



# **ASIIN Certification Report**

**PhD Programmes**

***Mechanics***

***Space Engineering and Technologies***

Provided by

**al-Farabi Kazakh National University, Almaty,  
Kasakhstan**

Version: 21<sup>st</sup> of November 2014

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## A About the Certification Process

Title of the PhD Programmes	Previous ASIIN certification
Mechanics	No
Space Engineering and Technologies	No
<p><b>Date of the contract:</b> 25<sup>th</sup> of December 2012</p> <p><b>Submission of the final version of the self-assessment report:</b> 17<sup>th</sup> of February 2014</p> <p><b>Date of the onsite visit:</b> 12.-15. May 2014</p> <p><b>at:</b> al-Farabi Kazakh National University, Almaty, Kazakhstan</p>	
<p><b>Peer panel:</b></p> <p>Prof. Dr. Bernd Meyer, Jade University of Applied Sciences</p> <p>Prof. Dr. Axel Schumacher, University of Wuppertal</p> <p>Prof. Dr. Heinrich Rake, Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen</p> <p>Dr. Jörg Longmuß, Gitta mbH</p> <p>Ms. Anastasiya Krasnyuk (student peer), Technical State University Karaganda</p>	
<p><b>Representatives of the ASIIN headquarter:</b> Dr. Thomas Lichtenberg</p>	
<p><b>Responsible decision-making committee:</b> Certification committee</p>	
<p><b>Criteria used:</b></p> <p>European Qualifications Framework for Lifelong Learning (<i>level 8</i>)</p> <p>Standards for the Certification of (Further) Education and Training for courses and modules related to Computer Sciences, Technology, Natural Sciences and Business Economics as of 27.07.11.</p> <p>European Standards and Guidelines as of 2009 (3<sup>rd</sup> edition).</p>	

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 PhD Programmes

a) Name of the course	b) Degree awarded upon conclusion	c) Mode of Study	d) Duration & Credit Points	e) First time of offer & Intake rhythm	f) Number of students per intake	g) Fees
PhD programme Mechanics	PhD in Mechanics	Full time	6 Semester/ 75 credits (125 ESTC)	2005, annual intake	3 per year (depending on grants provided by government)	N/A
PhD programme Space Engineering and Technologies	PhD in Space Engineering and Technologies	Full time	6 Semester/ 75 credits (125 ESTC credits)	2013, annual intake	2 per year (depending on grants provided by government)	N/A

For the PhD Programme Mechanics, the self-assessment report states the following **intended learning outcomes**:

The aim of program on “5D060300 – Mechanics” specialty 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 graduates of 5D060300 – Mechanics program are intended to achieve the following learning outcomes

### Knowledge

- Deep system knowledge of the specified field of mechanics, determined by the chosen individual educational trajectory
- Knowledge of the methods of the mathematical model creation and use for description and forecasting of the different physical-chemical and nature processes and phenomena
- Knowledge of the new approaches to solving of the problems of modeling, bound with development of new technologies and manufacture of new materials
- Knowledge of the methods and techniques of teaching of the basic and elective subjects of mechanics

### Skills

- Ability to develop the right strategy to address the tasks and apply the necessary technologies for the problems solving
- Ability to analyze the possible ways of the problem solving, review of the current technologies of the problems solving and choose the optimal one
- Ability to evaluate critically the problems, approaches and trends that reflect the current state of mechanics and develop new approaches to solving professional problems and organize work of the team, united by the solving of the common tasks

- Ability to present effectively own conclusions both for professionals and for audience without adequate training

## Competence

- Demonstrate effectively own conclusions both for professionals and for audience without adequate training
- Carry out the correct logical professional discussion and demonstrate confident skills of scientific communications

The following **curriculum** design PhD in Mechanics (6D060300) is presented:

Module Code	Module Name	Module weight	Discipline Code	Discipline	Credits	Unit (ECTS)	L+P+Lb	Semester
Compulsory State Module - 3 credits								
OGM1	Compulsory State Module 1	3	TPSPVM 7201	Theoretical Problems and Modern Applied Questions of Mechanics	3	5	2+1+0	1
Elective Modules of Professional Specialization - 15 credits								
EMPS 1	Elective Module 1 of Professional Specialization	3	7202	Electives	3	5	2+1+0	1
EMPS 2	Elective Module 2 of Professional Specialization	3	7203	Electives	3	5	2+1+0	1
EMPS 3	Elective Module 3 of Professional Specialization	3	7204	Electives	3	5	2+1+0	2
EMPS 4	Elective Module 4 of Professional Specialization	3	7205	Electives	3	5	2+1+0	2
EMPS 5	Elective Module 5 of Professional Specialization	3	7206	Electives	3	5	2+1+0	2
Modules of Individual Educational Paths - 18 credits								
MIOT 1	Module 1 of Individual Educational Path	6	8301	Electives	3	5	2+1+0	3
			8302	Electives	3	5	2+1+0	3
MIOT 2	Module 2 of Individual Educational Path	3	8303	Electives	3	5	2+1+0	3
MIOT 3	Module 3 of Individual Educational Path	3	8304	Electives	3	5	2+1+0	4

MIOT 4	Module 4 of Individual Educational Path	6	8305	Electives	3	5	2+1+0	4
			8306	Electives	3	5	2+1+0	4
				Total: Theoretical Training - 36 credits (54 ECTS)				
<b>II. Additional Types of Training</b>								
NIRD	Doctoral Student's Research Work and Fulfilment of Dissertation	28	NIRD I	Research Seminar I	1	2	1	
			NIRD II	Research Seminar II	1(+3+4)	2	2	
			NIRD II	Research Seminar III	1	2	3	
			NIRD IV	Research Seminar IV	1(+3+4)	2	4	
			NIRD V	Research Seminar V	1	2		
			NIRD VI	Research Seminar VI	1(+8)	2		
PP	Professional Internship	6	PP	Pedagogical Internship	3	5	2	
			IP	Research internship	3(2+1)	5	2	
				<b>Total: Additional Types of Training: 34 credits (51 ECTS)</b>				
<b>III. Final Attestation</b>								
FSA	Final Attestation	5	KE	Complex Examination (1 credit)	1	2		
			ZD	Dissertation Fulfilment and Defence (3 credits)	4	6		
				<b>Grand Total: 75 credits (112,5 ECTS)</b>				

**Research Direction 6D060301 – Theoretical and celestial mechanics**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
EMPS 1	Hori-Deprit Method and its Modifications	MHDM 7202	Hori-Deprit Method and its Modifications	2+1+0	1	Theoretical Mechanics	Mechanics
EMPS 2	Construction of Near-Resonant Periodic Solutions of the Perturbed Systems	POPRVS 7203	Construction of Near-Resonant Periodic Solutions of the Perturbed Systems	2+1+0	1	Theoretical Mechanics	Mechanics
EMPS 3	Modern Theory of Dynamical Systems	STDS 7204	Modern Theory of Dynamical Systems	2+1+0	2	Theoretical Mechanics	Mechanics
EMPS 4	A Qualitative Study of Translational-Rotational Motion of Artificial Celestial Bodies	KIPVDINT 7205	A Qualitative Study of Translational-Rotational Motion of Artificial Celestial Bodies	2+1+0	2	Theoretical Mechanics	Mechanics
EMPS 5	Qualitative and Analytical Methods of Celestial Mechanics	KAMNM 7206	Qualitative and Analytical Methods of Celestial Mechanics	2+1+0	2	Theoretical Mechanics	Mechanics

