ASIIN Seal

Accreditation Report

Bachelor's and Master´s Degree Programmes
Mathematics
Computer Science
Nuclear Physics

Provided by
Eurasian National University named after L.N. Gumilyov, Astana

Version: March 31st 2017

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for[1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
5B060100-Математика	Mathematics (Bachelor of Natural Science)	ASIIN	--	12
6M060100-Математика	Mathematics (Master of Natural Science)	ASIIN	--	12
5B060200– Информатика	Computer Science (Bachelor of Natural Science)	ASIIN	--	04
6M060200– Информатика	Computer Science (Master of Natural Science)	ASIIN	--	04
5B060500-Ядролық физика	Nuclear Physics (Bachelor of Natural Science)	ASIIN	--	13
6M060500-Ядролық физика	Nuclear Physics (Master of Natural Science)	ASIIN	--	13
Date of the contract: June 12th 2013 **Submission of the final version of the self-assessment report:** February 12th 2015 **Date of the onsite visit:** May 27th-28th 2015 **at:** Eurasian National University named after L.N. Gumilyov, 2 Satpayev Str., Astana Republic of Kazakhstan				

[1] ASIIN Seal for degree programmes

[2] TC: Technical Committee for the following subject areas: TC 04 – Informatics/Computer Science; TC 12 – Mathematics; TC 13 – Physics.

Peer panel: Prof. Dr. Friedrich Hoyler, University of Applied Sciences Aachen; Jörg Krüger, Putz & Partner Consulting Hamburg; Prof. Dr. Volker Mammitzsch, University of Marburg; Prof. Dr. Michael Müller-Preußker, Humbold University Berlin; Prof. Dr. Jürgen Nolting, University of Applied Sciences Aalen; Prof. Dr. Thomas Ottmann, University of Freiburg i.Brsg.;	
Representative of the ASIIN headquarter: Dr. Alexander Weber	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of 10.05.2005 ASIIN General Criteria, as of 04.12.2014 Subject-Specific Criteria of Technical Committee 04 – Informatics as of 09.12.2011 Subject-Specific Criteria of Technical Committee 12 – Mathematics as of 09.12.2011 Subject-Specific Criteria of Technical Committee 13 – Physics as of 09.12.2011	

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

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Mathematics	Bachelor of Natural Science	--	6	Full time	--	4 years/8 semester	240 ECTS	Annually 1st September/2004
Mathematics	Master of Natural Science	--	7	Full time	--	2 years/4 semester	120 ECTS	Annually 1st September/2006
Computer Science	Bachelor of Natural Science	--	6	Full time	--	4 years/8 semester	240 ECTS	Annually 1st September/2004
Computer Science	Master of Natural Science	--	7	Full time	--	2 years/ 4 semester	120 ECTS	Annually 1st September/2003
Nuclear Physics	Bachelor of Natural Science	--	6	Full time	--	5 years/10 semester	300 ECTS	Annually 1st September/2004
Nuclear Physics	Master of Natural Science	--	7	Full time	--	2 years/4 semester	120 ECTS	Annually 1st September/2007

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

According to the website of the Faculty of Mechanics and Mathematics the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Mathematics:

The objectives of EP 5B060100 – Mathematics is to prepare comprehensively educated, skilled and competitive specialist with fundamental knowledge in Mathematics, capable to realize the professional abilities.

The following **curriculum** is presented:

Academic degree: «Bachelor of natural sciences on specialty 5B060100 – Mathematics»

Term of study: 4 years

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle of discipline	RK credits	ECTS	Lec/sem/wor/lab	Self study	Type of final control
SEMESTER 1										
General compulsory modules										
	HIST11001	History of Kazakhstan	HK 1101	History of Kazakhstan	GCD CC	3	5	2/1/0/0	6	SE
	CSSE11005	Computer Science	CS 1102	Computer Science	GCD CC	3	5	1/0/0/2	6	exam
	KAZK11104 (RUSS)11104	Kazakh (Russian) language	K(R)L 1106	Kazakh (Russian) language 1	GCD CC	3	5	0/0/3/0	6	exam
	ENGL11103 GRMN11103	Foreign language	FL 1108	Foreign language 1	GCD CC	3	5	0/0/3/0	6	exam
Compulsory modules										
	MATH12021	Mathematical analysis-1	MA 1203	Mathematical analysis-1	BD CC	3	5	2/0/1/0	6	exam
	MATH12022	Analytical geometry	AG 1205	Analytical geometry	BD CC	3	5	2/0/1/0	6	exam
Additional education										
	PhCS14114	Physical education	PhE 1401	Physical education	AE	2		0/0/2/0		differentiated offset
Total on theoretical training						**18**	**30**			
Total on semester 1						**20**	**30**			

SEMESTER 2										
General compulsory modules										
	POLS11008	Political Science	PS 1110	Political Science	GCD CC	2	3	1/1/0/0	4	exam
	ECOL11006	Ecology and sustainable development	ESD 1105	Ecology and sustainable development	GCD CC	2	3	1/0/1/0	4	exam
KAZK11104 (RUSS)11104 Kazakh (Russian) language	KAZK11204 (RUSS)11204	Kazakh (Russian) language	K(R)L 1106	Kazakh (Russian) language 2	GCD CC	3	5	0/0/3/0	6	exam
ENGL11103 GRMN11103 Foreign language	ENGL11203 GRMN11203	Foreign language	FL 1108	Foreign language 2	GCD CC	3	4	0/0/3/0	6	exam
	LFST11011	Basics of life safety	BLS 1103	Basics of life safety	GCD CC	2	4	1/0/1/0	4	exam
Compulsory modules										
MATH12021 Mathematical analysis-1	MATH12023	Mathematical analysis-2	MA 1204	Mathematical analysis-2	BD CC	4	6	2/0/2/0	8	exam
	MATH12024	Basics of algebra	BA 1206	Basics of algebra	BD CC	3	4	2/0/1/0	6	exam
Additional education										
	PhCS14215	Physical education	PhE 1402	Physical education	AE	2		0/0/2/0		differentiated offset
	EDIN14025	Educational practice	EP 1403	Educational practice	AE	2	1			report
				Total on theoretical training		**19**	**29**			
				Total on semester 2		**23**	**30**			
SEMESTER 3										
General compulsory module										
	ECON11009	Basics of Economic theory	BETh 2107	Basics of Economic theory	GCD CC	2	3	1/1/0/0	4	exam
Compulsory modules										

	KAZK22012 (RUSS)22012	Professional Kazakh (Russian) languages	PK(R)L 2201	Professional Kazakh (Russian) languages	BD CC	2	3	0/0/2/0	4	exam
MATH12023 Mathematical analysis-2	MATH22026	Ordinary differential equations	ODE 2207	Ordinary differential equations	BD CC	3	5	2/0/1/0	6	exam
Professional compulsory modules										
MATH12023 Mathematical analysis-2	MATH23027	Mathematical analysis-3	FMV 2208	Functions of many variables	BD EC	3	5	2/0/1/0	6	complex exam
			DCFMV 2209	Differential calculus of functions of many variables		3	5	2/0/1/0	6	
MATH12023 Mathematical analysis-2	PHYS23028	Physics	Phys 2210	Physics	BD EC	3	5	2/0/0/1	6	exam
CSSE11005 Computer Science	COMP23029	Programming languages	PL 2211	Programming languages	BD EC	3	4	2/0/0/1	6	exam
Additional education										
	PhCS14116	Physical education	PhE 2404	Physical education	AE	2		0/0/2/0		differentiated offset
				Total on theoretical training		**19**	**30**			
				Total on semester 3		**21**	**30**			
SEMESTER 4										
General compulsory modules										
	LAWS11010	Basics of law	BL 2109	Basics of law	GCD CC	2	3	1/1/0/0	4	exam
	PHIL11002	Phylosophy	Phyl 2111	Phylosophy	GCD CC	3	4	2/1/0/0	6	exam
	SOCY11007	Sociology	Sol 2104	Sociology	GCD CC	2	4	1/1/0/0	4	exam
Compulsory modules										
	ENGL22013 GRMN22013	Professionally-oriented foreign language	PFFL 2202	Professionally-oriented foreign language	BD CC	2	3	0/0/2/0	4	exam
MATH12023 Mathematical analysis-2	MATH32030	Probabilities theory and mathematical statistics	PThMS 2301	Probabilities theory and mathematical statistics	PD CC	3	5	2/0/1/0	6	exam

Professional compulsory module										
MATH12023 Mathematical analysis-2	MATH23031	Real analysis	RA 2212	Real analysis	BD EC	3	5	2/0/1/0	6	exam
Elective module - 1 (choose one)					PD EC	4	6		8	
	MATH13032	Workshop on the solution of problems	MSOP 2303	Methods of the solution of olimpiad problems		2	3	0/0/2/0	4	complex exam
			MSNsP 2304	Methods of the solution of non-standard problems		2	3	0/0/2/0	4	
MATH12022 Analytical geometry	MATH23033	General questions of axiomatics	FG 2303	Foundations of Geometry		2	3	1/0/1/0	4	complex exam
			PG 2304	Projective geometry		2	3	1/0/1/0	4	
Additional education										
	PhCS14217	Physical education	PhE 2405	Physical education	AE	2		0/0/2/0		differentiated offset
Total on theoretical training						**19**	**30**			
Total on semester 4						**21**	**30**			
SEMESTER 5										
Compulsory module										
MATH23027 Mathematical analysis-3	MATH42034	Functional analysis	FA 3302	Functional analysis	PD CC	2	3	1/0/1/0	4	exam
Professional compulsory modules										
MATH12023 Mathematical analysis-2	MATH33035	Theory of functions of complex variables	ThFCV 3305	Theory of functions of complex variables	PD EC	3	5	2/0/1/0	6	exam
MATH12024 Basics of algebra MATH12021 Mathematical analysis-1	MATH33036	Modern basics of School Mathematics	MBSM 3213	Modern basics of School Mathematics	BD EC	3	5	2/0/1/0	6	exam
Elective module - 2 (choose one)					PD EC	4	7		8	
MATH12022 Analytical geometry	MATH23037	Differential geometry and topology	DGT 3306	Differential geometry and topology		4	7	2/0/2/0	8	exam

MATH12024 Basics of algebra. CSSE11005 Computer Science	MATH23038	Methods of calculations	MV 3306	Methods of calculations		4	7	2/0/0/2	8	exam
Elective module - 3 (choose one)					BD EC	6	10		12	
MATH22026 Ordinary differential equations	MATH33039	Variational calculus and methods of optimization	VC 3214	Variational calculus		3	5	2/0/1/0	6	complex exam
			MO 3215	Methods of optimization		3	5	2/0/1/0	6	
MATH12024 Basics of algebra	MATH33040	Discrete mathematics and mathematical logic	DM 3214	Discrete mathematics		3	5	2/0/1/0	6	complex exam
			ML 3215	Mathematical logic		3	5	2/0/1/0	6	
Additional education										
	PhCS14118	Physical education	PhE 3406	Physical education	AE	4		0/0/4/0		differentiated offset
Total on theoretical training						**18**	**30**			
Total on semester 5						**22**	**30**			

SEMESTER 6										
Professional compulsory modules										
MATH23027 Mathematical analysis-3 MATH22026 Ordinary differential equations.	MATH43041	Equations of mathematical physics and numerical methods of their decision	EMPh 3216	Equations of mathematical physics	BD EC	3	5	2/0/1/0	6	complex exam
			NMSPMPh 3217	Numerical methods of the solution of problems of mathematical physics		2	4	1/0/0/1	4	
MATH42034 Functional analysis	MATH43042	Selected chapters of the theory of functions	TO 3307	The theory of operators	PD EC	3	5	2/0/1/0	6	complex exam
			TGF 3308	The theory of generalized functions		3	5	2/0/1/0	6	
Elective module - 4 (choose one)					PD EC	4	6		8	
			RPDE 3309	Regional problems for the differential equations		2	3	1/0/1/0	4	

MATH12023 Mathematical analysis-2 MATH22026 Ordinary differential equations.	MATH33043	Analytical and numerical methods of the solution of the differential equations	NMSDE 3310	Numerical methods of the solution of the differential equations		2	3	1/0/0/1	4	complex exam
MATH12024 Basics of algebra	MATH33044	Algorithmic questions of algebra	AMR 3309	Arithmetic modules and rings		2	3	1/0/1/0	4	complex exam
			ILA 3310	Introduction in Li-algebra		2	3	1/0/1/0	4	
Elective module - 5 (choose one)					BD EC	3	5		6	
MATH42034 Functional analysis	MATH33045	Finite-dimensional analysis	FDA 3218	Finite-dimensional analysis		3	5	2/0/1/0	6	exam
MATH42034 Functional analysis	MATH33046	The theory of the linear integral equations	TLIU 3218	The theory of the linear integral equations		3	5	2/0/1/0	6	exam
Additional education										
	PhCS14219	Physical education	PhE 3407	Physical education	AE	2		0/0/2/0		differentiated offset
Total on theoretical training						**18**	**30**			
Total on semester 6						**20**	**30**			

SEMESTER 7										
Elective module - 6 (choose one)					BD EC	6	10		12	
MATH42034 Functional analysis	MATH33047	Additional chapters of the theory of series	OS 4219	The orthogonal series		3	5	2/0/1/0	6	complex exam
			TFS 4220	The trigonometrical series		3	5	2/0/1/0	6	
			FSG 4219	Final solvable groups		3	5	2/0/1/0	6	compl

MATH12024 Basics of algebra	MATH33048	The chosen questions of the theory of groups	IThGA 4220	Introduction in the theory of groups of automorphisms		3	5	2/0/1/0	6	ex exam
Elective module - 7 (choose one)					BD EC	6	10		12	
MATH32030 Probability theory and mathematical statistics	MATH33049	Mathematics in economy	E 4221	Econometrics		3	5	2/0/1/0	6	complex exam
			AFM 4222	Actuarial and financial mathematics		3	5	2/0/1/0	6	
MATH12024 Basics of algebra COMP23029 Programming languages	MATH33050	Mathematical foundations of information security	ThNAE 4221	Number theory and algo-rithms for the encrypt		3	5	2/0/1/0	6	complex exam
			MBC 4222	Mathematical bases of cryptography		3	5	2/0/1/0	6	
Elective module - 8 (choose one)					PD EC	6	10		12	
MATH42034 Functional analysis	MATH33051	Additional chapters of the functional analysis	FS 4311	Functional spaces		3	5	2/0/1/0	6	complex exam
			OFS 4312	Operators in Functional Spaces		3	5	2/0/1/0	6	
MATH32030 Probability theory and mathematical statistics	MATH33052	Mathematical modeling	EMM 4311	Economic-mathematical modeling		3	5	2/0/1/0	6	complex exam
			LPThG 4312	Linear programming and theory of games		3	5	2/0/1/0	6	
Additional education										
	PhCS14020	Physical education	PhE 4408	Physical education	AE	2		0/0/2/0		differentiated offset
Total on theoretical training						**18**	**30**			
Total on semester 7						**20**	**30**			

SEMESTER 8							
	Additional education						

	TEEX34053	Teaching practice	TP 4409	Teaching practice	AE	5	6		5	report
	PREX44054	Industrial practice	IP 4410	Industrial practice	AE	2	6		8	report
	PWIN44055	Prediploma practice	PdP 4411	Prediploma practice	AE	2	6		8	report
Final attestation										
	STEM44056	State examination on the major			FA	1	4		6	SE
	DBDD44057	Writing and defence of the diploma thesis			FA	2	8		12	Defence of the diploma thesis
	Total on semester 8					**12**	**30**			
	Total of theoretical training					**129**	**209**			
	Total to MEP					**159**	**240**			

According to the website of the Faculty of Mechanics and Mathematics the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Mathematics

The objectives of EP 6M060100 – Mathematics is to prepare highly skilled Masters possessing in-depth scientific and pedagogical knowledge, capable on science base to carry the professional working in mathematics.

