ASIIN Accreditation Report

Bachelor's Degree Programmes

Ba Mechanics

Ba Space equipment (engineering) and Technology

Ba Standardization, Certification and Metrology (by branches)

Master's Degree Programmes

Ma Mechanics

Ma Metrology

Ma Space equipment (engineering) and Technology

Ma Standardization and Certification

Provided by

al-Farabi Kazakh National University, Almaty, Kasakhstan

01 July 2016

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A About the Accreditation Process

Title of the degree Programme	Labels applied for [1]	Previous accreditation	Involved Technical Committees (TC)[2]
Ba Standardization, Certification and Metrology	ASIIN, EUR-ACE® Label	n/a	01
Ba Mechanics	ASIIN, EUR-ACE® Label	n/a	01
Ba Space engineering and technologies	ASIIN, EUR-ACE® Label	n/a	01
Ma Mechanics	ASIIN, EUR-ACE® Label	n/a	01
Ma Metrology	ASIIN, EUR-ACE® Label	n/a	01
Ma Space engineering and technologies	ASIIN, EUR-ACE® Label	n/a	01
Ma Standardization and Certification	ASIIN, EUR-ACE® Label	n/a	01
Date of the contract: 25th of December 2012 **Submission of the final version of the self-assessment report:** 17th of February 2014 **Date of the onsite visit:** 12.-15. May 2014 **at:** al-Farabi Kazakh National University, Almaty, Kazakhstan			
Peer panel: Prof. Dr. Bernd Meyer, Jade University of Applied Siences			

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

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

Prof. Dr. Axel Schumacher, University of Wuppertal Prof. Dr. Heinrich Rake, Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen Dr. Jörg Longmuß, Gitta mbH Ms. Anastassiya Krasnyuk (student peer), Technical State University Karaganda
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
Mechanics B. Sc.	Four trajectories: • Theoretical and celestial mechanics • Fluid and gas mechanics • Mechanics of structural elements • Mechanics of machines, robots and control systems	Full time	8 Semester 153 credits (KZ/US) = 6.885hours = 255 ECTS	September 1, 1952 Autumn term	N° 55-61 students per academic year	636 000 kzt (about 3.380 €) per year
Space Engineering and Technologies B. Sc.	Two trajectories: • Space technologies • Ballistics and satellite navigation	Full time	8 Semester 153 credits (KZ/US) = 6885hours = 255 ECTS	September 1, 2010 Autumn term	N° 13 students per academic year	636 000 kzt (about 3.380 €) per year
Mechanics M. Sc.	Four trajectories: • Theoretical and celestial mechanics • Fluid and gas mechanics • Mechanics of machines, robotics, and their control and 3D modelling • Hydrodynamics and geoenergies engineering	Full time	4 Semester 59 credits (KZ/US) = 2.655 hours = 99 ECTS	September 1, 1996 Autumn term	N° 16-20 students per academic year	650 000 kzt about (3.620 €) per year
Space Engineering and Technologies M. Sc.	Two trajectories: • Space information systems • Information technologies in space	Full time	4 Semester 59 credits (KZ/US) = 2.655 hours = 99 ECTS	September 1, 2012 Autumn term	N° 10 students per academic year	650 000 kzt (about 3.620 €) per year
Standardization, Certification and Metrology (by branches) B.Sc.	Two trajectories: • Quality control • Metrology and standardization	Full time	8 Semester 151 Kazakh credits = 6.795 hours = 252 ECTS	April, 2004 Summer / Autumn term	N° 89 Summer Term N° 80 Autumn Term	650 000 kzt (about 3.620 €) per year
Standardization and certification M.Sc.	Two trajectories: • Cryophysics • Thermal Power Engineering	Full time	4 Semester 59 Kazakh credits = 2.655 hours = 99 ECTS	April 2010 Summer / Autumn term	N° 10 Summer Term N° 10 Autumn Term	650 000 kzt (about 3.620 €) per year
Metrology M.Sc.	Two trajectories: • Cryophysics • Thermal Power Engineering	Full time	4 Semester 59 Kazakh credits = 2.655 hours = 99 ECTS	April 2010 Summer / Autumn term	N° 8 Summer Term N° 4 Autumn Term	650 000 kzt (about 3.620 €) per year

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

The goal of the programme is: Preparation of highly qualified specialists in the field of mechanics in accordance with the highest academic standards in a competitive but challenging educational environment, capable of self-employed work and life-long learning.

The objective is to provide students with a systematic knowledge of the basic courses of specialty based on strong experimental and theoretical basis, along with the knowledge of the elective subjects, based on the latest achievements of science.

To form a system of skills related to problem solving, critical assessment of the original data and communication skills.

To ensure the mastery of practical techniques and computational skills, learning research skills and ability to perform independent research work.

To enable the students at the end of training to carry out a confident choice for future professional activities and to find successfully an employment in their chosen field.

Education

Goal: Preparing of a competent professional at the field of mechanics.

Objectives:

1. Graduates will know basic subjects of mathematics and natural sciences
2. Graduates will know fundamentals of all main fields of mechanics
3. Graduates will have basic computer skills and be able to use at least one type of software package for solving professional problems
4. Graduates will know theoretical and experimental methods of study of the standard problems in specific area of mechanics, which will be determined by the elective subjects
5. Graduates will be able to apply the studied analytical and experimental methods for solving the given professional problem

Goal: Development of students' independent thinking and the ability to self-directed learning.

Objectives:

1. Graduates will be able to develop and deepen their knowledge and professional skills at the chosen area of mechanics independently
2. Graduates should demonstrate independence and original approach to solving the problems

3. Graduates should analyze and solve problems in a professional manner independently.
4. Graduates will be ready to continue study for receiving academic degree in any leading university of Kazakhstan or other country or ready to professional career bound with research at the industrial sector

Research

Goal: Develop students' ability to conduct scientific research.

Objectives:

1. Graduates should know basic techniques of search, data collection, preparation, processing and analysis of information used in professional activities with the help of modern computer technology
2. Graduates should demonstrate skills of time-management and independent work
3. Graduates should be able to realize a scientific project, which will require deepen theoretical or practical techniques, providing original result

Social life

Goal: Develop the students' leadership skills.

Objectives:

1. Graduates should demonstrate ability to precisely, clearly and logically express their thoughts in writing and speaking skills
2. Graduates should demonstrate knowledge of the culture of thinking and communication, capacity for creative thinking, independent learning
3. Graduates should demonstrate availability of leadership qualities, the ability to take responsibility for decisions
4. Graduates should demonstrate personal qualities and skills needed for successful employment and requiring initiative and personal responsibility, problem-solving skills in complex and unpredictable situations

Goal: Development of the students' communicative abilities

Objectives:

1. Graduates should demonstrate ability to work in a team, ability to demonstrate interpersonal skills.
2. Graduates should demonstrate ability to work in an interdisciplinary team, to create an atmosphere of mutual understanding and co-operation with experts from other disciplines

The following **curriculum** is presented:

Title of modules	Course code	Title of courses	Credit	Unit (ECTS)	Lec/prac/Lab	Sem
Semester 1						
1. State **C**ompulsory Module	HRK 1101	History of the Republic of Kazakhstan	2	3	2+1+0	1
	K(R)LPP 1102	Kazakh (Russian) Language for Professional Purposes	3	5	0+3+0	1
	FLPP 1103	Foreign Language for Professional Purposes	3	5	0+2+1	1
3.1 Natural Sciences **(STEM)** module	ITPP1301	Information Technologies for Professional Purposes	***3***	**5**	1+2+0	1
Vocational Modules	**3.2.** Basic Professional Modules					
	Module 1 Algebra and Geometry					
	LAAG 1401	Linear Algebra and Analytical Geometry 1	3	5	2+1+0	1
	Module 2 Mathematical Analysis					
	MA1403	Mathematical Analysis 1	4	6	2+2+0	1
6. Additional Types of Learning	6.1	Sport and Recreation	2	3	0+0+2	
Semester 2						
3.1 Natural Sciences (STEM) module	MPhEQM1302	Molecular Physics. Electricity. Quantum Mechanics	***3***	5	2+0+1	2
	PhCh1303	Physical Chemistry	***3***	5	2+0+1	2
Vocational Modules	**3.2. Basic Professional Modules**					
	Module 1 Algebra and Geometry					
	LAAG 1402	Linear Algebra and Analytical Geometry 2	3	5	2+1+0	2
	Module 2 Mathematical Analysis					
	MA1404	Mathematical Analysis 2	4	6	2+2+0	2
	Module 5 Classical mechanics					
	PhFM1411	Basic Physics of Mechanics	2	3	1+0+1	2
	Module 8 Programming and Computer Graphics					
	Pro1422	Programming	3	5	1+0+2	2
4. Internship		Professional internship (by types of internship)				
	EP101	Educational internship	4			2
6. Additional Types of Learning	6.1	Sport and Recreation	2	3	0+0+2	

Semester 3						
3.1 Natural Sciences **(STEM)** module	PhM2304	Material Science	***2***	3	1+1+0	3
Vocational Modules (115 credits)	**3.2. Basic Professional Modules**					
	MA2405	Mathematical Analysis 3	3	5	2+1+0	3
	Module 3 Computational methods and differential equations					
	DU2406	Differential Equations	3	5	2+1+0	3
	CM2407	Computational Methods	3	5	2+0+1	3
	Module 5 Classical mechanics					
	TM2412	Theoretical Mechanics	3	5	2+0+1	3
	Module 8 Programming and Computer Graphics					
	OOP2423	Object Oriented Programming	3	5	1+0+2	3
	ECG2424	Engineering and Computer Graphics	2	3	1+0+1	3
6. Additional Types of Learning	6.1	Sport and Recreation	2	3	0+0+2	
Semester 4						
1. State **C**ompulsory Module	PhSK 2104	Philosophy of Scientific Knowledge	2	3	1+1+0	4
3. Vocational Modules	**Module 3 Computational methods and differential equations**					
	MPhE2408	Mathematical Physics equations	3	5	2+1+0	4
	Module 4 Probability theory and optimization methods					
	PTMS2409	Probability Theory and Mathematical statistics	3	5	2+1+0	4
	Module 5 Classical mechanics					
	AMSBD2413	Analytical Mechanics and Solid Body Dynamics	3	5	2+1+0	4
	Module 6 Mechanics of materials and deformable solids					
	MM2416	Materials Mechanics	2	3	1+0+1	4
	ICM2417	Introduction to Continuum Mechanics	2	3	1+1+0	4
	Module 7 Fundamentals of fluid mechanics					
	FTHMT2419	Fundamentals of thermodynamics and heat and mass transfer	2	3	1+1+0	4
4. Internship		Professional Internship (by types of Internship)	Minimum of 6 credits			
	EP202	Educational Internship	4			4
6. Additional Types of	6.1	Sport and Recreation	2	3	0+0+2	

Learning						
Semester 5						
2. Social and Communicative **M**odule	PIC2201	Psychology of Interpersonal Communication	2	3	1+1+0	3
	EPSS2203	Ethics of Personal and Social Success	2	3	1+1+0	3
	CR2204	Culture and Religion	2	3	1+1+0	3
	GAS2205	General and Applied Sociology	2	3	1+1+0	3
	HLS2206	Human Life Safety	2	3	1+1+0	3
3. Vocational Modules	**Module 5 Classical mechanics**					
	MMR3414	Mechanics of Machines and Robotics	3	5	2+0+1	5
	Module 6 Mechanics of materials and deformable solids					
	MDS3418	Mechanics of Deformable Solids	3	5	2+0+1	5
	Module 7 Fundamentals of fluid mechanics					
	FGM3420	Fluid and Gas Mechanics	3	5	2+0+1	5
	3.3 Modules for Individual Educational Trajectories **(IET)**					
	IET 1 Theoretical and celestial mechanics	**IET 2 Fluid and gas mechanics**	**IET 3 Mechanics of Structural Elements**	**IET 4 Mechanics of machines, robots and control systems**		
	SW3501 **Scientific writing**	SW3501 **Scientific writing**	SW3501 **Scientific writing**	SW3501 **Scientific writing**	1	2	0+1+0	5
	3.4 Interdisciplinary Module					
	IE3601	Innovative Entrepreneurship (trade-wise)	2	3	1+1+0	5
	IPL3602	Intellectual Property Law	2	3	1+1+0	5
	FEM3603	Finite element method	2	3	1+0+1	5
	PDC3604	Parallel and distributed computing	2	3	1+0+1	5
Semester 6						
3. Vocational Modules	**Module 4 Probability theory and optimization methods**					
	VCOT3410	Variational Calculus and Optimization Techniques	3	5	2+1+0	6
	Module 5 Classical mechanics					
	TOV3415	Theory of Oscillations and Vibrations	2	3	1+0+1	6

	Module 7 Fundamentals of fluid mechanics						
	EMM3421	Experimental Methods in Mechanics			3	5	1+0+2	6
	Module 8 Programming and Computer Graphics						
	CM3425	Computational Mechanics			3	5	2+0+1	6
	3.3 Modules for Individual Educational Trajectories **(IET)**						
	IET 1 Theoretical and celestial mechanics	**IET 2 Fluid and gas mechanics**	**IET 3 Mechanics of Structural Elements**	**IET 4 Mechanics of machines, robots and control systems**			
	NM3502 Nonholonomic Mechanics 1+1+0	TFCV3502 Theory of Functions of Complex Variables 1+1+0	PMM3502 Practicum on Materials Mechanics 1+0+1	EMMM 3502 Experimental Methods in Machines Mechanics 1+0+1	2	3		6
	PGT3503 Principles of Gyroscope Theory 2+1+0	EG3503 Experimental Fluid Mechanics 1+1+1	VER3503 Vibrations of elastic rods 2+1+0	BR3503 Basics of Robotics 2+0+1	3	5		6
	STAM3504 Software for theoretical and applied mechanics 1+0+2	SFGM3504 Software for fluid and gas mechanics 1+0+2	SCM3504 Software for continuum mechanics 1+0+2	SMP3504 Software for mechanic problems 1+0+2	3	5		6
4. Internship		Professional Internship (by types of Internship)			Minimum of 6 credits			
	PT301	Internship Training			4			6
Semester 7								
	3.3 Modules for Individual Educational Trajectories **(IET)**						
	IET 1 Theoretical and celestial mechanics	**IET 2 Fluid and gas mechanics**	**IET 3 Mechanics of Structural Elements**	**IET 4 Mechanics of machines, robots and control systems**			
	DBVM4505 Dynamics of bodies with variable masses	FD4505 Fluid dynamics 1+1+1	PEM4505 Principles of earthquake mechanics	TMHP4505 Theory of mechanisms with higher pairs	3	5		7