**Modules of Individual Educational Paths 6D060301 – Theoretical and celestial mechanics**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
MIOT 1	Modern Problems of Astrometry and Spaceflight Dynamics	OZSCA 8301	Major Problems of Modern Astrometry	2+1+0	3	No	Mechanics
		AZDKP 8302	Actual Problems of Spaceflight Dynamics	2+1+0	3	Theoretical Mechanics	Mechanics
MIOT 2	Applied Theory of Gyroscopes and Principles of the Gyroscopic Systems Design	PTGPPGS 8303	Applied Theory of Gyroscopes and Principles of the Gyroscopic Systems De-	2+1+0	3	Theoretical Mechanics	Mechanics

			sign				
MIOT 3	The Spacecraft Design	PKA 8304	The Spacecraft Design	2+1+0	4	No	Mechanics
MIOT 4	Control of the Spacecraft Orientation	UOKA 8305	Control of the Spacecraft Orientation	2+1+0	4	No	Mechanics
		ChMRZ OU 8306	Numerical Methods of the Optimal Control Problems	2+0+1	4	Computational Methods	Mechanics

**Research Direction 6D060302– Fluid and gas mechanics**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semester	Prerequisites	Department
EMPS 1	Technologies of Parallel Computing	TPV 7202	Technologies of Parallel Computing	2+0+1	1	Computational Methods	Mechanics
EMPS 2	Advanced Computational Methods for Mechanics Problems Solving	SChMR ZM 7203	Advanced Computational Methods for Mechanics Problems Solving	2+0+1	1	Computational Methods	Mechanics
EMPS 3	Statistical Physics	SF 7204	Statistical Physics	2+1+0	2	Physics	Mechanics
EMPS 4	Nanomechanics	NM 7205	Nanomechanics	2+1+0	2	Theoretical Mechanics, Continuum Mechanics	Mechanics
EMPS 5	Methods of Mechanics Problems Study by Advanced Software	MIZMP SPP 7206	Methods of Mechanics Problems Study by Advanced Software	2+0+1	2	Computational Methods	Mechanics

**Modules of Individual Educational Paths 6D060302– Fluid and gas mechanics**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
MIOT 1	Physical-Chemical Hydrodynamics and Multiphase Flows	FHG 8301	Physical-Chemical Hydrodynamics	2+1+0	3	Fluid and Gas Mechanics	Mechanics
		TMS 8302	Multiphase Flows	2+0+1	3	Fluid and Gas Mechanics	Mechanics
MIOT 2	Numerical Methods of Optimal Control Problems	ChMRZ OU 8303	Numerical Methods of Optimal Control Problems	2+0+1	3	Computational Methods	Mechanics
MIOT 3	Method of Monte-Carlo	MMK 8304	Method of Monte-Carlo	2+0+1	4	Fluid and Gas Mechanics	Mechanics
MIOT 4	Methods of Turbulent Flows Modeling	OT 8305	Fundamentals of Turbulence	2+1+0	4	Fluid and Gas Mechanics	Mechanics
		SMMTT 8306	Modern Methods of Turbulent Flows Modeling	2+1+0	4	Fluid and Gas Mechanics	Mechanics

**Research Direction 6D060303 – Mechanics of machines, robotics, and their control and 3D modeling**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
EMPS 1	Inverse Problems of Theoretical and Applied Mechanics	OZTPM 7202	Inverse Problems of Theoretical and Applied Mechanics	2+1+0	1	Mechanics of machines and robots	Mechanics
EMPS 2	Analytical Methods for the Determination of Internal Forces in the Bar Systems	AMOVUSS 7203	Analytical Methods for the Determination of Internal Forces in the Bar Systems	2+1+0	1	Mechanics of machines and robots	Mechanics
EMPS 3	Solving Problems Mechanics by Bond Graphs	RZMMSG 7204	Solving Problems Mechanics by Bond Graphs	1+2+0	2	Mechanics of machines and robots	Mechanics
EMPS 4	Control Systems of Robotic Systems	SURK 7205	Control Systems of Robotic Systems	2+0+1	2	Mechanics of machines and robots	Mechanics
EMPS 5	Fundamentals of the Theory of Vibration and	OTVV 7206	Fundamentals of the Theory of Vibration	2+1+0	2	Mechanics of machines and robots	Mechanics

	Vibration Protec- tion		and Vibration Protection				
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**Modules of Individual Educational Paths 6D060303 – Mechanics of machines, robotics, and their control and 3D modeling**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
MIOT 1	Mechanisms Modelings and Computer Solution of Problems of Mechanics	RZNSV 8301	Solution of the Problem of Mechanics With Tools Visual C 2010+IMSL 2	2+1+0	3	/Mechanics of Machines and Robots	Mechanics
		TMMVP 8302	Solid Modeling Mechanisms With Higher Pairs	1+2+0	3	Mechanics of Machines and Robots	Mechanics
MIOT 2	Research and Design of the Drilling Robot Mechanisms With Variable Structure	IPBRMPS 8303	Research and Design of the Drilling Robot Mechanisms With Variable Structure	1+2+0	3	Mechanics of Machines and Robots	Mechanics
MIOT 3	Dynamics of Nonholonomic Systems and Mobile Robots	DNSMR 8304	Dynamics of Nonholonomic Systems and Mobile Robots	2+0+1	4	Mechanics of Machines and Robots	Mechanics
MIOT 4	Mechanics of Flexible Rods and Applied Theory of Oscillations	MGSN 8305	Mechanics of Flexible Rods and Threads	2+1+0	4	Mechanics of Machines and Robots	Mechanics
		PTKTAR 8306	Applied Theory of Vibrations and Theory of Automatic Control	2+0+1	4	Mechanics of Machines and Robots	Mechanics

**Research Direction 6D060304 – Solid Mechanics**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
EMPS 1	Underground Hydromechanics	PG 7202	Subterrian Hydromechanics	2+1+0	1	Fluid and Gas Mechanics	Mechanics
EMPS 2	Theory of Plasticity and Creep	TPP 7203	Theory of Plasticity and Creep	2+1+0	1	Solid Mechanics	Mechanics
EMPS 3	Rock Mechanics	MGP 7204	Rock Mechanics	2+1+0	2	Solid Mechanics	Mechanics
EMPS 4	Fracture Mechanics	MR 7205	Fracture Mechanics	2+1+0	2	Solid Mechanics	Mechanics

EMPS 5	Calculation Methods of Me- chanical Problems	MRZM 7206	Calculation Methods of Mechanical Problems	2+1+0	2	Computational Methods	Mechanics
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**Modules of Individual Educational Paths 6D060304 – Solid Mechanics**

Mod- ule code	Module name	Disciplin e code	Discipline na- me	Credits L+P+Lb	Se me str	Prerequisites	Department
MIOT 1	Methods of Struc- tural Mechanics Problems Solving	SM 8301	Structural Mechanics	2+1+0	3	Mechanics of Structural Elements	Mechanics
		MKE 8302	Finite Element Method	2+1+0	3	Computational Methods	Mechanics
MIOT 2	Fundamentals of Heat and Mass Transfer	OT 8303	Fundamentals of Heat and Mass Transfer	2+1+0	3	Continuum Mechanics	Mechanics
MIOT 3	Theory of Non- linear Oscillations	TNK 8304	Theory of Nonlinear Oscillations	2+1+0	4	Theoretical Mechanics	Mechanics
MIOT 4	Geophysics and Seismology	GPh 8305	Geophysics	2+1+0	4	Theoretical Mechanics	Mechanics
		Ses 8306	Seismology	2+1+0	4	Solid Mechanics	Mechanics

For the PhD Programme Space Engineering and Technologies, the self-assessment report states the following **intended learning outcomes**:

The aim of program on “5D074600 – Space Engineering and Technologies” specialty is preparation of highly qualified specialists in the field of Space Engineering in accordance with the highest academic standards in a competitive but challenging educational environment, capable of self-employed work and life-long learning.

