a practical placement without loss of time. The peers were being explained that student mobility takes primarily place within the country; about 5-10% of the students go abroad. About 25 students went to Belarus lately for the practical phase. A contract had been signed between KSTU and the company clearly defining the tasks and supervision provided by each party. It is the vision of KSTU to be-

come more international and develop more exchange programmes with different countries.

Criterion 3.2 Workload and credit points

Evidence:

- Curricular structures
- Module descriptions
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The peer group had difficulties to comprehend the conversion of Kazakh credits into ECTS; the students' academic work load is expressed in credit points and makes on average of 27-30 hours for a credit point, of which 9-10 hours consist of classes, 9-10 hours are dedicated to students' independent work and 9-10 hours refer to students' independent work under teachers' supervision (SRSP/SIWT) during which students independently solve problems. The peer group also understood that a weekly workload of 57 hours is expected and accepted by students, with 3rd and 4th year students having classes on Saturdays. As a result, this leads to a workload which is much higher than that accepted by the ECTS system and equivalent to that of a full-time employee, namely a maximum of 900h per semester. The peer group appreciated the fact that the data on student progress and success rates as well as the statements of the students interviewed did not show any concern about the feasibility of the high workload. However, the peers noted that the university does not have any mechanisms implemented which would check the actual workloads of the students. Consequently, it was not fully clear to the peer group whether the workload is actually as high as the credit points would suggest or how structural pressure on the students is systematically avoided. Therefore, the peers required clarification on this aspect.

Criterion 3.3 Educational methods

Evidence:

- Module descriptions
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The peer group was told that in 2008 KSTU introduced the credit system with advanced teaching methods (using active and interactive forms of training, case technology, multimedia and distance learning, etc.). On January 1, 2013 the TM chair staff developed over

130 electronic teaching aids (electronic textbooks, slide-lectures, video-lectures). Moreover, a number of innovative teaching methods had been introduced like:

- psychotechnology – an apporach to develop students' constructive creative thinking;
- dialogue technology – communication between a teacher and a student, contradictory statements stimulate students' communicative capacity to reason and argue;
- imitation technology – game models, role training, methods of decision making;
- research technology – training through discovery. This form is realized in the form of SSRWs and later on when writing degree works;
- project technology – working on a project;
- video-technology – using audio-visual means.

The peer group praised the increasing application of Interactive methods of training. Laboratory works are, for example, based on virtual and soft- and hardware laboratory-practical complexes in a number of disciplines. In a summary, the peers noticed an increasing awareness of new teaching methods even though the overall teaching approach looked quite classical from the peers' point of view.

The peers noted positively the widely used concept of setting up student working groups in which Bachelor's and Master's work together on specific projects. Especially the master students aiming a scientific-pedagogical direction had to provide mandatory teaching.

Besides compulsory components a small but sufficient range of elective and compulsory elective subjects is offered to allow students to develop an individual focus. A corresponding catalogue of disciplines provided during the visit supported this assessment. The ratio of taught contact hours to self-study was considered adequate.

The peer group concluded that the teaching methods and tools support the achievement of the learning outcomes at the intended level.

Criterion 3.4 Support and advice

Evidence:

- Self-assessment report
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:

The peer group was impressed to take note of the overall satisfaction of the students. The students explained that there are student organisations like students charity groups which provide support to elderly people. The students confirmed that conflicts are dealt with amicably in the sense that round tables take place several times per semester and students and teachers discuss issues, courses and any kind of challenges and have the

impression that their concerns are being dealt with appropriately. Besides, there is a "book of proposals" in place where students can place comments anonymously. The students organise English Clubs where they invite English native speakers to provide an opportunity to practically speak the language. Furthermore, the students confirmed that courses are offered in both languages (Kazakh and Russian) throughout the entire study program; there are also poly language groups of Russian, Kazakh and English. The teacher divides the group into different parts to practice the language. The students convincingly confirmed that the teaching staff would be their first point of advice for any type of problem, not only directly study-related one; teachers even provide their telephone numbers to be available in case of need.

The students confirmed that there are sufficient resources available for offering individual support, supervision and advice to students.

The peer group came to the conclusion that there is a very good support for the students in place.