	2+1+0		2+1+0	2+0+1				
	CPCM4506 Classical problems of celestial mechanics 2+1+0	CFD4506 Computational fluid dynamics 1+0+2	GM4506 Geomechanics 2+1+0	BLMS4506 Basics of lever mechanisms synthesis 2+0+1	3	5		7
	SMMS4507 Stability of Motion of Mechanical Systems 2+1+0	PM4507 Principles of Magnetohydrodynamics 2+1+0	FMC4507 Fundamentals of Mechanics of Composites 2+0+1	CAD4507 Computer Aided Design 2+0+1	3	5		7
	PMM4508 Perturbation Methods in Mechanics 2+1+0	PhH4508 Physical - Chemical Hydrodynamics 1+1+1	FA4508 Fundamentals of Aeroelasticity 2+1+0	CRS4508 Control of Robotic Systems 2+0+1	3	5		7
	NAMM4509 Numerical Analysis of the Mechanics models 1+0+2	FTFMCM4509 Turbulent Flows, Models and Computation Methods 2+1+0	VSDS4509 Vibrations and Stability of Deformable Systems 2+1+0	OMM4509 Oscillations of Machines and Mechanisms 2+0+1	3	5		7
	APMPAS4510 Applied Problems of Motion of the Planet Artificial Satellite 2+1+0	EMPM4510 Experimental Methods for Flows in Porous Media 1+0+2	FTDR4510 Fundamentals of Theory of Durability and Reliability 2+0+1	ITM4510 Information Technologies in Mechanics 2+0+1	3	5		7
	PT4511 Principles of Tribology 1+1+0	PFTCMM4511 Filtration Theory, Models, Calculation and Methods 1+0+1	TS4511 Thermodynamics of Solids 1+1+0	ODMS4511 Optimal Design of Mechanical Systems 1+0+1	2	5		7
Semester 8								

4. Internship		Internship Training	Minimum of 6 credits	
	PT402	Internship Training	4	8
5. Final Certification		**5.1 Preparation and Presentation** of Bachelor's **D**issertation (Diploma Project)	2	

According to the self-assessment report, the Master's degree programme Mechanics shall enable students to acquire the following goals and **intended learning outcomes**:

Preparation of the highly qualified specialists in the field of Theoretical and celestial mechanics or Fluid and gas mechanics or Mechanics of machines, robots and their control and 3D modelling, Hydrodynamics and geo-energies engineering.

Upon completion of the program, the student will be able to:

1. Conduct the self research by the given theme.
2. Able to make the conclusions on the base of the obtained results of own research.
3. Able to give practical recommendations on the base of the made conclusions.

Goal: Preparation of the high school teacher

Upon completion of the program, the student will be able to:

1. Conduct the practical classes and laboratories for the undergraduate students.
2. Prepare the lectures on basic subjects of space technologies with presentations.
3. Conduct educative activities with the undergraduate students.
4. Be scientific supervisor of the undergraduate students.

The following **curriculum** is presented:

Module Code	Module Name	Module weight	Discipline Code	Discipline	ECTS/ hours units	Credits	L+P+Lb	Semester
Compulsory State Modules - 8 credits								
OGM1	**Compulsory State Module 1**	**4**	**IFN 5201**	History and Philosophy of Science	3/90	**2**	***1+1+0***	***2***
			Iya(p) 5202	Foreign language (Professional)	3/90	**2**	***1+1+0***	***2***
OGM 2	**Compulsory State Module 2**	**4**	**Ped 5203**	Pedagogics	3/90	**2**	***1+1+0***	***1***
			Psy 5204	Psychology	3/90	**2**	***1+1+0***	***1***
Compulsory Professional Modules - 14 credits								
OPM 1	**Compulsory Professional Module 1**	**2**	**SPM 5205**	*Modern Problems of Mechanics*	3/90	**2**	***1+1+0***	***1***
OPM 2	**Compulsory Professional Module 2**	**3**	**OPNI 5206**	Organization and Planning of Scientific Research	5/135	**3**	***2+1+0***	***1***
OPM 3	**Compulsory Professional Module 3**	**3**	**TDSP 5207**	Dynamical systems theory and its application	5/135	**3**	***2+1+0***	***1***
OPM 4	**Compulsory Professional Module 4**	**3**	**NT 5208**	Nanotechnologies	5/135	**3**	***2+1+0***	***1***
OPM 5	**Compulsory Professional Module 5**	**3**	**OMB 5209**	Fundamentals of Mechatronics and Biomechanics	5/135	**3**	***2+1+0***	***1***
Modules of Individual Educational Paths - 20 credits								
MIOT 1	**Module1 of Individual Educational Path**	**6**	**5301**	Electives	5/135	**3**		***2***
			5302	Electives	3/90	**2**		***2***
MIOT 2	**Module 2 of Individual Educational Path**	**2**	**5303**	Electives	5/135	**3**		***2***
MIOT 3	**Module 3 of Individual Educational Path**	**6**	**6304**	Electives	5/135	**3**		***3***
			6305	Electives	5/135	**3**		***3***

MIOT 4	**Module 4 of Individual Educational Path**	**6**	**6306**	Electives	5/135	**3**		***3***
			6307	Electives	5/135	**3**		***3***
				Total: Theoretical Training - 42 credits (63 ECTS)				
NIRM	**Master's Reseach Work and Fullfilment of Dissertation**	**7**	**NIRM I**	Research Seminar I	2	1		**1**
			NIRM II	Research Seminar II	2	1		**2**
			NIRM II	Research Seminar III	2	1		**3**
			NIRM IV	Research Seminar IV	6	4		**4**
PP	**Professional Internship**	**6**	**PP**	Pedagogical Internship		3		2
			IP	Research internship		3(1+2)		**2,4**
				Total: Additional Types of Training: 13 credits (19,5 ECTS)				
FSA	**Final Attestation**	**4**	**KE**	Complex Examination (1 credit)		**1**		
			ZD	Dissertation Fullfilment and Defence (3 credits)		**3**		
				Grand Total: 59 credits (88,5 ECTS)		**59**	**19**	**17**

For the Bachelor's degree programme Space Engineering and Technologies, the self-assessment report states the following **goals** and **intended learning outcomes**:

Preparation of highly qualified specialists in the field of space technology in accordance with the highest academic standards in a competitive but challenging educational environment, capable of self-employed work and life-long learning.

Objective

To provide students with a systematic knowledge of the basic courses of specialty based on strong experimental and theoretical basis, along with the knowledge of the elective subjects, based on the latest achievements of science.

To form a system skills related to problem solving, critical assessment of the original data and communication skills.

To ensure mastery of practical techniques and computational skills, learning research skills and ability to perform independent research work.

To generate at the students at the end of training the ability to carry out a confident choice for future professional activities and to find successfully an employment in their chosen field.

Education

Goal: Preparing of a competent professional at the field of space technologies.

Objectives:

1. Graduates will know basic subjects of mathematics, mechanics, engineering fundamentals in the field of modern space technologies
2. Graduates will have basic computer skills and be able to use at least one type of software package for solving professional problems
3. Graduates will know theoretical and experimental methods of study of the standard problems in specific area of space technologies, which will be determined by the elective subjects
4. Graduates will be able to apply the studied analytical and experimental methods for solving the given professional problem

Goal: Development of students' independent thinking and the ability to self-directed learning.

Objectives:

1. Graduates will be able to develop and deepen their knowledge and professional skills at the chosen area of space technologies independently
2. Graduates should demonstrate independence and original approach to solving the problems
3. Graduates should analyse and solve problems in a professional manner independently.
4. Graduates will be ready to continue study for receiving academic degree in any leading university of Kazakhstan or other country or ready to professional career bound with research at the industrial sector

Research

Goal: Develop students' ability to conduct scientific research.

Objectives:

1. Graduates should know basic techniques of search, data collection, preparation, processing and analysis of information used in professional activities with the help of modern computer technology
2. Graduates should demonstrate skills of time-management and independent work
3. Graduates should be able to realize a scientific project, which will require deepen theoretical or practical techniques, providing original result

Social Life

A. Goal: Develop the students' leadership skills.

Objectives:

1. Graduates should demonstrate ability to precisely, clearly and logically express their thoughts in writing and speaking skills
2. Graduates should demonstrate knowledge of the culture of thinking and communication, capacity for creative thinking, independent learning
3. Graduates should demonstrate availability of leadership qualities, the ability to take responsibility for decisions
4. Graduates should demonstrate personal qualities and skills needed for successful employment and requiring initiative and personal responsibility, problem-solving skills in complex and unpredictable situations

B. Goal: Development of the students' communicative abilities

Objectives:

1. Graduates should demonstrate ability to work in a team, ability to demonstrate interpersonal skills.
2. Graduates should demonstrate ability to work in an interdisciplinary team, to create an atmosphere of mutual understanding and co-operation with experts from other disciplines

The following **curriculum** is presented:

Title of modules	**Course code**	**Title of courses**	**Credit**	**Unit (ECTS)**	**Lec/prac/Lab.**	**Sem.**
Semester 1						
1. State Compulsory Module(10credits)	HRK1101	History of the Republic of Kazakhstan	2	3	2+1+0	1
	K(R)LPP1102	Kazakh(Russian) Language for Professional Purposes	3	5	0+3+0	1
	FLPP1103	Foreign Language for Professional Purposes	3	5	0+2+1	1
3.1 Natural Sciences**(STEM)** module	ITPP1301	Information Technologies for Professional Purposes	***3***	5	1+2+0	1
Vocational Modules (115 credits)	**3.2.** Basic Professional Modules					
	Module 1 Algebra and Geometry					
	LAAG 1401	Linear algebra and analytical geometry 1	3	5	2+1+0	1
	Module 2 Mathematical analysis					
	MA1403	Mathematical analysis 1	4	6	2+2+0	1
6. Additional Types ofLearning	6.1	Physical Training	2	3	0+0+2	1
Semester 2						
3.1 Natural Sciences(STEM) module	MPhEQM1302	Molecular physics. Electricity. Quantum mechanics	***3***	5	2+0+1	2
	PhCh1303	Physical chemistry	***3***	5	2+0+1	2

Vocational Modules (115 credits)	**3.2. Basic Professional Modules**					
	Module 1 Algebra and Geometry					
	LAAG 1402	Linear algebra and analytical geometry 2	3	5	2+1+0	2
	Module 2 Mathematical analysis					
	MA1404	Mathematical analysis 2	4	6	2+2+0	2
	Module 6 Basic electronics and circuits					
	TEC1415	Theory of electrical circuits	3	5	1+0+2	2
	Module 8 Programming and Computer Graphics					
	Pro1422	Programming	3	5	1+0+2	2
4. Practice		Professional practice(by types of practice)				
	EP101	Educational practice	6			2
6. Additional Types ofLearning	6.1	Physical Training	2	3	0+0+2	2
Semester 3						
3.1 Natural Sciences**(STEM)** module	PhM2304	Physical materials	***2***	3	1+1+0	3
Vocational Modules (115 credits)	**3.2. Basic Professional Modules**					
	MA2405	Mathematical analysis 3	3	5	2+1+0	3
	Module 3 Computational methods and differential equations					
	DU2406	Differential equations	3	5	2+1+0	3
	CM2407	Computational methods	3	5	2+0+1	3
	Module 5 Classical mechanics					
	TM2412	Theoretical Mechanics	3	5	2+0+1	3
	Module 8 Programming and Computer Graphics					

	OOP2423	Object – oriented programming	3	5	1+0+2	3
	ECG2424	Engineering and Computer Graphics	2	3	1+0+1	3
6. Additional Types ofLearning	6.1	Physical Training	2	3	0+0+2	2
Semester 4						
Name of modules	Discipline code	**Title of courses**	Credit	**Unit(ECTS)**	**Lec/prac/Lab.**	**Sem.**
1. State Compulsory Module	PhSK2104	Philosophyof Scientific Knowledge	2	3	1+1+0	4
3. Vocational Modules	**Module 4Mechanics and control processes**					
	DSF2409	Dynamics of space flight	3	5	2+1+0	4
	Module 5Mechanics of materials and mechanisms					
	MM2411	Mechanics of materials	2	3	1+0+1	4
	MSC2412	Metrology, standardization and certification	3	5	1+0+2	4
	Module6Basic electronics and circuits					
	BE2416	Basic electronics	3	5	2+0+1	4
	Module 8Continuum mechanics					
	BTHMT2422	Basics of thermodynamics and heat and mass transfer	2	3	1+1+0	4
	ICM2423	Introduction to continuum mechanics	2	3	1+1+0	4
4. Practice		Professional Practice (by types of Practice)	Minimum of6 credits			
	EP202	Educational Practice	4			4
6. Additional Types ofLearning	6.1	Physical Training	2	3	0+0+2	4
Semester 5						
2. Social andCommunic	PIC3201	Psychologyof Interpersonal Communication	2	3	1+1+0	3
	TAPS 3202	Theoreticaland AppliedPolitical Science	2	3	1+1+	5

ativeModule(4 credits)					0	
	EPSS3203	Ethicsof Personal andSocial Success	2	3	1+1+0	5
	CR3204	Culture and Religion	2	3	1+1+0	5
	GAS3205	General andApplied Sociology	2	3	1+1+0	5
	HLS3206	Human Life Safety	2	3	1+1+0	5
	ESD 3207	Ecology and Sustainable Development	2	3	1+1+0	5
	KL 3208	Kazakhstan Law	2	3	1+1+0	5
	FE 3209	Fundamentals of Economics	2	3	1+1+0	5
3. Vocational Modules	**Module 4 Mechanics and control processes**					
	MMR3414	Mechanics of machines and robotics	3	3	2+0+1	5
	Module 5Mechanics of materials and mechanisms					
	MMR3413	Mechanics of machines and robots	3	5	2+0+1	5
	Module 6Basic electronics and circuits					
	BDE3417	Basics of digital electronics	3	5	1+0+2	5
	Module 9 Spacecraftdesign					
	BSD3424	Bases of spacecraft design	3	5	2+1+0	5
	3.3 Modules forIndividual EducationalTrajectories **(IET)**					
	IET 1 Space technologies	**IET 2** Ballistics and satellite navigation				
	SW3501 **Scientific writing (каз/рус/анг)**	SW3501 **Scientific writing (каз/рус/анг)**	1	2	0+1+0	5
	3.4 InterdisciplinaryModule					
	IE3601	Innovative Entrepreneurship(trade-wise)	2	3	1+1+0	5