The graduates of 5D074600 – Space Engineering and Technologies program are intended following learning outcomes

**Knowledge**

- Knowledge of space mission analysis and design
- Knowledge of the modern systems of the spacecraft attitude determination and control
- Knowledge of the processes of onboard data handling
- Deep knowledge of the spacecraft subsystems

**Skills**

- Ability to develop the right strategy to address the tasks and apply the necessary technologies for the problems solving
- Ability to analyze the possible ways of the problem solving, review of the current technologies of the problems solving and choose the optimal one
- Ability to evaluate critically the problems, approaches and trends that reflect the current state of space engineering and technologies and develop new approaches to solving professional problems and organize work of the team, united by the solving of the common tasks
- Ability to present effectively own conclusions both for professionals and for audience without adequate training

#### Competence

- Demonstrate effectively own conclusions both for professionals and for audience without adequate training
- Carry out the correct logical professional discussion and demonstrate confident skills of scientific communications

The following **curriculum** design PhD in Space Engineering and Technologies (6D074600) is presented:

Module Code	Module Name	Module weight	Discipline Code	Discipline	Credits	Unit (ECTS)	L+P+L	Semester
Compulsory State Module - 3 credits								
OGM1	Compulsory State Module 1	3	KKT 7201	Computer space technologies	3	5	2+1+0	1
Elective Modules of Professional Specialization - 15 credits								
EMPS 1	Elective Module 1 of Professional Specialization	3	7202	Electives	3	5	2+1+0	1
EMPS 2	Elective Module 2 of Professional Specialization	3	7203	Electives	3	5	2+1+0	1
EMPS 3	Elective Module 3 of Professional Specialization	3	7204	Electives	3	5	2+0+1	2
EMPS 4	Elective Module 4 of Professional Specialization	3	7205	Electives	3	5	2+1+0	2

EMPS 5	Elective Module 5 of Professional Specialization	3	7206	Electives	3	5	2+1+0	2
Modules of Individual Educational Paths - 18 credits								
MIOT 1	Module 1 of Indi- vidual Education- al Path	6	8301	Electives	3	5	2+0+1	3
			8302	Electives	3	5	2+1+0	3
MIOT 2	Module 2 of Indi- vidual Education- al Path	3	8303	Electives	3	5	2+1+0	3
MIOT 3	Module 3 of Indi- vidual Education- al Path	3	8304	Electives	3	5	2+1+0	4
MIOT 4	Module 4 of Indi- vidual Education- al Path	6	8305	Electives	3	5	2+1+0	4
			8306	Electives	3	5	2+1+0	4
Total: Theoretical Training - 36 credits (54 ECTS)								
II. Additional Types of Training								
NIRD	Doctoral Student's Research Work and Fullfilment of Dis- sertation	28	NIRD I	Research Seminar I	1	2	1	
			NIRD II	Research Seminar II	1	2	2	
			NIRD II	Research Seminar III	1	2	3	
			NIRD IV	Research Seminar IV	1	2	4	
			NIRD V	Research Seminar V	1	2		
			NIRD VI	Research Seminar VI	1	2		
PP	Professional Prac- tice	6	PP	Pedagogical Practice	3	5	2	
			IP	Research practice	3	5	2	
Total: Additional Types of Training: 34 credits (51 ECTS)					5			
III. Final Attestation								
FSA	Final Attestation	5	KE	Complex Examination (1 credit)	1	2		

			<b>ZD</b>	Dissertation Fulfillment and De- fence (3 credits)	4	<b>6</b>		
				<b>Grand Total: 75 credits (112,5 ECTS)</b>				

**Research Direction 6D074601 – Attitude control system of the spacecraft**

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
EMPS 1	Applied Theory of Gyroscopes	PTG 7202	Applied Theory of Gyroscopes	2+1+0	1	Theoretical Mechanics	Mechanics
EMPS 2	Space Mission Analysis and Design	RMPKA 7203	Space Mission Analysis and Design	2+1+0	1	Theoretical Mechanics	Mechanics
EMPS 3	Object-Oriented Simulation of Complex Systems	OMSS 7204	Object-Oriented Simulation of Complex Systems	2+0+1	2	Theoretical Mechanics	Mechanics
EMPS 4	Modern Astrometry	SA 7205	Modern Astrometry	2+1+0	2	Theoretical Mechanics	Mechanics
EMPS 5	Modern Systems of the Spacecraft Attitude Determination and Control	SSOSKA 7206	Modern Systems of the Spacecraft Attitude Determination and Control	2+1+0	2	Theoretical Mechanics	Mechanics

### Modules of Individual Educational Paths 6D074601 – Attitude control system of the spacecraft

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
MIOT 1	Onboard Data Handling and Spacecraft Flight Control	BSOD 8301	Onboard Data Handling	2+0+1	3	No	Mechanics
		UDKA 8302	Spacecraft Flight Control	2+1+0	3	Theoretical Mechanics	Mechanics
MIOT 2	The System of the Spacecraft Thermal Control	SOTRKA 8303	The System of the Spacecraft Thermal Control	2+1+0	3	Theoretical Mechanics	Mechanics
MIOT 3	The Power Supply System of the Spacecraft	CEKA 8304	The Power Supply System of the Spacecraft	2+1+0	4	No	Mechanics
MIOT 4	Satellite Navigation Systems and Management of Space Projects	PISNS 8305	Perspective Use of Satellite Navigation Systems	2+1+0	4	No	Mechanics
		PUKP 8306	Planning and Management of Space Projects	2+1+0	4	Computational Methods	Mechanics

### Research Direction 6D074602 – The spacecraft design

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
EMPS 1	Applied Theory and Principles of the Gyroscope System Construction	PTPPGS 7202	Applied Theory and Principles of the Gyroscope System Construction	2+1+0	1	Theoretical Mechanics	Mechanics

EMPS 2	Problems of the Spacecraft Design	PPKA 7203	Problems of the Spacecraft Design	2+1+0	1	Theoretical Mechanics	Mechanics
EMPS 3	System Analysis of the Complex Systems	SASS 7204	System Analysis of the Complex Systems	2+0+1	2	Theoretical Mechanics	Mechanics
EMPS 4	Modern Problems of Astrometry	SPA 7205	Modern Problems of Astrometry	2+1+0	2	Theoretical Mechanics	Mechanics
EMPS 5	Problems of the Spacecraft Attitude Determination and Control	ZOSKA 7206	Problems of the Spacecraft Attitude Determination and Control	2+1+0	2	Theoretical Mechanics	Mechanics