The following **curriculum** is presented:

Academic degree: Master of Science degree in Mathematics

Term of study: 2 years

Prerequisites: Mathematical analysis - III (3 RK cr. / 5 ECTS), Differential Equations (2 RK cr. / 3 ECTS)

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle of discipline	RK credits	ECTS	Lec/sem/wor/lab	Self study	Type of final control
SEMESTER 1										
Compulsory modules										
	PHIL 52001	History and philosophy of science	HPhS 5201	History and philosophy of science	BD/CC	2	4	1\1\0\0	4	exam
	ENGL 52002	Foreign language (professional)	FL 5202	Foreign language (professional)	BD/CC	2	4	0\0\2\0	4	exam
Mathematical analysis 3	MATH 53003	Mathematical analysis on manifolds and stochastic analysis	MAMSA 5301	Mathematical analysis on manifolds and stochastic analysis	PD/CC	2	3	1\0\1\0	4	exam
Professional compulsory modules										
Differential Equations	MATH 53004	Differential equations, mathematical physics and numerical methods of its solutions	DEMPhNMS 5302	Differential equations, mathematical physics and numerical methods of its solutions	PD/EC	2	3	1\0\1\0	4	exam
Elective module-1 (choose one)					BD/EC	4	6		8	
Mathematical analysis 3	MATH 52005	Linear and nonlinear analysis in finite-dimensional space	LNAFDS 5203	Linear and nonlinear analysis in finite-dimensional space	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52006	The theory of finite-dimensional operators	ThFDO 5203	The theory of finite-dimensional operators	BD/EC	4	6	2\0\2\0	8	exam
Differential equations	MATH 52007	Boundary value problems for differential equations	BVPDE 5203	Boundary value problems for differential equations	BD/EC	4	6	2\0\2\0	8	exam

Mathematical analysis 3	MATH 52008	Hilbert space methods	HSM 5203	Hilbert space methods	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52009	Trigonometric Fourier series and Fourier transform	TFSFT 5203	Trigonometric Fourier series and Fourier transform	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52010	Discrete space and the basic inequalities in them	DSBIT 5203	Discrete space and the basic inequalities in them	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52011	Topological vector spaces	TVS 5203	Topological vector spaces	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52012	Haar and Walsh series	HWS 5203	Haar and Walsh series	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52013	Lie algebra	LA 5203	Lie algebra	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52014	Universal Algebra	UA 5203	Universal Algebra	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52015	The general theory of integration	GThI 5203	The general theory of integration	BD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 52016	Measure and integral	MI 5203	Measure and integral	BD/EC	4	6	2\0\2\0	8	exam
Elective module-2 (choose one)					PD/EC	4	6		8	
Mathematical analysis3	MATH 53017	Theory of metric spaces	ThMS 5303	Theory of metric spaces	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53018	Methods of functional analysis	MFA 5303	Methods of functional analysis	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53019	Additional chapters of the theory of operators	AChThO 5303	Additional chapters of the theory of operators	PD/EC	4	6	2\0\2\0	8	exam
Differential equations	MATH 53020	Linear differential operators	LDO 5303	Linear differential operators	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53021	Transformations of type Hardy and Bellman	THB 5303	Transformations of type Hardy and Bellman	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53022	Inequalities in function spaces	IFS 5303	Inequalities in function spaces	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53023	Elements of the theory of generalized functions	EThGF 5303	Elements of the theory of generalized functions	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53024	Singular integrals	SI 5303	Singular integrals	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53025	Automorphisms of free algebras	AFA 5303	Automorphisms of free algebras	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53026	Application of the theory of lattices in formal con-cept analysis	AThLFCA 5303	Application of the theory of lattices in formal concept analysis	PD/EC	4	6	2\0\2\0	8	exam

Mathematical analysis 3	MATH 53027	Algebraic theory of numbers in problems of recovery	AThNPR 5303	Algebraic theory of numbers in problems of recovery	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 53028	Von Neumann algebra	VNA 5303	Von Neumann algebra	PD/EC	4	6	2\0\2\0	8	exam
Additional education										
	SRWG 52129	Research, including the implementation of the master's thesis (NIRM)			AE	1	4		7	report
Total on theoretical trai ing						**16**	**26**			
Total on semester 1						**17**	**30**			

SEMESTER 2										
Compulsory modules										
	EDUC 52030	Pedagogics	Ped 5204	Pedagogics	BD/CC	2	3	1\1\0\0	4	exam
	PSYC 52031	Psychology	Psi 5205	Psychology	BD/CC	2	3	1\1\0\0	4	exam
Elective module-3 (choose one)					PD/EC	8	12		16	
Mathematical analysis 3	MATH 53032	Weighted inequalities and the theory of linear operators	ThLO 5304	Theory of linear operators	PD/EC	4	6	2\0\2\0	8	exam
			HTIA 5305	Hardy-type inequality and its applications	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53033	Functional and qualitative research methods operators	WDI 5304	Weight differential inequalities	PD/EC	4	6	2\0\2\0	8	exam
			QChSHSLE RE 5305	Qualitative characteristics of solutions of the homogeneous Sturm-Liouville equation and the Riccati equation	PD/EC	4	6	2\0\2\0	8	
Differential equations	MATH 53034	Singular and linear differential equations	SDE 5304	Singular differential equations	PD/EC	4	6	2\0\2\0	8	exam
			LEBS 5305	Linear equations in Banach space	PD/EC	4	6	2\0\2\0	8	
Differential equations, Mathematical analysis 3	MATH 53035	Functional methods for solving partial differential equations	ThFS 5304	Theory of functional spaces	PD/EC	4	6	2\0\2\0	8	exam
			PDE 5305	Partial differential equation	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53036	Fourier multipliers	ThM 5304	Theory of multipliers	PD/EC	4	6	2\0\2\0	8	exam
			OS 5305	Orthogonal series	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53037	Summability of multiple Fourier series	SMFS 5304	Summability of multiple Fourier series	PD/EC	4	6	2\0\2\0	8	exam
			HA 5305	Harmonic analysis	PD/EC	4	6	2\0\2\0	8	

Mathematical analysis 3	MATH 53038	Advanced course in the theory of measure	GCMT 5304	The general course of measure theory	PD/EC	4	6	2\0\2\0	8	exam
			SIF 5305	Space of integrable functions	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53039	Signal processing	OTSP 5304	The orthogonal transform and signal processing	PD/EC	4	6	2\0\2\0	8	exam
			ITSP 5305	Integral transforms and signal processing	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53040	Associative algebras and their automorphisms	ANA 5304	Associative rings and algebras	PD/EC	4	6	2\0\2\0	8	exam
			APR 5305	Automorphisms of polynomial rings	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53041	Lattice theory and algebraic systems	LTh 5304	Lattice Theory	PD/EC	4	6	2\0\2\0	8	exam
			AS 5305	Algebraic systems	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53042	Computer (computing) width	BCUNA 5304	The basic computational units of the numerical analysis	PD/EC	4	6	2\0\2\0	8	exam
			CD 5305	Computer (computing) width (for accurate information)	PD/EC	4	6	2\0\2\0	8	
Mathematical analysis 3	MATH 53043	Algebra C*	CA 5304	Commutative algebra	PD/EC	4	6	2\0\2\0	8	exam
			OA 5305	Operator algebras	PD/EC	4	6	2\0\2\0	8	
Additional education										
	SRWG 52229	Research, including the implementation of the master's thesis (NIRM)			AE	3	12		21	report
Total on theoretical training						**12**	**18**			
Total on semester 2						**15**	**30**			
SEMESTER 3										
Professional compulsory modules										
Mathematical analysis 3	MATH 63044	Modern problems of algebra and theory of management	MPAThM 6306	Modern problems of algebra and theory of management	PD/EC	2	3	1\0\1\0	4	exam
Elective module-4 (choose one)					PD/EC	4	6		8	
Mathematical analysis 3	MATH 63045	Conditions and limitations of integrated matrix operators	CLIMO 6307	Conditions and limitations of integrated matrix operators	PD/EC	4	6	2\0\2\0	8	exam

Mathematical analysis 3 Differential equations	MATH 63046	Elements of qualitative analysis semilinear second order differential equation	EQASSODE 6307	Elements of qualitative analysis semilinear second order differential equation	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63047	Weighted spaces of smooth functions	WSSF 6307	Weighted spaces of smooth functions	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63048	Separability theory operators	SThO 6307	Separability theory operators	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63049	Introduction to the theory of interpolation	IThI 6307	Introduction to the theory of interpolation	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63050	Fourier multipliers in Lorentz spaces	FMLS 6307	Fourier multipliers in Lorentz spaces	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63051	Weighted spaces intact and a fractional smoothness	WSIFS 6307	Weighted spaces intact and a fractional smoothness	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63052	Binary analysis	BA 6307	Binary analysis	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63053	Affine Algebraic Geometry	AAG 6307	Affine Algebraic Geometry	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63054	Minimum rings and modules	MRM 6307	Minimum rings and modules	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63055	Limit error of inexact information at optimum recovery (case of recovery the function)	LEIIOR 6307	Limit error of inexact information at optimum recovery (case of recovery the function)	PD/EC	4	6	2\0\2\0	8	exam
Mathematical analysis 3	MATH 63056	Matrix Analysis	MA 6307	Matrix Analysis	PD/EC	4	6	2\0\2\0	8	exam
Elective module-5 (choose one)					BD/EC	4	7	2\0\2\0	8	

Mathematical analysis 3	MATH 62057	Spaces with multiweighted derivatives and their properties	SMDP 6206	Spaces with multiweighted derivatives and their properties	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3 Differential equations	MATH 62058	Variational method of investigation of the oscillatory properties of half-linear differential equations of the second order	VMIOSPHLDESO 6206	Variational method of investigation of the oscillatory properties of half- linear differential equations of the second order	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62059	Spectral theory of linear operators	SThLO 6206	Spectral theory of linear operators	BD/EC	4	7	2\0\2\0	8	exam

Mathematical analysis 3	MATH 62060	Expansion and contraction of linear operators	ECLO 6206	Expansion and contraction of linear operators	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62061	Fourier series in the regular system	FSRS 6206	Fourier series in the regular system	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62062	Multivariable interpolation method and its application	MIMA 6206	Multivariable interpolation method and its application	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62063	Multipliers in weighted spaces of smooth functions	MWSSF 6206	Multipliers in weighted spaces of smooth functions	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62064	Series in multiplicative systems	SMS 6206	Series in multiplicative systems	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62065	Subalgebras of free algebras	SFA 6206	Subalgebras of free algebras	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62066	Universes theory	UT 6206	Universes theory	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62067	Reconstruction problem in classes of infinitely smooth functions	RPCISF 6206	Reconstruction problem in classes of infinitely smooth functions	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62068	Noncommutative space	NS 6206	Noncommutative space	BD/EC	4	7	2\0\2\0	8	exam
Elective module-6 (choose one)					BD/EC	4	7		8	
Mathematical analysis 3	MATH 62069	Properties of semi-bounded operators	PSBO 6207	Properties of semi-bounded operators	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3 Differential equations	MATH 62070	Oscillatory second order differential equations	OSODE 6207	Oscillatory second order differential equations	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3 Differential equations	MATH 62071	General boundary value problems for partial differential equations	GBVPPDE 6207	General boundary value problems for partial differential equations	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62072	Modern methods of the theory of elliptic equations	MMThEEN6207	Modern methods of the theory of elliptic equations	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62073	Classes of multipliers in the trigonometric system	CMTS 6207	Classes of multipliers in the trigonometric system	BD/EC	4	7	2\0\2\0	8	exam

Mathematical analysis 3	MATH 62074	Generalized Morrey spaces and their applications	GMSA 6207	Generalized Morrey spaces and their applications	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62075	The general theory of function spaces	GThFS 6207	The general theory of function spaces	BD/EC	4	7	2\0\2\0	8	exam

Mathematical analysis 3	MATH 62076	Orthogonal polynomials	OP 6207	Orthogonal polynomials	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62077	Galois theory	GTh 6007	Galois theory	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62078	Conceptual analysis	CA 6207	Conceptual analysis	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62079	Limiting errors by inexact information for the discretization of PDE solutions	LEIIDPDES 6207	Limiting errors by inexact information for the discretization of PDE solutions	BD/EC	4	7	2\0\2\0	8	exam
Mathematical analysis 3	MATH 62080	Additional chapters of the theory of integrals	AChThI 6207	Additional chapters of the theory of integrals	BD/EC	4	7	2\0\2\0	8	exam
Additional education										
	TEIN 62081	Teaching Practice			AE	3	3		3	report
	SRWG 62182	Research, including the implementation of the master's thesis (NIRM)			AE	1	4		7	report
Total on theoretical training						**14**	**23**			
Total on semester 3						**18**	**30**			
SEMESTER 4										
Additional education										
	REEX 62083	Research Practice			AE	3	12		21	report
	SRWG 62282	Research, including the implementation of the master's thesis (NIRM)			AE	2	8		14	report
Final attestation										
	CXEM 62084	Complex exam			FA	1	3		6	SE
	DMDT 62085	Writing and defence of master's thesis			FA	3	7		18	Defence of master's thesis
Total on semester 4						**9**	**30**			
Total of theoretical training						**42**	**67**			
Total to MEP						**59**	**120**			

According to the website of the Faculty of Information Technology the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Computer Science

The objectives of EP 5B060200 – Computer Science is to prepare comprehensively educated, skilled and competitive specialists with fundamental knowledge in Computer science, capable to realize the professional abilities.

The following **curriculum** is presented:

Academic degree: Bachelor of science in specialty 5B060200 – «Computer science»

Specialization: Programming, Computational Linguistics, Software Engineering

Term of study: 4 years

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle and component	RK credits	ECTS	Lec/sem/wor/lab	Self study	Type of final
2	3	4	5	6	7	8	9	10	11	12
I-SEMESTER										
General compulsory modules										
	HIST11001	The history of Kazakhstan	HK 1101	The history of Kazakhstan	GCD/CC	3	5	2/1/0/0	6	SE
	KAZK 11102 RUSS 11102	Kazakh (Russian) language	K(R)L1102	Kazakh (Russian) language 1	GCD/CC	3	5	0/0/3/0	6	exam
	COMS11003	Informatics	INF 1103	Informatics	GCD /CC	3	5	1/0/0/2	6	exam
	SOCY11004	Sociology	Soc 1104	Sociology	GCD/CC	2	4	1/1/0/0	4	exam
Compulsory modules										
	MATH 12005	Analytic Geometry and Linear Algebra	AGLA 1201	Analytic Geometry and Linear Algebra	BD / CC	3	6	1/0/2/0	6	exam
	MATH 12006	Mathematical analysis	MA 1202	Mathematical analysis	BD / CC	3	5	1/0/2/0	6	exam

Module of choice that goes beyond qualification (choose one)					GCD/EC	**2**			**4**	
	RELS 14007	Religious	Rel 1401	Religious	GCD/EC	2		1/1/0/0	4	exam
	EAST 14008	Eurasianism: Theory and Practice	ETP 1401	Eurasianism: Theory and Practice	GCD/EC	2		1/1/0/0	4	exam
Aditional education										
	PhCS14109	Physical culture	PhC 1402		AE	2				differen
Total theoretical training						**19**	**30**			
Total for 1 semester						**21**	**30**			
2-SEMESTER										
General compulsory modules										
KAZK 11102 RUSS 11102 Kazakh (Russian) language 1	KAZK 11202 RUSS 11202	Kazakh (Russian) language	K(R)L1105	Kazakh (Russian) language 2	GCD/CC	3	5	0/0/3/0	6	exam
	ECOL11010	Environment and Sustainable Development	ESD 1106	Environment and Sustainable Development	GCD/CC	2	3	1/0/1/0	4	exam
	LFST11011	Principles of Life Safety	PLS 1107	Principles of Life Safety	GCD/CC	2	4	1/0/1/0	4	exam
Compulsory modules										
COMS11003 Informatics	COMS12012	Algorithms and Data Structures	ADS 1203	Algorithms and Data Structures	BD / CC	3	6	1/0/0/2	6	exam
Elective module 1 (select one)					BD/ EC	**6**	**10**		**12**	
MATH12006 Mathematical analysis	MATH13013	The theory of probability and mathematical statistics	PT 1301	Probability theory		3	5	1/0/2/0	6	complex exam
			MS 1302	Mathematical Statistics		3	5	1/0/2/0	6	
MATH12006 Mathematical analysis	COMS13014	Optimization Methods and operations research	OM 1301	Optimization Methods		3	5	1/0/2/0	6	complex exam
			OR 1302	Operations research		3	5	1/0/2/0	6	
Aditional education										
	EDIN12015	Educational Practice	EP 1204		AE	4	2			report
	PhCS14209	Physical culture	PhC 1403		AE	2				differen
Total theoretical training						**16**	**28**			
Total for 2 semester						**22**	**30**			
3-SEMESTER										

General compulsory modules										
	POLS21016	Political science	PolS 2108	Political science	GCD/CC	2	3	1/1/0/0	4	exam
	ENGL21117 GRMN21117 FREN 21117	Foreign Language	FL 2109	Foreign Language 1	GCD/CC	3	5	0/0/3/0	6	exam
	ECON21018	Foundations of Economic Theory	FET 2110	Foundations of Economic Theory	GCD/CC	2	3	1/0/1/0	4	exam
Compulsory modules										
KAZK 11202 RUSS 11202 Kazakh (Russian) language 2	KAZK22019 RUSS22019	Professional Kazakh (Russian) language	PK(R)L 2205	Professional Kazakh (Russian) language	BD / CC	2	3	0/0/2/0	4	exam
COMS12012 Algorithms and Data Structures	COMS22020	Languages and Software Engineering	LSE 2206	Languages and Soft-ware Engineering	PD / CC	3	4	1/0/0/2	6	exam
MATH12006 Mathematical analysis	MATH22021	Differential Equations	DE 2207	Differential Equations	BD / CC	2	3	1/0/1/0	4	exam
Elective module 2 (select one)					BD / EC	**2**	**3**		**4**	
COMS11003 Informatics	COMS23122	Computer systems	ACS 2303	The architecture of computer systems	BD/ EC	2	3	1/0/1/0	4	exam, course work
COMS11003 Informatics	COMS23123	Operating Systems	TOS 2303	Theory of operating systems	BD/ EC	2	3	1/0/1/0	4	exam, course work
Elective module 3 (select one)						**4**	**6**		**8**	
COMS12012 Algorithms and Data Structures	COMS23024	The theory of algorithms	AA 2304	Analysis of Algorithms	BD/ EC	2	3	1/0/1/0	4	complex exam
			SA 2305	Synthesis of Algorithms	BD/ EC	2	3	1/0/1/0	4	
COMS12012 Algorithms and Data Structures	COMS23025	Discrete programming	TAGA 2304	Theory of algorithms and graph algorithms	BD/ EC	2	3	1/0/1/0	4	complex exam
			PD 2305	Programming of discrete algorithms	BD/ EC	2	3	1/0/1/0	4	
Aditional education										