	IPL3602	Intellectual Property Law	2	3	1+1+0	5
	FEM3603	Finite element method	2	3	1+0+1	5
	PDC3604	Parallel and distributed computing	2	3	1+0+1	5
Semester 6						
3. Vocational Modules	**Module 5Mechanics of materials and mechanisms**					
	TV3414	Theory of vibrations	2	3	1+0+1	6
	Module7 Programming and computer graphics					
	BIP3421	Bases of information protection	2	3	1+0+1	6
	Module 9Spacecraftdesign					
	PLD3425	Programmable logic devices	3	5	1+0+2	6
	3.3 Modules forIndividual EducationalTrajectories **(IET)**					
	IET 1 Space technologies	**IET 2** Ballistics and satellite navigation				
	MBVM3502 Mechanics of bodies with variable masses	RD3502 Rocket dynamics	3	5	2+1+0	6
	BSC3503 Basics of the spacecraft control	SDOCS3503 Systems of determination and orientation control for spacecrafts	3	5	2+1+0	6
	CM3504 Celestial mechanics	BAECM3504 Basics of astrometry and elements of celestial mechanics	3	5	2+1+0	6
4. Practice		Professional Practice (by types of Practice)	Minimum of6 credits			
	PT301	Practice Training	2			6
Semester 7						
	3.3 Modules forIndividual EducationalTrajectories **(IET)**					
	IET 1 Space technologies	**IET 2** Ballistics and satellite navigation				
	APEASM4505 Applied problems of the Earth's artificial satellite motion	TMEAS4505 Theory of motion of the Earth's artificial satellite	3	5	1+2+0	7

	PGSD4506 Principles of gyroscopic systems design	ATG4506 Applied theory of gyroscopes	3	5	2+1+0	7
	PDAPh4507 Processing and decoding of aerial photographs	BGicT4507 Basics of GIS technologies	3	5	1+2+0	7
	SR4508 Space robotics	ISS4508 Intelligent space systems	3	5	2+1+0	7
	BSNS4509 Basics of the satellite navigation systems	NT4509 Navigation technologies	2	3	1+1+0	7
	SMCS4510 Simulation modeling of complex systems	SADCS4510 System analysis in the design of complex systems	3	5	1+2+0	7
	BSC4511 Basics of space communications	OCSS4511 Onboard communication systems of the spacecraft	2	3	1+0+1	7
Semester 8						
4. Practice		Practice Training	Minimum of 6 credits			
	PT402	Practice Training	4			8
5. Final Certification		**5.1 Preparation and Presentation** ofBachelor's Dissertation (Diploma Project)	2			

For the Master's degree programme Space Engineering and Technologies, the self-assessment report states the following goals and intended learning outcomes:

Preparation of highly qualified specialists in the field of Space information systems or Information technologies in space

Upon completion of the program, the student will be able to:

1. Conduct the self research by the given theme.
2. Able to make the conclusions on the base of the obtained results of own research.
3. Able to give practical recommendations on the base of the made conclusions.

Goal: Preparation of the high school teacher

Upon completion of the program, the student will be able to:

1. Conduct the practical classes and laboratories for the undergraduate students.
2. Prepare the lectures on basic subjects of space technologies with presentations.
3. Conduct educative activities with the undergraduate students.
4. Be scientific supervisor of the undergraduate students.

The following **curriculum** is presented:

Title of modules	Course code	Title of courses	Credit	Unit (ECTS)	Lec/prac/Lab.	Sem.
Semester 1						
1. Compulsory State Module 2	**Ped 5203**	Pedagogics	2	3	***1+1+0***	***1***
	Psy 5204	Psychology	2	3	***1+1+0***	***1***
Compulsory Professional Module 1	**PMN 5205**	Micro- and nano-satellite design	**2**	**3**	1+1+0	1
Compulsory Professional Module 2	**OPNI 5206**	Organization and Planning of Scientific Research	**3**	5	2+1+0	1
Compulsory Professional Module 3	**SUOKA 5207**	Attitude control system of the spacecraft	**3**	5	2+1+0	1
Compulsory Professional Module 4	**SPDINT 5208**	Modern problems of the motion of artificial celestial bodies	**3**	5	2+1+0	1
Compulsory Professional Module 5	**AZDKP 5209**	Actual problems of the dynamics of space flight	**3**	5	2+1+0	1
Master's Reseach Work	**NIRM I**	Research Seminar I	1	2		1

Semester 2						
Compulsory State Module 1	**IFN 5201**	History and Philosophy of Science	***2***	3	1+1+0	2
	Iya(p)5202	Foreign language (Professional)	***2***	3	1+1+0	2
	3.3 Modules for Individual Educational Trajectories **(IET)**					
	IET 1 **Space information systems**	**IET 2** **Information technologies in space**				
	SGS 5301 Modern gyroscopic systems 2+1+0	**MNP 5301** Mechanics of navigation instruments 2+1+0	3	5		2
	TSNS 5302 Theory of satellite navigation systems 2+1+0	**SSNT 5302** The modern satellite navigation technologies 2+1+0	3	5		2
	GS 5303 Geoinformation systems 1+1+0	**DAI 5303** Remote aerospace research 1+1+0	2	5		2
Master's Reseach Work	**NIRM II**	Research Seminar I**I**	1	2		2
Professional Practice	**PP**	Pedagogical Practice	3	5		2

Semester 3						
	IET 1 **Space information systems**	**IET 2** **Information technologies in space**				
	SATOR 6304 System analysis and the theory of optimal solutions 2+1+0	**TSSA 6304** System theory and system analysis 2+1+0	3	5		3
	IMDS 6305 Simulation modeling of dynamic systems 2+0+1	**STIM 6305** Modern theories of simulation 2+0+1	3	5		3
	TSIISKA 6306 Technical facilities of the spacecraft's information-measuring systems 2+0+1	**ISLA 6306** Measuring systems of the aircraft 2+0+1	3	5		3
	TsOIIS 6307 Digital image processing in information systems 2+0+1	**NMOS 6307** The newest methods of signal processing 2+0+1	3	5		3
Master's Reseach Work	**NIRM III**	Research Seminar III	1	2		3
Semester 4						
Master's Reseach Work	**NIRM IV**	Research Seminar IV	4	6		3
Professional Practice	**IP**	Research practice				4
Final Attestation	**KE**	Complex Examination	1	2		4
	ZD	Dissertation Fullfilment and Defence	3	5		4

For the Bachelor's degree programme Standardization, Certification and Metrology (by branches), the self-assessment report states the following **goals** and **intended learning outcomes**:

The mission of the educational program is training of highly skilled experts for power, oil and gas, building industry, materials science, bodies of customs control and objects of scientific activity of the Republic of Kazakhstan, and also test, calibration laboratories (centers).

Program's goals and objectives focus on the three areas of education, research and service.

Education

Goal: Ongoing professional development of teachers in the Department

Objective

1. Planning staff of the department to participate in educational seminars for annual academic year
2. Approving plan of methodical seminars for annual academic year
3. Scheduling of Demonstration lessons to exchange the experiences
4. The publication of educational-methodical articles of the department teaching staff

Goal: ensuring the quality of educational services

Objectives:

1. Offer students a variety of elective courses to provide career-oriented concentrations;
2. Development of a typical model curriculum subjects of the basic curriculum;
3. Checking the quality of holding classes by the chief person of department;
4. Issue of educational-methodical materials for the students of this specialty;
5. Forming the base of the "alternative" teachers of the department to check the examination papers of students in teaching disciplines;
6. The signing of agreements with foreign universities for students' participation in the program of academic mobility;
7. The development of the department teaching staff of the bank test items disciplines by specialty;
8. The development of virtual laboratory facilities on specialty disciplines.

Goal: giving students practical skills for their future profession

Objectives:

1. Students recognition of their future specialization with the involvement of experts in the field of quality
2. Increasing the internship's base for the students
3. Involvement of students to participate in the quality circle
4. Encourage students to demonstrate their ability to define and solve quality problems on workshops
5. Stimulate students to demonstrate their ability to relate basic physics, math and engineering principles to the field of Standardization, Certification and Metrology so they can function professionally as quality engineers and scientists.

Research

Goal: In the area of research, the Department conducts a range of scientific research programs and establishes partnerships with government and industry.

Objectives:

1. Participation in international scientific and educational projects and programs of basic, applied and contract research
2. Engaging students and undergraduates in paid based research project to basic, applied and contract work
3. Development diploma and master's graduate work on the orders of the enterprise
4. Implementation of innovative projects in production
5. Creation of small innovative enterprise to issue new products
6. Obtaining patents for inventions
7. Provide international and national scientific conferences, seminars, round tables at the Department of extra-budgetary funds (international funds; sponsored funds; Intl . Grants, etc.)
8. Commissioning of new scientific equipment
9. Creating a "start-up companies" within functioning student business incubators
10. Publication of scientific papers published in international journals by Thomson Reuters having (ISI Web of Knowledge, Thomson Reuters) nonzero impact factor and included in the database Scopus
11. Increase in the total value of the impact factor publications of the department (ISI Web of Knowledge, Thomson Reuters)
12. Increasing the citation index (Hirsch) teachers of the department (ISI Web of Knowledge, Thomson Reuters)
13. Publication in periodicals, materials in local and international conferences held in the Republic of Kazakhstan in the near and far abroad

14. Publication of scientific monographs published in domestic and foreign publishing houses
15. Publication of students, undergraduates, doctoral students in Kazakh publications and abroad under the supervision of teachers in the Department
16. Constantly operating educational and methodological Seminar of the Department
17. Introduction in educational process disciplines developed based on the results of research work

Social Life

A. Goal: Provide leadership, consultation, and guidance to the professional/quality communities.

Objectives:

1. Serve in leadership roles for professional activities and organizations.
2. Provide expert-opinion support to meet the needs of quality professionals through consultation and facilitation.
3. Support alumni in their professional development through such activities as placement, advisement, communication, and an alumni association.

B. Goal: Contribute to University governance by participation at the departmental and University levels.

Objectives:

1. Facilitate faculty participation in School decision-making and regularly evaluate the effectiveness of established governance structures.
2. Pursue actively opportunities for service through election or appointment of faculty to University-wide governance bodies.
3. Participate as appropriate in the policy structures of other units in the University.

C. Goal: Promote and defend the profession's values to society.

Objectives:

1. Advocate values of the profession regarding ethics, intellectual freedom, and participation in the democratic process.
2. Encourage participation in professional activities and organizations at School, university, state, national, and international levels.
3. Promote professional development through student involvement in School planning and governance.

The following **curriculum** is presented:

Title of modules	Course code	Title of courses	Credit	ECTS/ hours	Lec/prac/Lab	Sem.
Semester 1						
1. State compulsory module	HRK1101	History of the Republic of Kazakhstan	2	3/90	1+1+0	1
	K(R)LPP1102	Kazakh(Russian) Language for Professional Purposes	3	5/135	0+3+0	1
	FLPP1103	Foreign Language for Professional Purposes	3	5/135	0+2+1	1
3. Vocational Modules	**3.1 Natural Sciences (STEM) Module**					
	Pr1301	Programming	3	5/135	1+0+2	1
	Mat1302	Mathematics	3	5/135	1+2+0	1
	Module 1. Physics 1					
	Mech1401	Mechanics	3	5/135	1+1+1	1
6. Additional Types of Learning	FK	Physical Training	8	13/360	0+0+2	1, 2, 3, 4
Semester 2						
3. Vocational Modules	**3.1 Natural Sciences (STEM) Module**		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	Chem1303	Chemistry	3	5/135	1+1+1	2
	GTM1304	General Theory of Measurement	3	5/135	1+1+1	2
	Module 1. Physics 1					
	MP1402	Molecular Physics	3	5/135	1+1+1	2
	Module 3. Applied Methods of Engineering and Computer Graphics					
	TM1407	Theoretical Mechanics	3	5/135	1+2+0	2
	ECG1408	Engineering and Computer Graphics	3	5/135	1+0+2	2
4. Internship	Professional practice (by types of practice)					
	UP101	Educational Practice	**2**	3/90		2
6. Additional Types of Learning	FK	Physical Training	8	13/360	0+0+2	1, 2, 3, 4
Semester 3						
Title of mod-	**Course**	**Title of courses**	**Cre**	**ECTS/**	**Lec/pr**	**Se**

ules	code		dit	hours	ac/Lab.	m.
2. Social and Communicative Module (4 credits)	PIC2201	Psychology of Interpersonal Communication	2	3/90	1+1+0	3
	TAPS2202	Theoretical and Applied Political Science	2	3/90	1+1+0	3
	EPSS2203	Ethics of Personal and Social Success	2	3/90	1+1+0	3
	CR2204	Culture and Religion	2	3/90	1+1+0	3
	GAS2205	General and Applied Sociology	2	3/90	1+1+0	3
	HLS2206	Human Life Safety	2	3/90	1+1+0	3
	ESD2207	Ecology and Sustainable Development	2	3/90	1+1+0	3
	KL2208	Kazakhstan Law	2	3/90	1+1+0	3
	FE2209	Fundamentals of Economics	2	3/90	1+1+0	3
3. Vocational Modules	**Module 1. Physics 1**					
	EM2403	Electricity and Magnetism	3	5/135	1+1+1	3
	Module 3. Applied Methods of Engineering and Computer Graphics					
	CDPM2409	Computer Data Processing Methods	3	5/135	1+1+1	3
	Module 4. Professional Foreign Language					
	FLBP2410	Foreign Language. Basics of professional cummunication	***6***	10/270	0+6+0	3, 4
	Module 5. Standardization					
	Sta2411	Standardization	3	5/135	1+2+0	3
	Module 8. Quality Assurance					
	Qual2418	Qualimetry	3	5/135	1+2+0	3
6. Additional Types of Learning	FK	Physical Training	8	13/360	0+0+2	1, 2, 3, 4