### Modules of Individual Educational Paths 6D074602 - The spacecraft design

Module code	Module name	Discipline code	Discipline name	Credits L+P+Lb	Semestr	Prerequisites	Department
MIOT 1	The Spacecraft Hardware Programming and Flight Control	PAOKA 8301	Hardware Programming of the Spacecraft	2+0+1	3	No	Mechanics
		UPKA 8302	Spacecraft Flight Control	2+1+0	3	Theoretical Mechanics	Mechanics
MIOT 2	The Problems of Provision of the Spacecraft Thermal Regime	ZOTRKA 8303	The Problems of Provision of the Spacecraft Thermal Regime	2+1+0	3	Theoretical Mechanics	Mechanics
MIOT 3	Calculation of the Spacecraft Power Supply System	REKA 8304	Calculation of the Spacecraft Power Supply System	2+1+0	4	No	Mechanics
MIOT 4	Satellite Navigation Systems and Management of the Space Projects	RSSNS 8305	Development of the Modern Satellite Navigation Systems	2+1+0	4	No	Mechanics

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		POUIPK A 8306	Problems of the Treatment and Manage- ment of the Spacecraft Information Flows	2+1+0	4	Computational Methods	Mechanics
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# C Peer Report for the ASIIN Certificate

## 1. Formal Information

<b>Criterion 1.1 Formal Information</b>
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**Evidence:**

- Self assessment report
- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University

**Preliminary assessment and analysis of the peers:**

Relevant formal information on duration, credit points and study form are provided in the self-assessment report. Concerning the name of the PhD programme “Mechanics” the auditors wondered like for the Bachelor’s and Master’s degree programmes if the name properly reflected the intended learning outcomes and competences of a graduate from this programme. The auditors understood that the responsible Ministry has to give its consent to change the name of a degree programme but looking at the content of the programme and the PhD theses that had been submitted to the peers they recommended reconsidering the name of this programme.

The formal requirements for PhD programmes are pointed out in the “University-wide Academic Policies and Procedures of al-Farabi Kazakh National University”. The programme requires full-time involvement of students and extends over a period of three years. Not all time spent within these three years is credited. Participants are awarded with 75 Kazakh credits, which are supposed to equal 125 credit-points ECTS. As other documents present partly different ECTS credit-point conversion, the peer group understood that there is an uncertainty in the conversion from Kazakh credits to ECTS, which is explained in chapter 3.2 in more detail.

The self assessment reports stated tuition fees for the Bachelor’s and the Master’s degree programmes; no information is provided for the PhD programmes. From the “University-wide Academic Policies and Procedures of al-Farabi Kazakh National University” the auditors learnt that “Admission for the PhD degrees of the Republic of Kazakhstan is carried out only based on educational grants, self-funded students cannot study at PhD degrees” (Admissions for the Master and PhD Degrees, page 20).

The audit team considered the formal specifications of the two PhD programmes, except for the mentioned conversion between ECTS and the Kazakh credit system, to be adequately defined.

### **Criterion 1.2 Legal relationship: mutual rights and duties**

#### **Evidence:**

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

#### **Preliminary assessment and analysis of the peers:**

The legal relationship between PhD students and the al-Farabi Kazakh National University had been documented in the Academic Policy of the al-Farabi Kazakh National University. An English version of the Policy had been provided to the auditors prior to the on-site visit. The Academic Policy defining all rules and regulations had been made accessible to all interested parties.

As indicated in the previous section, the Academic Policy defined the rules of admission. The allocation of grants is conducted on a very competitive base among all Kazakh Higher Education Institutions. Furthermore, it was determined in the Academic Policy that each PhD student has one local adviser and one international adviser; the local research adviser must be a full-time professor of al-Farabi Kazakh National University. An international research adviser must be a full-time professor of international universities or research centers. The PhD Students are required to conduct parts of the research at the institution of the international research advisor and they must produce 7 academic pieces of works. In addition, PhD students have to fulfill teaching obligations.

The auditors concluded that the rights and duties applicable to PhD students at the al-Farabi University were clearly defined.

#### **Final assessment of the peers after the comment of the Provider regarding criterion 1:**

The auditors see this criterion fully fulfilled.

## **2. Courses/Modules: Content, Policy and Implementation**

### **Criterion 2.1 Learning outcomes of the course/module**

#### **Evidence:**

- Objectives matrix

- Module handbook
- Academic Policy
- Self-assessment report of University
- Website <https://ec.europa.eu/ploteus/content/descriptors-page> (accessed 10/09/2014)

**Preliminary assessment and analysis of the peers:**

The panel deemed that the intended learning outcomes of the programmes are formulated in a comprehensible way and correspond to descriptions of the level 8 of the European Qualifications Frameworks for Life-long learning (EQF).

For the PhD programme Mechanics, the self-assessment report states for the field of knowledge that graduates should have “Knowledge of new approaches to solving the problems of modeling, bound with development of new technologies and manufacture of new materials” which roughly corresponds to the requirements of knowledge as defined in the EQF that students have knowledge “at the most advanced frontier of a field of work or study and at the interface between fields”. According to the EQF, graduates of level 8 must have “the most advanced and specialized skills and techniques, including synthesis and evaluation, required solving critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice”. The auditors understood that this level of qualification was aimed at with graduates having “the ability to evaluate critically the problems, approaches and trends that reflect the current state of mechanics and develop new approaches to solving professional problems”. Furthermore, the EQF descriptor of level 8 demands that graduates “demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas”. The auditors concluded that the intended learning outcome like “Graduates demonstrate effectively own conclusions both for professionals and for audience without adequate training” corresponded to the requirement of the EQF descriptor.

The same applies to the PhD programme Space Engineering and Technologies for the intended learning outcomes are defined as: “Space Engineering and Technologies” speciality is preparation of highly qualified specialists in the field of Space Engineering in accordance with the highest academic standards in a competitive but challenging educational environment. Applying the development of methods of recording and ionizing electromagnetic radiation and measuring methods of the quantitative characteristics of nuclear materials” is roughly reflecting the requirement of the level 8 of EQF stating “have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity”. The skills to be obtained are defined like “the ability

to evaluate critically the problems, approaches and trends that reflect the current state of space engineering and technologies and develop new approaches to solving professional problems” which corresponds to the EQF descriptor as the auditors confirmed.

The auditors could not see where the intended learning outcomes and the requirements to achieve them have been made transparent to the learners. From the audit of Bachelor’s and Master’s programme of the same cluster, the panel acknowledged that the learning outcomes are published in the internal document-management system UNIVER. However, under these premises the prospective study candidates cannot access them, which is crucial for a thorough decision making and comparison of different programmes. Therefore, the panel underlined that the publication of the learning outcomes accessible to the public is a necessity.

### **Criterion 2.2 Prospects of the labour market and practical orientation**

#### **Evidence:**

- Overview of companies for practical training
- Discussions with students/alumni

#### **Preliminary assessment and analysis of the peers:**

The number of PhD students who were accepted in the last years is very small. In Mechanics, since 2005, 3 students commenced their PhD studies per year; in Space Engineering, which just started in 2013, only 2 students had been admitted so far. Consequently, the number of graduates is very limited and those who graduated were employed either by the university itself, by other universities of Kazakhstan or by external research institutes. In the self-assessment report of the PhD Programme Mechanics a list of employers was provided like the “Research Institute on Mathematics” and Mechanics or the “Academy of Science of the Republic of Kazakhstan”. Also private companies were mentioned as employers like the “Institute of High Technologies”, the Atomic Company “KAZATOM-PROM” (national operator of the Republic of Kazakhstan for import and export of uranium, rare metals, nuclear fuel for power plants) or “KazMunaiGas”; the auditors appreciated that also private companies showed interest in graduates with these competences and comprehended that there is a demand for graduates with the intended learning outcomes.