	PhCS24125	Physical culture	PhC 2404		AE	2				differen
Total theoretical training						**20**	**30**			
Total for 3 semester						**22**	**30**			
4-SEMESTER										
General compulsory modules										
	PHIL21026	Philosophy	Phil 2111	Philosophy	GCD/CC	3	4	2/1/0/0	6	exam
ENGL 21117 GRMN 21117 FREN 21117 Foreign Language 1	ENGL21217 GRMN21217 FREN21217	Foreign Language	FL 2112	Foreign Language 2	GCD/CC	3	4	0/0/3/0	6	exam
	LAWS21027	Foundations of Law	FL 2113	Foundations of Law	GCD/CC	2	3	1/1/0/0	4	exam

Compulsory modules										
ENGL 21117 GRMN 21117 FREN 21117 Foreign Language 1	ENGL22028 GRMN22028 FREN22028	Professionally-oriented foreign language	POFL 2208	Professionally-oriented foreign language	BD / CC	2	3	0/0/2/0	4	exam
COMS 12012 Algorithms and Data Structures	COMS 22029	Theory of Languages and Automata	TLA 2209	Theory of Languages and Automata	BD / CC	3	4	1/0/2/0	6	exam
MATH 12005 Analytic geometry and linear algebra	MATH22030	Discrete Mathematics	DM 2210	Discrete Mathematics	BD / CC	2	3	1/0/1/0	4	exam
Elective module 4 (select one)					BD / EC	**3**	**4**		**6**	
COMS 23122 Computer Systems	COMS 23222	Computer systems	OS 2306	Operating Systems	BD/ EC	3	4	1/0/2/0	6	exam
COMS 23123 Operating Systems	COMS23223	Operating Systems	DOS 2306	Design of operating systems	BD/ EC	3	4	1/0/2/0	6	exam
Elective module 5 (select one)					BD / EC	**3**	**4**		**6**	
COMS 22020 Languages and Software Engineering	COMS 23131	Programming in machine-oriented language	PA 2307	Programming in Assembler	BD/ EC	3	4	1/0/1/1	6	exam, course work
COMS 22020 Languages and Software Engineering	COMS 23132	Programming problem-oriented language	JP 2307	Java-programming	BD/ EC	3	4	1/0/1/1	6	exam, course work

COMS 22020 Languages and Software Engineering	COMS 23133	Programming a symbolic processing	LProg 2307	Logic programming	BD/ EC	3	4	1/0/1/1	6	exam, course work
Aditional education										
	EDIN22034	Educational Practice	EP 2211		AE	2	1			report
	PhCS24225	Physical culture	PhC 2405		AE	2				differen
Total theoretical training						**21**	**29**			
Total for 4 semester						**25**	**30**			
5-SEMESTER										
Compulsory modules										
COMS12012 Algorithms and Data Structures	COMS32035	Database Theory	DT 3212	Database Theory	PD / CC	2	3	1/0/0/1	4	exam
Elective module 6 (select one)						**3**	**4**		**6**	
MATH22030 Discrete Mathematics	COMS33136	Mathematical logic	LP 3308	Logic of predicates	BD/ EC	3	4	1/0/2/0	6	exam
LProg 2307 Logic programming	COMS33137	Systems of artificial intelligence	MBAI 3308	Mathematical bases of artificial intelligence	BD/ EC	3	4	1/0/2/0	6	exam
Elective module 7 (select one)					BD/ EC	**3**	**5**		**6**	
COMS23131 Programming in machine-oriented lan-guage	COMS33231	Programming in machine-oriented language	ProgP 3309	Programming of processors		3	5	1/0/1/1	6	exam
COMS23132 Programming problem-oriented language	COMS33232	Programming problem-oriented language	MEW 3309	Manager and experts workstation		3	5	1/0/1/1	6	exam
COMS23133 Programming a symbolic processing	COMS33233	Programming a symbolic processing	ProcProg 3309	Procedural programming		3	5	1/0/1/1	6	exam
Elective module 8 (select one)					BD/ EC	**3**	**5**		**6**	
COMS22029 Theory of Languages and Automata	COMS33138	Neural networks	TNN 3310	The theory of neural networks		3	5	1/0/2/0	6	exam
COMS22029 Theory of Languages and Automata	COMS33139	Semantic networks	TSN 3310	The theory of semantic networks		3	5	1/0/2/0	6	exam
COMS22029 Theory of Languages and Automata	COMS33140	Petri Nets	TPN 3310	Theory of Petri Nets		3	5	1/0/2/0	6	exam
Elective module 9 (select one)					PD / EC	**2**	**3**		**4**	
COMS22029 Theory of Languages and Automata	COMS33141	Language processors	LE3311	Language editors		2	3	1/0/0/1	4	exam, course work

COMS22029 Theory of Languages and Automata	COMS33142	Translators	Int 3311	Interpreters		2	3	1/0/0/1	4	exam, course work
Elective module 10 (select one)					BD/ EC	**6**	**10**		**12**	
COMS11003 Informatics	COMS33043	Information Security	ISS 3312	Information Security Standards		3	5	1/0/2/0	6	complex exam
			RAIS 3313	Risk assessment of information security		3	5	1/0/2/0	6	
COMS11003 Informatics	COMS33044	Software and hardware-based security	SBS 3312	Software-based security		3	5	1/0/1/1	6	complex exam
			HBS 3313	Hardware-based security		3	5	1/0/2/0	6	
Aditional education										
	PhCS34145	Physical culture	PhC 3406		AE	4				differen
Total theoretical training						**19**	**30**			
Total for 5 semester						**23**	**30**			
6-SEMESTER										
Elective module 11 (select one)					PD / EC	**3**	**4**		**6**	
COMS33141 Language Processors	COMS33241	Language processors	LA 3314	Language analyzers		3	4	1/0/0/2	6	exam
COMS33142 translators	COMS33242	Translators	Comp 3314	Compilers		3	4	1/0/0/2	6	exam
Elective module 12 (select one)					BD/ EC	**3**	**5**		**6**	
COMS33138 Neural networks	COMS33238	Neural networks	PR 3315	Pattern recognition		3	5	1/0/1/1	6	exam
COMS33139 Semantic networks	COMS33239	Semantic networks	SS 3315	Simulation Software		3	5	1/0/1/1	6	exam
COMS33140 Petri Nets	COMS33240	Petri Nets	PM 3315	Parallel modeling		3	5	1/0/1/1	6	exam

Elective module 13 (select one)					BD/ EC	**5**	**7**		**10**	
COMS11003 Informatics	COMS33046	Computer graphics	2DG 3316	Two-dimensional graphics		2	3	1/0/0/1	4	complex exam
			3DG 3317	Three-dimensional graphics		3	4	1/0/0/2	6	
COMS12012 Algorithms and Data Structures	COMS33047	Application Packages	PSMP 3316	Packages to solve mathematical problems		2	3	1/0/0/1	4	complex exam
			PDIP 3317	Packages Digital Image Processing		3	4	1/0/0/2	6	

Elective module 14 (select one)					BD/ EC	**3**	**4**		**6**	
COMS33136 Mathematical logic	COMS33236	Mathematical logic	AS 3318	Axiomatic system		3	4	1/0/2/0	6	exam
COMS33137 Systems of artificial intelligence	COMS33237	Systems of artificial intelligence	ES 3318	Expert systems		3	4	1/0/0/2	6	exam
Elective module 15 (select one)					BD/ EC	**3**	**5**		**6**	
COMS22020 Languages and Software Engineering	COMS33148	Web - Technology	WD 3319	Web design		3	5	1/0/0/2	6	exam
COMS22025 Theory of Languages and Automata	COMS33149	Speech Technologies	DSP 3319	Digital signal processing		3	5	1/0/0/2	6	exam
Aditional education										
	INEX32050	Industrial Practice	IP 3213		AE	2	5		8	report
	PhCS34245	Physical culture	PhC 3407		AE	2				differen
Total theoretical training						**17**	**25**			
Total for 6 semester						**21**	**30**			
7-SEMESTER										
Elective module 16 (select one)					PD / EC	**6**	**10**		**12**	
COMS32035 Database Theory	COMS43051	Systems Management Information Systems	CIS 4320	Corporate Information Systems		3	5	1/0/0/2	6	complex exam
			POEDT 4321	Persistent objects and extended database technology		3	5	1/0/0/2	6	
COMS32035 Database Theory	COMS43052	Database Management Systems	ND 4320	The network databases		3	5	1/0/0/2	6	complex exam
			POEDT 4321	Persistent objects and extended database technology		3	5	1/0/0/2	6	
Elective module 17 (select one)					PD / EC	**3**	**5**		**6**	
COMS22020 Languages and Software Engineering	COMS43248	Web - Technology	WD 4322	Web Development		3	5	1/0/1/1	6	exam, course work
COMS22025 Theory of Languages and Automata	COMS43249	Speech Technologies	SRS 4322	Speech recognition and synthesis		3	5	1/0/1/1	6	exam, course work

Elective module 18 (select one)					PD / EC	**5**	**7**		**10**	
COMS22020 Languages and Software Engineering	COMS43053	Information technology standards	SITS 4323	Systems of information technology standards	PD / EC	2	3	1/0/1/0	4	complex exam
			SMPA 4324	Standards and method-ology for project as-sessment	PD / EC	3	4	1/0/2/0	6	
COMS22029 Theory of Languages and Automata	COMS43054	Natural language processing	LProc 4323	Linguistic processors	PD / EC	2	3	1/0/1/0	4	complex exam
			ISRS 4324	Information retrieval systems	PD / EC	3	4	1/0/2/0	6	
Elective module 19 (select one)					PD / EC	**5**	**8**		**10**	
COMS22020 Languages and Software Engineering	COMS43055	Software development tools and user interface	SDT 4325	Software development tools	PD / EC	2	3	1/0/0/1	4	complex exam
			DUI 4326	Development the User Interface	PD / EC	3	5	1/0/1/1	6	
COMS22020 Languages and Software Engineering	COMS43056	Software development tools and language interfaces	DTSSI 4325	Development tools of software with speech interface	PD / EC	2	3	1/0/0/1	4	complex exam
			LI 4326	Language interfaces	PD / EC	3	5	1/0/1/1	6	
Aditional education										
	PhCS44057	Physical culture	PhC 4408		AE	2				differen
				Total theoretical training		**19**	**30**			
				Total for 7 semester		**21**	**30**			
8-SEMESTER										
Aditional education										
	INEX42058	Industrial Practice	IP 4214		AE	2	6		8	report
	PWIN42059	Pre-diploma practice	PP 4215		AE	4	12		16	report
Final state attestation										
	STEM42060	Public examinations in the specialty				1	4		6	SE
	DBDD42061	Writing and defense of the diploma thesis				2	8		12	defence the diploma thesis
				Total for 8 semester		**9**	**30**			

Total theoretical training		**131**	**202**			
Total, modular educational program		**164**	**240**			

According to the website the website of the Faculty of Information Technology the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Computer Science

The objectives of EP 6M060200-Computer Science is to prepare highly skilled Masters possessing in-depth scientific and pedagogical knowledge, capable on science base to carry the professional working in Computer Science.

The following **curriculum** is presented:

Academic degree: Master of Natural Sciences in speciality 6M060200-«Computer Science» Term of study: 2 years
Prerequisites: Algoritms and data structure (3 cr. RK / 5 ECTS), Programming languages and technologies (3 cr. RK / 5 ECTS), Theory of languages and automata (3 cr. RK / 5 ECTS)

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle of discipline	Quantity of credits RK	ECTS credits	Lec/sem/pr/lab	SSL	Form of the control
2	3	4	5	6	7	8	9	10	11	12
1st semester										
Compulsory modules										
Philosophy	PHIL 52001	Science history and phylosophy	SHPh 5201	Science history and phylosophy	BD CC	2	4	1/1/0/0	4	exam
Foreign language	ENGL 52002	Foreign language (professional)	FL5202	Foreign language (professional)	BD CC	2	4	0/0/2/0	4	exam
Elective module-1 (choose one)					**BD EC**	**6**	**10**		**12**	
Algoritms and data structure	COMS 52005	Models and assessments of algorithms complexity	MAS 5205	Models of algorithms specification		3	5	1/0/2/0	6	exam
			AAC 5206	Assessment of algorithms complexity		3	5	1/0/2/0	6	
Systems of artificial intelligence	COMS 52005	Computer logic	PL 5205	Probabilistic logic		3	5	1/0/2/0	6	exam
			FL 5206	Fuzzy lofic		3	5	1/0/2/0	6	
Object-oriented programming	COMS 52005	Programming paradigms	POOP 5205	Procedural and object oriented programming		3	5	1/0/2/0	6	exam

			FLP 5206	Functional and logical programming		3	5	1/0/2/0	6	
Elective module-2 (choose one)					**BD EC**	**2**	**4**		**4**	
Foundations of Information Security	COMS 52006	Cryptology	Cy 5207	Cryptology		2	4	1/0/1/0	4	exam
Systems of artificial intelligence	COMS 52006	Intellectual systems	IS 5207	Intellectual systems		2	4	1/0/1/0	4	exam
Algoritms and data structure Mathematical analysis	COMS 52006	Computer methods of static analysis and forecasting	CMSAF 5207	Computer methods of static analysis and forecasting		2	4	1/0/1/0	4	exam
Additional education										
	SRWG 52107	Research work of a student, including the implementation of the master's thesis	SRWG		AE	2	8		14	report
Total on theoretical training:						**12**	**22**			
Total on semester						**14**	**30**			
2 nd semester										
Compulsory modules										
	EDUC 52003	Pedagogics	Ped 5203	Pedagogics	BD CC	2	3	1/1/0/0	4	exam
	PSYC 52004	Psychology	Psy5204	Psychology	BD CC	2	3	1/1/0/0	4	exam
Programming languages and technologies	COMS 53001	Technologies of software development	TSD 5301	Technologies of software development	BD CC	2	3	1/0/1/0	4	exam
Elective module-3 (choose one)					**BD EC**	**4**	**6**		**8**	
Programming languages and technologies	COMS 52008	Methodology of information systems design technologies	MISDT 5208	Methodology of information systems design technologies		4	6	2/0/2/0	8	exam
Programming languages and technologies	COMS 52008	Multithreading programming	MP 5208	Multithreading programming		4	6	2/0/2/0	8	exam

Programming languages and technologies	COMS 52008	Working with XML on Java language	WXMLJL 5208	Working with XML on Java language		4	6	2/0/2/0	8	exam
Elective module-4 (choose one)					**PD EC**	**6**	**10**		**12**	
Theory of languages and automata	COMS 53002	Programs specification and verification	XS 5302	Programs specification		3	5	1/0/2/0	6	exam
			PV 5303	Programs verification		3	5	1/0/2/0	6	
Intellectual systems	COMS 53002	Natural languages formalization	OST 5302	Ontologies and semantic technologies		3	5	1/0/2/0	6	exam
			MMSR 5303	Modeling morphological and syntactic rules		3	5	1/0/2/0	6	
Functional and logical programming	COMS 53002	Symbolic processing languages	RPL 5302	Refal programming language		3	5	1/0/2/0	6	exam
			PPL 5303	Prolog programming language		3	5	1/0/2/0	6	
Additional education										
	SRWG 52207	Research work of a student, including the implementation of the master's thesis	SRWG		AE	1	5		7	report
					Total on theoretical training:	**16**	**25**			
					Total on semester	**17**	**30**			
3rd semester										
Elective module-5 (choose one)					**PD EC**	**4**	**6**		**8**	
Methodology of information systems design technologies	COMS 63003	Data analysis and processing in Natural Sciences	DADNS 6304	Data analysis and processing in Natural Sciences		4	6	2/0/2/0	8	exam
Algoritms and data structure	COMS 63003	Using theory of graphs in programming	UTGP6304	Using theory of graphs in programming		4	6	2/0/2/0	8	exam

Theory of languages and automata	COMS 63003	Automaton programming	AP 6304	Automaton programming		4	6	2/0/2/0	8	exam
Elective module-6 (choose one)					**PD EC**	**4**	**6**		**8**	
Systems of artificial intelligence	COMS63004	Semantic processing of texts	SPT 6305	Semantic processing of texts		4	6	2/0/2/0	8	exam
Object-oriented programming	COMS63004	Parallel and cloud computing	PCC 6305	Parallel and cloud computing		4	6	2/0/2/0	8	exam
Technologies of software development	COMS63004	Software development standards	SDS 6305	Software development standards		4	6	2/0/2/0	8	exam
Elective module-7 (choose one)					**PD EC**	**6**	**10**		**12**	
Object-oriented programming	COMS63005	Complex systems devel-opment technologies	RSDT 6306	Real systems development technology		3	5	1/0/2/0	6	exam
			DSDT 6307	Disrtibuted systems development tech-nology		3	5	1/0/2/0	6	
Natural language formalization Intel-lectual systems	COMS63005	Human-computer interface	OMUI 6306	Ontological modeling of user interface		3	5	1/0/2/0	6	exam
			DIUI 6307	Design and implemen-tation of user interface		3	5	1/0/2/0	6	
Object-oriented programmingTechnologies of software development	COMS63005	Visual designing	VDM 6306	Visual designing methodology		3	5	1/0/2/0	6	exam
			VDT 6307	Visual designing technologies		3	5	1/0/2/0	6	
Additional education										
	TEIN 62009	Teaching internship	TI		AE	3	5		3	report
	SRWG 62110	Research work of a student, including the implementation of the master's thesis	SRWG		AE	1	3		7	report
Total on theoretical training:						**14**	**22**			
Total on semester						**18**	**30**			

4th semester										
Additional education										
	RhIN 62011	Research internship	RI		AE	3	9		21	report
	SRWG 62210	Research work of a student, including the implementation of the master's thesis	SRWG		AE	3	11		21	report
Final state attestation										
	CXEM 62012	Complex exam	CE		FA	1	3		6	exam
	DMDT 62013	Registration and protection of his master's thesis	DMT		FA	3	7		18	defence of Masters thesis
					Total on semester	**10**	**30**			
					Total according to plan of theoretical training	**42**	**69**			
					Total on a program	**59**	**120**			

According to the website of the Department of Nuclear Physics, New Materials and Technologies the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Nuclear Physics:

The objectives of EP 5B060500 - Nuclear Physics is to prepare comprehensively educated, skilled and competitive specialists with fundamental knowledge in Nuclear physics, capable to realize the professional abilities.