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

The university did not provide additional information on the exact work load. Hence, the students' workload per semester must be set at a level that avoids structural pressure on training quality. In line with the ECTS Users' Guide, the work-load per semester must not exceed that of a full-time employee (maximum of 900h). The ECTS credits awarded must be adapted accordingly.

All other aspects of the criterion were considered to be fulfilled.

4. Examination: System, Concept & Implementation

Criterion 4 Exams: System, concept & implementation

Evidence:

- "Regulations for organizing and carrying out students final attestation at higher educational institutions" adopted by the RK Ministry of Education and Science No 714 of July 12, 2000
- "Regulations for organizing higher educational institutions activity" adopted by the RK Ministry of Education and Science regarding interim exams

Preliminary assessment and analysis of the peers:
KSTU explained the organisation of examinations to the peers. An examination timetable is prepared and made available to the students, examinations are coordinated so that students have sufficient time to prepare for them, a minimum of three days. The type of exam is indicated in the module description; most exams seem to be written exams; there are between 4-6 exams per semester which confirmed the assessment by the students who commented that sufficient time for preparation before and in between the exams was given. There are only few oral exams like the presentation of the final thesis.

The timescale for marking exams does not interfere with individual academic progression which means that students can directly move on from the bachelor to the master's programme.

The peers understood that students can carry out an assigned task independently and at the level of the qualification sought.

Compensating disadvantages of handicapped students with regard to time-related and formal guidelines in the studies as well as in the final performance tests and those during the studies is ensured.

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

All aspects of the criterion were considered to be fulfilled.

5. Resources

Criterion 5.1 Staff involved

Evidence:

- staff handbook
- list of and information about research projects in the self-assessment report

Preliminary assessment and analysis of the peers:
The peer group studied the staff handbook and concluded that the composition of the teaching body was able to ensure that the intended learning outcomes are achieved by the time the degree is completed. Regarding the recruitment of staff members the peer group gained the impression that most staff members are graduates from KSTU. The peers encouraged KSTU to advertise new staff positions nationally or even internationally to recruit staff members with diverse educational and experiential backgrounds.

The students confirmed that seminars even for very small groups are being offered which proves that there are sufficient human resources available to carry out all classes appropriately. The available contact hours (overall and for individual lecturers) are defined and outlined in the self assessment report. The peers were impressed that teachers of KSTU were awarded to be the best teachers in the country by the National Ministry of Education.

Where feasible, the topics of lectures are linked to research, e.g. progressive methods of processing, progressive methods of treatment, and demonstration projects. The descriptions in the staff handbook which was part of the appendices provided with the self-assessment report depict the various research activities of the staff members and the peers conclude that the research activities of teaching staff are adequate to ensure that the educational level sought is attained.

Criterion 5.2 Staff development

Evidence:

- detailed lists of equipment in the self-assessment report
- Visit of laboratories of the faculty for electrical power engineering
- Information on library, indicators, university budget, indicators provided in booklet “General Information” during the onsite visit

Preliminary assessment and analysis of the peers:

The peer group understood that the faculty organises education in a way that resources for research are available. The faculty is very supportive and flexible in this manner and tries to find adequate solutions to make use of research opportunities. An increasing number of staff members take advantage of international research programmes like the European Tempus Project. One staff member was on 6 months’ probation in Berlin (Germany) involved in “Projecting of small Satellites”. Other staff members were 6 months in Lithuania and other European countries. The peer group praised the efforts of KSTU to give staff members the opportunity for further development of subject-relevant knowledge and teaching skills and to gain international working and research experiences which in turn contribute to the enhancement of education and training of the university as a whole. The peers underlined that especially the improvement of English language skills would be highly desirable to implement the vision of the university to become more international.

Criterion 5.3 Institutional environment, financial and physical resources

Evidence:

- detailed lists of equipment in the self-assessment report
- Visit of laboratories of the faculty for electrical power engineering
- Information on library, indicators, university budget, indicators provided in booklet "General Information" during the onsite visit

Preliminary assessment and analysis of the peers:

Generally, the peer group gained a positive impression of the facilities and technical equipment available at the KSTU. The laboratories visited by the peers were adequate for basic education. However, the peer group indicated that for research and development projects more sophisticated machines would be advised for Mechanical Engineering and Metrology, which can be used in research projects or are subject to research projects or are of interest for the local industry to do some prototyping/tests. The peers noticed awareness that an upgrading of the technical equipment for educational purposes would be sensible to give the students a better understanding of the broader scope of the discipline.