The auditors understood that the PhD candidates have to conduct research internships in research projects of their professors in Kazakhstan and abroad and most of them teach undergraduate students which gives them an opportunity for pedagogical practice. The panel deemed this to be positive for their further teaching activities. The panel concluded

that an acceptable relation to the practical, professional side of the programme had been integrated into the course.

### **Criterion 2.3 Admission requirements**

#### **Evidence:**

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University, page 21.
- Website: <http://www.kaznu.kz/ru/13691/page/welcome///> (accessed 10/09/2014)

#### **Preliminary assessment and analysis of the peers:**

The admission rules for the PhD programmes are defined in the academic policy, based on the law developed by the Ministry of Education and Science of Kazakhstan based on the (#109 since January 19, 2012) article number 4 of the law on Education (Since June 27, 2007). As indicated above, admission for the PhD degrees of the Republic of Kazakhstan is carried out only based on educational grants, self-funded students cannot study PhD degree programmes.

According to these rules, an applicant for a PhD program of al-Farabi Kazakh National University should satisfy the following requirements:

- a completed M.Sc. degree in the proposed field of research;
- a relevant topic of research proposal;
- some background work experience related to the proposed field of research
- a motivation letter, including a proposed plan of the envisaged doctoral thesis signed by one of supervisors usually by a domestic one.

Furthermore, the state grants are awarded based on the best results of admission exams, which are an extensive foreign language test and a written exam dealing with the chosen subject and envisaging two theoretical questions and one essay. The tests are conducted by the National Testing Center.

The auditors could see that all processes and quality criteria required for admission to the PhD programme are defined in a transparent and binding way; the rules ensure that all admitted learners fulfill the necessary requirements.

The auditors welcomed the thorough knowledge of a foreign language as an important prerequisite, given that PhD students are supposed to conduct research abroad, be able to read and synthesize technical literature, as well as communicate without any linguistic

obstacles with their foreign supervisors. During the on-site visit, the auditors were surprised to see that the majority of the PhD students felt unable to briefly outline their thesis in English. Given that PhD students have a foreign advisor and regularly go abroad to pursue their studies, they wondered how this was possible. The auditors recommended introducing also oral exams as part of the overall selection procedure.

#### Criterion 2.4 Contents

##### Evidence:

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University, page 45.
- Module Descriptions
- Curriculum
- Discussion with students
- Discussion with teaching staff

##### Preliminary assessment and analysis of the peers:

The PhD Degree Programme Structure is clearly defined in the Academic Policy of the university. In 2013, al-Farabi Kazakh National University updated the structure of the curricula of the PhD programmes; PhD programmes consist of 36 (Kazakhstan) credits of *theoretical training* and 34 credits of additional types of training, such as research work and professional practice. The theoretical training comprises (36 credits) one Compulsory State Module (3 credits) which is the same for all PhD students and the other 33 credits depend on the research direction and on the research field of the PhD student. Hence, the curriculum for the doctoral programme is elaborated for each student individually; 15 credits of the Elective Modules of Professional Specialization are the same for all PhD students of same Research direction. Each subject of the Elective Modules of Professional Specialization has 3 credits including 2 lectures per week and 1 seminar. During the lecture PhD student are supposed to develop new techniques in the field of research and apply that technique for the thesis. The remaining 18 credits of Modules are exclusively for the Individual Educational Path to gain the specific expertise required for the research of the PhD thesis. In summary, 35-40% of the work load is dedicated to theoretical education and 60-65% of the work load is dedicated to individual research. The PhD candidates confirmed that they take individualised modules matching to the specific challenges of their scientific work and that the theoretical training does not exceed 35-40%. Although the curriculum allows for a considerable flexibility by offering different electives and also

possibilities of individual paths, the University is planning to get more autonomy for designing the curriculum in future, which the panel found strongly recommendable.

Prior to being accepted to present and defend the PhD thesis, the candidate has to prove the following publications

- 1 paper in journal indexed by TR or Scopus
- 3 papers in journal recommended by Committee of Science
- 3 presentations at international scientific conferences, including at least 1 abroad

The auditors welcomed this publication obligation as well as the necessity to have a second foreign supervisor.

The auditors appreciated the individualized presentation of the different PhD candidates which allows for a detailed assessment of the actual work of the PhD candidates. The panel could understand that the modules are very individualized and consequently some of them are not part of the module handbook. As indicated, even though this individualized approach was considered positive and laudable, module descriptions must be available in order to have a joint point of reference not only for students, but also for teachers. These descriptions are also crucial for internal quality assurance (aligning the modules to the intended learning outcomes and regular checking the achievement). For this reason, the panel strongly emphasized the need to reflect this option of maximum individual customization in the current module descriptions. In summary, the current practice of documenting the modules should be revised. An update and completion of the respective module descriptions is required in order to make them reflect the high level of individuality and customization, publication on the website (and not just in the internal system UNIVER) in order to make them accessible and usable as reliable reference for all relevant stakeholders.

The auditors underlined that the quality of the available module descriptions is appropriate and they encourage the university to stick to the output-oriented module description.

**Final assessment of the peers after the comment of the Provider regarding criterion 2:**

The auditors understood that the learning outcomes are published in the internal document-management system UNIVER. However, the auditors underlined that the learning outcomes must be accessible to all stakeholders, including prospective students, potential employers and any interested party.

The panel could understand that the modules are very individualized and consequently some of them are not part of the module handbook. However, an update and completion of the module descriptions is required; the high level of individuality and customization must become obvious.

The auditors acknowledged that the admission procedure is approved at the level of Ministry of Education and Science and is not in the power of the university. Still the auditors recommended trying to take influence in the Ministry's definition of the admission procedures to ascertain that oral capacities of PhD applicants are also taken into consideration. Apart from this the auditors see this criterion fulfilled.

### 3. Courses/Modules: Structures, Methods and Implementation

#### Criterion 3.1 Structure

**Evidence:**

- Self-assessment report
- Curriculum
- Discussion with students

**Preliminary assessment and analysis of the peers:**

The PhD programmes are generally full-time positions. As indicated above, the PhD programme consists of two main pillars: 36 (Kazakhan) credits of theoretical training and 34 credits of additional types of training, such as research work and professional practice. The theoretical training (36 credits) was dealt with in the preceding section and it can be summarised that the teaching is individualised and tailored to the specific needs of the PhD candidate. The research work of the PhD-students is assessed and the results are recorded in the transcript of records. The candidate receives 28 credits for this work; an additional 6 credits are dedicated to professional internships. Besides, every PhD-student is requested to work at the laboratory and the scientific projects of the foreign supervisor for at least two months twice during the period of training. These four months are funded by the Ministry of Education and Science of the Republic of Kazakhstan. Some students informed the panel that they were allowed to stay longer in case they needed it (e.g. the labs of the second institutions allow for better research) and that they can also "accumulate" this time to half a year and stay abroad for a longer time at once.

The strict structure of three years for the completion of the PhD programme should be revised as the auditors strongly recommended. The auditors agreed that it was sensible to create a structure that is based on three years but in reality especially for an experimental thesis it may be difficult or impossible to stick to the envisaged timeframe if experiments do not go as anticipated. The PhD students considered it sometimes almost

impossible to handle the strict rules particularly in the final phase of the programme. The students informed the panel on the possibility of taking the final exams in the autumn session instead of the regular defense in May, in order to obtain at least a short prolongation for finalizing the thesis. However, the panel recommended revising the strict maximum duration of three years, making an option of prolongation for one or two semesters possible in well-justified cases.