The following **curriculum** is presented:

Faculty: Physics and Technology

Major: 5B060500 - Nuclear physics

Academic degree: Bachelor of Natural Science in the specialty «5B060500 - Nuclear physics»

Term of study: 5 years

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle and component	RK credits	ECTS	Lec/sem/wor/lab	Self study	Type of final
SEMESTER 1										
General compulsory modules										
	HIST 11001	History of Kazakhstan	HK 1101	History of Kazakhstan	GCD/CC	**3**	**5**	**2/1/0/0**	**6**	SE
	ENGL11103 GRMN 11103	Foreign Language	FL 1104	Foreign Language 1	GCD/CC	**3**	**4**	**0/0/3/0**	**6**	exam
	CSSE 11005	Computer Science	CS 1102	Computer Science	GCD/CC	**3**	**5**	**1/0/0/2**	**6**	exam
	KAZK11104 RUSS 11104	Kazakh (Russian) Language	K(R)L 1106	Kazakh (Russian) Language 1	GCD/CC	**3**	**5**	**0/0/3/0**	**6**	exam
	ECOL 11106	Ecology and sustainble development	ESD 1105	Ecology and sustained development	GCD/CC	**2**	**3**	**1/0/1/0**	**4**	exam
Compulsory module										
	MATH 12016	Mathematical analysis	MA 1201	Mathematical analysis	BD/CC	**3**	**4**	**1/0/2/0**	**6**	exam

Compulsory module										
	PHYS 12017	Mechanics	Meh 1201	Mechanics	BD/CC	**3**	**4**	**1/0/1/1**	**6**	exam
Additional education										
	PhCS 14114	Physical education	PhE 1401	Physical education	AE	**2**				differentiated offset
				Total over the theoretical training		**20**	**30**			
				Total on 1 semester		**22**	**30**			
SEMESTER 2										
General compulsory modules										
Kazakh (Russian) Language 1	KAZK 11204 RUSS 11204	Kazakh (Russian) Language	K(R)L 1106	Kazakh (Russian) Language 2	GCD/CC	**3**	**5**	**0/0/3/0**	**6**	exam
Foreign Language 1	ENGL 11203 GRMN 11203	Foreign Language	FL 2108	Foreign Language 2	GCD/CC	**3**	**5**	**0/0/3/0**	**6**	exam
	LFST 11011	Basics of life safety	BLS 1103	Basics of life safety	GCD/CC	**2**	**4**	**1/0/1/0**	**4**	exam
	POLS 11008	Political Science	Pol 2110	Political Science	GCD/CC	**2**	**3**	**1/1/0/0**	**4**	exam
Compulsory module										
Mechanics	PHYS 12018	Molecular physics	MPh 2208	Molecular physics	BD/CC	**3**	**6**	**1/0/1/1**	**6**	exam
Elective module - 1 (choose one)					**BD/EC**	**4**	**7**		**8**	
	NUCL13019	An introduction to specialty	IS 1211	An introduction to specialty		**4**	**7**	**2/0/2/0**	**8**	exam
	PHYS13020	An introduction to theoretical physics	IThPh 1212	An introduction to theoretical physics		**4**	**7**	**2/0/2/0**	**8**	exam
Additional education										
	PhCS 14214	Physical education	PhE 1402	Physical education	AE	**2**				differentiated offset
				Total over the theoretical training		**17**	**30**			
				Total on 2 semester		**19**	**30**			
SEMESTER 3										
General compulsory module										
	PHIL 21002	Philosophy	Phil 2111	Philosophy	GCD/CC	**3**	**4**	**2/1/0/0**	**6**	exam

Compulsory module										
Foreign Language 2	ENGL 22013 GRMN 22013	Professionally-oriented Foreign Language	POFL 2201	Professionally-oriented Foreign Language	BD/CC	**2**	**3**	**0/0/2/0**	**4**	exam
Compulsory module										
Mathematical analysis	PHYS 12020	Differential and integral equations	DIE 2207	Differential and integral equations	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam

Compulsory module										
Molecular physics	PHYS 22021	Electricity and magnetism	EM 2206	Electricity and magnetism	BD/CC	**3**	**5**	**1/0/1/1**		exam
Elective module - 2 (choose one)					**BD/EC**	**7**	**13**			
Mathematical analysis	MATH 13022	Applications of linear algebra and probability theory in physics	LAAG 2213	Linear Algebra and Analytic Geometry		4	8	2/0/2/0	8	complex exam
			ThPMS 2214	The theory of probability and mathematical statis-tics		3	5	1/0/2/0	6	
	MATH 13023	Basics of vector and tensor analysis of group theory	BVTA 2216	Basics of vector and tensor analysis		4	8	2/0/2/0	8	complex exam
			SGTh 2215	Symmetry and Group Theory		3	5	1/0/2/0	6	
Additional education										
	PhCS 14115	Physical education	PhE 2403	Physical education	AE	**2**				differentiated offset
			Total over the theoretical training			**18**	**30**			
Total on 3 semester						**20**	**30**			
SEMESTER 4										
General compulsory modules										
	SOCY 11007	Sociology	Soc 2110	Sociology	GCD/CC	**2**	**3**	**1/1/0/0**	**4**	exam
	LAWS 11010	Basics of law	BL 2109	Basics of law	GCD/CC	**2**	**3**	**1/1/0/0**	**6**	exam
	ECON 11009	Basics of Economic Theory	BETh 2108	Basics of Economic Theory	GCD/CC	**2**	**4**	**1/0/1/0**	**4**	exam
Compulsory module										

Kazakh (Russian) Language 2	KAZK 22012	Professional Kazakh (Russian) Language	PK(R)L 2202	Professional Kazakh (Russian) Language	BD/CC	**2**	**4**	**0/0/2/0**	**4**	exam
Compulsory module										
Mathematical analysis	MATH 22024	The theory of functions of a complex variable	ThFCV 2208	The theory of functions of a complex variable	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Electricity and magnetism	PHYS 22025	Optics	Opt 2209	Optics	BD/CC	**3**	**5**	**1/0/1/1**	**6**	exam
Compulsory module										
Differential and integral equations	PHYS 22026	Theoretical Mechanics	TM 2210	Theoretical Mechanics	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Additional education										
	EDEX 22027	Educational Practice	EP 2404	Educational Practice	AE	**2**	**1**		**4**	**report**
	PhCS 14215	Physical education	PhE 2404	Physical education	AE	**2**				differentiated
										offset
			Total over the theoretical training			**17**	**29**			
				Total on 4 semester		**21**	**30**			
SEMESTER 5										
Compulsory module										
Electricity and magnetism	PHYS 22028	Basic Electronics	BE 3212	Basic Electronics	BD/CC	**3**	**5**	**2/0/0/1**	**6**	exam
Compulsory module										
Optics	PHYS 22029	Atomic physics	APh 3213	Atomic physics	BD/CC	**3**	**5**	**1/0/0/2**	**6**	exam
Compulsory module										
The theory of functions of a complex variable	PHYS 22030	Methods of mathe-matical physics	MMPh3211	Methods of mathe-matical physics	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Electricity and magnetism	PHYS 22031	Electrodynamics	Ele 3214	Electrodynamics	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Elective module - 3 (choose one)					**BD/EC**	**6**	**10**		**12**	
Informatics	CSSE 13032	Programming and Computational Physics	PT 3213	Programming technology		3	5	1/0/0/2	6	complex exam
			CPh 3214	Computing Physics		3	5	1/0/0/2	6	
	CSSE 13033	Computer Physics	CGA 3215	Computer graphics and animation		3	5	1/0/0/2	6	

			BCPh 3216	Basics of Computer Physics		3	5	1/0/0/2	6	complex exam
Additional education										
	PhCS 14116	Physical education	PhE 3405	Physical education	AE	**4**				differentiated offset
			Total over the theoretical training			**18**	**30**			
				Total on 5 semester		**22**	**30**			
SEMESTER 6										
Compulsory module										
Atomic physics	NUCL22034	Introduction to the physics of atomic nucleus	IPhAN 3215	Introduction to the physics of atomic nucleus	BD/CC	**4**	**6**	**2/0/2/0**	**8**	exam
Compulsory module										
Differential and Integral Equations	PHYS22035	Quantum Mechanics	QM 3216	Quantum Mechanics	BD/CC	**4**	**6**	**2/0/2/0**	**8**	exam
Elective module - 4 (choose one)					**BD/EC**	**6**	**10**		**12**	
Optics	PHYS 23036	Nanochemistry	Ch 3217	Chemistry		3	5	2/0/0/1	6	complex exam
			IPhN 3118	Introduction to the physics of nanosystems		3	5	2/0/1/0	6	
	PHYS 23037	Modern problems of cosmology and astrophysics	IGC 3119	Introduction to gravitation and cosmology		3	5	2/1/0/0	6	complex exam
			A 3120	Astrophysics		3	5	2/1/0/0	6	
Elective module - 5 (choose one)					**BD/EC**	**5**	**8**		**10**	
Mathematical analysis	MATH 23038	Mathematical and computer modeling	NMMM 3223	Numerical methods and mathematical modeling		3	5	1/0/0/2	6	complex exam
			CSPhP 3224	Computer simulation of physical processes		2	3	1/0/0/1	4	
	MATH 23039	Theory of special generalized functions	CMMMPh 3225	Computing methods in modern mathematical physics		3	5	1/0/2/0	6	complex exam
			NSEMPh 3236	The numerical solution of the equations of mathematical physics		2	3	1/0/1/0	4	

Additional education										
	PhCS 14216	Physical education	PhE 3406	Physical education	AE	**2**				differentiated offset
				Total over the theoretical training		**19**	**30**			
				Total on 6 semester		**21**	**30**			
SEMESTER 7										
Compulsory module										
Quantum Mechanics	PHYS 22040	Basics of Thermodynamics and Statistical Physics	BThSPh 4217	Basics of Thermodynamics and Statistical Physics	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Introduction to the physics of atomic nucleus	NUCL 22041	Experimental Methods of Nuclear Physics	EMNPh 4301	Experimental Methods of Nuclear Physics	PD/CC	**3**	**5**	**2/0/0/1**	**6**	exam
Compulsory module										
Introduction to the physics of atomic nucleus	NUCL 32042	Nuclear physics at low energies	NPhLE 4302	Nuclear physics at low energies	PD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Elective module - 6 (choose one)					**BD/EC**	**4**	**6**			
Professionally-oriented Foreign Language	NUCL 33043	Foreign Language. Practice of speech and writing	FLPSW 4235	Foreign Language. Practice of speech and writing		**4**	**6**	**0/0/4/0**	**8**	exam
Professionally-oriented Foreign Language	NUCL 33044	Foreign Language. Practice of scientific and technical translation	FLPSTT 4236	Foreign Language. Practice of scientific and technical translation		**4**	**6**	**0/0/4/0**	**8**	exam
Elective module - 7 (choose one)					**PD/EC**	**5**	**9**		**10**	
Experimental Methods of Nuclear Physics	NUCL 33045	Physics of neutral and charged particles	APh 4243	Accelerator Physics		**3**	**5**	**2/0/1/0**	**6**	complex exam
			NPh 4244	Neutron Physics		**2**	**4**	**1/0/1/0**	**4**	
	NUCL 33046	Nanotechnology	BMT 4231	Basics of membrane technology		**3**	**5**	**2/0/0/1**	**6**	complex exam
			PPTM 4232	Preparation and properties of track membranes		**2**	**4**	**1/0/0/1**	**4**	
Additional education										

	PhCS 14117	Physical education	PhE 4407	Physical education	AE	**2**				differentiated offset
				Total over the theoretical training		**18**	**30**			
				Total on 7 semester		**20**	**30**			
SEMESTER 8										
Compulsory module										
Fundamentals of Thermodynamics and Statistical Physics	NUCL 22047	Condensed Matter Physics	CMPh 4218	Condensed Matter Physics	BD/CC	**3**	**5**	**1/0/0/2**	**6**	exam
Compulsory module										
Nuclear physics	NUCL 32048	Interaction between emission and substance	IES 4303	Interaction between emission and substance	BD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Nuclear physics	NUCL 32049	The structure of atomic nucleus	**SAN 4304**	The structure of atomic nucleus	PD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Elective module - 8 (choose one)					**PD/EC**	**9**	**15**			
Introduction to the physics of atomic nucleus	NUCL 33050	The theory of nuclear interactions	PhFI 4131	Physics of fundamental interactions		3	5	2/1/0/0	6	complex exam
			TANN 4132	The theory of atomic nuclei and nuclear models		3	5	2/1/0/0	6	
			STh 4133	Scattering theory		3	5	2/0/1/0	6	
Experimental Methods of Nuclear Physics	NUCL 33051	Applied Nuclear Physics	PFANPh 4139	Physical Principles of Applied Nuclear Physics		3	5	2/0/1/0	6	complex exam
			RS 4134	Radiation safety		3	5	2/1/0/0	6	
			PD 4235	Principles of dosimetry		3	5	2/0/1/0	6	
				Total over the theoretical training		**18**	**30**			
				Total on 8 semester		**18**	**30**			

SEMESTER 9
Compulsory module

The structure of atomic nucleus	NUCL 32052	The theory of nuclear reactions	ThNR 5305	The theory of nuclear reactions	PD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Experimental Methods of Nuclear Physics	NUCL 32053	Nuclear reactors and nuclear power	NRNP 5306	Nuclear reactors and nuclear power	PD/CC	**3**	**5**	**2/0/1/0**	**6**	exam
Compulsory module										
Experimental Methods of Nuclear Physics	NUCL 32054	Nuclear Radiation Detectors	NRD 5307	Nuclear Radiation Detectors	PD/CC	**3**	**5**	**2/0/0/1**	**6**	exam
Elective module - 9 (choose one)					**PD/EC**	**9**	**15**		**6**	
Nuclear physics	NUCL 33055	Modern condition of nuclear physics	HIPh 5243	Heavy-Ion Physics		**3**	**5**	**2/0/1/0**	**6**	complex exam
			RSHINRP 5244	Registration and spec-trometry of heavy ions and nuclear reaction products		**3**	**5**	**2/0/1/0**	**6**	
			EN 5245	Exotic nuclei		**3**	**5**	2/1/0/0	**6**	
Condensed Matter Physics	NUCL 33056	Radiation material science	CMNPh 5246	Condensed Matter and Nanosystem Physics		**3**	**5**	**2/0/1/0**	**6**	complex exam
			RSSPh 5247	Radiation solid state physics		**3**	**5**	**2/0/1/0**	**6**	
			HENM 5248	Hydrogen Energy and nanostructured materials		**3**	**5**	**2/0/1/0**	**6**	
				Total over the theoretical training		**18**	**30**			
Total on 9 semester						**18**	**30**			
SEMESTER 10										
Additional education										
	PREX 52057	Industrial practice	IP 5410	Industrial practice	AE	**4**	**12**		**16**	report
	PWIN 52058	Prediploma practice	PdP 5411	Prediploma practice	AE	**2**	**6**		**8**	report
Final attestation										
	STEM 52059	State examination on the major	SE	State examination on the major	**FA**	**1**	**4**		**6**	**SE**
	DBDT 52060	Writing and defence of the diploma thesis	WDDTh	Writing and defence of the diploma thesis	**FA**	**2**	**8**		**12**	**defence of the diploma**
Total on 10 semester						**9**	**30**			
Theoretical training						**163**	**269**			
Total over the modular educational program						**174**	**300**			

According to the website of the Department of Nuclear Physics, New Materials and Technologies the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Nuclear Physics:

The objectives of EP 6M060500- Nuclear Physics is to prepare highly skilled Masters possessing in-depth scientific and pedagogical knowledge, capable on science base to carry the professional working in Nuclear Physics.