The students confirmed that the overall equipment of the university is adequate. The library has appropriate opening hours, books are available in sufficient quantity and computers can be used individually.

The peers were impressed to hear that a comparatively small amount of resources is made available by state funds but that the larger amount comes directly from the industry; this underlines the close connection and cooperation with the regional industry. The peers took note that the financing of the programmes is assured.

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

The peer group concluded that the composition of the teaching body was able to ensure that the intended learning outcomes are achieved. The peers praise the efforts undertaken to give staff members international exposure and improve their level of English; the peers underlined that further improvement of English language skills would be highly desirable to implement the vision of the university. The peers took note that the financing of the programmes is assured.

6. Quality Management: Further Development of Degree Programmes

Criterion 6.1 Quality assurance & further development

Evidence:

- Document General Information provided during the onsite visit: Policy and Aims in the Field of Quality, certified quality management system ISO 9001:1008
- Document General Information provided during the onsite visit: QMS quality management system handbook

Preliminary assessment and analysis of the peers:
In 2004, KSTU introduced a certified quality management system, and in this context the university has appropriately defined its quality aims and understanding for teaching and learning, research and administration.

In general, it was highly appreciated by the peer group that there is a very personal relationship between students and teachers. Each teacher has a group of students for personal supervision. Regular feedback is provided to the parents of all students which takes a lot of efforts but is highly appreciated by the parents. This very personal relationship between staff members and students also contributes to the very low rate of termination of studies without a degree. The students confirmed that they are very satisfied with the teachers; if the students make proposals for improvement they are taken up by the department and implemented where feasible. The students underlined that they are not facing any serious challenges. Even though no structural processes seem to be in place to steadily improve the quality of the degree programmes they still see that on a more informal level self-reflection and improvement are granted.

The industry is involved in the development of the intended learning outcomes and the curricula; the industry provides positive feedback to the qualification of the students. The students confirmed that graduates do not have difficulties to find a job (also compare the results of the tracer studies).

Criterion 6.2 Instruments, methods and data

Evidence:

- QMS quality management system handbook
- Results of teaching quality assessments
- Data about exam results, pass rates, student numbers, student progress

Preliminary assessment and analysis of the peers:

At the end of each module, questionnaires are provided to the students to assess the quality of teaching according to a number of items. The questionnaires are analysed and working groups comprising staff members and students are organised to discuss the results. The analysis of the evaluation is also transferred to the department which takes note of the results. If a staff member receives low results on a regular basis the head of the department encourages this staff member to take measures in terms of further qualifications to improve the quality of teaching. The students confirmed that they can raise issues and make proposals which are taken into account by the department. The peers concluded that the data collected and the tools foreseen put the university in a position to check whether its aims in general and the objectives of the programmes in particular are achieved.

As indicated in criterion 6.1 the very personal relationship between students and teachers and the well organised supervision system including regular feedback to the parents of the students allows the university keeping full track of students' achievements; the peer group considered this approach as fully adequate.

The peers pointed out that the current quality assurance system does not foresee a mechanism for identifying whether the student workload allocated through the credit point system is consistent with the actual student workload or whether adjustments would be needed. The students themselves did not indicate a structural overburden of workload. Still, the peers recommended making this issue a concern of the further development of the quality assurance mechanisms.

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

The peers concluded that the data collected and the tools foreseen put the university in a position to check whether its aims in general and the objectives of the programmes in particular are achieved. The peers recommend making this issue of student workload a concern of the further development of the quality assurance mechanisms.