### Criterion 3.2 Workload

#### Evidence:

- Self-assessment report, Curriculum
- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University, page 47.
- Discussions with students

#### Preliminary assessment and analysis of the peers:

The University-wide Academic Policy states that the average student workload of PhD Degree students must not exceed 57 hours per week; one hour auditorium workload must be followed by 7 hours self study workload. Even though this workload was considered very high by the auditors, the students confirmed that they can cope with their workload and think it is feasible and acceptable (apart from the cases mentioned above where experimental thesis concepts made the completion in time impossible). The curriculum provided by the university shows the number of ECTS points that can be gained every semester. The auditors understood that the workload is fairly balanced. The students confirmed that the modules offered are necessary and helpful. They highlighted that this way of learning, in almost individual classes is beneficial for their thesis.

The self assessment report tried to explain the work load per semester and even though the auditors had difficulties to allocate the work load to each semester they finally understood that the workload was fairly evenly balanced over the semesters. This was also confirmed by the students. The auditors reckoned that the estimated time budgets are realistic enough to enable learners to reach the learning outcomes of the module within the scheduled time and at the level aimed at.

But the auditors remarked critically, that the University-wide Academic Policy was difficult to understand in the actual conversion of Kazakh credit points to ECTS points. The conversion of Kazakh credit points to ECTS credit points must be described in a way that it is understandable and comprehensible for externals

<b>Criterion 3.3 Teaching methodology</b>
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**Evidence:**

- Module descriptions

**Preliminary assessment and analysis of the peers:**

Each PhD student is required to have two supervisors, one from the al-Farabi Kazakh National University and one from abroad. The local scientific supervisor has to be a well-reputed scientist implementing research projects (being the scientific leader of the project or the main executer of the project). The domestic supervisor is responsible for advising the PhD student to find a foreign supervisor and negotiate the preliminary dissertation. The foreign scientific supervisors should be scientists with relevant scientific projects. Research advisers must have at least three articles at international journals with higher than zero impact factor. Research advisors are directly responsible for performing all required workloads on time and provide annual results of students. The foreign scientist should come from a University with considerable high International Rating. The foreign supervisors are invited to the al-Farabi University for at least 14 days per year to offer lectures and discussions for doctoral students. The University covers all relevant expenses. The foreign supervisor is requested to invite the doctoral student to conduct an internship in his lab at least twice during the period of training for at least two months each time. The University covers all expenses for the staying of doctoral students at the Lab of the foreign supervisor. The auditors were impressed by this international approach and are convinced that this concept is appropriate in reaching the learning outcomes at the level aimed at. However, the university explained that out of the 9 PhD theses that had been completed in the last years, three candidates had Russian-speaking international supervisors and wrote their thesis exclusively in Russian. The auditors thought that this contradicts the idea of internationalization and recommended that the advisors should encourage the students to write their thesis or at least the PhD-relevant publications in English, in order to make the work results visible internationally. Three other candidates wrote their theses in Russian and English, for example.

PhD students are involved in research activities right from the start of the PhD programme. The auditors appreciated the individualized approach to tailor the content of modules to the scientific and research needs of PhD students. This approach is capable of ascertaining that the students receive that kind of scientific support that is required to successfully implement the research work. The auditors confirmed that the teaching instruments support the learners in reaching the learning outcomes.

<b>Criterion 3.4 Support and assistance</b>
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**Evidence:**

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University
- Discussion with students

**Preliminary assessment and analysis of the peers:**

Especially for the PhD students the auditors gained the conviction that the support and advice infrastructure at the al-Farabi Kazakh State University was particularly well developed. The university provides a good setting for development of the skills and competences as stated above. Especially the support and assistance provided by the foreign supervisor was considered very valuable since this international cooperation broadens the scientific scope of the candidates and the language competences; the auditors advised to reconsider if a Russian-speaking second academic advisor may bear the expected benefits for the candidate.

Even though a number of student organizations are in place, the students indicated that their influence on the overall development and management of studies, especially their conceptual implementation, was low. Initiatives of student-driven peer-to-peer support are just starting and rather an innovative phenomenon in the Kazakh academic setting. Nevertheless, the students confirmed that in cases of problems, not only study-related but also private ones, advisors are always available for and ready to help.

The audit team acknowledged the option to change the supervisor if needed. For this purposes, the students confirmed that they were free to address the deans and that there were cases where a PhD supervisor's change had taken place.

**Final assessment of the peers after the comment of the Provider regarding criterion 3:**

The auditors remarked critically that the conversion from Kazakh credit points to ECTS points is not transparent and understandable. The peers took note that the University could understand this assessment and supported the intention of the University to improve the items related to the conversion of credit points in the Academic Policy. Until this intention will have materialised the peers stick to the envisaged requirement.

The auditors thank the University for the clarification that the PhD candidates have the opportunity to submit their PhD thesis after the official duration of 3 years. The auditors also understood that the extended period was not covered by governmental fellowship but had to be covered by research projects of the domestic supervisor. It is also understandable that this support is only granted to students who are close to completion of their work. The auditors see the recommended flexibility of the duration of PhD theses in place and refrain from the envisaged recommendation.

In order to foster the internationalisation of the Kazakh Higher Education system the auditors recommended that the advisors encourage the students to write their thesis or at least the PhD-relevant publications in English to make the results visible internationally.

## 4. Examination: System, Policy and Forms

<b>Criterion 4 Exams: System, policy and forms</b>
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**Evidence:**

- Academic Policy, p. 24 ff.
- Module Handbook
- discussion with student

**Preliminary assessment and analysis of the peers:**

All modules must be passed with examinations. The module descriptions explain the kind of examination that has to be passed. A timetable for the examinations that need to be taken is made known to the PhD-students at the beginning of the semester. According to the students, the sequence of exams was appropriate to have sufficient time to prepare for the exams. In most cases there are interim controls comprising attendance, in-class discussion, problem solving, and testing. Furthermore, there is normally a final exam which contributes 50% to the overall grade of the module. In some cases, additional written testing as an intermediate control measure is applied. The students indicated that the factual workload caused by the interim testing, was occasionally challenging. The auditors advised to monitor the actual workload of interim exams and modify this approach where overload can be detected.

For the modules stated in the module handbook only written examinations are foreseen, oral examinations are not mentioned at all. Even though the auditors acknowledged that oral presentations have to be made at conferences, the panel underlines that oral competences should also be fostered and developed during the PhD programmes and not only at conferences. Hence, it is recommended providing more opportunities to PhD students to orally present a scientific problem of their speciality and to properly explain measures of potential solutions also in English language. The auditors underlined that a competence-oriented examination approach must be applied. As indicated earlier, the auditors gained the impression that the capacities of PhD students to orally express themselves particularly in English can still be enhanced considerably.

The auditors received a detailed list of all PhD students, an abstract of the current PhD work and the list of publications of the PhD students. Moreover, four PhD theses had been provided to the auditors who examined them thoroughly. Based on this information the auditors could understand the academic and scientific level of the PhD thesis. The auditors could confirm that the research topics of the PhD thesis were appropriate and

the scientific approaches selected implied methodological innovation and scientific independence.

