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**AGREEMENT
FOR THE DOUBLE DEGREE BACHELOR PROGRAM IN
MATHEMATICS
BETWEEN
ULM UNIVERSITY (GERMANY) AND
V. N. KARAZIN KHARKIV NATIONAL UNIVERSITY (UKRAINE)**

1. Background

On the basis of equality and mutual benefits, Ulm University registered at Helmholtzstraße 16, 89069 Ulm, Germany, and through the Faculty of Mathematics and Economics, hereafter referred to as ULM, which is the executive body of this agreement bound by the rights and obligations specified here, and V. N. Karazin Kharkiv National University registered at 4, Maidan Svobody, Kharkiv 61022, Ukraine, through the School of Mathematics and Computer Sciences, hereafter referred to as KKNU, which is the executive body of this agreement bound by the rights and obligations specified here, will organize and implement the Double Degree Professional Bachelor Program in Mathematics.

Whereas, in consideration of the premises, terms and conditions herein provided, both parties agree as follows:

2. Aim

The double degree professional bachelor program in the field of mathematics between ULM and KKNU offers very qualified students the chance to enhance their knowledge and intercultural understanding; thus, students gain better profiles and international employability. Therefore existing degree programs at the two universities are linked. Students can either complete the Bachelor's degree program at their home university as normal and only obtain the degree from their home university or choose the "double degree" option and obtain two academic degrees.

After three years' study in the program and successfully completing the study component at the host university and at their home university, included the Bachelor thesis as stipulated in the curriculum. , students enrolled in the program will be awarded with two degrees respectively: *Bachelor of Science* (according to the Bachelor program in Mathematics) by ULM and *Bachelor of Science* (students enrolled in the Bachelor

programs in Pure Mathematics, Applied Mathematics, Computer Science are awarded the respective degrees) by KKNU.

3. Organization and Administration of the Program

The double degree program will be executed by the two parties. ULM will be responsible for the events taking place at ULM, including the organization and administration of courses, credits, theses, etc., while KKNU will take the same responsibility for the relevant events taking place at KKNU.

A program committee will be formed, consisting of 4 representatives, including a director of academic affairs and a coordinator for the program from each party:

From ULM: Dr. Jan-Willem Liebezeit, Prof. Dr. Evgeny Spodarev. From

KKNU: PD Dr. Marina Vladymyrova, PD Dr. Iryna Zaretskaya

Each university will timely notify the partner university in writing if there is any change in the composition of the above committee.

The committee will hold regular meetings to offer both academic and administrative advice on the program, and provide guidance to the administrative staff regarding the implementation, coordination and development of the program.

The respective study and examination regulations of the two parties do conclusively regulate the examination-related issues for all required courses offered by the two parties in the degree programs.

If a repeat examination is to be taken, the examination regulations according to which the examination procedure was started apply, irrespective of the place of residence. If an examination is definitively failed at the host university, this also applies to the home university. A further repeat examination is excluded and the student will not be awarded a degree at the host university.

Students sent by the two parties must strictly abide by the laws and regulations of the locality, and the disciplines and rules of the host institution.

4. Start-Up Time and the Size of Enrolment

The expected annual intake target is about 10 students, but the exact number is to be approved by KKNU and ULM each year.

The first cohort after the initiation of the Program is planned to be enrolled in the spring term 2024.

5. Duration

This full-time program lasts three years.

Students will spend their 4th term of studies (in spring) as well as the following fall term at the partner university to meet its requirements; the home university will recognize credits that the students have obtained at the partner university and transfer required courses among them according to its own credit system. After this year of studies abroad the Ukrainian students will return to KGNU to continue their study for another academic year to achieve the required amount of credits and meet the degree requirements or regulations from home university. UULM will recognize and transfer required credits that the Ukrainian students have obtained at KGNU. The final term before graduation (6th term for Germans and 8th term for Ukrainians) will be (again) spent at the partner university to write the Bachelor thesis.