The following **curriculum** is presented:

Faculty: Physics and Technology

Major: 6M060500 - Nuclear physics

Academic degree: Master of Natural Science in the specialty "6M060500 - Nuclear physics"

Term of study: 2 years

Prerequisites: The structure of atomic nucleus (3 cr.), Experimental methods of nuclear physics (3 cr.)

Prerequisites	Module code	Name of module	Discipline code	Name of discipline	Cycle and component	RK credits	ECTS	Lec/sem	Self study	Type of final
SEMESTER 1										
Compulsory modules										
	PHIL 52001	History and Philosophy of Science	HPhS 6201	History and Philosophy of Science	BD/CC	2	4	1/1/0/0	4	exam
	ENGL 52002	Foreign language (professional)	FL 6202	Foreign language (professional)	BD/CC	2	4	0/0/2/0	4	exam
The structure of atomic nucleus	NUCL 52005	Nuclear models	NM 6301	Nuclear models	PD/CC	2	4	1/0/1/0	4	exam
Elective module - 1 (choose one)										
The structure of atomic nucleus	NUCL 53006	Nuclear reactions with heavy ions	NRHI 5303	Nuclear reactions with heavy ions	PD/EC	4	7	2/0/2/0	8	exam
The structure of atomic nucleus	NUCL 53007	Reactions with neutrons and gamma rays	RNGR 5304	Reactions with neutrons and gamma rays	PD/EC	4	7	2/0/2/0	8	exam

Elective module - 2 (choose one)										
Experimental methods of nuclear physics	NUCL 52009	Formulation and carrying out experiments in nuclear physics	FCENPh 5302	Formulation and carrying out experiments in nuclear physics	PD/EC	4	7	2/0/2/0	8	exam
Experimental methods of nuclear physics	NUCL 52009	Detecting equipment and electronics of nuclear physical experiment	DEENPhE 5303	Detecting equipment and electronics of nuclear physical experiment	PD/EC	4	7	2/0/2/0	8	exam
Additional education										
	SRWG 52108	Research including the implementation of master's thesis (RWS)	RIIMTh	Research including the implementation of master's thesis (RWS)	AE	1	4		7	report
					Total over the theoretical training	**14**	**26**			
					Total on 1 semester	**15**	**30**			
SEMESTER 2										
Compulsory modules										
	PSYC 52003	Pedagogy	Ped 6203	Pedagogy	BD/CC	2	3	1/1/0/0	4	exam
	PSYC 52004	Psychology	Psy 6204	Psychology	BD/CC	2	3	1/1/0/0	4	exam
Elective module - 3 (choose one)										
Nuclear models	NUCL53010	Physics of heavy nuclei	SMThPN 5305	Statistical model and thermodynamical properties of nuclei	PD/EC	3	5	2/0/1/0	6	exam
			NF 5306	Nuclear fission	PD/EC	3	5	2/0/1/0	6	
Nuclear models	NUCL 53011	Radiation Physics	IRPhSRMS 5307	Introduction to radiation physics of solids and radiation material science	PD/EC	3	5	2/0/1/0	6	exam
			RCh 5308	Radiochemistry	PD/EC	3	5	2/0/1/0	6	
Elective module - 4 (choose one)										

Nuclear models	NUCL 53012	Nuclear astrophysics	CRPh 6309	Cosmic Ray Physics	PD/EC	3	5	1/0/2/0	6	exam
			NS 6310	Nucleosynthesis	PD/EC	3	5	2/0/1/0	6	
Nuclear models	NCPh 53013	Physics of Nuclear Reactions	NRThE 6311	Nuclear reactions at threshold energies	PD/EC	3	5	2/0/1/0	6	exam
			NRIE 6312	Nuclear reactions at intermediate energies	PD/EC	3	5	2/0/1/0	6	
Additional education										
	SRWG 52208	Research including the implementation of master's thesis (RWS)	RIIMTh	Research including the implementation of master's thesis (RWS)	AE	1	4		7	report
Total over the theoretical training						**16**	**26**			
Total on 2 semester						**17**	**30**			
SEMESTER 3										
Elective module - 5 (choose one)										
Nuclear models	NUCL53014	Methods and techniques of nuclear physics	MNPhE 6205	Methods of nuclear physical experiment	BD/EC	3	4	2/0/1/0	6	exam
			DTNE 6206	Devices and technique of nuclear experiment	BD/EC	3	5	2/0/1/0	6	
			APEDPPh 6208	The accumulation and processing of experimental data in particle physics	BD/EC	3	4	2/0/1/0	6	
			PDCR 6207	The problem of the detection of cosmic rays	BD/EC	3	5	2/0/1/0	6	
	NUCL 53015		CTSE 6209	Computer technologies in science and education	BD/EC	3	4	2/0/1/0	6	
			MSQ 6210	Modern science questions	BD/EC	3	5	2/0/1/0	6	

Nuclear models		Methodological basis of research	OPR 62101	Organisation and planning of research	BD/EC	3	4	2/0/1/0	6	exam
			FMN 6212	Levels and methods of research	BD/EC	3	5	2/0/1/0	6	
Additional education										
	SRWG 62117	Research including the implementation of master's thesis (RWS)	RIIMTh	Research including the implementation of master's thesis (RWS)	AE	3	12		21	report
Total over the theoretical training						**12**	**18**			
Total on 3 semester						**15**	**30**			

SEMESTER 4										
Additional education										
TEIN 62016	Teaching Practice	TP	Teaching Practices	AE	3	3		3	report	
RhEX 62018	Research Practice	RP	Research Practice	AE	3	9		21	report	
SRWG 62217	Research including the implementation of master's thesis (RWS)	RIIMTh	Research including the implementation of master's thesis (RWS)	AE	2	8		14	report	
Final attestation										
CXEM 62019	Complex exam	CE	Complex exam	FA	1	3		6	SE	
DMDT 62020	Writing and defence of the master's thesis (WDMTh)	WDMTh	Writing and defence of the master's thesis (WDMTh)	FA	3	7		18	Defence of master's thesis	
Total on 4 semes ter					**12**	**30**				
Total over the theoretical training p lan					**42**	**70**				
Total over the modular education al program					**59**	**120**				

C Peer Report for the ASIIN Seal

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- ENU – Self-Assessment Report, Chapter 2
- Description of specialities 5B060100 – Mathematics, 5M060100 – Mathematics (http://mmf.enu.kz/index.php?option=com_content&view=article&id=139:2013-02-19-18-16-17&catid=8:2011-07-08-10-12-30&Itemid=154&lang=en (June 7th 2015))
- Description of specialities 5B060200 – Computer Science, 6M060200 – Computer Science (http://fit.enu.kz/index.php?option=com_content&view=article&id=497%3A2014-09-30-05-41-47&catid=12%3A4&Itemid=148&lang=en (June 7th 2015))
- Decription of specialities 5B060500 – Nuclear Physics, 5M060500 – Nuclear Physics (http://ftf.enu.kz/index.php?option=com_content&view=article&id=362%3A2013-11-22-11-59-11&catid=9%3A2011-07-08-10-13-05&Itemid=38&lang=en (June 7th 2015))
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:

In the self assessment report and on the English web-pages of the respective departments the HEI presents the overall aims and learning objectives for each program under review. Thereby it uses a standard wording respectively for the bachelor- und master-programs though. According to this, the bachelor programs are meant to "prepare comprehensively educated, skilled and competitive specialists with fundamental knowledge [in the respective field of study], capable to realize the professional abilities". In contrast to that the master-programs should "prepare highly skilled Masters possessing in-depth scientific and pedagogical knowledge, capable on science base to carry professional working" in the specific specialization. The peers assess these aims and objectives to be rather generic and hardly meaningful. The specific academic qualification profiles of the respec-

tive programs remain unclear. Even though the English web-pages each list exemplarily professional fields graduates should be prepared to work in, distinct professional profiles aren´t visible either.

As a major consequence of the fact, that the overall objectives and specific profiles and approaches are not determined in a satisfactory manner, the curricular structure of the Computer Science and the Nuclear physics program appear at least on the first sight to a certain extend arbitrary (cf. Chapter 1.3.). Even if the respective curricular implementation ("modular educational programs") show a largely compliance with the respective ASIIN subject specific criteria (ibid.) the peers furthermore judge the overall objectives at the present state to be clearly not in line with these frameworks.

All in all the peers concluded that for each degree program under review the overall objectives and learning outcomes need to be elaborated in a more specific way. Thereby it is required that distinct academic and professional profiles are presented in a clear and comprehensible manner. These profiles and objectives finally need to be published in an official binding document and made easily accessible to the public.

Criterion 1.2 Name of the degree programme

Evidence:

- ENU – Self-Assessment Report, Chapter 1
- Speciality Classification for higher and postgraduate education in the Republic of Kazaksthan
- Faculty of Information Technology/For applicants (http://fit.enu.kz/index.php?option=com_content&view=article&id=81&Itemid=22 (June 7th 2015))

Preliminary assessment and analysis of the peers:
Educational level, profiles and names of the degree programs are set according to a digital and letter based classifier system prescribed by the Ministry of Education. As the teaching languages are mainly Russian and Kazakh the degree programs are named in these languages. The English translations 5B60100 Mathematics, 6M060100 Mathematics, 5B060500 Nuclear Physics and 6M060500 Nuclear Physics properly reflect the intended learning outcomes. That the name of the degree program 5B060200/5M06200-Информатика hasn´t been translated literally in "Informatics", but in "Computer Science" corresponds to the common English language usage. All the more the peers wonder that this translation obviously isn´t used consistently. On the web-page of the respective department the degree program is partially advertised as 5B060200/5M06200 – Informat-

ics. As in this context the English term “Informatics” can easily be misunderstood the peers strongly encourage the HEI to use “Computer Science” as standard translation.

Criterion 1.3 Curriculum

Evidence:

- ENU – Self-Assessment Report, Chapter 2
- ENU – Instruction Order of Statement Modular Educational Program
- Modular Educational Program 5B060100 – Mathematics
- Modular Educational Program 5B060200 – Computer Science
- Modular Educational Program 5B060500 – Nuclear Physics
- Modular Educational Program 6M060100 – Mathematics
- Modular Educational Program 6M060200 – Computer Science
- Modular Educational Program 6M069500 – Nuclear Physics
- Objective matrix of EP 5B060100 – Mathematics, 6M060100 – Mathematics
- Objective matrix of EP 5B060200 – Computer Science, 6M060200 – Computer Science
- Objective matrix of EP 5B060500 – Nuclear Physics, 6M069500 – Nuclear Physics
- Comparative Analysis 5B060100 – Mathematics
- Comparative Analysis 5B060200 – Computer Science
- Comparative Analysis 5B060500 – Nuclear Physics
- Comparative Analysis 6M060100 – Mathematics
- Comparative Analysis 6M060200 – Computer Science
- Comparative Analysis 6M069500 – Nuclear Physics
- Catalogue of Modular Education program for speciality EP 5B060100 – Mathematics
- Catalogue of Modular Education program for speciality EP 5B060200 – Computer Science
- Catalogue of Modular Education program for speciality EP 5B060500 – Nuclear Physics
- Catalogue of Modular Education program for speciality – EP 6M060100 – Mathematics
- Catalogue of Modular Education program for speciality – EP 6M060200 – Computer Science

- Catalogue of Modular Education program for speciality – EP 6M069500 – Nuclear Physics
- Audit-Interviews May 27th-28th 2015

Preliminary assessment and analysis of the peers:
In Kazakhstan the content of educational programs is to some extend (approximately 40%) prescribed by so called "model curricula" provided by the Ministry of Education. At ENU the curricula implementation of educational programs is governed by certain regulations. To ensure relevance with regard to the labour market an involvement of employers is required on a regular basis.

As primary and secondary education at schools in Kazakhstan only last 11 years it is comprehensible that educational-programs contain general-education subjects like history, sociology or economics as compulsory components. As regards the content these subjects are more or less detached from the chosen speciality. The peers learn that only the titles of the respective modules are prescribed by the model curricula, while the content related design lies in the responsibility of the HEI. As the students judge these courses partially to be irrelevant in terms of their real subject, the peers encourage the program-coordinators to better harmonize the general-education subjects with the content framework of the respective specialities (where possible and useful). In the economic related modules in the bachelor´s degree program Computer Science for example, it might be useful to set the focus more on questions of Business Administration than on Economics.

The HEI provides for each study program under review a module objective matrix. In terms of quality these matrices create conflicting impressions. The matrices for the bachelor and master Mathematics are reasonably useful. In comparison to that the ones for the Computer Science and Nuclear Physics program are predominant less meaningful. Claims like the module "semantic network" skills the students "in the use of semantic network" could hardly be seen as a part of a substantiated competence profile. Thus the peers feel vindicated that the HEI should urgently develop specific competence-profiles (cf. Chapter 1.1.). Without reference to these objective-matrices the HEI tries to prove the compliance with the respective ASIIN subject specific criteria by a comparative analysis. The allocation of competencies (literally) quoted from the ASIIN-documents to certain modules gives an impression that the curricula might match with the respective subject-specific framework.

In particular based on the respective module descriptions, the curricula are assessed as follows:

The educational program Mathematics sets the focus on analysis. Nevertheless it appears to be well substantiated in terms of an adequate impartment of subject related competencies.

The peers do not see how the bachelor´s and master´s degree programs Computer Science had been positioned within the fields of computing (computer science, software engineering, information technology, information systems, computer engineering) as recommended by professional societies like IEEE or ACM. Nevertheless the program coordinators stress that they are aware of and also try to adapt the respective international standards and categorizations. As the state obligatory classifiers of the Ministry of Education must be observed, these framework standards can´t be reflected consistently though. Once established by the former department of theoretical computer science also the present educational program has to pursue a comparatively pronounced theoretical approach. By focussing mainly on programming, computational linguistics and (at least partially) software engineering as well, it is the general aim of the HEI to educate students who are able to satisfy a country based demand for well educated experts in the field of computing. The peers learn that the training is indeed relevant for the labour market. The students feel well prepared for working life; most of them even start working in the professional field already during their studies. Even so in comparable study programs the technical side of computer science is significantly more visible the peers deem the overall approach of the educational program Computer Science comprehensible. In terms of the ASIIN subject specific criteria they determine that the curriculum of the bachelor does not contain a larger team project where the students have the chance to experience all phases of the software development cycle under the control of the HEI. Apart from that the curriculum is nevertheless *in principal* designed to cover all core subjects of computer science according to this framework. Most of the respective topics are spread over a huge section of elective courses though. Therefore the peers wonder whether it is ensured that all students *inevitably* get into contact with *all* core topics of computer science. All in all they see depending on the courses chosen the possibility of a significant lack of practical/application-orientation. They learn that the HEI is aware of this problem: Therefore the program coordinators try to guide the students' way through the elective sections by providing an in-depth guidance with specific recommendations. However, as significant parts of the core curriculum are regulated by state standards, a binding consideration of all disciplines required appears hardly possible. Regarding the demanded team project the HEI stresses that there are certain modules, where students get into contact with the different steps of a subject specific project management. In some courses relevant projects are set as prerequisites for the examination admission as well. An additional software project (e.g. as a specific module) is not provided in the state standards though. The

peers understand that significant changes of the structure of the curriculum aren´t easy to implement. Nevertheless they point out that for the award of the ASIIN seal the HEI has to ensure that the disciplines theoretical informatics/algorithms and data structures, data base and information systems, operating systems, communication systems, computer architecture, programming technology and software engineering are covered by all students *irrespective* from the individual course of study. As the explained course projects are reflected neither in the curriculum/syllabus nor in the module descriptions, the peers judge that the HEI furthermore has to proof that a team-project in software development is part of the study program as well.

