



MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
NATIONAL TECHNICAL UNIVERSITY "KHARKIV POLYTECHNIC INSTITUTE"

CURRICULUM

EDUCATIONAL AND SCIENTIFIC PROGRAM

Software engineering

in the field of knowledge 12 Information Technologies  
(code and name of field of knowledge)

APPROVED BY

Rector of NTU "KhPI" Yevgen SOKOL for the training second (master's) level  
(educational level)

by specialty - 121 Software engineering

Qualification Master of Science in Software Engineering

Apprenticeship 1 year 4 months

based on educational degree bachelor's degree

" " p.

Form of education i.e

I. Schedule of the educational process

Cours	September				October				November				December				January				February				March				April				May				June				July				August							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
1																		V				V																														
2																																																				

				<b>68</b>							
				<b>52</b>		<b>16</b>					
				9	10	11	12	sum inian le			
T theor. Study				20	20	10		50	T		
D diploma project						4		4	Q		
V Vacation				2	10			12	V		
D attestation						2		2	D		

Marking:  Theoretical and practical training       Preparation of qualification work       Defending of qualification work       Vacation

II. Consolidated time budgets (in weeks)

Course	Theoretical study	Completion of the thesis	Attestation	Implementation of a diploma project (work)	Vacation	Total
1	40				12	52
2	10		2	4		16
together	50		2	4	12	68

IV. Attestation

Activities	Number of ECTS credits	Semester
Preparation of qualification work	6.0	11
Defending of qualification work	3.0	11