Semester 4						
Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
1. State compulsory module	PSK1104	Philosophy of Scientific Knowledge	2	3/90	1+1+0	4
3. Vocational Modules	**Module 2. Physics 2**					
	Opt2404	Optics	3	5/135	1+1+1	4
	Module 4. Professional Foreign Language					
	FLBP2410	Foreign Language. Basics of professional cummunication	***6***	10/270	0+6+0	**4**
	Module 7. Verification of conformity					
	Ser2415	Sertification	3	5/135	1+2+0	4
	Module 8. Quality Assurance					
	QMS2420	Quality management system	3	5/135	1+2+0	4
	Module 9. Quality management					
	SMQC2421	Statistical Methods for Quality Control of Products and Processes	3	5/135	1+1+1	4
4. Internship	Professional practice (by types of practice)					
	PP202	Practice Training	2	3/90		4
6. Additional Types of Learning	FK	Physical Training	8	13/360	0+0+2	1, 2, 3, 4
Semester 5						
3. Vocational Modules	**Module 2. Physics 2**		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	APS3405	Atomic Physics and Spectroscopy	3	5/135	1+1+1	5
	Module 7. Verification of conformity					
	ACAB3416	Accreditation of Conformity Assessment Bodies and Testing Laboratories	3	5/135	1+1+1	5
	3.3 Minor Modules (Modules for Individual Educational Trajectories (IET))					
	IET 1. Quality control	**IET 2.Metrology and standardization**				
	OE3502 Organization of the Experiment	POE3502 Planning and Organization of the Experiment	3	5/135	1+1+1	5
	EM3503 EnvironmentalManage	IE3503 Industrial Ecology	3	5/135	1+1+1	5

	ment					
	EPL3504 Environmental and Patent Law	PIPP3504 Protection of Intellectual Property and Patenting	3	5/135	1+2+0	5
	TOPS3505 Technology and Organization of Production and Services	AMMS3505 Automation of Measurements and Measurement Systems	3	5/135	1+1+1	5
Semester 6						
3. Vocational Modules	**Module 2. Physics 2**		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	NP3406	Nuclear Physics	3	5/135	1+1+1	6
	Module 7. Verification of conformity					
	TCSP3417	The Test, Control and Safety of Production	3	5/135	1+2+0	6
	Module 9. Quality management					
	DES3422	Database and Expert Systems	3	5/135	1+1+1	6
	3.3 Modules for Individual Educational Trajectories **(IET)**					
	IET 1. Quality control	**IET 2.Metrology and standardization**				
	MM3506 Management and Marketing	Man3506 Management	3	5/135	1+2+0	6
	QMLT3507 Quality Management in Laboratory Testing	MEMTE3507 Metrological Examination of Measuring and Test Equipment	3	5/135	1+2+0	6
	RRM3508 Reliability and Risk Management	DR3508 Designing Reliability	2	3/90	1+1+0	6
	3.4 Interdisciplinary module					
	FLST3601	Foreign Language. Scientific and Technical Translation	2	3/90	0+1+1	6
	FLSP3602	Foreign Language for Special Purposes	2	3/90	0+1+1	6
	IE3603	Innovative Entrepreneurship (tradewise)	2	3/90	0+2+0	6
	IPL3604	Intellectual Property Law	2	3/90	0+2+0	6
4. Internship	Professional practice (by types of practice)					
	PP303	Practice Training	2	3/90		6
Semester 7						
3. Vocational Modules	**Module 5. Standardization**		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	TWS4412	Technology of Working Standards	3	5/135	1+1+1	7
	Module 6. Metrology and metrological support of					

	production					
	MSP4414	Metrological support of production	3	5/135	1+2+0	7
	3.3 Modules for Individual Educational Trajectories (IET)					
	IET 1. Quality control	**IET 2.Metrology and standardization**				
	SW4501 Scientific writing (kaz/ru/eng)	SW4501 Scientific writing (kaz/ru/eng)	1	1.66/ 45	0+1+0	7
	ISPL4509 Information Support of the Product Life Cycle	NSAM4509 Numerical Solution of Applied Metrology Applications	3	5/135	1+1+1	7
	IM4510 Innovation Management	MTI4510 Management of Technological Innovation	3	5/135	1+2+0	7
	SMN4511 Standardization and Metrology in Nanotechnology	MSNR4511 Metrological Support of Nanotechnology Research	3	5/135	1+2+0	7
Semester 8						
4. Internship	Professional practice (by types of practice)		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	PP404	Practice Training	2	3/90		8
5. Final certification	NZD801	Preparation and Presentation of Bachelor's Dissertation (Diploma Project)	2	3/90		8

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

A. Goal: To prepare specialists to take on roles where they have responsibility for achieving quality goals.

Upon completion of the program, the student will be able to:

1. to ensure raw materials samples are sent to the lab for testing, at time of delivery and monitor acceptable/non conformance
2. to ensure that all QS9000/ISO14001 requirements are maintained and updated as required for the Company and customers.
3. to conduct machine capability studies and decision/conduct of study along with weekly or monthly quality reports, as required.
4. to communicate all job related matters to Quality Assurance Manager (QA Manager)
5. to procedure revisions and process non-conforming material reports (NCMR)
6. to assist with a follow-up on corrective action – internal and subcontractors

B. Goal: provides students with an in-depth understanding of the usage of modern product quality and process capability metrics

Upon completion of the program, the student will be able to:

1. assist, when required, production in problem solving of quality issues and corrective action
2. use of quality tools for continuous improvement
3. apply empirical study, particularly using the experimental methods, to evaluate empirical evidence

The following **curriculum** is presented:

Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab**	**Sem.**
Semester 1						
Compulsory state modules	**IFN 5201**	History and Philosophy of Science	2	3/90	1+1+0	1
	Iya(p)5202	Foreign language (Professional)	2	3/90	0+2+0	1
Compulsory Professional Modules -	**OPNI 5206**	Organization and Planning of Scientific Research	3	5/135	1+2+0	1
	SSSM5205	Standardization, Certification and Metrology Systems	3	5/135	1+2+0	1
	MNNS5209	Methods of writing scientific articles	2	3/90	1+1+0	1
Modules of Individual Educational Paths	**MIOT 1 Module of Individual Educational Path 1**					
	FPK5301 Physical processes and Cryotechnology	FPT5301 Physical processes in the power system	3	5/135	1+2+0	1
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar I	1	1.66/ 45		1
Professional Practice	**IP**	Research practice	1	1.66/ 45		1
Semester 2						
Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
Compulsory state modules	**Ped 5203**	Pedagogics	2	3/90	1+1+0	2
	Psy 5204	Psychology	2	3/90	1+1+0	2

Compulsory Professional Modules -	**TR5207**	Technical Regulation	3	5/135	1+2+0	2
	MK5208	Quality management	3	5/135	1+2+0	2
Modules of Individual Educational Paths	**MIOT 1 Module of Individual Educational Path 1**					
	SK5302 Standardization in Cryotechnology	ST5302 Standardization in Thermal Power Engineering	3	5/135	1+2+0	2
	MIOT 2 Module of Individual Educational Path 2					
	KNI5303 Computerizationof science research	PPP5303 The software package	2	3/90	1+1+0	2
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar II	1	1.66/ 45		2
Semester 3						
Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	MIOT 2 Module of Individual Educational Path 2					
	KMFP6304 Computer simulation of physical processes	OEM6306 Fundamentals of Environmental Monitoring	2	3/90	1+1+0	3
	MIOT 3 Module of Individual Educational Path 3					
	RTD6305 Development of technical documentation	IUTP6305 Computerization in the management process	3	5/135	1+2+0	3
	IAS6306 Information aspects of standardization	OEM6306 Fundamentals of Environmental Monitoring	2	3/90	1+1+0	3
	MIOT 4 Module of Individual Educational Path 4					
	MMP6307 Marketing and management in the company	SMKU6307 Statistical methods for monitoring and control	3	5/135	1+2+0	3
	AK6308 Quality Audit	ASMK6308 Audit of Quality Management Systems	2	3/90	1+1+0	3
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar III	1	1.66/ 45		3
Professional Practice	**PP**	Pedagogical Practice	3	5/135		3
Semester 4						
Title of mod-	**Course**	**Title of courses**	**Cre**	**ECTS/**	**Lec/pr**	**Se**

ules	code		dit	hours	ac/Lab.	m.
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar III	1	1.66/45		4
Professional Practice	**IP**	Research practice	2	3/90		4
Final Attestation	**KE**	Complex Examination	1	1.66/45		4
	ZD	Dissertation Fullfilment and Defence	3	5/135		4

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

A. Goal: To give insight in the cooperation to achieve international confidence in measurement results.

Upon completion of the program, the student will be able to:

1. to procedure revisions and process non-conforming material reports (NCMR)
2. to maintain gauge calibration and verification program as per the quality procedures and frequencies
3. to ensure gauges are in good working condition plus clean and repair equipment as needed
4. plan, manage, and complete tasks while keeping in mind all aspects of safety measures, standardized processes and work hazard prevention techniques while ensuring/exceeding compliance to safety policies and legislative requirements
5. be responsible in issuing the control plan for production and revise in-process plans as required
6. interpret all Statistical Process Control (SPC) charts and follow-up corrective action for out of tolerance conditions

B. Goal: to emphasise the metrological basis and traceable calibration of measuring instruments and uncertainty in measurements

Upon completion of the program, the student will be able to:

1. Present and analyze experimental/test data in written form and by oral presentation.
2. Make accurate and precise dimensional and physical measurements.
3. Make accurate and precise electrical measurements.
4. Calculate Test Uncertainty Ratios (TURs) – defined as the Uncertainty of the Unit Under Test to that of the Standard/Calibrator.

5. Apply critical and analytical thinking skills in problem solving situations

The following **curriculum** is presented:

Title of modules	Course code	Title of courses		Credit	ECTS/ hours	Lec/prac/Lab	Sem.
Semester 1							
Compulsory state modules	**IFN 5201**	History and Philosophy of Science		2	3/90	1+1+0	1
	Iya(p)5202	Foreign language (Professional)		2	3/90	0+2+0	1
Compulsory Professional Modules -	**OPNI 5206**	Organization and Planning of Scientific Research		3	5/135	1+2+0	1
	SPM5205	Modern Problems of Metrology		3	5/135	1+2+0	1
	MNNS5209	Methods of writing scientific articles		2	3/90	1+1+0	1
Modules of Individual Educational Paths	**MIOT 1 Module of Individual Educational Path 1**						
	OK5301 Basics of cryophysics		TOT5301 Thermal physics and the basis of power system	3	5/135	1+2+0	1
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar I		1	1.66/45		1
Professional Practice	**IP**	Research practice		1	1.66/45		1
Semester 2							
Title of modules	**Course code**	**Title of courses**		**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
Compulsory state modules	**Ped 5203**	Pedagogics		2	3/90	1+1+0	2
	Psy 5204	Psychology		2	3/90	1+1+0	2
Compulsory Professional Modules -	**TPSMO5207**	Hardware and Software for Measurement Assurance		3	5/135	1+2+0	2
	SSSM5208	Standardization, Certification and Metrology Systems		3	5/135	1+2+0	2
Modules of Individual Educational Paths	**MIOT 1 Module of Individual Educational Path 1**						
	MOIK5302 Metrological support of measurements in cryotechnologies		MOT5302 Metrological provision in the power system	3	5/135	1+2+0	2
	MIOT 2 Module of Individual Educational Path 2						
	PPPNI5303 The software package for research		KMTP5303 Computer modeling of thermal processes	2	3/90	1+1+0	2

Master's Research Work and Fulfillment of Dissertation	**NIRM I**	Research Seminar II	1	1.66/45		2
Semester 3						
Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
	MIOT 2 Module of Individual Educational Path 2					
	3DMPP6304 3D modeling of physical processes	VEGT6304 Computer experiment on the fuel combustion	2	3/90	1+1+0	3
	MIOT 3 Module of Individual Educational Path 3					
	TPFEM6305 Theoretical approaches of forming an economic metrology	OEM6305 Foundations of Economic Metrology	3	5/135	1+2+0	3
	MIS6306 Metrology in the innovation sector	NT6306 Nanotechnology in the power system	2	3/90	1+1+0	3
	MIOT 4 Module of Individual Educational Path 4					
	METD6307 Metrological examination of the technical documentation	NTD6307 Check Standards of Technical Documentation	3	5/135	1+2+0	3
	TKKI6308 The technology of quality control measurements	UKT6308 Quality management in power system	2	3/90	1+1+0	3
Master's Research Work and Fulfillment of Dissertation	**NIRM I**	Research Seminar III	1	1.66/45		3
Professional Practice	**PP**	Pedagogical Practice	3	5/135		3
Semester 4						
Title of modules	**Course code**	**Title of courses**	**Credit**	**ECTS/ hours**	**Lec/prac/Lab.**	**Sem.**
Master's Reseach Work and Fullfilment of Dissertation	**NIRM I**	Research Seminar III	1	1.66/45		4
Professional Practice	**IP**	Research practice	2	3/90		4
Final Attestation	**KE**	Complex Examination	1	1.66/45		4
	ZD	Dissertation Fulfillment and Defense	3	5/135		4

C Peer Report for the ASIIN Seal[3]

1. Formal Specifications

Criterion 1 Formal Specifications

Evidence:

- Self-assessment report
- Discussions with representatives of the university

Preliminary assessment and analysis of the peers:

The names of the degree programmes relate to their curricular content and also reflect their respective intended learning outcomes except for the Bachelor's and the Master's programmes called "Mechanics". The auditors wondered if the name properly reflected the intended learning outcomes and competences of a graduate from this programme. It was explained by representatives of the university that the students are not trained as engineers or for the engineering field. The auditors underlined, when looking at the competences and skills that shall be acquired, it becomes evident that these are typical competences of an engineer like problem-solving in the field of mechanical engineering or application of experimental methods for investigating standard problems. To avoid misunderstandings and better match the name of the programme as understood at an international level with the contents of the curriculum the name of the programme should be revised.