**Final assessment of the peers after the comment of the Provider regarding criterion 4:**

Even though the auditors acknowledged that oral presentations have to be made at conferences, the panel underlined that oral competences should also be fostered and developed during the PhD programmes and not only at conferences. Hence, it is recommended providing more opportunities to PhD students to orally present a scientific problem of their speciality and to properly explain measures of potential solutions also in English language. The auditors underlined that a competence-oriented examination approach must be applied.

## 5. Resources

### Criterion 5.1 Staff

**Evidence:**

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University, page 20
- Information about research projects in the self-assessment report
- Staff Handbook
- Presentation of PhD candidates and the respective international supervisor
- Discussions with programme coordinators, teaching staff and students

**Preliminary assessment and analysis of the peers:**

The panel gained the impression that considerable resources were made available to run the PhD programmes at the al-Farabi University. As indicated above, the first supervisor for the PhD thesis comes from the al-Farabi university and the second from abroad. The international supervisor is supposed to come to al-Farabi University and provide lectures relevant to the specific topics of the PhD candidates. Hence, the academic teaching is tailored to the specific needs of the PhD students and carried out by international supervisors or other well reputed experts from the specific scientific field.

The university provided staff handbooks for both PhD-programmes which allowed the auditors to gain a thorough impression of the qualification of the relevant staff members; in addition, the international supervisors were presented individually for each PhD candidate, the scientific background, the research fields, and the publications. It was also explained which modules had been carried out by the PhD students. The auditors concluded

that the staff that is available to supervise and teach the PhD candidates is of appropriate academic level and capable of providing adequate scientific support. The PhD students confirmed that the lecturers have enough time to teach the modules and to appropriately assist them.

<b>Criterion 5.2 Institutional setting, funding and equipment</b>
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**Evidence:**

- University-wide Academic Policies and Procedures of al-Farabi Kazakh National University, page 20
- Overview of existing labs in the self-assessment report
- Visit of the institute's labs
- Discussion with students
- Discussion with teaching staff

**Preliminary assessment and analysis of the peers:**

The self-assessment report presented a very detailed overview of the available equipment. Furthermore, the auditors visited the facilities of the Mechanics and the Space Engineering Department. In the Mechanics Department the auditors had a chance to witness inter alia the Electrical Resistance Tomography, the Electromechanical testing system or the Laser Doppler Anemometry. In the Space Engineering Department the auditors looked at the Ground station to communicate with small satellites in low-Earth orbit.

The students confirmed that they know during the set-up of the plan for their research activities, which additional equipment their foreign supervisor can provide, so that they adjust their work plan to available logistics beforehand. The equipment that is provided at the foreign university where the PhD student has to conduct parts of his studies is mentioned in the self assessment report. In addition, the PhD students explained that research equipment was also partly available at the field locations where the PhD thesis was carried out in collaboration with research institutes or private businesses. The panel came to the conclusion that partnering with other institutions, particularly the cooperation with the foreign supervisors, supports a smooth implementation of the research work and is a promising approach to successfully perform scientific research projects depending on expensive and demanding technical equipment. In summary, the auditors understood that the infrastructure (e.g. laboratories, libraries, IT equipment) is in line with the requirements as to quality and quantity.

The auditors gained the impression that essential literature and online key scientific periodicals are available in English Language to a certain extent. The students indicated that additionally needed literature could be obtained through their supervisors or the re-

sources at the international partnering institutions. The auditors appreciated the fact that the students received an additional annual funding for literature.

Regarding the finances of the PhD programme, the auditors learnt that a certain number of PhD grants is provided by the government and all expenses are covered for the activities (including abroad training) PhD students have to carry out. The university was able to convince the auditors that the funds that had been granted for PhD students will be available at least for the time of accreditation; nevertheless if the programme had not been completed by the PhD student within the three years, the students have to work part-time to earn their living. According to the University-wide Academic Policies Admission for the PhD degrees of the Republic of Kazakhstan is carried out only based on educational grants, self-funded students cannot study at PhD degrees. Given the increasing interest of private companies to employ highly qualified experts the auditors recommended to reconsider the university wide policy and allow private companies to support and fund PhD candidates. Since many Kazakh companies are working in the field of applied sciences, widening the permission for private funding of PhD places would lead to mutual benefit for universities and industry. The panel acknowledged, however, that such a change does not depend on the university but on policy making institutions.

**Final assessment of the peers after the comment of the Provider regarding criterion 5:**

Given the increasing interest of private companies to employ highly qualified experts the auditors recommended to reconsider the university wide policy and allow private companies to support and fund PhD candidates. The University clarified that the rules of enrolment to PhD programmes needed to be approved by the Ministry of Education and Science. The auditors recommended underlining to the relevant Ministry the advantages of more flexible funding opportunities. The panel acknowledged that such a change does not depend on the university but on policy making institutions.

## 6. Quality Management: Development and Enhancement

### Criterion 6.1 Quality assurance & enhancement

**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

- [http://www.kaznu.kz/en/4828/page/About Al-Farabi Kazakh National University/Quality management system Strategic directions of QMS development/](http://www.kaznu.kz/en/4828/page/About-Al-Farabi-Kazakh-National-University/Quality-management-system-Strategic-directions-of-QMS-development/) (accessed 20.09.2014)

**Preliminary assessment and analysis of the peers:**

The auditors were informed that ISO 9001 for management and administration processes was implemented in the whole university in 2003 and annually re-certified ever since.

Furthermore, the university underlined that the quality in teaching and learning was supported through the organizational setting with two supervisors, one from the faculty and one from abroad, to ensure two independent perspectives and evaluation of the work done; this fulfills a key requirement for impartiality. The very small number of PhD students provides an environment where students and teachers can interact directly and individual supervision can be granted. The students confirmed a good and close relationship to their supervisors.

Due to the small number of students and the very specific modules large scale evaluations like in the other academic programmes do not take place but the students confirmed that the very close relationship to the teachers allows for a direct feedback to the teachers. Moreover, the students indicated that they would turn to the head of the respective chairs directly, the dean, or even the Vice-rector for Academic Issues in case of major deficiencies, which proves that the open-door policy of the university is functioning well. Considering the fact that the PhD-programmes are still in a developmental phase, the audit team considered quality assurance as sufficient when it depends on a very close student-teacher interaction. Nevertheless, a consistent policy with clearly defined aims, methods and responsibilities is not yet existent and should be developed, ensuring a consistent closing of the feedback loops and further strengthening of the stakeholder involvement. It should be well noted that the methodology chosen does not have to be very complex but should be clearly related to the set targets. In addition, the students and other stakeholders should be involved in the quality assurance process more actively.

<b>Criterion 6.2 Instruments, data and methods</b>
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**Evidence:**

- Self-assessment reports
- Discussion with programme coordinators and students

**Preliminary assessment and analysis of the peers:**

The self-assessment reports demonstrated that the university collects relevant data, such as graduate's number, job placement, and also publication activity. For each and every

PhD student a detailed profile was conveyed providing information on the Kazakh supervisor and the international supervisor with their track records of research activities and publications. For the PhD candidates themselves, a short description of the thesis and the publications was provided. This proves that all relevant information on the current PhD students is properly recorded and available. Furthermore, based on the self assessment report, it is explained that all of the 8 PhD graduates in Mechanics are working in leading scientific centers of Kazakhstan. In Space Engineering no graduates exist yet. In summary, the auditors noticed that key information was collected regularly and that the responsible persons are familiar with the key insights.