The credit value of the courses has been determined in cooperation between ULM and KGNU program coordinators and is based on the ECTS in order to simplify the transfer of the credits. Details of the study plan will be set out in Annex 1 to this Agreement.

Each university will provide, in a timely fashion, the partner university with the transcript of the credits and grades obtained by the students during the period of study in its own university; the credits and grades contained in the transcript will be converted into the credit/grades system of the home university. The conversion table is set out in Annex 2 to this agreement.

Both annexes are part of the cooperation agreement.

6. Selection and Admission of the Candidates

The process of selection and admission will be executed in accordance with the relevant regulations of both parties.

Both parties are responsible for the selection of the candidates and admission to the double degree program. ULM and KGNU will accept the number of students according to 4. from each university participating who

- meet the undergraduate admission requirements of the Bachelor in Pure Mathematics, Applied Mathematics or Computer Science at KGNU;
- meet the undergraduate admission requirements of Bachelor in Mathematics at ULM;
- have a sufficient knowledge of the German (B2 level or higher) and English language (B2 level or higher), allowing them to study in German at ULM and in English at KGNU, usually confirmed by an official language test certificate.

- belong to the best 15% of all the students of one semester; their sufficient mathematical skills' level will be additionally tested by the partner university in oral or written form.
- complete the application procedures required by ULM and KGNU.

KGNU and ULM will issue admission letters respectively to the qualified candidates.

As an additional quality security measure, the modules Analysis and Linear Algebra have to be completed after the end of the second semester abroad.

7. Curriculum

All courses of the Program taught at KGNU/ULM will be given in English/German, respectively.

KGNU students enrolled in Bachelor in Computer Science should choose the specialization Computer Science of the Bachelor in Mathematics program in ULM. ULM students should choose the Bachelor in Applied Mathematics program in KGNU.

Both sides will provide up to 50 hours of learning the national language.

Details of the curriculum will be set out in Annex 1 to this agreement. The semester subjects' distribution may vary each year in both Universities, therefore, Annex 1, will be updated if necessary.

The students have to inform themselves about the current requirements for the award of the respective degrees and to select the modules and courses they attend accordingly.

8. Degree Thesis

Both parties will assign supervisors for the students' theses, which must meet the degree thesis requirements set by KGNU and ULM, respectively. The theses defense will be conducted by each party, respectively, according to its own regulations.

9. Enrolment, Tuition Fee Arrangement, Responsibilities of Students, Scholarships

Admitted students will be enrolled both at ULM and KGNU throughout the program.

ULM and KGNU will not charge tuition fees payable to the host university; within the framework of this agreement, ULM exempt the students from KGNU from the obligation to pay tuition fees in accordance with § 3 Abs. 1 Satz 2 1. HS LHGebG; registration fees remain unaffected. Admitted students will pay tuition and other fees at his/her Home University during the Double Degree Programme.

Other expenses, such as travelling, accommodation (food & board), books, etc., will be borne by the students themselves.

Students are responsible for their own health insurance. Private liability insurance is recommended; however, while attending classes and events in the campus of ULM, students are covered by the accident insurance of ULM.

Should national or multilateral funds be available, KKNU and ULM will place scholarships for the students admitted to this program.

10. Rights and Obligations of Both Parties

Rights and Obligations of ULM

1. ULM will be responsible for the events taking place at ULM including the organization and administration of courses, credits, theses, etc.
2. ULM will assist the students with the German visa procedure and other related administrative procedures.
3. ULM will help students find accommodation in the university residence, and the students will be responsible for all living costs.
4. ULM will assist the students with the related administrative procedures in Europe.

Rights and Obligations of KKNU

1. KKNU will be responsible for the events taking place at KKNU including the organization and administration of courses, credits, theses, etc.
2. KKNU will help students find accommodation during their study at KKNU, and the students will be responsible for all living costs.
3. KKNU shall assist students with passport and visa application procedures.