The auditors learned that the maximum of expected intakes per study year is specified by the national ministry of education. The auditors noted that tuition is charged but that, in fact, students receive state grants for their studies. Enrolment on a fee base is possible but only very few students pay the fees themselves.

All other formal information like type, final degree, standard period of study and the starting date of the programme within the academic year were clearly defined. The Kazakh credit points and the conversion into ECTS credit points is not always easy to understand as the auditors indicated.

[3] 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.

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

The auditors appreciate the indication of the university that the name of the speciality “Mechanics” is considered to be changed to "Mechanics and Applied Mathematics". The auditors trust that the Ministry of Education and Science will approve this change and keep the requirement until this approval will have been received. The auditors welcome the additional explanation regarding the conversion of Kazakh credit points and the conversion into ECTS credit points. Apart from the name of the above mentioned programme the auditors see this criterion 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 aiming at education of mechanics, space engineers, and of professionals dealing with standards and certifications and of metrologists correspond to the qualifications of the European Qualifications Framework level 6 and 7 respectively.

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 self-assessment report presented a list of objectives and intended learning outcomes for the Bachelor’s programmes. The stated learning outcomes give a detailed insight into the programmes. The auditors appreciated the consistent approach to shape a clear and distinct profile for each individual programme.

The goals, objectives and intended learning outcomes were made available to the students at the beginning of each semester through the internet platform and the syllables which were developed by the lecturers. The syllables are revised before the commencement of the new semester and then handed over to students. The students confirmed

that the syllables are posted on the intranet, and every student can login and download all information and documents.

The inclusion of stakeholder groups into the process of the development of the degree programmes is not uniform. The Bachelor's degree programme Mechanics, for example, is a study programme which exists since 1952 and has established a strong network between the al-Farabi University and local businesses. These network partners had been involved in the further development of the Bachelor's and the Master's degree programmes.

The auditors took note that for all degree programmes, a number of compulsory modules set by the government have to be part of the curriculum.

The Bachelor's and Master's standardization degree programmes were established after Kazakhstan had gained independence; there was a growing need to standardize machines and measure raw materials etc. Different stakeholders from government as well as from industry were able to provide input in the development of these programmes. The auditors wanted to know why these study programmes were located at the Department of Physics. It was explained that especially measuring was closely connected to Physics and that is why these programmes were allocated to the Physics Department. The auditors acknowledged this explanation.

The Bachelors´ and Masters` programme Space Engineering and Technologies are newly founded programmes in the context of the Kazakhstan governmental space programme. Primarily research institutes were dealing with space related topics and most graduates are likely to work in research institutes later. The respective institutions had been involved in the planning of these programmes.

The **Subject-Specific Criteria (SSC)** of the Technical Committee for Mechanical Engineering and Process Engineering provide the basis for judging whether the intended learning outcomes framed by Higher Education Institutions are constituted in the degree programmes in a comprehensible manner. The auditors agreed that the areas of competence as set forth by the *Subject-Specific Criteria* (SSC) for degree programmes are partly met for the different degree programmes but do not meet them fully.

Bachelor's degree programme Mechanics: The objectives and goals are presented in a structured manner in the self-assessment report indicating clearly the basic competences to be acquired in the field of mathematics and natural sciences as well as in mechanics. Furthermore, the graduates shall develop competences to solve problems in the field of mechanics independently. The graduates are supposed to know and practically apply experimental methods for investigating standard problems in specific areas of mechanics,

which is determined by the elective subjects. The graduates shall also be competent in basic techniques of search, data collection, preparation, processing and analysis of information with the help of modern computer technology. The graduates should also be able to carry out a scientific project, which requires the competence to practically apply the theoretical knowledge. Finally, the graduates shall obtain a number of social skills like presentation or communication skills, the readiness to take responsibility, team work competences and understanding of intercultural communication.

The Master's degree programme Mechanics provides only a limited number of objectives and goals which clearly aim at deepening the knowledge acquired in the Bachelor's programme and developing graduates who can conduct scientific research individually and supervise undergraduate students. The auditors can see that there is the goal to develop graduates with advanced knowledge of mathematic-scientific and engineering principles, who can abstract and formulate complex problems and apply innovative methods to problem-solving. The graduates shall have the ability to assess the methodological approaches of mechanics and present own conclusions to a professional audience.

In both programmes, the auditors saw a discrepancy between the goals and objectives and how this was further elaborated into learning outcomes: the learning outcomes and the objective matrix were neglecting the social skills. The goals and objectives defined in the field of social competences had not been taken up in the learning outcomes. The auditors strongly recommended ascertaining that the goals of the study programmes especially with regard to social skills are properly reflected in the learning outcomes.

The Bachelor's degree programme in Space Engineering and Technologies clusters the objectives of the degree programme along the key pillars of education, research and services. The graduates are supposed to acquire fundamental knowledge of mathematics, mechanics, and engineering in the field of modern space technologies. The graduates should also be able to use at least one type of software package for solving professional problems in the field of space engineering and should be capable to analyse and solve problems in a professional manner independently. Looking at the criterion "Engineering Design" the study programme mentions the ability of Graduates to realize a scientific project, which will require thorough theoretical or practical techniques and providing original results. Furthermore, graduates should know basic techniques of search, data collection, preparation, processing and analysis of information used in professional activities with the help of modern computer technology. Finally, the graduates should demonstrate the ability to work in an interdisciplinary team, to create an atmosphere of mutual understanding and co-operation with experts from other disciplines and to precisely, clearly and logically express their thoughts in writing and speaking.

The Master's degree programme in Space Engineering and Technologies offers two individual educational trajectories, namely "Space information systems" and "Information technologies in space". The objectives provided for the Master's thesis are very generic as they only state that graduates should be able to "conduct self research by the given theme and should be able to make the conclusions on the base of the obtained results of own research.

The Bachelor's degree programme Standardization, certification and metrology focuses on the three core areas of education, research and service. In the field of knowledge and understanding students shall obtain a fundamental understanding of physical laws and mathematical vehicles used in physics as well as a special knowledge on standardization, certification and metrology. Problem solving and quality improvement shall be developed, and the graduates shall know the principles and methods of estimating the level of the quality of products. Furthermore, the graduates shall be able to apply their knowledge of physics at a professional level and to decide the standard tasks of scientific and productive activities in the area of standardization, certification and metrology. The graduates shall be able to select processes and practices appropriate to project goals and the use of quality tools for continuous improvement. The ability to acquire and analyze data using appropriate statistical methods to facilitate process analysis and improvement shall be developed too. Finally, the graduates shall obtain an understanding of professional and ethical responsibility and be able to actively communicate with other disciplines. The graduates shall be able to express themselves effectively in presentations, particularly in English language. Also team work competences in multi-disciplinary teams shall be developed.

In the Master's degree programme Standardization and certification the graduates shall gain knowledge of major experimental procedures, including registration data, analysis and design of experiments and they shall have a profound understanding of legislative and regulatory acts, tools for standardization, certification, metrology and quality management. Furthermore, the graduates shall be able to exercise control over compliance with the requirements of existing rules, regulations and standards and certify products, processes, services, quality systems, and production. The graduates shall have obtained the ability to plan and prepare internal and external quality audits and they shall be able to carry out the practical development of quality management systems. Regarding "soft skills" the Master students shall also be able to formulate orally and in writing their views and have skills in conducting scientific and general cultural discussions in the Russian and English languages. The graduates shall be able to work in teams and apply the skills of effective work organization and teamwork practically.

Master's degree programme Metrology: The peers can understand that "standardisation, certification and metrology" are summarised in one bachelor programme and need to be separated into two different master's degree programmes to strengthen the specific features of the two topics. Graduates from this Master's programme shall have knowledge of major experimental procedures, including registration data, analysis and design of experiments. They shall also have competences in the basics of the legal framework for intellectual property protection, priority protection and novelty of research results. Graduates shall have the competence to adequately use physical methods, based on information technologies and collate, analyze and interpret complex experimental data and draw conclusions.

The peers provided the following assessment regarding the award of the EUR-ACE label:

Ba and Ma Mechanics: The auditors discussed the award of the EUR-ACE Label. The representatives of the university indicated during the discussion that the students of the Mechanics degree programmes are not trained as engineers. The auditors take this information into consideration and learnt that the two degree programmes Mechanics (Ba and Ma) had a focus on fluid dynamics and the practical application in coal mining and oil production. Referring to Hermann Schlichting, Mechanics is on the rim of Physics and Mechanical Engineering; in fact, Mechanics is developing from Physics towards Mechanical Engineering. Accordingly the auditors came to the conclusion that knowledge of classical mechanics, knowledge of mechanics of materials and deformable solids and knowledge of fundamentals of fluid mechanics are competences of engineers and they reinforce their stipulation to revise the name of the degree programme. The auditors confirm that the intended learning outcomes comply – by and large - with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering for the two degree programmes and recommend the award of the EUR-ACE Label.

Ba and Ma Space Engineering and Technologies: For these two degree programmes the auditors concluded that the intended learning outcomes comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering and recommend the award of the EUR-ACE Label.

Ba Standardization, Certification and Metrology, Ma Metrology, Ma Standardization and Certification: As the EUR-ACE Label is dedicated to mechanical engineering, process engineering or chemical engineering they do not see that graduates from these programmes fall into any of these categories. The same applies to graduates from the Master's degree programme. Consequently, the auditors recommend not awarding the EUR-ACE label to these two degree programmes.

The auditors noticed that a number of intended learning outcomes are very generic for the Master's programmes "Standardisation and certification" and "Metrology". The auditors acknowledged that some learning outcomes referred to the specific Master's programme only but, in general, there was a lot of overlapping in the learning outcomes. Hence, the auditors concluded that the specific features of each Master's programme must be reflected more clearly and distinctively in the intended learning outcomes.

Criterion 2.3 Learning outcomes of the modules/module objectives

Evidence:

- Module descriptions / module handbook
- Objectives Matrix

Preliminary assessment and analysis of the peers:

The self-assessment reports of the university provided Objectives Matrices for each study programme. The matrices show on the one hand the modules being taught and on the other hand the knowledge, skills, and competences that are to be acquired in the different modules. The auditors agreed that all intended learning outcomes had been integrated into the objective matrix. The auditors were puzzled that a "Social and communicative" module is mentioned in the objective matrix but does not appear in the module handbook. The auditors request the module description of "Social and communicative competences". Furthermore, the learning outcomes referring to social skills like team work or project management are not part of the objective matrix. The auditors also noticed that the learning outcomes for "Mechanics" and "Standardisation" stated: The students are able to "express themselves effectively in presentations, either in spoken standard American English or sign language (American Sign Language or English-based Signing)". This is not reflected in the objective matrix or in the module descriptions either. Hence, it is recommended to ascertain that the goals of the study programmes are properly reflected in the learning outcomes, - especially social skills need to be addressed more clearly. Besides, it is recommended introducing mandatory scientific lectures in English and also to take oral exams in English. In summary, the auditors concluded that the intended learning outcomes for the programme as a whole were systematically put into practice within the individual modules of the programmes except for social and English skills.

The auditors wanted to know in which module "Finite element techniques" were taught; they were told that this was taught e.g. in a so-called interdisciplinary module (FEM3603 Finite element method) and appropriate hardware was available for this purpose too (compare criterion 5.3).

The modules are described in a Module Handbook which is available for relevant stakeholders (Syllables) for consultation. The auditors confirmed that the module descriptions are detailed and provide all relevant information required to comprehend what knowledge, abilities and competences students are expected to acquire in the individual modules. The intended learning outcomes and the prerequisites, the contents of the modules and the examinations for achieving them are clearly understandable to students. The module handbook provides a basis for the further development of the modules.

Criterion 2.4 Job market perspectives and practical relevance

Evidence:

- Self-assessment report
- Overview of jobs and companies of graduate employment

Preliminary assessment and analysis of the peers:

The self-assessment reports of all degree programmes provided a list of potential and actual employers of graduates. For the Mechanics programmes the list of employers covers public as well as private institutions. The university representatives explained that the graduates work in scientific institutions, as teachers, and also in the private sector like banks, mining and IT companies. The self assessment report of the degree programmes for Standardization, certification and metrology provided a lengthy list of 177 employers for bachelor graduates. The audit group understood that this underlined the statement made by the university representatives that there was a high demand for graduates with these competences. The students confirmed that graduates find employment easily. The new degree programmes on Space engineering and technologies are primarily linked to research institutions working in the field of space science. The auditors could follow the argumentation that there is a demand on the labour market for graduates who possess the intended learning outcomes.

Even though the self-assessment reports also provided a list of organisations offering internships to students from the different degree programmes, the students highlighted that there is hardly any workplace exposure in private companies. The students underlined that they would like to gain more practical experiences and would appreciate lecturers who had working experiences from private companies. Representatives of the university explained that it was very difficult to attract professionals from private businesses to the university because the salaries in the private sector are far higher. Professionals from research institutes are involved in teaching and closely cooperate with the university. According to the lecturers there is a policy in place which demands that syllables are sent to private sector representatives to crosscheck the relevance of modules. The audi-

tors understood that there are attempts to link up with the local industry but nevertheless they recommended further enhancing the practical orientation of classes and giving students more possibilities of work place exposure in companies.

According to some students from the Mechanics degree programmes, in some companies IT programmes are being applied which are not taught at the university, and the students have to learn these programmes from the start. More than 50% of the graduates of Mechanics do not work in their speciality. The audit group recommended to better illustrate the link between theoretical knowledge and practical application (e.g. application of software used by industry).

Criterion 2.5 Admissions and entry requirements

Evidence:

- § 2.5 University-wide Academic Policies and Procedures of al-Farabi Kazakh National University

Preliminary assessment and analysis of the peers:
The auditors discussed the admission rules and procedures with the university representatives. The programme coordinators explained that the selection of the applicants is made by the Ministry of Education and Science; more specifically, admission for the bachelor degrees is carried out by the admission rule developed by the Ministry of Education and Science of Kazakhstan based on the article number 4 of the law on Education. It was further explained that educational grants are awarded to students on a competitive basis in accordance with gained scores on the Unified National Test (UTN). This Unified National Test is being taken by all high school graduates and the score received qualifies a high school graduate to apply for university admission. The Ministry of Education and Science defines the quantity of Educational Grants for each academic degree programme. Altogether the auditors judged that the admission requirements were reasonable for maintaining the quality of the Bachelor´s degree programmes.