The lay-out of the Nuclear Physics program appears to some extend "old-fashioned". The focus is set on questions of low energy experimental physics. Modern topics like basic quantum field theory or elementary particle physics are missing. A clear orientation on whether theoretical or experimental physics isn´t visible either. Finally the students hardly come into contact with the applied fields of Nuclear Physics: Radiation safety plays a limited part in the curriculum, other application areas like radiotherapy or environmental protection can´t be found elsewhere though. The peers assume there could be a demand for the latter on the Kazakh labour-market. Taking into account that a clear qualification profile isn´t recognizable either they wonder whether there is a need for a bachelor Nuclear Physics besides a standard Physics program. The HEI points out that the establishment of a separate study program in Nuclear Physics goes back to a widespread radiophobia in the 1990s. In this respect it was the general aim to pay more attention to the scientific research of peaceful nuclear engineering equipment. In comparison to the standard educational program in physics (that prepares primarily for the teaching profession) graduates of the Nuclear physics program should be enabled for high level scientific research or for the work in specific nuclear institutions. In comparison to the standard bachelor/master Physics the curriculum is characterized by a prolonged standard study period of ten (instead of eight) semesters, a detailed mathematics cycle, an in-depth dissemination of the theoretical background and a systematic familiarization with subject specific English. The peers learn that in this respect the structure of the curriculum still today is indeed aligned to current developments in the field of Nuclear Physics, at least on a national level: In Semipalatinsk there is a huge nuclear test site, whose activities are still focused on reactor working. Furthermore the nuclear research programme of ENU is closely linked to projects of the Russian research centre in Dubna. Thus the profile of the study program has been harmonized with these institutions and has taken the suggestions of expert societies of the Eurasian Region into account. Regarding the consideration of the application fields of Nuclear Physics the audit-team discovers that the elective section is strictly related to the needs of the regional job market: As the Astana Diagnostic

Centre, for example, declared a need for experts in the field of radiotherapy, the HEI integrated specific modules in the curriculum. Once this need was satisfied the respective modules had been replaced. All in all the peers come to the conclusion that the offer of a bachelor/master Nuclear Physics *besides* a standard bachelor/master in Physics is justified. To some extend the assumed orientation on outdated topics has been put into perspective as well. In the perspective of the Eurasian Region the curriculum seems to be suitable to educate Nuclear Physicists with competencies that match the needs of a regional job market. Nevertheless the peers think a sharpening of the profile would improve the quality of the study program under review. In so far they encourage the HEI to clearly decide for either an application- or a research-oriented approach. The HEI should further consider the needs of a broader national labour-market (e.g. TNORM in the oil and mining industry, environmental protection) as well as current international developments in the field of Nuclear Physics.

Criterion 1.4 Admission requirements

Evidence:

- ENU – Self Assessment Report, Chapter 2.5.
- ENU – Admission rules for Bachelor
- ENU – Admission rules for Master
- Audit-Interviews May 27th-28th 2015

Preliminary assessment and analysis of the peers:

The admission procedure for the bachelor as well as for the master programs is mostly governed by regulations issued by the Ministry of Education and conducted through a nationwide entry exam. Applicants for the bachelor programs under review have to pass exams in Kazakh and Russian language, History of Kazakhstan, Mathematics and Physics. Applicants for the master programs have to prove their knowledge in the chosen speciality as well as in a foreign language. According to the test results of the individual students, the Ministry of Education distributes grants. Those who pass the exam but stay below a predefined threshold score are entitled to start the respective bachelor or master at their own expense. The number of attempts is not limited, if an applicant fails in the first try, he/she can repeat the exam in the next year. With regards to the ASIIN criteria, the audit team considers admission standards and procedures to be adequately defined (mostly by regulations of the Kazakh Ministry of Education and Science) and beneficial to the achievement of programme learning outcomes. They ensure equality of entry qualifications to the required extent.

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

1.1. Objectives and learning outcomes

With its statement the HEI delivered for all study programs under review revised competence profiles. These profiles are published on the respective faculties´ websites. If these profiles are included in an official binding document (e.g. modular educational program) as well remains still unclear. All in all the revised competence profiles appear to be satisfactory: Distinct academic profiles are visible. Information about the professional fields graduates should be prepared to work in is provided as well. Moreover the competence profiles show a largely compliance with the specialist and social competences prescribed by the ASIIN-subject specific criteria of the technical committees 04 – Computer Science, 12 – Mathematics and 13 – Physics. Besides the still pending publication of the competence profiles in an official binding document the peers see no need for further action.

1.2. Translation of 5B060200/5M06200-Информатика

To clarify their intention the peers group emphasizes that in most languages the terms "Informatics" and "Computer Science" are indeed synonyms. However, in the English language the term "Computer Science" is used in a more specific way: Within the general field of "Informatics" "Computer Science" typically indicates a more theoretical approach. As the Bachelors and Masters Program at ENU pursue theoretical approach as well, the peers appreciate that the HEI is going to translate 5B060200/5M06200-Информатика consistently as "Computer Science". All in all they see no need for further action.

1.3. General education-subjects

The peers notice that the HEI declares the intention to better harmonize the general education subjects with the content framework of the respective specialties. Beneath a clearer orientation on the intended learning outcomes this measure should improve the students´ acceptance of the non-subject specific curricular content. In so far the peers encourage the HEI to further pursue this strategy. All in all they adhere to their former assessment and a respective recommendation.

1.3. Curriculum Bachelor Computer Science

The intention of the peers was not to question the overall approach of the degree programs Computer Science. Taking the additional information provided during the site visit into account they understood that the programs are oriented on the recommendations of international expert societies. That this orientation is partly limited by state obligatory standards wasn´t seen as a problem at all. Furthermore the peers acknowledged that the curriculum of the Bachelor is principally designed to cover all core subjects of computer

science according to the ASIIN subject specific criteria. Nevertheless the HEI was requested to proof that all students *mandatory* get into contact with all disciplines needed. In this respect the peers notice that the curriculum of the Bachelor apparently has been restructured. The revised "modular educational program" contains a number of compulsory elements that by then have been electives. The module descriptions published on the institutes´ website have been revised in this respect as well. The peers notice that meanwhile the modules Algorithms and Data Structures (2nd semester), Programming language and technologies (3rd semester), Computer System (including communication systems) (5th semester), Architecture of computer Systems (including operation systems) (5th semester), Database theory (5th semester), Software engineering (6th semester) and Software engineering 1 (including a workshop on software engineering (7th semester) have to be covered by all students. All in all they consider these structural changes to be sufficient. From their point of view the curriculum of the Bachelor Computer Science now corresponds for all students with the ASIIN subject specific criteria. In so far they see no need for further action.

1.4. Curriculum Bachelor/Master Nuclear Physics

The peers emphasise that their impression of the Bachelor/Master Nuclear Physics gained during the site visit was quite positive. They have no doubt that the study program is oriented on the needs of a regional labour market. In so far the peers stress, that it wasn´t their intention to criticise the overall approach of the study program. However, they are convinced that a sharpening of the profile including a reasonable consideration of current international developments in the fields of Nuclear Physics would further improve its quality.

The peers emphasise that their impression of the Bachelor/Master Nuclear Physics gained during the site visit was quite positive. They have no doubt that the study program is oriented on the needs of a regional labour market. In so far the peers stress, that it wasn´t their intention to criticise the overall approach of the study program. However, they are convinced that a sharpening of the profile including a reasonable consideration of current international developments in the fields of Nuclear Physics would further improve its quality. In this respect the peers notice, that the HEI apparently made a first step in the right direction: That within the curriculum of the Bachelor the subject "Modern problems of cosmology and astrophysics" has been replaced by the module "Nuclear medicine" is considered to be a useful change. That the modules "Introduction to the theory of quantized fields" and "Radiation medicine" were added to the Master´s curriculum seems to be reasonable as well. Nevertheless the peers still think that the profile of the Degree program Nuclear Physics should be revisited in the course of the re-accreditation. Therefore they adhere to their former assessment and a respective recommendation.

Taking the statement of the HEI into account the peers assess criterion 1 for all degree programs under review to be partly fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- ENU - Self-Assessment Report, Chapter 3
- Ministry of Education - Regulations on transfer and recovery of students (translated extract)
- Model Curriculum and Modular Educational Program 5B060100 – Mathematics
- Model Curriculum and Modular Educational Program 5B060200 – Computer Science
- Model Curriculum and Modular Educational Program 5B060500 – Nuclear Physics
- Model Curriculum and Modular Educational Program 6M060100 – Mathematics
- Model Curriculum and Modular Educational Program 6M060200 – Computer Science
- Model Curriculum and Modular Educational Program 6M069500 – Nuclear Physics
- Catalogue of Modular Education program for speciality EP 5B060100 – Mathematics
- Catalogue of Modular Education program for speciality EP 5B060200 – Computer Science
- Catalogue of Modular Education program for speciality EP 5B060500 – Nuclear Physics
- Catalogue of Modular Education program for speciality – EP 6M060100 – Mathematics
- Catalogue of Modular Education program for speciality – EP 6M060200 – Computer Science
- Catalogue of Modular Education program for speciality – EP 6M069500 – Nuclear Physics
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:

All study programs under review are modularized. To some extend structure and content are prescribed by the Ministry of Education. A so called “model curriculum” each provides the general structure and approximately 40% of the modules to be taught. On site of the university the development of the so called “modular educational programs” is comprehensively ruled. For all study programs under review the modularization generally appears to be accomplished: The modules are mostly a sum of teaching and learning whose contents are concerted.

The modularization of all programs is characterized by a comparatively strict system of binding prerequisites. Thus for most of the modules the successful completion of a previous teaching unit is mandatory. While in the educational program Mathematics these prerequisites seem to be useful in terms of a concerted learning progress, they appear in the other programs to some extend arbitrary. It is for example difficult to understand why in the bachelor Nuclear Physics “Optics” is set as a prerequisite for the module “Atomic Physics”. In this respect the peers assume that some of these prerequisites are unnecessary barriers for individual learning paths and thus hinder an effective and target-oriented study progress. In the course of the audit interviews the HEI offered more or less convincingly explanations for some of the prerequisites that had been questioned. Nevertheless the peers deem it useful to verify the module related prerequisites in terms of content related necessity.

Each “modular educational program” encompasses differently pronounced elective sections that allow students to define an individual focus and (at least to some extend) an individual course of study. The peers learn that the selection process is prepared and accompanied by information events and an in-depth guidance. The students confirm that these general conditions ensure a useful and target oriented compilation of the respective study sections. Given a certain number of students is reached a later change of an elective course is moreover possible. As discussed above the elective section of the bachelor Computer Science nevertheless entails the risk of a content-related one-sided education and should be generally reconsidered (cf. chapter 1.3.). The audit-team furthermore discovers that the elective sections are obviously subject of rapid change. Strictly related to employers demands per term up to 20% of these courses may be replaced. The provided two year old transcripts illustrate the consequence of this practice: A considerable number of modules doesn´t match with the present curricula anymore (cf. as well ibid.). As a precaution the peers point out that according to the ASIIN procedure rules those modifications are during the accreditation period as long justified as they match with the overall learning objectives (that yet have to be elaborated, cf. chapter 1.1.). Every modification that affects the overall learning objectives (e.g. a new main focus

or specialisation option) just like the general study conditions will be assessed as a "significant change" and has to be reported to the agency.

The curricula include different forms of internships as compulsory elements (cf. Chapter 2.4.). These internships are carefully supervised by the HEI. For the ones that are fulfilled outside the university the students usually can refer to agreements and structured cooperations between the departments and certain companies and institutions. Furthermore each chair assigns a coordinator who is competent for the quality assurance in terms of relevance, content and structure.

The recognition of qualifications gained from other institutions of higher education, in particular abroad, is determined by regulations of the Ministry of Education as well as by rules set by the HEI. The specific process at ENU remains nevertheless largely unclear: During the site visit the peers only learned that on national level only students from other "national universities" may change to ENU and that the recognition of qualifications is conducted on the basis of educational curricula and transcripts. As Kazakhstan is member of the European Higher Education Area (EHEA) the peers wonder whether these rules are compatible with the Lisbon Convention. In this respect the HEI has to prove that the recognition of qualifications takes place competence based (i.e. not an unsoiled quantification of credits may be taken into account). If competences obtained elsewhere cannot be recognized the HEI is moreover obliged to provide a transparent explanation.

Criterion 2.2 Work load and credits

Evidence:

- ENU - Self-Assessment Report, Chapter 3.2.
- ENU - Position about the order of reoffset credits on the type of ECTS
- Catalogue of Modular Education program for speciality EP 5B060100 – Mathematics
- Catalogue of Modular Education program for speciality EP 5B060200 – Computer Science
- Catalogue of Modular Education program for speciality EP 5B060500 – Nuclear Physics
- Catalogue of Modular Education program for speciality – EP 6M060100 – Mathematics
- Catalogue of Modular Education program for speciality – EP 6M060200 – Computer Science
- Catalogue of Modular Education program for speciality – EP 6M069500 – Nuclear Physics

- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:
Since 2003/04 the students´ workload at ENU is measured in a national credit point system. Since 2011 Kazakh credits and ECTS points are used both in parallel. The general standards for the use of ECTS points as well as the rules for the transition of national credits in ECTS points are fixed by the Ministry of Education ("Rules of Organization of educational process according to the credit technology of education") and implemented by the HEI ("Position about the order of reoffset credits on the type of ECTS in ENU"). According to the normative provisions ECTS points are used "for providing academic mobility of student and confession [sic!] of the educational programs (…) in European educational space" and are a "unit of labor-intensiveness of study of discipline, both on audience employments and during independent work". As the Kazakh credit-system uses different metrics for certain types of educational work the conversion factor for the transition of national credits in ECTS points differs. At Eurasian National University not only a range of 25 to 30 hours equals one ECTS point (by 30 ECTS-points per semester) but the calculated (fractional) values are also rounded which makes the transition additionally difficult to understand. Nevertheless the peers judge the use of ECTS-points to be at least in line with the provisions of the ECTS-Users guide. The peers discover and appreciate that on a national level there are certain discussions whether the national credit system should be completely replaced by the European credit transfer system.

All in all the students consider the estimated time budgets in all study programs under review to be realistic. The workload is reviewed on a regular basis through the course evaluations. The students stress that moreover shortcomings can be reported to the teachers, to the heads of departments or the science conference at any time (cf. Chapter 2.4).

In all study programs under review the drop-out-rate is significantly low. Furthermore program coordinators, teachers and students confirm that graduation is mostly achieved in the standard period of time. From the point of view of all participants this can be explained by a strong country-based competition for the Masters-places. Additionally, retests have to be paid for, hence, in terms of study success the students are highly motivated.

Criterion 2.3 Teaching methodology

Evidence:

- ENU – Self-Assessment Report, Chapter 3.3.
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:
The HEI uses different teaching methods and instruments to support the students in achieving the intended learning outcomes. While lectures are used to impart the theoretical foundations of the respective topics, so called "workshops" are meant to deepen the basics knowledge by solving concrete tasks. The didactical design of these "workshops" differs depending on the respective study program (e.g. solving of arithmetical problems, lab work or program development).

In terms of teaching methods it is remarkable that the curricula include different forms of "practices" as compulsory elements. The so called "educational practice" takes place in the 4th bachelor semester in the universities departments. During two weeks the students should strengthen their achieved theoretical knowledge by practical activities. The "teaching practices" is fulfilled during five weeks in the 8th bachelor semester and is meant to give the students insights in the teaching activities of primary and secondary schools. The "industrial practice" (bachelor) respectively "research practice" (master) finally should prepare the students for their final thesis. Usually based on agreements between the departments and companies or research institutions the students spend five weeks in the host facility to find a topic for their final project.

Major parts of the programs under review are offered in Russian and Kazakh in parallel. With their enrolment the students opt for one language. While most of the basic courses are taught in the language chosen, later study sections are given mainly in Russian. The peers learn and appreciate that certain modules (mainly in the Nuclear Physics program) are given in English as well. This complies with the general aim of the HEI to continuously enhance the English skills of students and teachers; especially the number of teachers who are able to read lectures in English should be significantly increased step by step. This purpose is supported by the university´s own centre for bilingual education, where students and teachers, for example, can pass internationally accepted language exams like TOEFL. The peers encourage the HEI to continue in this direction and constantly increase the English skills of students and teachers.

The study programs under review are at least to some extent connected with the respective faculties´ research activities. The departments maintain scientific schools. The results of their research activities are integrated in the educational process of the Masters´ programs in terms of elective modules. The Master Programs furthermore each include research internships as compulsory components. The peers finally learn that capable students are encouraged for proceeding scientific activities (like participation in conferences).

Criterion 2.4 Support and assistance

Evidence:

- ENU – Self-Assessment Report, Chapter 3.4.
- ENU – Procedure Teaching process
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:

From its very beginning, the educational process at ENU is characterized by a structured and established system of support and advice. The adaption to the system of higher education is supported by a so called supervisor. The supervisor accompanies new students during their first year. Apart from administrative questions (as organization of the educational process) the supervisor assists the students on a personal level as well. In addition the so called advisor fosters the students´ academic development throughout the entire educational period. This does not only include continuous course guidance but also a kind of scientific supervision. The peers get the impression that the university strives to create a climate of openness in general: The students confirm that in case of problems all teachers and even the heads of the departments are approachable. But also on the administrative level there are certain facilities students can appeal to: The department of international cooperation for example helps with the organization of semesters abroad. The department of social and civil development finally supports the students´ self-development on a non-subject-specific level.

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

2.1. Module related prerequisites in the Bachelor/Master Computer Science and the Bachelor/Master Nuclear Physics

The peers notice that the HEI has taken their recommendation into account and yet verified the module related prerequisites in terms of content related necessity. Significantly less modules require prerequisites. The remaining prerequisites seem to be well balanced with the content of the respective module. All in all the peers see no need for further action.

2.1. Transfer of credits:

The peers notice and appreciate that the rules for a transfer of credits are now clearly published on the universities website. According to this qualifications are recognized if the learning outcomes/competences correspond to at least 80% with those of the module that should be replaced. If the compliance is between 50 and 80% the student is sup-

posed to retake the exam at ENU. The peers see that the recognition of qualifications is apparently not based on an unsoiled quantification of credit points and thus can be estimated as competence oriented. While the Lisbon-Convention as the relevant legal framework in this point is fulfilled, the HEI still has to set rules for the case that the recognition of qualifications obtained outside ENU has to be rejected. The peers stress that in that case the HEI is obliged to provide a transparent explanation.