All above mentioned administrative services in conformity with this agreement shall be provided on equal basis. The participants on exchanges shall not bear payments for such services at the partner universities.

11. Academic and Degree Issues

The Professional Degrees of Bachelor in Pure Mathematics, Applied Mathematics, or Computer Science awarded by KKNU are official degrees accredited by the Ministry of Education and Science of Ukraine, and Bachelor of Science in Mathematics awarded by ULM is an official degree according to 36 Abs. 1 Landeshochschulgesetz Baden - Württemberg.

The terms, conditions and procedure for the liquidation of academic debts in the home institution are governed by the internal regulations of each institution.

Each student participating in the program is obliged to submit a report at the home institution after participation in the program.

KKNU and ULM will issue the degrees to their students, respectively, according to their own graduation requirements.

12. Agreement Renewal

This agreement will enter into effect on the date the two parties sign (after the last signature) and will be valid for five years. The two parties shall decide on the renewal or termination of the agreement within six months from the date of enrollment of the fifth cohort of students. If the two parties do not reach consensus within this time frame, no further students will be recruited. But the two parties should continue their cooperation until the agreement expires, so as to ensure that students already enrolled in the program can complete their studies as planned.

13. Applicable Laws and Settlement of Disputes

The Parties shall use good faith efforts to resolve any dispute arising out of or in relation to this Agreement. In the event that any dispute cannot be resolved through negotiation then the two parties should decide on independent mediation to make it settled.

14. Other Issues

To address issues not covered by this Agreement, a more detailed supplementary agreement may be signed by both parties.

In case of failure to fulfill any of the obligations under this agreement due to force majeure or any event beyond the control of the two parties, the parties shall not be responsible for any losses thus incurred. Neither party shall compensate for any direct, consequential, or special losses pertinent to issues not covered by this agreement, unless otherwise specified in this agreement.

This agreement has been prepared in two original English copies all being equally authentic.

The signatories below confirm that both parties agree to abide by and execute the above terms and conditions.

For ULM UNIVERSITY

Prof. Dr.-Ing. Michael Weber

President

**For V. N. KARAZIN KHARKIV
NATIONAL UNIVERSITY**

Prof. Tetiana Kaganovska



Rector

Date

May 15, 2024

Date

May 13, 2024

Appendices

Appendix 1: Curriculum

1. For the students from KGNU, the details of the courses and credits are as follows:

a) Applied Mathematics

Basic outline for students from Kharkiv				
Kharkiv				
Semester		ECTS	credited in Ulm as	ECTS
1	History of Ukraine	3	additional key qualification	3
	Foreign language – 1	3		
	Mathematical Analysis – 1	6	see Mathematical Analysis – 3	
	Elements of Algebra and Number Theory	6		
	Elements of Mathematical Logic and Discrete Mathematics	4		
	Analytic Geometry – 1	4		
	Computer Programming – 1	4	see Algorithms and Data Structures	
		30		
2	Foreign language – 2	4		
	Mathematical Analysis – 2	8	see Mathematical Analysis – 3	
	Analytic Geometry – 2	4		
	Linear Algebra – 1	6	see Linear Algebra – 2	
	Discrete Mathematics	4		
	Computer Programming – 2	4	see Algorithms and Data Structures	
		30		
3	Foreign language – 3	3		
	Mathematical Analysis – 3	8	Mathematical Analysis 1-3 as Analysis I	10
	Linear Algebra – 2	6	Lineare Algebra 1	10
	Algorithms and Data Structures	4	With Computer Programming as „Introduction to Computer Science I – Fundamentals”	
	Methods of Optimization	3	Combinatorial Optimization	5
	Project and Remote (Distributed) Team Management	3		