With regard to the quality assurance instruments in use, students confirmed that they make use of instruments like completing the student’s surveying tools, direct feedback to the teachers or the responsible person for modules for their further development. The panel encouraged further use of the surveying, especially of alumni, since first cohorts graduated and could in the retrospective make better judgments on practical relevance, the adequacy of the academic programme, make some proposals on further development of the modules and also provide additional career mentoring for the younger students. The auditors encouraged the university to further broaden the instruments and methods used.

**Final assessment of the peers after the comment of the Provider regarding criterion 6:**

The auditors recommended developing a consistent policy with clearly defined aims, methods and responsibilities for quality assurance and closing of the feedback loops. In addition, the students and other stakeholders should be involved in the quality assurance process more actively.

## 7. Documentation & Transparency

<b>Criterion 7.1 Relevant documents</b>
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**Evidence:**

- Academic Policy as a whole
- Self-assessment reports

**Preliminary assessment and analysis of the peers:**

The regulations are transparently presented and clearly explained by the “University-wide Academic Policies and Procedures of al-Farabi Kazakh National University” (called here

“Academic Policy”). This policy is available in Russian language on the website of al-Farabi-University.

The audit team considered the specific characteristics of the programmes to be adequately defined in the respective documents, especially the self-assessment reports and the module handbooks.

<b>Criterion 7.2 Certificate upon conclusion</b>
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**Evidence:**

- Example of the leaving certificate

**Preliminary assessment and analysis of the peers:**

An example of the leaving certificate provided upon conclusion of the programme was not made available to the panel. Such a certificate should contain information on programme’s structure, contents and level of the concluded programmes, as well as the learner's individual performance, the calculation of final mark including different weighting regulations for the separate modules.

Therefore the panel requested the submission of such certificate as additional document jointly with the comment of the university on this report. This document is needed for the final assessment of the programme.

**Final assessment of the peers after the comment of the Provider regarding criterion 7:**

The auditors gratefully received the example of a PhD Diploma and the Transcript of Records for the PhD theses. The auditors could see that this certificate provides information on programme’s structure, contents and level of the concluded programmes, as well as the learner's individual performance, the calculation of final mark including different weighting regulations for the separate modules. The auditors judge this criterion as fulfilled.

## D Additional Documents

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

- D 1. Example of the leaving certificate for each programme – was provided but does not fulfill the requirements.

## E Recommendations of the Auditors

The auditors recommend awarding the following certificates:

<b>PhD Programme</b>	<b>ASIIN Certificate</b>	<b>Maximum duration of certification</b>
PhD Mechanics	Certification with requirements	31.12.2019 (upon fulfillment of requirements)
PhD Space equipment (engineering ) and technology	Certification with requirements	31.12.2019 (upon fulfillment of requirements)

### Requirements

- A 1. (ASIIN C Seal 2.1) The learning outcomes must be accessible to all stakeholders, including prospective students, potential employers and any interested party.
- A 2. (ASIIN 2.4) An update and completion of the module descriptions is required; the high level of individuality and customization must become obvious.
- A 3. (ASIIN 3.2) The conversion of Kazakh credit points to ECTS credit points must be described in a way that it is understandable for externals.

- A 4. (ASIIN 4) A competence-oriented examination approach must be applied. PhD students must be able to orally present a scientific problem of their speciality and to properly explain measures of potential solutions also in English language.

### **Recommendations**

- E 1. (ASIIN 2.3) The auditors recommended introducing also oral exams as part of the overall selection procedure.
- E 2. (ASIIN 3.3) It is recommended that the advisors encourage the students to write their thesis or at least the PhD-relevant publications in English; the goal is to make the results visible internationally.
- E 3. (ASIIN 5.2) The panel recommends considering further cooperation with industry and other third parties as possible source of new funding for additional PhD thesis.
- E 4. (ASIIN 6.1) It is recommended to develop a consistent policy with clearly defined aims, methods and responsibilities for quality assurance and closing of the feedback loops. In addition, the students and other stakeholders should be involved in the quality assurance process more actively.

## **F Decision of the Certification Committee (11.11.2014)**

The Certification Committee discussed the procedure and the proposed requirements and recommendations.

Their discussions and decisions regarding this cluster were preliminary<sup>1</sup> in so far as the final recommendations of the peers had not yet been consolidated among the panel members.

They noted that one of their tasks was to ensure consistency in the decision-making among the different certification procedures. Thus, they decided that some requirements and recommendations needed to be transferred, deleted or edited for each of the procedures.

In particular, with regard to requirement 3, they emphasized that the award of ECTS credit points was not mandatory for PhD programmes. However, if Al-Farabi University wishes to transfer its national Kazakh credit point system into ECTS, the calculation must be both consistent and in line with the ECTS Users' Guide. Additionally, the committee members considered it reasonable that credits would be awarded to the taught components, not for the research components or associated dissemination outputs. Similarly, concerning requirement 5, they did not consider the award of a Diploma Supplement, as reserved for First and Second Cycle degree programmes, reasonable whereas an informative leaving certificate or similar document would be beneficial for PhD holders.

The second part of requirement 2 was deleted as its intention was not clear; similarly, the second part of requirement 4 seemed to propose rather an additional programme objective than state where a requirement was not met.

Former recommendations 1 and 3 were combined into a new recommendation to make it more concise.

The committee members also considered that former recommendation 2 was both too vague and would interfere with national legislation in a way exceeding the scope of the certification procedure. It was thus deleted.

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<sup>1</sup> The peers confirmed their proposal for the requirements and recommendations as outlined in the draft final report. The Certification Commission had therefore based its decision upon the correct version of the draft final report as subsequently confirmed by the peers. The Certification Commission amended the proposed requirements and recommendation in line with the other PhD-certification procedures taking place in parallel. Hence, the decision taken by the Certification Commission is to be considered as the final and valid version.

The Certification Committee decides to award the following certificates:

PhD Programme	ASIIN Certificate	Maximum duration of certification
PhD Mechanics	Certification with requirements	31.12.2019 (upon fulfillment of requirements)
PhD Space equipment (engineering) and technology	Certification with requirements	31.12.2019 (upon fulfillment of requirements)

### Requirements

- A 1. (ASIIN 2.1) The learning outcomes must be accessible to all stakeholders, including prospective students, potential employers and any interested party.
- A 2. (ASIIN 2.4) An update and completion of the module descriptions is required.
- A 3. (ASIIN 3.2) If ECTS credits are used, the transformation of the Kazakh credit points into ECTS must correspond to the ECTS regulations that one credit point is awarded for 25-30 hours student workload and be in line with the Users' Guide. ECTS should be applied for taught parts of the programmes only.
- A 4. (ASIIN 4) A competence-oriented examination approach must be applied.
- A 5. (ASIIN 7.2) A programme-specific leaving certificate or equivalent document 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.

### Recommendations

- E 1. (ASIIN 4) It is recommended to better equip the PhD students to use scientific work methods, including English, soft skills and scientific writing skills.
- E 2. (ASIIN 5.2) The panel recommends considering further cooperation with industry and other third parties as possible source of new funding for additional PhD vacancies.

- E 3. (ASIIN 3.2) Within the quality assurance policy feedback loops and further development of the programmes should be carefully implemented. In addition, the students and other stakeholders should be involved in the quality assurance process more actively.