Admission for the Master's degree programmes is defined by the admission rule (#109 since January 19, 2012) developed by the Ministry of Education and Science of Kazakhstan based on the article number 4 of the law on Education (Since June 27, 2007). Educational grants for Master's degree programmes are awarded to students on a competitive basis. Bachelor graduates have to take entrance exams which comprise a Foreign Language Test and a Programme Based Written Exam. The peer group concluded that this was an appropriate approach to secure the quality of the academic standard.

International students can apply for the Higher Education Institutes by taking the complex test (Bachelor degree) and university entrance exams; part of this university entrance

exams are also language tests of Kazakh language. The auditors wanted to know if students can also be admitted if they do not have any Kazakh language skills. It was explained that these rules are set on the national level; in practical terms, foreign students have to take language classes when studying in Kazakhstan. As for the recognition of qualifications gained from other institutions of higher education, in particular abroad, grades, credits and content of modules are taken into consideration. There is a specific reference made by the regulations to the qualifications or competencies to be recognized. According to the Lisbon Convention each university is asked to recognize activities completed externally unless the HEI can prove that the competencies gained at the other HEI are completely different. The university representatives confirmed that two international students had been admitted to the programmes recently, one student from South-Korea and one from Hungary.

Criterion 2.6 Curriculum/Content

Evidence:

- Curriculum / content overview
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:

The auditors 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. Furthermore, the auditors took note of the fact that the curriculum contains modules like “History of the Republic of Kazakhstan” or “Sport and Recreation” which have to be seen in the specific context of the country. The auditors noted that a number of modules include elements of social skills (Social and Communicative Module; e.g. Psychology of Interpersonal Communication) even though it had not been indicated in the objective matrices.

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 and English competences are defined as a learning outcome. The peers were explained that the students learned primarily technical English which was easier to them than “ordinary” English. By the same token, the auditors noticed that only very few oral presentations were mentioned in the module descriptions. Consequently, the auditors concluded that the capabilities of students to orally present a scientific problem of their speciality and to properly explain measures of potential solutions as well as

putting the topic into the broader context of the speciality must be enhanced. The presentation skills in English should also be observed.

The auditors understand that the curriculum consists of compulsory and of elective courses; the students are being advised by the university teachers regarding the elective courses. Some students claimed that even though the names of elective courses differed, the content of different elective courses was the same. It was also claimed that in some cases, the students do not have the right to choose which elective course they would like to take but the teacher takes the decision on their behalf. The auditors underlined that students must be supported in an appropriate manner that elective courses offered are actually taking place and that a real selection of elective courses is possible.

The auditors welcomed that students have to participate in educational internships; furthermore the auditors saw that internships of 6 ECTS are foreseen in the curriculum. Still the students from the Mechanics degree programme indicated that, from their point of view, more practical work exposure would be desirable, including bachelor thesis with practical relevance that would assist graduates to find employment in their field of speciality. This corresponds to the information provided under criterion 2.4, and it is recommended to provide more opportunities for students to gain industrial working experiences.

The auditors could see that the intended learning outcomes are reflected in the module descriptions which are in line with the Subject-Specific Criteria (SSC) of the Technical Committee for Mechanical Engineering and Process Engineering.

The auditors discovered that the **Subject-Specific Criteria** (SSC) had been observed to a large extent in the different degree programmes. The goals and the modules were put into an objectives-matrix which aligned the objectives and the corresponding modules.

For the Bachelor's degree programme Mechanics in the field of *Knowledge and Understanding* could be obtained in modules like Module Natural Sciences (STEM), Module 1 Algebra and Geometry, Module 2 Mathematical Analysis, Module 3 Computational Methods and Differential Equations or Module 4 Probability Theory and Optimization Methods. Competences of *Engineering Analysis* could be acquired in modules like Module 5 Classical Mechanics, Module 6 Materials Mechanics and Deformable Solid Mechanics or Module 7 Fundamentals of fluid mechanics. The field of Engineering Design should be covered through Module 8 Programming and Computer Graphics or the so-called Interdisciplinary Module which comprises topics like the Finite element method or Parallel and distributed computing. Approaches of Investigations and Assessment could be gained through the Module Scientific writing. *Engineering Practice* could be obtained through different professional internships. *Transferable Skills* are covered in modules like Innova-

tive Entrepreneurship (trade-wise) or Intellectual Property Law. It is worthwhile to mention that Individual Educational Trajectories like IET 1 Theoretical and celestial mechanics, IET 2 Fluid and gas mechanics, IET 3 Mechanics of Structural Elements or IET 4 Mechanics of machines, robots and control systems can be selected which deepen the competences in the respecting fields.

For the Master's degree programme Mechanics the auditors could see that extensive advanced knowledge of mathematic-scientific and engineering principles of mechanical engineering should be obtained through modules like Dynamical Systems Theory and its Application, Nanotechnologies or Fundamentals of Mechatronics and Biomechanics. Advanced competences in the field of Engineering Analysis could be gained through the Individual Educational Trajectories which put an emphasis on engineering competences in the specific field of specialization like Methods of Celestial Mechanics, Fluid Dynamics, The Dynamics of Machines and Mechanisms with Elastic Links or Subterranean Hydrodynamics - Transport in Porous Media. The same applies to competences in *Engineering Design* where specific modules in each trajectory are offered like Software Packages for Analytic Calculations of the Problems of Mechanics, Modern High-Performance Computing Technology in Mechanics, Optimal Planning of Lever Mechanisms and Constructions, 3D Reservoir Modeling Eclipse or Simulation of Reservoir Exploitation and History Matching. Competences in Investigations and Assessment could be acquired through 4 different Research Seminars. *Engineering Practice* is supposed to be secured through the Research internship and the dissertation. Transferrable Skills are intended to be learned in modules like Pedagogics, Psychology or foreign languages.

The auditors discussed the award of the EUR-ACE Label. The representatives of the university indicated during the discussion that the students of the Mechanics degree programmes are not trained as engineers. The auditors take this information into consideration and learnt that the two degree programmes Mechanics (Ba and Ma) had a focus on fluid dynamics and the practical application in coal mining and oil production. Referring to Hermann Schlichting, Mechanics is on the rim of Physics and Mechanical Engineering; in fact, Mechanics is developing from Physics towards Mechanical Engineering. Accordingly the auditors came to the conclusion that knowledge of classical mechanics, knowledge of mechanics of materials and deformable solids and knowledge of fundamentals of fluid mechanics are competences of engineers and they reinforce their stipulation to revise the name of the degree programme. The auditors confirm that the intended learning outcomes comply – by and large - with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering for the two degree programmes and recommend the award of the EUR-ACE Label.

For the Bachelor's degree programme in Space Engineering and Technologies competences in the field of *knowledge and understanding* are supposed to be obtained through the Natural Sciences (STEM) module, Module 1 Algebra and Geometry, Module 2 Mathematical Analysis or Module 3 Computational Methods and Differential Equations. *Engineering Analysis* should be covered through modules like Module 4 Mechanics and Control Processes, Module 5 Mechanics of Materials and Mechanisms or Module 6 Basic Electronics and Circuits. Competences in the field of Engineering Design are supposed to be gained through modules like Module 7 Programming and Computer Graphics, Module 8 Continuum mechanics or Module 9 Spacecraft design. *Investigations and Assessment* could be learned in the preparatory module of the Bachelor's thesis. Engineering Practice takes place in the different professional practices and transferrable skills are covered through modules like Philosophy of Scientific Knowledge, Psychology of Interpersonal Communication or foreign languages.

For the Master's degree programme in Space Engineering and Technologies advanced knowledge of mathematic-scientific and engineering principles are supposed to be obtained in modules like Modern problems of the motion of artificial celestial bodies, Attitude control system of the spacecraft or Actual problems of the dynamics of space flight. *Engineering Design* is covered in modules like Micro- and nano-satellite design. Furthermore, there are two Individual Educational Trajectories like IET 1 Space information systems or IET 2 Information technologies in space which offer specific modules like Simulation modelling of dynamic systems or Modern theories of simulation which provide competences according to the specific trajectory. *Investigations and Assessment* are covered through modules like Organization and Planning of Scientific Research, Research Practices or the dissertation. Engineering Practice takes place in the so-called Research Practice. Modules like Pedagogics, Psychology or foreign languages provide *transferrable competences*. Also for these two degree programmes the auditors concluded that the intended learning outcomes comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering and recommend the award of the EUR-ACE Label.

Examining the Bachelor's degree programme Standardization, certification and metrology the auditors understand that modules like the Natural Sciences (STEM) Module, Module 1 Physics or Module 2 Physics provide the basic knowledge and understanding in mathematics and science. Competences in the field of *Engineering Analysis* could be obtained in modules like Module 3 Applied Methods of Engineering and Computer Graphics or Module 5 Standardization. But when it comes to competences of *Engineering Design* the auditors understand that modules like Module 6 Metrology and metrological support of production, Module 7 Verification of conformity, Module 8. Quality Assurance or Module 9

Quality management provided significant competences to secure quality assurance of technical processes but they lack fundamental engineering competences. Also the two Individual Educational Trajectories Quality Control and Metrology and standardization cover essential competences like Automation of Measurements and Measurement Systems or Designing Reliability but that does not contribute to essential engineering competences either. The auditors conclude that graduates from this programme are quality managers of technical processes and they can understand and assess the quality of such processes but they are not engineers themselves. As the EUR-ACE Label is dedicated to mechanical engineering, process engineering or chemical engineering they do not see that graduates from this programme fall into any of these categories. The same applies to graduates from the Master's degree programme. Consequently, the auditors recommend not awarding the EUR-ACE label to these two degree programmes.

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

The auditors maintain their concern that for the Master's programmes "Standardisation and certification" and "Metrology" that the intended learning outcomes are very generic and underline that the specific features of the two Master's programmes must be reflected more clearly and distinctively in the intended learning outcomes.

The peers provided the following assessment regarding the award of the EUR-ACE label:

Ba and Ma Mechanics: The auditors discussed the award of the EUR-ACE Label. The representatives of the university indicated during the discussion that the students of the Mechanics degree programmes are not trained as engineers. The auditors take this information into consideration and learnt that the two degree programmes Mechanics (Ba and Ma) had a focus on fluid dynamics and the practical application in coal mining and oil production. Referring to Hermann Schlichting, Mechanics is on the rim of Physics and Mechanical Engineering; in fact, Mechanics is developing from Physics towards Mechanical Engineering. Accordingly the auditors came to the conclusion that knowledge of classical mechanics, knowledge of mechanics of materials and deformable solids and knowledge of fundamentals of fluid mechanics are competences of engineers and they reinforce their stipulation to revise the name of the degree programme. The auditors confirm that the intended learning outcomes comply – by and large - with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering for the two degree programmes and recommend the award of the EUR-ACE Label.

Ba and Ma Space Engineering and Technologies: For these two degree programmes the auditors concluded that the intended learning outcomes comply with the engineering

specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering and recommend the award of the EUR-ACE Label.

Ba Standardization, Certification and Metrology, Ma Metrology, Ma Standardization and Certification: As the EUR-ACE Label is dedicated to mechanical engineering, process engineering or chemical engineering they do not see that graduates from these programmes fall into any of these categories. The same applies to graduates from the Master's degree programme. Consequently, the auditors recommend not awarding the EUR-ACE label to these two degree programmes.

The auditors stick to the recommendation that the goals of all study programmes regarding social skills should be properly reflected in the learning outcomes.

The auditors are pleased to hear that "Employer's Councils", comprising departmental staff members and representatives from commercial companies, have been developed at each faculty. The auditors can understand the explanation of the university that not all software programmes which are being used in the industry can be taught at the university. It makes sense to set the basis only; that provides the students with an appropriate basis and they can easily adapt to new software applications. However, the auditors keep recommending that the "Employer's Councils" should be fostered to provide opportunities to students to gain working experiences in their specific speciality and enhance their chances to find employment in their field of expertise.

The auditors thank the University for providing a detailed overview of the oral presentations that have to be made within the study programmes. Even though the auditors understand that team presentations, scientific presentations or presentations during the internships are valuable exercises they conclude that these exercises cannot replace real oral exams. The auditors keep their recommendation that oral examinations should be part of a mandatory form of examination. In addition, English presentation skills should be observed too.

The auditors can understand that elective courses may not be offered if the group of interested students is too small. Furthermore, the peers comprehend that students must be placed in other courses if certain electives do not come into being; this may cause displeasure among the concerned students. The auditors support the University by recommending that the number of elective courses should be reduced to ensure to offer elective courses that allow developing a specific profile that complements the degree programme sensibly. The number of elective courses that are offered should be limited to a realistic size so that they are likely to be carried out.

The auditors reckon the other aspects of this criterion as 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:
According to the peers, modularisation and structure of the curriculum allow for the completion of the degree programme in time.

The auditors welcomed to hear that international exchange programmes are being pursued and that exchanges with France, Germany, or Japan were taking place frequently; but only very few places were available. Students with particular good performance may also stay and prolong the exchange. The students who participate do not lose time as the modules offered abroad are incorporated into the curriculum. Even "distant" exams are offered to ascertain that the international exchanges do not lead to unintended prolongation of the study. Unfortunately, the number of students who have the opportunity to participate in these exchange programmes is limited. If the number of applicants is higher than the number of places offered, the best students in terms of grades are selected and have to talk to a selection committee. Even though the selection criteria seem to be fair and transparent, students reported that they had been selected in the first place and then the acceptance had been revoked without any explanation understandable to the students. The auditors underline that the selection process of students who can participate in international exchange programmes must be clear and transparent. The students must be able to comprehend how the final selection has been taken.

The auditors verified that modules taught at undergraduate level were not part of the curriculum in the Master's degree programmes.