	Interdisciplinary Elective Subject	3	Subsidiary Subject	
		30		
Admission requirements (quality assurance) <ul style="list-style-type: none"> • Mathematical Analysis 1,2,3; Linear Algebra 1,2; Computer Programming 1,2; Algorithms and Data Structures • German language at B2 level 				
Ulm				
Semester		ECTS	credited in Kharkiv as	ECTS
4	Mathematical Software	5	Interdisciplinary Elective Subject	3
	Linear Algebra – 2	10	Professional Elective 1	4
			Differential Equations 1	4
	Analysis – 2	10	Mathematical Analysis 4	8
			Differential Geometry	4
	Introduction to Computer Science II – Advanced Concepts	6	Professional Elective 2	4
		31		
			Philosophy	3
				30
Semester		ECTS	credited in Kharkiv as	ECTS
5	Measure theory	5	Measure theory and integration	4
	Algebra	9	Professional Elective 3	4
			Numerical Analysis	4
	Ordinary differential equations	5	Differential equations 2	4
	Elementary probability theory and statistics	9	Probability theory	4
			Professional Elective 4	4
	Subsidiary Subject	5	Interdisciplinary Elective Subject	3
			Theoretical Mechanics	4
		33		
			Complex analysis 1	3
				30
Kharkiv				
Semester		ECTS	credited in Ulm as	ECTS
6	Professional Elective 5	4	Compulsory elective module in mathematics	4
	Professional Elective 6	4		

	Functional Analysis	4	see Differential Geometry as „Manifolds and Fourier Analysis“	
	Complex Analysis 2	4	Elements of complex analysis	5
	Differential Geometry		with „Functional Analysis“ as „Manifolds and Fourier Analysis“	
	Probability Theory	4		
	Interdisciplinary Elective Subject	3	Subsidiary Subject	3
	Processing, Storage and Transmission of Data in the Modern Information Technologies	3	Subsidiary Subject	4
	Calculus of Variations and Optimal Control	4	Compulsory elective module in mathematics	4
		30		
7	Differential equations – 2		compulsory elective module in (pure) mathematics	5
	Numerical Analysis		Numerical Analysis	5
	Equations of mathematical physics 1	4	Elementary partial differential equations	5
	Mathematical Statistics	4		
	Professional Elective 7	4		
	Professional Elective 8	4		
	Professional Elective 9	4		
	Theoretical Mechanics		Subsidiary Subject	4
	Data Bases and Information Systems	3	Subsidiary Subject	3
	Data Analysis	4	Subsidiary Subject	4
	Term paper	3	compulsory elective module in mathematics or subsidiary subject	
	Professional Foreign language		Seminar	4
		30		
Ulm				
Semester		ECTS	credited in Kharkiv as	ECTS
8			Mathematical Statistics	
	Numerical Linear Algebra	6	Numerical methods for solving differential and integral equations	4
	Discrete Structures and Algorithms	5	Professional Elective 10	4
	Probability theory		Professional Elective 11	4

	and stochastic processes		Professional Elective 12	4
	Bachelor's thesis	12	Course work	
			Research practice	5
			Bachelor thesis	2
		32		
			Professional foreign language	3
			Equations of mathematical physics 2	4
				30

b) Pure Mathematics

Basic outline for students from Kharkiv				
Kharkiv				
Semester		credits	credited in Ulm as	credits
1	History of Ukraine	3	additional key qualification	3
	Foreign language – 1	3		
	Mathematical Analysis – 1	6	see Mathematical Analysis – 3	
	Elements of Algebra and Number Theory	6		
	Elements of Mathematical Logic and Discrete Mathematics	4		
	Analytic Geometry – 1	4		
	Programming – 1	4	see Programming – 3	
		30		
2	Foreign language – 2	4		
	Mathematical Analysis – 2	8	see Mathematical Analysis – 3	
	Analytic Geometry – 2	4		
	Linear Algebra – 1	6	see Linear Algebra – 2	
	Discrete Mathematics	4	see Probability theory, Semester 7	
	Programming – 2	6	see Programming – 3	
		32		
3	Foreign language – 3	3		
	Mathematical Analysis – 3	8	Mathematical Analysis 1-3 as Analysis 1	10
	Linear Algebra – 2	6	Lineare Algebra 1	10
	Topology	3		
	Programming – 3	6	Introduction to Computer Science I and II	12
	Elective Course	3	Compulsory elective module in mathematics	3
	Interdisciplinary Elective Subject	3	Subsidiary Subject	
		32		