7. Documentation & Transparency

Criterion 7.1 Relevant Regulations

Evidence:

- QMS 05.02.03 – 2012 organization of educational process for credit training technology, including relevant Rules and Orders of the Government of the Republic of Kazakhstan and the Minister of Education and Science
- QMS MI 110.08 – 2012 General requirements to organizing and conducting laboratory classes
- QMS SO 4.5.03 – 2012 Educational and organizational processes management
- QMS SO 4.4.01 – 2012 Managing the process of entrants selection
- QMS SO 1.1.08 – 2012 General requirements to the formation, exposition and execution of working curricula in the European system ECTS
- QMS DP 04 – 2012 – Managing NA production,
- QMS FS 1.1.02 - 2013 – regulations of making academic documentation. Common requirements to test documents.
- Diploma supplement

Preliminary assessment and analysis of the peers:
As listed above a number of regulations are in placed to regulate the used methods and tools for the efficiency of the teaching process. KSTU points out that the documentation is regularly actualized in accordance with present day requirements for its validity and efficiency. The peers concluded that all aspects of admission, assessment, progress and graduation of the students are thoroughly regulated but they are not accessible to interested stakeholders. All rules and regulations dealing with admission, examinations, final thesis, etc. must be made publically accessible to give all relevant stakeholders the opportunity to refer to it.

Criterion 7.2 Diploma Supplement and Certificate

Evidence:

- An English Diploma Supplement was provided to the peer group during the site visit.

Preliminary assessment and analysis of the peers:
The Diploma supplement that was provided to the peer group fulfils all requirements in terms of personal information of the holder, level of qualification, information on the

contents and results achieved, data of the national system of education and the composition of the final grade. The peers concluded that this Diploma Supplement is adequate in its present form.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 7:

The peers concluded that all rules and regulations dealing with admission, examinations, final thesis, etc. must be made publically accessible to give all relevant stakeholders the opportunity to refer to it. The Diploma Supplement is adequate in its present form.

D Additional Documents

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

D 1. Clear overview of modules per semester (how many elective points) and the respective ECTS points (How many ECTS points per semester) to assess the real workload on students

E Comment of the Higher Education Institution (12.05.2015)

The institution provided a detailed statement as well as additional documents on the following issues:

- we carried out differentiation by educational programs: bachelor's degree and master's degree «Mechanical engineering», bachelor's degree «Standardization, certification and metrology» and master's degree «Standardization and certification» and «Metrology». Changes in matrixes of competences and matrixes of aims were made (see the attached files);

- we translated into English missing modules specifications and fill out ECTS (see the attached files);

- since September 2014 it is supposed to include components like multivariate analysis, advanced methods of statistics or strengthening the component of Design of experiments and to incorporate also well-known methods for filter design, frequency domain analysis

F Summary: Peer recommendations (22.05.2014)

Taking into account the additional information and the comments given by Karaganda State Technical University 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**
Bachelor Mechanical engineering	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Bachelor Standardization, certification and metrology	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Mechanical engineering (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Standardization and certification (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Metrology (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019

Requirements

For all degree programmes

A 1. (ASIIN 3.2) The students' workload per semester must be set at a level that avoids structural pressure on training quality. In line with the ECTS Users' Guide, the workload per semester must not exceed that of a full-time employee (maximum of 900h). The ECTS credits awarded must be adapted accordingly.

A 2. (ASIIN 2.2, 7.1) The intended learning outcomes and rules and regulations dealing with admission, examinations, final thesis, etc. must be made publically accessible to give all relevant stakeholders the opportunity to refer to it.

A 3. (ASIIN 2.3) The module descriptions must describe the type of examination for all modules (written, oral, project work, etc.) and the respective duration.

Recommendations

For all degree programmes

E 1. (ASIIN 2.6) The peer group recommends that parts of the subject-specific modules or projects should be taught in English. In consequence, the language capacities of the teaching staff would also need to be enhanced to some extent.

E 2. (ASIIN 3.2, 6.2) The peers recommend making this issue of student workload a concern of the further development of the quality assurance mechanisms.

Bachelor Mechanical Engineering

E 3. (ASIIN 2.6) The peers point out that Bachelor Mechanical Engineering is very focused on metal cutting and construction; the peers recommend broadening the topics of electives in other fields to widen the scope of mechanical engineering which must also be reflected in the equipment available at KSTU. Namely, the peers strongly encourage KSTU considering components like automation, robotics, feedback control, sensors and actuators, including engine technology as these are important aspects for an engineer. Also engineering with synthetic materials should be incorporated into the studies according to its world-wide relevance.