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 self reports provided a detailed overview of the workload in terms of credits points according to the system of Kazakhstan and the conversion into ECTS points. The auditors took note that the curriculum comprises compulsory modules like the "History of the Republic of Kazakhstan" (3 ECTS) or "Physical Training" (3 ECTS) which need to be interpreted in the specific environment of Kazakhstan. When looking at the distribution of credit points, the auditors gained the impression that the workload was distributed unevenly over the different semesters. In the Bachelor's programme Space Engineering and Technologies, for example, the first semester comprises 32 ECTS points, the second semester 40 ECTS, the third semester 34 ECTS, the fourth semester 37 ECTS, the fifth semester 38 ECTS, the sixth semester 34 ECTS, the seventh semester 31 ECTS, and the eighth semester 12 ECTS. In the eighth semester the exact workload for the bachelor thesis is not explained. Similar findings can be reported from the self-assessment report from the Bachelor's degree programme Mechanics: 1. Semester 32 ECTS, 2. Semester 36 ECTS, 3. Semester 34 ECTS, 4. Semester 40 ECTS, 5. Semester 44 ECTS, 6. Semester 41 ECTS, 7. Semester 36 ECTS, 8. Semester 12 ECTS without information on workload of Bachelor Thesis. The distribution of ECTS points for the Bachelor's degree programme Standardisation, Certification and Metrology is more balanced (1. Semester 31 ECTS, 2. Semester 32 ECTS, 3. Semester 32 ECTS, 4. Semester 32 ECTS, 5. Semester 30 ECTS, 6. Semester 38 ECTS, 7. Semester 27 ECTS, 8. Semester 6 ECTS).

The students from the Bachelor's degree programme Standardisation, Certification and Metrology explained that the work load was reasonable and acceptable to them which confirmed the impression of the auditors that the distribution of workload was fairly well managed. Students from the Bachelor's programme Space Engineering and Technologies did not complain either but students from the Bachelor's degree programme Mechanics indicated that in some semesters the work load was too high and it was very difficult to manage. The auditors assumed that student workload was set at a level that meant structural pressure on training quality and requirements for the level of study. Especially for the Bachelor's degree programme Mechanics the auditors require that the work load for students must be adequate and properly reflected in the provided ECTS credit points.

The duration of studies is in line with the Kazakh state requirements. This means the bachelors´ programmes lasting four years, in which 151 Kazakh credits (reported to correspond with around 252 ECTS) are achieved and the masters´ programmes lasting two years with overall 59 Kazakh credits (reported to correspond with around 98 ECTS). Concerning the comparison between both credit systems the peers do not understand the calculation at masters´ level. The "University-wide Academic Policies and Procedures of al-Farabi Kazakh National University" state that one credit in the masters´ programmes is

equal to 60 hours of student workload. In this calculation the masters´ programmes should sum up to 131 ECTS although 98 ECTS are stated in the Self-Evaluation-Report. The peers ask the faculty to clarify this because it is not understandable in an easy manner.

With regard to the Master's degree programmes, the auditors noticed that in most cases the number of ECTS points was below 30 and the workload was evenly distributed. But the auditors were unable to understand the exact workload of the Master's thesis; like in the Bachelor's degree programmes, this is not presented in a comprehensible manner. The auditors would like to receive more information on the workload of the 8th semester for all Bachelor's degree programmes and for the 4th semester of the Master's degree programmes as the actual workload could not be assessed with the information at hand.

The auditors understood that professional internship (6 ECTS) and Practice Training (3 ECTS) were part of each curriculum of the Bachelor's degree programmes where particularly laboratory training was carried out. The auditors were told that the laboratory work was conducted in small groups with mixed sets of students to also foster team work experiences. The internships can be carried out in different ways: Either the students work in laboratories and receive tasks they have to resolve individually or they work in companies under supervision of university lecturers. The auditors underlined that from their point of view the practical components are logically integrated into the curriculum. The students of the Bachelor's degree programme Standardisation, Certification and Metrology confirmed to have internships at international and well reputed companies (e.g. Coca Cola); a number of students receive payment. The internships are supervised by university lecturers. Students from the Bachelor's degree programme Mechanics indicated that they would like to have more opportunities to conduct their internship in companies; the auditors recommended to develop more opportunities for students to gain experiences in companies (compare also criterion 2.4 and 2.6).

Criterion 3.3 Educational methods

Evidence:

- Module descriptions
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The module handbook provided a proper overview of the "type of teaching" that is applied. The lecturers explained that they use a number of different teaching methods. There are classical lectures and presentations for the major part but they also pursued very student and project oriented approaches. This means students have to carry out projects or tasks given in smaller groups and present the results at the end of the course.

Furthermore, they have lab courses with individual or group work under the supervision of the lecturer. The teams are mixed with students of good and mediocre performance and have to develop arrangements of how to organise their work. The auditors noticed that in the module descriptions no oral exams were foreseen. The bachelor's thesis needs to be presented and the candidates have to respond to questions. Altogether the auditors gained the impression that oral competences in terms of presenting a topic to an audience are developed to a small extent only. Like indicated under criterion 2.6 the auditors underline that the competence of students to present a scientific problem of their speciality and to properly explain measures of potential solutions as well as putting the topic into the broader context of the speciality must be enhanced. The auditors welcomed the different teaching methods and concluded that the teaching methods and tools support the achievement of the learning outcomes at the intended level; only oral competences should be further developed.

The auditors acknowledged that in all Bachelor's degree programmes so-called "Modules for Individual Educational Trajectories" were offered to allow students to develop an individual focal area of competence. As indicated in criterion 2.6, some students claimed that in some cases the elective courses have different names but the content is almost the same. Furthermore, it allegedly happened that students were told by the lecturer which elective courses they had to take. The auditors underlined that students must be supported in an appropriate manner that elective courses offered are actually taking place and that a real selection of elective courses is possible.

The ratio of taught contact hours to self-study was explained to the auditors in detail and they understood that the amount of self-study differed from Bachelor's to Master's programme. The exact ratio is properly indicated in the module descriptions. The auditors considered the ratio of contact time to individual self-study time as adequate.

Criterion 3.4 Support and advice

Evidence:

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

Preliminary assessment and analysis of the peers:

Regarding support devices, the students explained that posters with tables depicting goals and objectives of the different degree programmes were published. When entering the university, the students had a two weeks introductory phase before the actual study programmes started; a lot of information was made available during this introductory phase and over the university intranet. The students confirmed that a well developed

system of tutorials was in place and each student had a scientific advisor who supported the students in case of problems. The self-assessment reports provided information on student organsiations which perform different activities at the university. The auditors could see that sufficient resources were available for offering individual support, supervision and advice to students.

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

The auditors confirm that the additional explanation regarding the work load of the Bachelor's and the Master's thesis is understandable and appropriate.

The auditors stick to the requirement that for the Bachelor's degree programme Mechanics the work load for students must be adequate and properly reflected in the provided ECTS credit points.

The auditors understand that clear and transparent rules are in place to select students for international exchange programmes. Given the small number of students who can receive grants it is obvious that a large number of students cannot be awarded which may cause disappointment. The auditors agree that the rules of selection may not be changed but the communication with the students, so that they can comprehend the decisions.

Oral examinations and links to the private industry have been dealt with in the preceding sections.

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:

Representatives of the university explained the organisation of examinations to the auditors. An examination timetable is prepared and made available to the students, examina-

tions are coordinated so that students have sufficient time to prepare for them; some students complained that the organisation of examinations provided not sufficient time for preparations as sometimes there are up to three exams per week. The auditors considered this a tight but a still acceptable timeframe. Nevertheless, the auditors advise to the sequence of examinations in a way that the students have sufficient time for preparation before taking the next exam. The type of exam is indicated in the module description; most exams are written exams; there are between 4-6 exams per semester. There are only few oral exams like the presentation of the final thesis (compare criterion 2.6 and 3.3).

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

The peers understood that students get trained to carry out an assigned task independently and at the level of the qualification sought. But the auditors were told that students who want to continue with the Master's programme after having finished the Bachelor's degree work on the topic in a more extensive manner. The peers advise the supervisors of Master's degrees to encourage students choosing different themes for a Master's thesis and not follow up the same topic of the Bachelor's thesis in order to expand the fields of research.

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:

The auditors maintain their recommendation to organize the sequence of examinations in a way that the students have sufficient time for preparation of the next exam.

The peer group welcomes the clarification that Master's students are free to select their supervisor as well as their Master's thesis. They trust that students are properly counseled when selecting their topic for the final thesis.

5. Resources

Criterion 5.1 Staff involved

Evidence:

- Analysis of needs and capacities
- 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 auditors gained the impression that a competitive selection procedure was carried out to recruit university lecturers from other institutions of Higher Education or from private companies. Also international candidates apply and are partly contracted on a permanent or a yearly basis. The university makes available significant resources to ensure that international scholars come to al-Farabi University and contribute to a high quality of education. Regarding the resources for student supervision, the auditors were convinced that the available contact hours (overall and for individual lecturers) were sufficient for teaching and student supervision.

The auditors noticed that the staff handbook provided a detailed overview of the research activities of all staff members carried out in the last five years. It became evident to the auditors that all staff members were involved in research activities; it was explained to them that all staff members are required to conduct research. Furthermore, it was underlined that research activities were of increasing importance and that extensive research activities could be compensated with a reduction of teaching load.

Criterion 5.2 Staff development

Evidence:

- Acceptance of non-teaching periods for research purposes
- Capacity development offers / Further education
- Interview with lecturers

Preliminary assessment and analysis of the peers:
The auditors learnt that students who pursue a Master's or a PhD degree are required to offer tutorials and other classes for students to gain teaching experiences. A number of

lecturers went to foreign countries like Russia, the USA or Germany to get international exposure and get to know new ways of teaching. Furthermore, the auditors were explained that didactical training courses were offered to all lecturers at al-Farabi university but when confirming how many of them have actually participated in any of the offered courses it turns out that only two of the lecturers had made use of it. It is recommended to further encourage teaching staff members to make use of professional didactical training courses.

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

Preliminary assessment and analysis of the peers:
The self-assessment reports provide a detailed list of equipment available. Generally, the peer group gained a positive impression of the facilities and technical equipment available at the al-Farabi University. The laboratories visited by the peers were adequate for basic education. It was explained that al-Farabi University received state funding which enabled the university to renew and upgrade equipment every three years. The auditors could confirm that some expensive technical equipment had been purchased and was available for more elaborated research activities.

The auditors had not been able to visit the library of the al-Farabi University. However, they learned from the students that up to date teaching books and scientific publications were sufficiently available through the internet and the library.

Financial information was made available to the auditors; the auditors concluded that financing is secured for the duration of the accreditation of degree programmes under review.

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

The auditors gratefully received the explanation of didactical training that is offered at the university and understand that these training opportunities are actively used by staff members. Hence, the envisaged recommendation is obsolete. All other resources are appropriate from the point of view of the auditors.

6. Quality Management: Further Development of Degree Programmes

Criterion 6.1 Quality assurance & further development

Evidence:

- Quality assurance policy is missing, certification according to ISO 9001:1008
- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University
- Interview with programme coordinators

Preliminary assessment and analysis of the peers:
The auditors gained the impression that the university has appropriately defined its quality aims and understanding for teaching and learning, research and administration. Through the introduction of the ISO 9001 quality management system for the administration and management the ground stock has been laid for the achievement of these aims and the implementation of enhancement mechanisms where necessary. The quality assurance policy was developed by the deans of the faculty and the Heads of Departments as defined in the University-wide Academic Policies and Procedures of al-Farabi Kazakh National University; the involvement of other staff members or students in the development of the quality assurance policy remained unclear to the auditors. The quality assurance policy and the different procedures are elaborated in the University-wide Academic Policies and Procedures of al-Farabi Kazakh National University. The Methodological Bureau of Faculties is in charge of the overall quality control and quality assurance like “Improvement of planning and organization of the educational process” or “Improving the quality of teaching”. The Office of the Registrar is responsible for the registration services and all kinds of monitoring duties.

At the end of each semester, lecturers are assessed by students and other staff members; the data is analysed and made available to the Management and the Head of Department. Neither the teachers nor the students see the results due to privacy reasons as it was explained. The lecturers participate in a competition called “Best teacher of Kazakhstan” and two teachers from the department under review had been awarded in the past. The students confirmed that evaluation questionnaires are handed out however they were not sure if anonymity was granted. Furthermore, they indicated that there was no space for free remarks and they were not informed about the results and therefore felt almost unable to assess whether there were any improvements derived from the evaluation results. Thus, the feedback loops of quality management activities could not yet be considered closed.

The auditors could see that a quality assurance policy and quality assurance procedures were in place however they underline that the Quality Management System must be further developed and ensure frequent internal processes to reflect upon the results achieved and take measures to further develop the quality of the study programmes. The results must be more transparent and relevant stakeholders (e.g. teaching staff, students) must be actively involved in the practical implementation.

Criterion 6.2 Instruments, methods and data

Evidence- the following data material still needs to be provided:

- 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:
Overall, the auditors 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. Monitoring of students' progress and control of students' achievements could not be assessed by the peer group as not all relevant data was available.

As mentioned above, the peers pointed out that the current quality assurance system does not fully implement a closed cycle. This should be 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 auditors stick to the requirement that the feedback loops of the Quality Management System must be closed and frequent internal processes should take place to reflect upon the results achieved and take measures to further develop the quality of the study programmes. The results must be more transparent and relevant stakeholders (e.g. teaching staff, students) must be actively involved in the practical implementation.

7. Documentation & Transparency

Criterion 7.1 Relevant Regulations

Evidence:

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University covering:
  - Credit Definitions
  - Admissions of Ba and Ma students
  - Academic Standing, Progress, Probation and Disqualification
  - Fees
  - Grading Policy
  - Examinations
  - Quality Management

Preliminary assessment and analysis of the peers:
The peers found that all aspects of admission, examinations, Academic Standing, Progress, Probation and Disqualification, Fees, Grading Policy, Examinations, and Quality Management were thoroughly regulated University-wide Academic Policies and Procedures of al-Farabi Kazakh National University.

Criterion 7.2 Diploma Supplement and Certificate

Evidence:

- No Diploma Supplement or Transcript of Records was provided

Preliminary assessment and analysis of the peers:
At present, the al-Farabi-University has just started to provide a diploma supplement as an auxiliary document to the degree certificate and the already delivered transcript of records (which was made available to the audit team). With regards to the objective of al-Farabi University to establish a conversion towards the European Higher Education Area as well as the requirements of the ASIIN seal, the peers strongly support the idea of providing a diploma supplement to the graduates. This document should describe the awarded qualification and the educational system of Kazakhstan – in this way fostering comprehensibility and comparability between the educational systems.