Admission requirements (quality assurance)

- **Mathematical Analysis 1,2,3; Linear Algebra 1,2; Programming 1,2,3;**
- **German language at B2 level**

Ulm

Semester		credits	credited in Kharkiv as	credits
4	Mathematical Software	5	Interdisciplinary Elective Subject	3
	Linear Algebra – 2	10	Professional Elective 1	4
			Differential Equations 1	4
	Analysis – 2	10	Mathematical Analysis 4	8
			Differential Geometry 1	4
	Discrete Structures and Algorithms	5	Programming	4
		30		
			Philosophy	3
				30

Semester			credited in Kharkiv as	credits
5	Measure theory	5	Measure theory and integration	4
	Algebra	9	Differential geometry 2	4
			General/abstract Algebra	
			Numerical analysis	4
	Ordinary differential equations	5	Differential equations 2	4
	Combinatorial Optimization	5	Professional Elective 4	4
	Subsidiary Subject		Professional Elective 3	4
		6	Interdisciplinary Elective Subject	3
		30		
			Complex analysis I	3
				30

Kharkiv

Semester			credited in Ulm as	credits
6	Harmonic Analysis	4	compulsory elective module in (pure) mathematics	5
	Functional Analysis	4	compulsory elective module in (pure) mathematics	5
	Symbolic computation and modeling	3		
	Complex Analysis	4	Elements of complex analysis	5

	Differential Geometry – 1 General Algebra	4		
	Interdisciplinary Elective Subject	3	Subsidiary Subject	
	Professional Elective 5	4	Compulsory elective module in mathematics	4
	Professional Elective 6	4	Compulsory elective module in mathematics	4
		30		
7	Probability theory	4	with Discrete Mathematics as „Probability theory and Statistics”	9
	Ordinary differential equations – 2		compulsory elective module in (pure) mathematics	5
	Professional Elective 7	4	Compulsory elective module in mathematics	4
	Professional Elective 8	4	Compulsory elective module in mathematics	4
	Professional Elective 9	4		
	Professional Elective 10	4		
	Differential Geometry – 2		with „Functional Analysis“ as „Manifolds and Fourier Analysis“	5
	Numerical Analysis		Numerical Analysis	5
	Equations of mathematical physics 1	4	Elementary partial differential equations	5
	Interdisciplinary Elective Subject		Subsidiary Subject	3
	Research practice	6		
	Professional Foreign language		Seminar	4
		30		
Ulm				
Semester			credited in Kharkiv as	credits
8			Mathematical Statistics	
	Numerical Linear Algebra	6	Professional Elective 11	5
	Subsidiary Subject	4	Professional Elective 12	5
	Probability theory and stochastic processes	9	Mathematical Statistics	4
			Professional Elective 13	5
	Bachelor’s thesis	12	Course work	4
			Research practice	
			Bachelor thesis	
		31		

			Attestation Exam	0
			Professional foreign language	3
			Equations of mathematical physics 2	4
				30

c) Computer Science

Basic outline for students from Kharkiv				
Kharkiv				
Semester		credits	credited in Ulm as	credits
1	History of Ukraine	3	additional key qualification	3
	English language – 1	3		
	Mathematical Analysis – 1	4		
	Elements of Algebra and Number Theory	6		
	Elements of Mathematical Logic and Discrete Mathematics	4		
	Analytic Geometry	4		
	Programming – 1	4	Einführung in die Informatik I – Grundlagen	6
		28		
2	English language – 2	4		
	Mathematical Analysis – 2	6		
	Linear Algebra	4	Analytic Geometry and Linear Algebra as Lineare Algebra 1	10
	Discrete Mathematics – 1	4		
	Programming – 2	6	Einführung in die Informatik II – Vertiefung	6
	Architecture of Computer Systems	4		
	Professional Elective 1	4		
		32		
3	English language – 3	3		
	Mathematical Analysis – 3	4	Mathematical Analysis 1-3 as Analysis I	9
	Discrete Mathematics – 2	4	Discrete Structures and Algorithms	5
	Algorithms and	4		
	Data Structures			
	Operating Systems	4		