Master's program Metrology

E 4. (ASIIN 2.6) The peers recommend elaborating the descriptions of knowledge, abilities and competences of this programme individually and to present a distinct profile. Furthermore, the peers strongly encourage including components like multivariate analysis, advanced methods of statistics or strengthening the component of Design of experiments.

Master's programme Mechanical Engineering

E 5.(ASIIN 2.3, 2.6) The peers recommend offering the possibility for students to deepen their theoretical basis (e.g. partial differential equations, mathematical system theory for optimizing, modelling of dynamic systems, etc.)

G Comment of the Technical Committee 01- Mechanical Engineering/Process Engineering (05.06.2014)

Technical Committee 01- Mechanical Engineering/Process Engineering (05.06.2014)

The Technical Committee discussed the procedure.

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee confirmed the proposals of peers. The members made a few editorial changes to the wording of some requirements and recommendations.

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 Subject-Specific Criteria of the Technical Committee 01 - Mechanical Engineering/Process Engineering.

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

Degree Programme	**ASIIN seal**	**Subject-specific labels**	**Maximum duration of accreditation**
Bachelor Mechanical engineering	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Bachelor Standardization, certification and metrology	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Mechanical engineering (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019

Degree Programme	**ASIIN seal**	**Subject-specific labels**	**Maximum duration of accreditation**
Master Standardization and certification (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Metrology (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019

H Decision of the Accreditation Commission (27.06.2014)

The Accreditation Commission discussed the procedure.

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

The Commission confirmed the proposals of peers and Technical Committee. The members made a few editorial changes to the wording of some requirements and recommendations.

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

The Accreditation Commission deemed that the intended learning outcomes of the degree programmes comply with the engineering specific parts of the Subject-Specific Criteria of the Technical Committees 01 - Mechanical Engineering/Process Engineering.

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

Degree Programme	**ASIIN seal**	**Subject-specific labels**	**Maximum duration of accreditation**
Bachelor Mechanical engineering	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Bachelor Standardization, certification and metrology	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Mechanical engineering (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Master Standardization and certification (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019
Master Metrology (profile direction + pedagogical direction)	With requirements	ASIIN, EUR-ACE® Label	30.09.2019

Requirements

For all degree programmes

A 1. (ASIIN 3.2) The students' workload per semester must be set at a level that avoids structural pressure on training quality. In line with the ECTS Users' Guide, the workload per semester must not exceed that of a full-time employee (maximum of 900h). The ECTS credits awarded must be adapted accordingly.

A 2. (ASIIN 2.2, 7.1) The intended learning outcomes, as well as rules and regulations dealing with admission, examinations, final thesis, etc., must be made publically accessible in order to allow all relevant stakeholders to refer to them in case of doubts.

A 3. (ASIIN 2.3) The module descriptions of all modules (written, oral, project work, etc.) must provide information about the type and duration of examinations.

Recommendations

For all degree programmes

E 1. (ASIIN 2.6) It is recommended that parts of the subject-specific modules or projects should be taught in English. In consequence, the language capacities of the teaching staff would also need to be enhanced.

E 2. (ASIIN 3.2, 6.2) It is recommended to make the question of student workload an issue in the further development of the quality assurance mechanisms.

For the Bachelor Mechanical Engineering

E 3. (ASIIN 2.6) It is strongly recommended to broaden the topics of electives in other fields to widen the scope of mechanical engineering, but taking into account in the equipment available at KSTU.

For the Master's program Metrology

E 4. (ASIIN 2.6) It is recommended to elaborate the descriptions of the overarching knowledge, abilities and competences to be acquired during this programme and to present a profile distinct from other degrees. Furthermore, the peers strongly encourage including components like multivariate analysis, advanced methods of statistics or strengthening the component of design of experiments.

For the Master's programme Mechanical Engineering

E 5. (ASIIN 2.3, 2.6) It is recommended to offer the possibility for students to deepen their theoretical knowledge (e.g. partial differential equations, mathematical system theory for optimizing, modelling of dynamic systems, etc.).