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

The auditors gratefully received the Diploma Supplement and conclude that it shows how the final grade is calculated and which subjects are part of the study programme including the individual grades. However, the auditors underline that it is important that the Diploma supplements explain the educational system of Kazakhstan in order to foster comprehensibility and comparability between the educational systems.

D Aditional Documents

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

1. Module description of the module called “Social and communicative module” (mentioned in the objective matrix)
2. Workload description of 8th Semester for all Bachelor’s degree programmes. Especially the workload of the bachelor’s thesis is not understandable - *received*
3. Quality Management Process description: Questionnaire, results of analysis
4. List of teachers having received didactical training (kind of training, year of training) - *received*
5. Diploma supplement, Certificate, Transcript of Records - *received*

E Summary: Peer recommendations (25.08.2014)

Following the recommendation of the Technical Committee 1, the peers had been requested to provide a more detailed assessment of the award of the EUR-ACE label:

Ba and Ma Mechanics: The auditors discussed the award of the EUR-ACE Label. The representatives of the university indicated during the discussion that the students of the Mechanics degree programmes are not trained as engineers. The auditors take this information into consideration and learnt that the two degree programmes Mechanics (Ba and Ma) had a focus on fluid dynamics and the practical application in coal mining and oil production. Referring to Hermann Schlichting, Mechanics is on the rim of Physics and Mechanical Engineering; in fact, Mechanics is developing from Physics towards Mechanical Engineering. Accordingly the auditors came to the conclusion that knowledge of classical mechanics, knowledge of mechanics of materials and deformable solids and knowledge of fundamentals of fluid mechanics are competences of engineers and they reinforce their stipulation to revise the name of the degree programme. The auditors confirm that the intended learning outcomes comply – by and large - with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering for the two degree programmes and recommend the award of the EUR-ACE Label.

Ba and Ma Space Engineering and Technologies: For these two degree programmes the auditors concluded that the intended learning outcomes comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering and recommend the award of the EUR-ACE Label.

Ba Standardization, Certification and Metrology, Ma Metrology, Ma Standardization and Certification: As the EUR-ACE Label is dedicated to mechanical engineering, process engineering or chemical engineering they do not see that graduates from these programmes fall into any of these categories. The same applies to graduates from the Master's degree programme. Consequently, the auditors recommend not awarding the EUR-ACE label to these two degree programmes.

Taking into account the additional information and the comments given by al-Farabi Kazakh National University, the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Standardization, Certification and Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ba Mechanics	With requirements	EUR-ACE®	30.09.2020
Ba Space engineering and technologies	With requirements	EUR-ACE®	30.09.2020
Ma Mechanics	With requirements	EUR-ACE®	30.09.2020
Ma Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Space engineering and technologies	With requirements	EUR-ACE®	30.09.2020
Ma Standardization and Certification	With requirements	EUR-ACE®, not awarded	30.09.2020

Requirements

All study programmes

A 1. (ASIIN 6.1) The feedback loops of the Quality Management System must be closed and frequent internal processes should take place to reflect upon the results achieved and take measures to further develop the quality of the study programmes. The results must be more transparent and relevant stakeholders (e.g. teaching staff, students) must be actively involved in the practical implementation.

A 2. (ASIIN 6.2) Diploma supplements must explain the educational system of Kazakhstan in order to foster comprehensibility and comparability between the educational systems.

A 3. (ASIIN 2.2, 2.6) The specific features of the two Master's programmes must be reflected more clearly and distinctively in the intended learning outcomes. Especially with regard to the EUR-ACE Label the auditors underline that the objectives of the respective degree programmes should correspond more clearly to the Subject-Specific Criteria (SSC) of the Technical Committee for Mechanical Engineering and Process Engineering.

Bachelor programme Mechanics

A 4. (ASIIN 3.2) The work load for students must be adequate and properly reflect the provided ECTS credit points.

Ba / Ma Mechanics

A 5. (ASIIN 1) The name of the degree programme must be reconsidered to better match the name and the contents of the curriculum.

Recommendations

All programmes

E 1. (ASIIN 2.6) The capabilities of students to orally present a scientific problem of their speciality and to properly explain measures of potential solutions as well as putting the topic into the broader context of the speciality must be enhanced. The presentation skills in English should also be observed

E 2. (ASIIN 2.3) It is recommended to ascertain that the goals of the study programmes are properly reflected in the learning outcomes, - especially social skills need to be addressed more clearly.

E 3. (ASIIN 2.4) It is recommended that the “Employer’s Councils” should be fostered to provide opportunities to students to gain working experiences in their specific speciality and enhance their chances to find employment in their field of expertise.

E 4. (ASIIN 2.6) It is recommended to ensure to offer elective courses that allow developing a specific profile that complements the degree programme sensibly. The number of elective courses that are offered should be limited to a realistic size so that they are likely to be carried out.

E 5. (ASIIN 4) It is recommended to organize the sequence of examinations in a way that the students have sufficient time for preparation for the next exam.

F Comment of the Technical Committee

Technical Committee 01 - Mechanical Engineering/Process Engineering (04.06.2014)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee 01 – Mechanical Engineering recommended the award of the seals ASIIN seal with requirements and recommendations.

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

The Technical Committee 01 – Mechanical Engineering discussed critically if the intended learning outcomes of the degree programmes do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee Mechanical Engineering and concluded that this was not proven by the university adequately. Hence, the Committee 01 decided to reject the EUR-ACE® Label and requested ASIIN to cross-check this with the auditors to gain a better comprehension if the award of the EUR-ACE® Label was justified.

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

Degree Programme	**ASIIN seal**	**Subject-specific labels**	**Maximum duration of accreditation**
Ba Standardization, Certification and Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ba Mechanics	With requirements	EUR-ACE®, not awarded	30.09.2020
Ba Space engineering and technologies	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Mechanics	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Space engineering and technologies	With requirements	EUR-ACE®, not awarded	30.09.2020

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ma Standardization and Certification	With requirements	EUR-ACE®, not awarded	30.09.2020

Requirements

All study programmes

A 1. (ASIIN 6.1) The feedback loops of the Quality Management System must be closed and frequent internal processes should take place to reflect upon the results achieved and take measures to further develop the quality of the study programmes. The results must be more transparent and relevant stakeholders (e.g. teaching staff, students) must be actively involved in the practical implementation.

A 2. (ASIIN 6.2) Diploma supplements must explain the educational system of Kazakhstan in order to foster comprehensibility and comparability between the educational systems.

Bachelor programme Mechanics

A 3. (ASIIN 3.2) The work load for students must be adequate and properly reflect the provided ECTS credit points.

Ba / Ma Mechanics

A 4. (ASIIN 1) The name of the degree programme must be reconsidered to better match the name and the contents of the curriculum.

Master's programmes "Standardisation and certification" and "Metrology"

A 5. (ASIIN 2.2) The specific features of the two Master's programmes must be reflected more clearly and distinctively in the intended learning outcomes.

Recommendations

All programmes

E 1. (ASIIN 2.6) The capabilities of students to orally present a scientific problem of their speciality and to properly explain measures of potential solutions as well as putting the topic into the broader context of the speciality must be enhanced. The presentation skills in English should also be observed

E 2. (ASIIN 2.3) It is recommended to ascertain that the goals of the study programmes are properly reflected in the learning outcomes, - especially social skills need to be addressed more clearly.

E 3. (ASIIN 2.4) It is recommended that the “Employer’s Councils” should be fostered to provide opportunities to students to gain working experiences in their specific speciality and enhance their chances to find employment in their field of expertise.

E 4. (ASIIN 2.6) It is recommended to ensure to offer elective courses that allow developing a specific profile that complements the degree programme sensibly. The number of elective courses that are offered should be limited to a realistic size so that they are likely to be carried out.

E 5. (ASIIN 4) It is recommended to organize the sequence of examinations in a way that the students have sufficient time for preparation for the next exam.

G Decision of the Accreditation Commission (26.09.2014)

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

The Accreditation Commission made minor editorial amendments to the wording of some requirements and recommendations. Recommendation number 5 was removed because the sequence of examinations is described as unproblematic in the report. Apart from the changes mentioned the Commission confirmed the proposals of peers and Technical Committee.

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

The Accreditation Commission for Degree Programmes discussed the procedure and concluded after having taken note of the assessment of the peers that for the award of the EUR-ACE® label fundamental engineering competences are neither adequately defined in the learning outcomes nor properly implemented in the curriculum. Hence, the Accreditation Commission for Degree Programmes decided that basic conditions for the award of the EUR-ACE® label were not fulfilled for any of the degree programmes.

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

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Standardization, Certification and Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ba Mechanics	With requirements	EUR-ACE®, not awarded	30.09.2020
Ba Space engineering and technologies	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Mechanics	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Metrology	With requirements	EUR-ACE®, not awarded	30.09.2020
Ma Space engineering and technologies	With requirements	EUR-ACE®, not awarded	30.09.2020

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ma Standardization and Certification	With requirements	EUR-ACE®, not awarded	30.09.2020

Requirements

All study programmes

A 1. (ASIIN 6.1) The quality management system must be amended with view to the points described in the report (students' evaluation and involvement, alumni and graduates analysis, workload evaluation, feedback loops).

A 2. (ASIIN 6.2) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives, intended learning outcomes, structure and level of the degree, as well as about an individual's performance. It must also explain the educational system of Kazakhstan in order to foster comprehensibility and comparability between the educational systems.

Bachelor programme Mechanics

A 3. (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 a maximum of 900h. The ECTS credits awarded must be adapted accordingly.

Ba / Ma Mechanics

A 4. (ASIIN 1) The name of the programme must reflect the intended learning outcomes.

Master's programmes "Standardisation and certification" and "Metrology"

A 5. (ASIIN 2.2) The specific features of the two Master's programmes must be reflected more clearly and distinctively in the intended learning outcomes.

Recommendations

All programmes

E 1. (ASIIN 2.6) The capabilities of students to orally present a scientific problem of their specialty and to properly explain measures of potential solutions as well as putting the topic into the broader context of the specialty should be enhanced. It is also recommended to enhance students' presentation skills in English language.

E 2. (ASIIN 2.3) It is recommended to ascertain that the goals of the study programmes are properly reflected in the learning outcomes, - especially social skills should be addressed more clearly.

E 3. (ASIIN 2.4) It is recommended that the "Employer's Councils" should be fostered to provide opportunities to students to gain working experiences in their specific speciality and enhance their chances to find employment in their field of expertise.

E 4. (ASIIN 2.6) It is recommended to ensure to offer elective courses that allow developing a specific profile that complements the degree programme sensibly. The number of elective courses that are offered should be limited to a realistic size so that they are likely to be carried out.

H Fulfillment of Requirements

Recommendation of the Auditors (27.11.2015)

The peers recommended the award of the label as follows:

Degree Programme	**ASIIN seal**	**Maximum duration of accreditation**
Ba Standardization, Certification and Metrology	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Mechanics	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Space engineering and technologies	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Mechanics	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Metrology	Requirement 3 not fulfilled	30.09.2020
Ma Space engineering and technologies	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Standardization and Certification	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020

Recommendation of the Technical Committee 01 - Mechanical Engineering/Process Engineering (03.12.2015)

The Technical Committee 01 - Mechanical Engineering/Process Engineering recommended the award of the label as follows:

Degree Programme	**ASIIN seal**	**Maximum duration of accreditation**
Ba Standardization, Certification and Metrology	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Mechanics	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Space engineering and technologies	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Mechanics	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Metrology	Requirement 3 not fulfilled	30.09.2020
Ma Space engineering and technologies	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Standardization and Certification	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020

Decision of the Accreditation Commission (11.12.2015)

The Accreditation Commission took the following decision:

Degree Programme	**ASIIN seal**	**Maximum duration of accreditation**
Ba Standardization, Certification and Metrology*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Mechanics*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ba Space engineering and technologies*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Mechanics*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Metrology*	Requirement 3 not fulfilled	30.09.2020
Ma Space engineering and technologies*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020
Ma Standardization and Certification*	Requirement 3 not fulfilled, 6 month prolongation	30.09.2020

The Accreditation Commission for Degree Programmes decided to include the following indication for your institution:

During the reaccreditation it will be verified that, in addition to the final mark, statistical data are provided in the Diploma Supplement according to the ECTS Users' Guide.

The Accreditation Commission justifies its decision as follows:

It should be verified that the awarded ECTS-credits for the modules correspond to the actual workload of the students (e.g. based on results of the teaching evaluation). The ECTS-credits and the actual Workload must be described in the module descriptions.

Recommendation of the Auditors (10.06.2016)

The peers recommended the award of the label as follows:

Degree Programme	ASIIN seal	Maximum duration of accreditation
Ba Standardization, Certification and Metrology	All requirements fulfilled	30.09.2020
Ba Mechanics	All requirements fulfilled	30.09.2020
Ba Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Mechanics	All requirements fulfilled	30.09.2020
Ma Metrology	All requirements fulfilled	30.09.2020
Ma Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Standardization and Certification	All requirements fulfilled	30.09.2020

Recommendation of the Technical Committee 01 - Mechanical Engineering/Process Engineering (15.06.2016)

The Technical Committee 01 - Mechanical Engineering/Process Engineering recommended the award of the label as follows:

Degree Programme	ASIIN seal	Maximum duration of accreditation
Ba Standardization, Certification and Metrology	All requirements fulfilled	30.09.2020
Ba Mechanics	All requirements fulfilled	30.09.2020
Ba Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Mechanics	All requirements fulfilled	30.09.2020
Ma Metrology	All requirements fulfilled	30.09.2020
Ma Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Standardization and Certification	All requirements fulfilled	30.09.2020

Decision of the Accreditation Commission (01.07.2016)

The Accreditation Commission took the following decision:

Degree Programme	**ASIIN seal**	**Maximum duration of accreditation**
Ba Standardization, Certification and Metrology	All requirements fulfilled	30.09.2020
Ba Mechanics	All requirements fulfilled	30.09.2020
Ba Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Mechanics	All requirements fulfilled	30.09.2020
Ma Metrology	All requirements fulfilled	30.09.2020
Ma Space engineering and technologies	All requirements fulfilled	30.09.2020
Ma Standardization and Certification	All requirements fulfilled	30.09.2020