	Computing Theory (Professional Elective 2)	4	compulsory elective module in mathematics	4
	Declarative Programming	4		
	Interdisciplinary Elective Subject (Numerical Analysis I)	3	see below 6th sem.	
		30		

Admission requirements (quality assurance)

- **Mathematical Analysis 1,2,3; Discrete Mathematics 1,2; Programming 1,2;**
- **German language at B2 level**

Ulm

Semester	Math track	credits	credited in Kharkiv as	credits
4	Object oriented programming	8	Object-oriented Programming (C++, Java)	8
	Linear Algebra – 2	10	Interdisciplinary Elective Subject	3
	Analysis – 2	10	Analysis 4	4
			Professional Elective 3	4
	Computability and Complexity	4	Professional Elective 4	4
		32		
			Philosophy	3
			Computer Networks	4
				30

Semester			credited in Kharkiv as	credits
5	Measure theory	5	Interdisciplinary Elective Subject	3
	Elementary Probability theory and Statistics	9	Probability Theory and Applications	8
	Algebra	9	Discrete Mathematics – 3	4
			Professional Elective 5	4
	Introduction to SQL Databases	4	Introduction to SQL Databases	4
	Ordinary differential equations	5	Ordinary differential equations	4
			Mathematical Logic and Logic Programming	4
		32		
				31

Kharkiv

Semester			credited in Ulm as	credits
6	Methods of User Interface Design	3		
	Introduction to Parallel Processes Programming (C++ and Java)	4		
	Methods of Optimization and Operations Research – 1	4	Combinatorial Optimization	5
	Theory and Methods of Relational Databases Design	4		
	Technical English	3	additional key qualification	3
	Numerical Linear Algebra (Professional Elective 6)	4	Numerical Linear Algebra	6
	Analytical Methods of Geometric Modelling (Professional Elective 7)	4	compulsory elective module in mathematics	4
	Interdisciplinary Elective Subject (Numerical Analysis 2)	3	Numerical Analysis 1 + 2	6
		29		
7	Methods of Optimization and Operations Research – 2	4	compulsory elective module in mathematics	4
	Introduction to Mathematical Statistics	4	compulsory elective module in mathematics	4
	Development of Compilers for Domain-oriented Languages	3		

	Software Systems Design	4		
	Parallel and Distributed Computing	4		
	Mathematical Methods of Image Processing (PE 8)	4	compulsory elective module in mathematics	4
	Web-programming Technology	4		
	Professional English	3	Seminar	4
		30		
Ulm				
Semester			credited in Kharkiv as	credits
8	Elements of complex analysis	5	Professional Elective 9	4
	Fourier analysis and integral theorems	5	Professional Elective 9	4
	Probability theory and stochastic processes	9	Professional Elective 9	4
			Professional Elective 9	4
	Bachelor's thesis	12	Course work	3
			Research practice	5
			Bachelor thesis	3
			Introduction to Artificial Intelligence	3
		31		
				30

**For the students from ULM, the details of the courses and credits are as follows:
Basic outline for students from ULM studying Applied Mathematics at KGNU**