2.3. Teaching methodology – Improvement of the teaching staffs language skills

The peers learn that the HEI apparently already spends several efforts to improve the English skills of both students and teachers. Free language courses should motivate the staff to give more teaching units in this foreign language. The peers deem this approach very useful. In so far they encourage the HEI to follow up this way. The peers adhere to their former assessment and a respective recommendation.

Taking the statement of the HEI into account the peers judge criterion 2 for all study programs under review to be partly fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- ENU – Self-assessment report, Chapter 4
- ENU – Regulations on control and assessment of academic achievements of learners
- Catalogue of Modular Education program for speciality EP 5B060100 – Mathematics
- Catalogue of Modular Education program for speciality EP 5B060200 – Computer Science
- Catalogue of Modular Education program for speciality EP 5B060500 – Nuclear Physics
- Catalogue of Modular Education program for speciality – EP 6M060100 – Mathematics
- Catalogue of Modular Education program for speciality – EP 6M060200 – Computer Science
- Catalogue of Modular Education program for speciality – EP 6M069500 – Nuclear Physics

- Audit-Interviews May 27th-28th

Preliminary assessment and analysis of the peers:
At ENU the organization of examination is legally binding laid down in the "regulations on control and assessment of academic achievements of learners". According to this each module assessment includes three different parts: (1) a current control of the independent work of students, (2) a "boundary control" after seven weeks and (3) the examination at the end of the lecture period. Within the university the examinations are organized centrally in a period of at least two weeks. To ensure sufficient time of preparation there are one to three free days between the respective exams. Students who failed exams have the possibility to repeat them in the summer session immediately following the semester. In principal, the number of attempts is not limited. However retake-exams are fee-based. Final attestations are held as state examinations in the respective specialty and each include a final thesis with colloquium. The final thesis can be conducted in the industry. The peers learn that also in this case the HEI vouches for its quality in terms of relevance and content (cf. Chapter 2.4.).

Students assess the number and duration of examinations to be adequate. This corresponds to the fact that failure rates in all study programs under review are significantly low. The students furthermore stress that the examination system at ENU is fair. The valuation standards are transparent. If a student feels unjustly treated he/she can appeal against the examination results. The peers learn that in the past those complaints have been effective. Students for example report about a case, in which an examination has been repeated with another teacher. That the prerequisites in the educational programs Computer Science and Nuclear Physics may possibly impede an individual study progress has been already discussed above (cf. Chapter 2.1.).

The peers learn that the HEI uses in all study programs under review different forms of examination. Even in the bachelor programs the oral form is usually used beside written examinations. In some courses the assessment is based on a multiple choice computer test. On the occasion of the site visit the peers had the opportunity to assess a selection of module examinations and final projects. They judge that the inspected works meet the bachelor respectively the masters level and are well harmonized with the expected learning outcomes.

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

The peers judge criterion 3 for all study programs under review to be completely fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- ENU – Self-Assessment Report, Chapter 5.1.
- Staff Handbook EP 5B060100 – Mathematics, EP 6M060100 – Mathematics
- Staff Handbook EP 5B060200 – Computer Science, EP 6M060200 – Computer Science
- Staff Handbook EP 5B060500 Nuclear Physics, EP 6M060500 – Nuclear Physics
- Audit-Interviews May 27th-28th

Preliminary assessment and analysis of the peers:
Staff involved in the teaching activities is listed in the self assessment report and the respective staff handbooks. In terms of quantity as well as quality the staffing level appears to be suitable to sustain the respective degree programs. Selective gaps in terms of content are reasonable closed by visiting professors even from abroad. With the view of a close labour market orientation the students regret, that visiting lecturers from the professional practice are barely represented. The peers share this opinion and encourage the HEI to generally increase the number of (if possible English speaking) visiting lecturers from the professional practice.

The ratio between teaching and research activities is fixed and depends on the respective academic rank. While there are positions that are only dedicated to teaching, an assistant professor, for example, is obliged to give three to five contact hours per week only. Even if the time budget spent for the students´ supervision is considered only partially, the teachers confirm that the overall workload is well-balanced and allows enough time for research activities. This is not at least underpinned by the fact that teachers from all study programs under review usually successfully apply for paid scientific projects offered by the industry or the Ministry of education.

Even if large parts of the staff have been recruited amongst the own graduates the appointment procedure for professorships aims at a wider target group. Vacant positions are announced in the press. Publications in the respective research area and the academic reputation are the major criteria according to which open positions are assigned. All in all the peers assess the recruitment procedure to be in principal competitive and suitable to attract highly qualified candidates.

Criterion 4.2 Staff development

Evidence:

- ENU – Self-assessment report, Chapter 5
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:
The continuous professional and didactical development of teaching staff is subject to as well state obligatory standards as regulations issued by ENU. In this framework it is ensured that teachers at least every five years have the opportunity to join certain activities. This comprises not only specific courses but also the participation in scientific conferences or research projects as well in Kazakhstan as abroad. The HEI proves that these offers are gladly used by staff members. Furthermore the professional and didactical suitability of the teaching staff is checked at least every three years. In case of identified shortcomings the so called "certification commission" has not only the right to direct specific trainings but also (in the worst case though) to downgrade the teacher concerned.

Criterion 4.3 Funds and equipment

Evidence:

- ENU – Self-Assessment Report, Chapter 5.3.
- Faculty of Information Technology/For applicants (http://fit.enu.kz/index.php?option=com_content&view=article&id=81&Itemid=22 (June 7th 2015))
- Audit-interviews May 27th-28th

Preliminary assessment and analysis of the peers:
Like in the whole of Kazakhstan teaching activities at ENU are mainly financed by tuition fees. Since a great number of students receive a state grant, the HEI obtains furthermore public subsidies. These subsidies depend on the number of enrolled students irrespective of the particular subject. In comparison to that research activities as well as the infrastructure are funded and maintained mainly project-based and to a smaller amount from the overall university budget. The peers find it remarkable that in terms of public subsidies obviously no differentiation is made between cost-intensive (mainly experimental based subjects like Nuclear Physics) and less cost-intensive study programs. Nevertheless they get the impression that financing of all study programs under review is ensured at least over the accreditation period.

Regarding the study programs Mathematics and Computer Science facilities and equipment surveyed on occasion of the on-site visit seem to be adequate and suitable to support a high quality educational process.

The Nuclear Physics, laboratories and large devices (e.g. Cyclotron) appear to be sufficient to ensure research activities and an adequate education at least of advanced students. An own experimental basis for a basic education in the fields of nuclear physics (e.g. gamma ray measurement) is nonexistent though. Program-coordinators and the universities administration point out that the necessary laboratory inventory should be built up in a medium term. By then the respective teaching units are kept in the facilities of different cooperation partners that are located as well in Astana itself as in partner universities like Almaty or Dubna (cf. also the next section). The students confirm that this modus operandi is suitable to ensure a high quality practical education in the respective fields of Nuclear Physics. The peers find this statement credible. Nevertheless they stress that on this basis a final assessment isn´t possible anyway. Therefore they ask the HEI to provide specific information about the legal foundations as well as about type and scope of the cooperation mentioned. Besides all this they strongly suggest the HEI to intensify its effort in building up an own experimental basis for the Nuclear Physics education process.

In the Nuclear Physics program the scientific literature indicated in the module descriptions is primarily of Russian origin and in the majority older than 25 years. The peers learn that the department is aware of this problem. Thus the library is about to renew the literature step by step. Licence based online supplies and easy interlibrary loan nevertheless guarantee that the students even now have access to current scientific literature.

The peers learn that the educational process of all study programs under review is supported by different cooperations maintained as well by the HEI as by the respective departments. University cooperations on an international level for example exist with Huntsville (Texas), Minsk (Belarus) or Dubna (Russia). These cooperations are used not only by students for exchange semester but also for the interchange of teaching staff. On a national level the HEI collaborates with several companies, research institutions and other facilities. These contacts can be used for internships as well as for the performance of final projects. The peers learn that selected students (as stated by the HEI approximately 10%) of the bachelor Nuclear Physics (and according to the web-page probably of the bachelor Computer Science as well) receive the opportunity to complete their studies at the University of Dubna with a double degree. The peers take note of this. Precautionary they underline that the ongoing accreditation procedure only affects study paths (a) in which all compulsory components are conducted by ENU and (b) that conclude with one final degree issued by this university. All kinds of double degree programs are explicitly excluded.

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

4.1. Visiting lecturers from professional practice

According to the HEIs statement the respective departments already invited persons from the professional practice to support the teaching activities in the upcoming study year. The peers appreciate these efforts and encourage the HEI to follow up this way. In so far they adhere to their former assessment and a respective recommendation.

4.3. Funds and equipment – experimental basis for the Bachelor Nuclear Physics

With its statement the HEI provided a list of laboratory devices that should be purchased in a medium term. The peers deem these devices to be suitable as an experimental basis for the education in the fields of Nuclear Physics. Nevertheless they strongly encourage the HEI to follow up this way and think the laboratory situation should be discussed in the course of the reaccreditation. In so far they adhere to their former assessment and a respective recommendation.

During the site visit the peers got the impression that the basic education in the field of Nuclear Physics is up to now conducted in the facilities of different cooperation partners located as well in Astana itself as in partner universities like Almaty or Dubna. In order to estimate the scope and the sustainability of these cooperations they asked the HEI to provide specific information about their legal foundations. With its statement the HEI delivered contracts with the Kazakh atomic energy committee of the Ministry of Industry and New Technologies in Astana and the Nuclear Physics Institute in Almaty. The wording of the English translations creates the impression that the intention of the peers was possibly mistaken. As these contracts mainly refer to a so called “professional practice” the peers aren´t sure whether this means the questioned laboratory education or a certain kind of professional internship. Issued in 2012 these contracts are furthermore limited to five years. Thus the sustainability of these cooperations remains unclear as well. Based on the information at hand the peers are still unable to assess under which conditions the laboratory education is conducted. Therefore they think that the HEI should prove that the laboratory-based education (partly or completely carried out by non-university institutions) can be conducted at least over the whole the accreditation period.

Taking the statement of the HEI into account the peers assess criterion 4 for the Bachelor/Master Mathematics, the Bachelor/Master Computer Science and the Master Nuclear Physics to be mainly fulfilled. For the Bachelor Nuclear Physics the peers assess criterion 4 to be partly fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Catalogue of Modular Education program for speciality EP 5B060100 – Mathematics
- Catalogue of Modular Education program for speciality EP 5B060200 – Computer Science
- Catalogue of Modular Education program for speciality EP 5B060500 – Nuclear Physics
- Catalogue of Modular Education program for speciality – EP 6M060100 – Mathematics
- Catalogue of Modular Education program for speciality – EP 6M060200 – Computer Science
- Catalogue of Modular Education program for speciality – EP 6M069500 – Nuclear Physics
- Description of specialities 5B060100 – Mathematics, 5M060100 – Mathematics (http://mmf.enu.kz/index.php?option=com_content&view=article&id=139:2013-02-19-18-16-17&catid=8:2011-07-08-10-12-30&Itemid=154&lang=en (June 7th 2015))
- Description of specialities 5B060200 – Computer Science, 6M060200 – Computer Science (http://fit.enu.kz/index.php?option=com_content&view=article&id=497%3A2014-09-30-05-41-47&catid=12%3A4&Itemid=148&lang=en (June 7th 2015))
- Decription of specialities 5B060500 – Nuclear Physics, 5M060500 – Nuclear Physics (http://ftf.enu.kz/index.php?option=com_content&view=article&id=362%3A2013-11-22-11-59-11&catid=9%3A2011-07-08-10-13-05&Itemid=38&lang=en (June 7th 2015))
- Audit-Interviews May 27th-28th 2015

Preliminary assessment and analysis of the peers:
For each study program under review the HEI provides detailed module descriptions in Russian and Kazakh. According to teachers and students these descriptions are easily accessible via the internal PLATONUS platform. On the free accessible areas of ENUs website module descriptions are only published for the bachelor and master Mathematics. In terms of transparency but also to attract applicants the peers strongly encourage the HEI to make the module descriptions of all study programs under review publically available in the national languages as well as in English translations.

With data on semester, number of credits (national and ECTS), teacher, language, workload in hours, prerequisites, module outlines, exam/conditions for credits obtained, means of learning and recommended literature the present English translations contain all necessary information. In terms of quality and completeness the module descriptions leave the peers with a mixed impression though: Precise information about the respective forms of the final control ("exam") is just as lacking as the module descriptions for the different forms of practices. The outlines are in the most cases barley competence-orientated. A few even do not correspond to the module title (e.g. NUCL 33051 "Applied Nuclear Physics"). Therefore the peers deem it necessary to revise the module descriptions in terms of quality and completeness. The missing descriptions for the practices should be provided together with the HEIs statements as subsequent deliveries.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample of Transcript EP 5B060100 – Mathematics
- Sample of Transcript EP 5B060200 – Computer Science
- Sample of Transcript EP 5B060500 – Nuclear Physics
- Sample of Transcript EP 6M060100 – Mathematics
- Sample of Transcript EP 6M060200 – Computer Science
- Sample of Transcript EP 6M069500 – Nuclear Physics

Preliminary assessment and analysis of the peers:
Along with the self assessment report the HEI provides for each study program under review transcripts (in an outdated version though), but neither the "real" diploma nor the diploma supplement. Thus the peers ask the HEI to deliver in addition (1) transcripts in the latest version, (2) example copies of the respective diplomas and (3) example copies of the respective diploma supplements. As Kazakhstan is part of the Bologna process the diploma supplement has to be in accordance with the standards provided with the ECTS Users Guide. It has to be issued in English and should provide information on the stu-

dent´s qualifications profile and individual performance as well as the classification of the degree programme with regard to the applicable educational system. Furthermore statistical data as set forth in the ECTS User´s Guide are to include allowing readers to categorize the individual result/degree.

Criterion 5.3 Relevant rules

Evidence:

- ENU – Procedure Teaching process
- ENU – Regulations on Control and Assessment of Acedemic Achievements of Learners
- ENU – Instruction Order of Statement Modular Educational Program
- Modular Educational Program EP 5B060100 – Mathematics
- Modular Educational Program 5B060200 – Computer Science
- Modular Educational Program 5B060500 – Nuclear Physics
- Modular Educational Program 6M060100 – Mathematics
- Modular Educational Program 6M060200 – Computer Science
- Modular Educational Program 6M069500 – Nuclear Physics
- ENU – Admission rules for Bachelor
- ENU – Admission rules for Master
- Audit-Interviews May 27th-28th 2015

Preliminary assessment and analysis of the peers:

The determination of the overall study conditions as well as structure and content of the educational programs takes place in a generally binding legal framework provided by the Ministry of Education. According to these legal provisions the HEI sets the rules that govern admission-requirements, the teaching process and the examination regulations. The general provisions for the modular-construction of the study programs are particularly specified as well. On program-level the study schedules for each admission cycle are finally bindingly laid down in the so called “modular educational program”. The peers learn that all relevant normative documents (like the module descriptions) are accessible at least in Russian and Kazakh via the internal PLATONUS platform. From what the peers can see the publicly available information is (if existent at all) generally much more basic. As mentioned above the peers consider this as a lack of transparency that ought to be mended. In so far they encourage the HEI once again to make *all* course-related docu-

ments publically available not only in the national languages but also in English translations.

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

5.1 Module descriptions

The peers notice that the module descriptions have been revised according to the comments made in the text. Missing information has been added as well as the descriptions for the different forms of practices. The quality of the descriptions seems to be improved likewise: The peers deem it possible to get an idea about the module outlines and the intended learning outcomes. All in all they see no need for further action.

5.2. Diploma and Diploma Supplement

As requested by the peers the HEI delivers in addition for each study program under review (1) leaving certificates, (2) transcripts in a current version and (3) diploma supplements. The provided English diploma supplements show information about the individual results and a classification of the degree programme with regard to the applicable educational system. The qualification profile and statistical data as set forth in the ECTS User´s Guide are still missing and should be added.

5.3. Relevant rules

The peers notice that meanwhile all relevant information (e.g. modular educational programs, module descriptions, learning objectives, teaching staff) about the degree programs under review are published on the respective departments' websites in English versions as well. In so far the peers deem their recommendation realized and see no need for further action.

Taking the statement of the HEI into account the peers judge criterion 5 for all study programs under review to be partly fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- ENU – Self Assessment Report, Chapter 6

- ENU – Self Assessment Report, Table 2.4.1. (Percentage of graduate employment EP), 2.4.2. (Information on the distribution of graduates of EP), 4.5.2.-4.5.6. (Results of thesis and diploma works), 6.2.1.-6.2.6 (Results of the state final examination/of passing the comprehensive exam)
- ENU – Procedure Teaching Process
- ENU – Regulations on Control and Assessment of Academic Achievements of Learners
- ENU – Instruction Order of Statement Modular Educational Program
- Audit-Interviews May 27th-28th

Preliminary assessment and analysis of the peers:
Since 2012 Eurasian National University maintains a structured Quality Management System (QMS). Based on certain overall guidelines of the Ministry of Education the HEI pursues the claim that the QMS is in line with the "standards and guidelines for quality assurance in higher education in the European space". The peers positively note that the operation of the QMS for the entire university is centralized in the responsibility of an own "Quality Management Department". A consistent handling seems to be furthermore ensured by quality manuals, documented procedures, and responsibility matrices for QMS-processes and QMS-instructions. Even if a broad range of the QMS-related documents is listed in the applicants´ self-assessment report, the peers only got insights in a few English translations: The process for the approval and modification of "modular educational programs" seems to be well defined. But also, for example, the teaching process and the organization of examinations are properly outlined by QMS-documents.