Ulm				
Semester		credits	credited in Kharkiv as	credits
1	Analysis – 1	10	Mathematical Analysis 1+2	14
	Linear Algebra – 1	10	Linear Algebra 1+ Analytic Geometry 1	10
	Introduction to Computer Science I – Fundamentals	6	Algorithms and Data Structures + Computer Programming 1	8
	Additional key qualification (compulsory elective)	3	Inter-faculty selective discipline (like History of Ukraine or Philosophy)	3
		29		
2	Analysis – 2	10	Mathematical Analysis 3	8
	Linear Algebra – 2	10	Linear Algebra 2+ Analytic Geometry 2	10
	Introduction to Computer Science II – Advanced Concepts	6	Computer Programming 2	4
	Mathematical Software	5	Project and Remote (Distributed) Team Management	3
		31		
3	Algebra	9	Elements of Algebra and Number Theory + Elements of Mathematical Logic and Discrete Mathematics	10
	Measure theory	5	Theory of Measure and Integral	4
	Ordinary differential equations	5	Differential Equations	8
	Elementary probability theory and statistics	9	Probability theory, discrete probability theory	8
		28		

Admission requirements (quality assurance):

Modules Analysis, Linear Algebra, Introduction to Computer Science I and II and Mathematical Software should be completed at time of application; all modules of the first three semesters should be completed when starting in Kharkiv, English language at B2 level

Kharkiv

Semester		credits	credited in Ulm as	credits	
4	Functional Analysis	4	Compulsory elective module	4	
	Evolution Systems	4	Compulsory elective module	4	
	Mathematical Modelling with Python	4	Subsidiary subject	4	
	Processing, Storage and Transmission of Data in the Modern Information Technologies	3	Subsidiary subject	3	
	Calculus of Variations and Optimal Control	4	Compulsory elective module	4	
	Differential Geometry	4	Manifolds and Fourier Analysis	5	
	Inter-faculty elective subject	3	Subsidiary subject	3	
	Basics of Web-Programming	4	Subsidiary subject	4	
	Basics of Game Theory	4	Compulsory elective module	4	
		34		35	
	5	Numerical Methods of Linear Algebra	4	Numerical Linear Algebra	6
		Numerical Analysis	4	Numerical Analysis	6
		Complex Analysis – I	3,5	Elements of complex analysis	5
Equations of mathematical physics – 1		4	Elementary partial differential equations	5	
Databases and Information Systems		4	Subsidiary subject	4	
Mathematical Statistics		4	Compulsory elective module	4	
Methods of Optimization		3	Combinatorial Optimization	5	
Theoretical Mechanics		4	Subsidiary subject	4	
Data Analysis		4	Subsidiary subject	4	

		34,5		43
<p>Choice: Students choose, where they want to write their Bachelor's Thesis and study the last semester accordingly either in Ulm or in Kharkiv</p>				
Kharkiv Alternative				
Semester			credited in Ulm as	credits
6	Complex Analysis – 2	3,5	Compulsory elective module	4
	Equations of mathematical physics – 2	4	Compulsory elective module	4
	Term Research Paper	3	Bachelor's Thesis	12
	Research Practice	5		
	Bachelor's Thesis	2		
	Numerical Methods for Solving Differential and Integral Equations	4	Numerics of differential equations	5
	Foreign Language for Professional purposes	3	Seminar	4
	Controllability of Robust Systems	4	Compulsory elective module	4
	Applied Problems of Big Data Analysis	4	Compulsory elective module	4
	Inter-faculty elective subject	3	Subsidiary subject	3
		35,5		40
Ulm Alternative				
Semester			credited in Kharkiv as	
6	Bachelor's Thesis	12	Term Research Paper, Research Practice, Bachelor's Thesis	10
	Seminar	4	Foreign Language for Professional purposes	3
	Compulsory Elective module/Probability theory and stochastic processes	9	Elective course(s)	
	Compulsory Elective module	5	Elective course	
		30		13

Appendix 2

Conversion table for the grades

ECTS Grade	Interpretation	KKNU	ULM
A	excellent	90-100 %	1
B	very good	82-89 %	1.3
C	good	75-81 %	1.7-2.3
D	satisfactory	67-74 %	2.7-3.3
E	sufficient	60-66 %	3.7-4
F/FX	fail	<60 %	5