As stated above the HEI obviously strives to involve the students in the further-development of the educational programs. Even if respective process descriptions (at least as far as the peers can see) are not available, the peers were able to understand that there are certain activities in place to evaluate teaching activities as well as overall study conditions. The educational process has been subject of a detailed survey most recently in 2013. On demand the peers learn, that specific modules and courses are evaluated on a regular basis as well. After completion of a module the students are asked to provide an individual feedback via the internal online-platform PLATONUS. The inspected questionnaires capture not only the performance of the respective teacher but also the didactical means and the workload of the assessed teaching unit. Even though feedback loops with the students are obviously not institutionalized, the results of the different surveys are (as the peers discover) not only intensively discussed in the different committees and councils, but also used for specific improvement measures. As the 2013s survey for example revealed a certain amount of discontent in terms of the professional relevance of the

Master Computer Science, the HEI took several efforts to attract more teachers from the professional practice. The students judge the efficiency of formalized surveys rather ambivalent. The peers learn that there are more effective ways of students' participation: The teaching staff (even on a higher level) is principally open for criticism. Complaints (of which nature they may be) are normally taken serious and sometimes lead to significant changes. Further opportunities to influence the curricular development are provided by the students' government. Along this path for example students of the Mathematics program were able to enforce the actuarial science as additional elective course.

Data in terms of study progress are collected as well. The HEI is aware of the grade distribution of all exams (and thus knows the respective failure rates as well) just like the percentage of graduate employment. Not only from the statistics presented but also from the on-site discussions the peers learn that neither dropouts nor long-term students nor failure rates seem to be problematic at all. Therefore they consider the collected figures to be rather basic, but all in all sufficient for the present purposes.

In sum the peers assess the QMS ambivalent. The HEI maintains instruments and collects data that appear principally useful for a continuous improvement of the educational process. In most cases it remains (at least as far the peers can judge) nevertheless unclear whether these means are used on a regular basis and according to formalized processes. Furthermore the peers deem it necessary that in particular the course evaluations include a direct feedback of the students. In this respect they encourage the HEI to refine the quality management system.

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

The peers feel vindicated that the HEI spends several efforts in the continuous development of the study programs under review. The peers see as well that the HEI is willing to better involve the students in this process. Nevertheless they underline, that it is necessary to establish institutionalized direct feedback processes. Normally those feedback processes are linked with the course evaluations. Therefore the HEI should for example ensure that the results of the course evaluations are discussed with the students. All in all the peers adhere to their primary assessment and a respective recommendation.

Taking the statement of the HEI into account that peers judge criterion 6 for all study programs under review to be mainly 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 Higher Education Institution on the previous chapters of this report:

1. Detailed information about the process of recognition of qualifications gained from other institutions of higher education, in particular abroad
2. Missing module descriptions (educational, teaching, industrial practice)
3. Subject-specific transcripts, each in a current version
4. Bachelor/Master Nuclear Physics: Specific information about the legal foundations as well as about type and scope of the cooperation that are used to maintain the experimental basis
5. Subject-specific diploma (leaving certificates)
6. Subject-specific diploma supplements

E Comment of the Higher Education Institution (31.07.2015)

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

- Objective matrix of applicant degree programmes
- ASIIN SSC in applicant degree programmes
- Modular educational program
- Cooperation Agreements Nuclear Physics
- Diploma Supplements and Transcripts

F Summary: Peer recommendations (04.08.2015)

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	n.a.	30.09.2021
Ma Mathematics	With requirements for one year	n.a.	30.09.2021
Ba Computer Science	With requirements for one year	n.a.	30.09.2021
Ma Computer Science	With requirements for one year	n.a.	30.09.2021
Ba Nuclear Physics	With requirements for one year	n.a.	30.09.2021
Ma Nuclear Physic	With requirements for one year	n.a.	30.09.2021

All Degree-Programs

A 1. (ASIIN 1.1.) The overall objectives and learning outcomes need to be published in an official binding document.

A 2. (ASIIN 5.2.) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives and the intended learning outcomes. In addition to the final degree statistical data according to ECTS-Users guide have to be shown.

A 3. (ASIIN 2.3.) Rules for the recognition of study courses completed at other national and international higher education institutions must be defined corresponding to

the Lisbon Convention. Especially it has to be assured that in case of a rejected recognition the HEI is obliged to provide a transparent explanation.

Bachelor Nuclear Physics

A 4. (ASIIN 2.7.) It has to be proven that the laboratory-based education partly or completely carried out by non-university institutions can be conducted at least over the whole the accreditation period."

Recommendations

All Degree-Programs

E 1. (ASIIN 1.3.) It is recommended (where possible and useful) to better harmonize the general education subjects with the content framework of the respective specialties.

E 2. (ASIIN 2.4.) It is recommended to further improve the English language skills of students and teachers.

E 3. (ASIIN 4.1.) It is recommended to increase the number of (if possible English-speaking) visiting lecturers from the professional practice.

E 4. (ASIIN 6) It is recommended to refine the quality management system with view to the points described in the report (process definition and direct feedback of students in course evaluations).

Bachelor and Master Nuclear Physics

E 5. (ASIIN 2.1.) It is recommended to sharpen the profile of the study program. This should include a decision about the overall approach (either application- or research oriented), a broader consideration of the needs of the national job-market (e.g. oil, environmental protection) and finally a consideration of current developments in the field of Nuclear Physics.

E 6. (ASIIN 5.3.) It is strongly recommended to develop an own experimental basis for the nuclear physics education process.

G Comment of the Technical Committees

Technical Committee 04 – Informatics (10.09.2015)

Assessment and analysis

The Technical Committee discusses the procedure and comes to the conclusion to follow the peers' recommendations in all aspects.

The Technical Committee 04 – Informatics recommends the award of the ASIIN seal as follows:

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	n.a.	30.09.2021
Ma Mathematics	With requirements for one year	n.a.	30.09.2021
Ba Computer Science	With requirements for one year	n.a.	30.09.2021
Ma Computer Science	With requirements for one year	n.a.	30.09.2021
Ba Nuclear Physics	With requirements for one year	n.a.	30.09.2021
Ma Nuclear Physic	With requirements for one year	n.a.	30.09.2021

Technical Committee 12 – Mathematics (15.09.2015)

Assessment and analysis for the award of the ASIIN seal:

The technical committee discusses the procedure. It judges the assessment of the peers as well as the proposed requirements and recommendations to be adequate.

The technical committee 12 – Mathematics recommends the award of the seal as follows

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	n.a.	30.09.2021
Ma Mathematics	With requirements for one year	n.a.	30.09.2021
Ba Computer Science	With requirements for one year	n.a.	30.09.2021
Ma Computer Science	With requirements for one year	n.a.	30.09.2021
Ba Nuclear Physics	With requirements for one year	n.a.	30.09.2021
Ma Nuclear Physic	With requirements for one year	n.a.	30.09.2021

Technical Committee 13 – Physics (10.09.2015)

Assessment and analysis for the award of the ASIIN seal:

The technical committee discusses the procedure. As the term “sharpen” implies more likely a constriction than the intended development of the profile of the Nuclear Physics Program the committee assesses the wording of recommendation five to be misleading. In so far it recommends to replace the term “sharpen” by “further develop”. In all other points the committee judges the assessment of the peers as well as the proposed requirements and recommendations to be adequate.

The technical committee 13 – Physics recommends the award of the seal as follows

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	n.a.	30.09.2021
Ma Mathematics	With requirements for one year	n.a.	30.09.2021
Ba Computer Science	With requirements for one year	n.a.	30.09.2021
Ma Computer Science	With requirements for one year	n.a.	30.09.2021
Ba Nuclear Physics	With requirements for one year	n.a.	30.09.2021
Ma Nuclear Physic	With requirements for one year	n.a.	30.09.2021

E 5. (ASIIN 2.1.) It is recommended to further develop the profile of the study program. This should include a decision about the overall approach (either application- or research oriented), a broader consideration of the needs of the national job-market (e.g. oil, environmental protection) and finally a consideration of current developments in the field of Nuclear Physics.

H Decision of the Accreditation Commission (25.09.2015)

Assessment and analysis

The accreditation commission discusses the procedure. To clarify the circumstances it decides minor editorial modifications in requirements 1, 3, 4 and recommendations 3, 4 and 5. In all other points it follows the recommendation for a decision of the peer panel.

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

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ba Mathematics	With requirements for one year	n.a.	30.09.2021
Ma Mathematics	With requirements for one year	n.a.	30.09.2021
Ba Computer Science	With requirements for one year	n.a.	30.09.2021
Ma Computer Science	With requirements for one year	n.a.	30.09.2021
Ba Nuclear Physics	With requirements for one year	n.a.	30.09.2021
Ma Nuclear Physic	With requirements for one year	n.a.	30.09.2021

Requirements

All Degree-Programs

A 1. (ASIIN 1.1.) The overall objectives and learning outcomes need to be published in an binding form.

A 2. (ASIIN 5.2.) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives and the intended learning outcomes. In addition to the final degree statistical data according to ECTS-Users guide have to be shown.

A 3. (ASIIN 2.3.) Rules for the recognition of achievements and competences acquired outside of the higher education institution must be defined based on the Lisbon Convention. Especially it has to be assured that in case of a rejected recognition the HEI is obliged to provide a transparent explanation.

Bachelor Nuclear Physics

A 4. (ASIIN 2.7.) It has to be demonstrated that the laboratory-based education partly or completely carried out outside the university can be conducted at least over the whole accreditation period.

Recommendations
All Degree-Programs

E 1. (ASIIN 1.3.) It is recommended (where possible and useful) to better harmonize the general education subjects with the content framework of the respective specialties.

E 2. (ASIIN 2.4.) It is recommended to further improve the English language skills of students and teachers.

E 3. (ASIIN 4.1.) It is recommended to increase the number of visiting lecturers from the professional practice, especially English speaking.

E 4. (ASIIN 6) It is recommended to refine the quality management system with view to the issues described in the report (process definition and direct feedback of students in course evaluations).

Bachelor and Master Nuclear Physics

E 5. (ASIIN 2.1.) It is recommended to further develop the profile of the study program. This should include a decision about the overall approach (either application- or research oriented), a broader consideration of the needs of the national job-market (e.g. oil, environmental protection) and finally a consideration of current developments in the field of Nuclear Physics.

E 6. (ASIIN 5.3.) It is strongly recommended to develop an own experimental basis for the nuclear physics education process.

I Fulfilment of Requirements (30.09.2016)

Analysis of the peers and the Technical Committees

For all study programs

A 1. (ASIIN 1.1.) The overall objectives and learning outcomes need to be published in a binding form.

First Treatment	
Peers	Fulfilled Justification: The overall objectives and learning outcomes are for all programs published on the universities´ website.
TC 04	Fulfilled Justification: The overall objectives and learning outcomes are for all programs published on the universities´ website
TC 12	Fulfilled Justification: The overall objectives and learning outcomes are for all programs published on the universities´ website
TC 13	Fulfilled Justification: The overall objectives and learning outcomes are for all programs published on the universities´ website

A 2. (ASIIN 5.2.) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives and the intended learning outcomes. In addition to the final degree statistical data according to ECTS-Users guide have to be shown.

First Treatment	
Peers	Fulfilled Justification: The HEI presents for all degree programs under review revised diploma supplements..
TC 04	not fulfilled Justification: Statistical data according to ECTS Users Guide are still missing.
TC 12	not fulfilled Justification: As the Diploma Supplements still don´t reveal statistical according to ECTS Users Guide the technical committee assesses requirement two to be not fulfilled.

TC 13	not fulfilled Justification: Statistical data according to ECTS Users Guide are still missing.

A 3. (ASIIN 2.3.) Rules for the recognition of achievements and competences acquired outside of the higher education institution must be defined based on the Lisbon Convention. Especially it has to be assured that in case of a rejected recognition the HEI is obliged to provide a transparent explanation.

First Treatment	
Peers	Fulfilled Justification: The HEI has adopted rules for the recognition of achievements and competences acquired outside of the higher education institution that are in line with the Lisbon Convention.
TC 04	Fulfilled Justification: The HEI has adopted rules for the recognition of achievements and competences acquired outside of the higher education institution that are in line with the Lisbon Convention.
TC 12	Fulfilled Justification: The HEI has adopted rules for the recognition of achievements and competences acquired outside of the higher education institution that are in line with the Lisbon Convention
TC 13	Fulfilled Justification: The HEI has adopted rules for the recognition of achievements and competences acquired outside of the higher education institution that are in line with the Lisbon Convention.

For the Bachelor Program Nuclear Physics

A 4. (ASIIN 2.7.) It has to be demonstrated that the laboratory-based education partly or completely carried out outside the university can be conducted at least over the whole accreditation period.

First Treatment	
Peers	Partly fulfilled Justification: The HEI presents agreements with partner institutions in the field of nuclear physics. These institutions seem to be somehow involved in the educational process. However, the *precise role* of these partners for the Bachelor Nuclear Physics remains still unclear. In particular it cannot be estimated whether the missing standard experiments are conducted in these facilities. I
TC 13	Partly fulfilled Justification: In principle, the technical committee assumes that the cooperation-contracts at hand ensure the laboratory education

	in the Bachelor Nuclear Physics within the accreditation period. Therefore it assesses the respective requirement four to be generally fulfilled. Nevertheless the technical committee deems it necessary – and recommends an indication in the decision letter – to closely check this issue in the course of the re-accreditation.

Decision of the Accreditation Committee (30.09.2016)

The accreditation commission follows the assessment of the technical committees and estimates requirement two to be not fulfilled. In terms of the disputed laboratory equipment for the Bachelor Nuclear Physics the commission follows the proposal of the technical committee 13 – Physics and assesses the respective requirement with an indication in the decision that this issue will be carefully checked on occasion of the re-accreditation to be fulfilled.

The accreditation commission for degree programs decides the prolongation of the accreditation as follows:

Degree Programm	ASIIN Seal	Subeject Specific Label	Maximum duration of accreditation
Ba Mathematics	Requirement 2 not fullfilled	n/a	6 month prolongation
Ma Mathematics	Requirement 2 not fullfilled	n/a	6 month prolongation
Ba Computer Science	Requirement 2 not fullfilled	n/a	6 month prolongation
Ma Computer Science	Requirement 2 not fullfilled	n/a	6 month prolongation
Ba Nuclear Physics	Requirement 2 not fullfilled *	n/a	6 month prolongation
Ma Nuclear Physics	Requirement 2 not fullfilled	n/a	6 month prolongation

***** It is pointed out, that the laboratory education will be closely reviewed in the course of the re-accreditation.

J Fulfilment of Requirements (31.03.2017)

Analysis of the peers and the Technical Committees (March 2017)

A 2. (ASIIN 5.2.) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives and the intended learning outcomes. In addition to the final degree statistical data according to ECTS-Users guide have to be shown.

First Treatment	
Peers	Fulfilled Justification: The HEI presents for all degree programs under review revised diploma supplements.
TC 04	not fulfilled Justification: Statistical data according to ECTS Users Guide are still missing.
TC 12	not fulfilled Justification: The technical committee follows the opinion of the peers and assesses requirements one and three to be fulfilled. As the Diploma Supplements still don´t reveal statistical according to ECTS Users Guide the technical committee assesses the respective requirement two to be not fulfilled.
TC 13	not fulfilled Justification: Statistical data according to ECTS Users Guide are still missing.
AC	not fulfilled Justification: Statistical data according to ECTS Users Guide are still missing.
Second Treatment	
Peers	fulfilled Justification: The HEI presents for all degree programs under review revised diploma supplements. All diploma supplements contain now statistical data according to ECTS Users Guide.
TC 04	fulfilled

	Justification: The technical committee follows the assessment of the peers.
TC 12	fulfilled Justification: The technical committee follows the assessment of the peers.
TC 13	fulfilled Justification: The technical committee follows the assessment of the peers.

Decision of the Accreditation Commission (31.03.2017)

Assessment

The accreditation commission follows the assessment of the peers and technical committees and judges the remaining requirement to be fulfilled.

The accreditation commission for degree programs decides the prolongation of the accreditation as follows:

Degree Programm	**ASIIN Seal**	**Subeject Specific Label**	**Maximum duration of accreditation**
Ba Mathematics	Requirement 2 fullfilled	n/a	30.09.2021
Ma Mathematics	Requirement 2 fullfilled	n/a	30.09.2021
Ba Computer Science	Requirement 2 fullfilled	n/a	30.09.2021
Ma Computer Science	Requirement 2 fullfilled	n/a	30.09.2021
Ba Nuclear Physics	Requirement 2 fullfilled	n/a	30.09.2021
Ma Nuclear Physics	Requirement 2 fullfilled	n/a	30.09.2021