V. EDUCATIONAL PROCESS PLAN

Code in accordance with the EPP	Name of academic discipline	Semester distribution			Number of ECTS credits	Number of hours						Distribution of classroom hours per week and ECTS credits by semester								Department	
		Exams	Tests	Individual tasks		Total amount	Classroom			Independent work	1 course		2 course		1		2		3		
							Total	including			Semester				Semester						
								Lectures	laboratory		Practical studies	Number of weeks in the semester									
												20		20		10					
Classroom hours	ECTS credits	Classroom hours	ECTS credits	Classroom hours	ECTS credits	Classroom hours	ECTS credits	Classroom hours	ECTS credits												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	29	
<b>1</b>	<b>Obligatory educational components</b>				<b>67.0</b>	<b>2010.0</b>	<b>596.0</b>	<b>180.0</b>	<b>110.0</b>	<b>306.0</b>	<b>1414.0</b>	<b>13.3</b>	<b>20.0</b>	<b>12.0</b>	<b>21.0</b>	<b>9.0</b>	<b>26.0</b>				
<b>1.1</b>	<b>General training</b>				<b>10.00</b>	<b>300.00</b>	<b>112.00</b>			<b>112.00</b>	<b>188.00</b>	<b>2.80</b>	<b>5.00</b>	<b>2.00</b>	<b>2.00</b>	<b>1.60</b>	<b>3.00</b>				
GT1	Foreign language for professional purposes		1-2		4.0	120.0	80.0			80.0	40.0	2.0	2.0	2.0	2.0					275	
GT2	Intellectual Property		1	R	3.0	90.0	16.0			16.0	74.0	0.8	3.0							202	
GT3	Innovative entrepreneurship and startup project management		3	R	3.0	90.0	16.0			16.0	74.0				1.6	3				321	
<b>1.2</b>	<b>Special (professional) training</b>				<b>27.00</b>	<b>810.00</b>	<b>450.00</b>	<b>180.00</b>	<b>110.00</b>	<b>160.00</b>	<b>360.00</b>	<b>10.50</b>	<b>12.00</b>	<b>10.00</b>	<b>11.00</b>	<b>4.00</b>	<b>4.00</b>				
PT1	Intelligent systems software		3	KR	4.0	120.0	40.0			40.0	80.0				4	4				321	
PT2	Formal methods of software systems research	1			3.0	90.0	60.0	20.0		40.0	30.0	3	3.0							321	
PT3	Fundamentals of intelligent systems design	1			3.0	90.0	60.0	40.0	20.0		30.0	3	3							321	
PT4	Scientific school of the department	1			3.0	90.0	30.0	10.0		20.0	60.0	1.5	3							321	
PT5	Project management in software engineering	2			4.0	120.0	80.0	20.0		60.0	40.0			4.0	4.0					321	
PT6	Decision support models and methods	2			4.0	120.0	80.0	40.0	40.0		40.0			4.0	4.0					321	
PT7	Models and technologies for ensuring the security of intelligent systems	1			3.0	90.0	60.0	30.0	30.0		30.0	3.0	3.0							321	
PT8	Introduction to DevOps		2		3.0	90.0	40.0	20.0	20.0		50.0			2.0	3.0					321	
<b>1.3</b>	<b>Scientific training</b>				<b>30.00</b>	<b>900.00</b>	<b>34.00</b>			<b>34.00</b>	<b>866.00</b>		<b>3.00</b>		<b>8.00</b>	<b>3.40</b>	<b>19.00</b>				
SP1	Basics of the scientific research		3	RE	3.0	90.0	14.0			14.0	76.0				1.4	3.0				321	
SP2	English for scientific purposes	3			2.0	60.0	20.0			20.0	40.0				2.0	2.0				275	
SP3	R&D		2		3.0	90.0					90.0			3.0						321	
SP4	Practice		1-3		13.0	390.0					390.0		3.0		5.0		5.0			321	
	Attestation				9.0	270.0					270.0						9.0			321	
<b>2</b>	<b>Optional educational components</b>				<b>23.0</b>	<b>690.0</b>	<b>184.0</b>	<b>120.0</b>		<b>120.0</b>	<b>506.0</b>	<b>4.0</b>	<b>10.0</b>	<b>6.0</b>	<b>9.0</b>	<b>4.0</b>	<b>4.0</b>				
<b>2.1</b>	<b>Profile training</b>				<b>15.00</b>	<b>450.00</b>	<b>120.00</b>	<b>60.00</b>		<b>60.00</b>	<b>330.00</b>	<b>4.00</b>	<b>10.00</b>	<b>2.00</b>	<b>5.00</b>						
<b>2.1.1</b>	<b>Profiled discipline package 01 "Project Management in Software Engineering"</b>				<b>15.00</b>	<b>450.00</b>	<b>120.00</b>	<b>60.00</b>		<b>60.00</b>	<b>330.00</b>	<b>4.00</b>	<b>10.00</b>	<b>2.00</b>	<b>5.00</b>						
OP 1.1	Analysis and management of requirements		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 1.2	Project management		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 1.3	Innovation and entrepreneurship		2		5.0	150.0	40.0	20.0		20.0	110.0			2.0	5.0					321	
<b>2.1.2</b>	<b>Profiled discipline package 02 "Cloud Computing"</b>				<b>15.00</b>	<b>450.00</b>	<b>120.00</b>	<b>60.00</b>		<b>60.00</b>	<b>330.00</b>	<b>4.00</b>	<b>10.00</b>	<b>2.00</b>	<b>5.00</b>						
OP 2.1	Databases and data warehouses		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 2.2	Intelligent data analysis and knowledge extraction		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 2.3	Cloud Computing: cloud technologies and applications		2		5.0	150.0	40.0	20.0		20.0	110.0			2.0	5.0					321	
<b>2.1.3</b>	<b>Profiled discipline package 03 "Artificial intelligence and Machine Learning"</b>				<b>15.00</b>	<b>450.00</b>	<b>120.00</b>	<b>60.00</b>		<b>60.00</b>	<b>330.00</b>	<b>4.00</b>	<b>10.00</b>	<b>2.00</b>	<b>5.00</b>						
OP 3.1	Intelligent data analysis and knowledge extraction		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 3.2	Multi-agent systems and technologies		1		5.0	150.0	40.0	20.0		20.0	110.0	2.0	5.0							321	
OP 3.3	Neural networks and methods of computational intelligence		2		5.0	150.0	40.0	20.0		20.0	110.0			2.0	5.0					321	
<b>2.2</b>	<b>Optional disciplines of profile training (the list is attached)</b>		<b>2-3</b>		<b>8.00</b>	<b>240.00</b>	<b>64.00</b>	<b>60.00</b>		<b>60.00</b>	<b>176.00</b>			<b>4.00</b>	<b>4.00</b>	<b>4.00</b>	<b>4.00</b>				
	<b>Total for education period</b>				<b>90.0</b>	<b>2700.0</b>	<b>780.0</b>	<b>300.0</b>	<b>110.0</b>	<b>426.0</b>	<b>1920.0</b>	<b>17.3</b>	<b>30.0</b>	<b>18.0</b>	<b>30.0</b>	<b>13.0</b>	<b>30.0</b>				
	Hours per week											17.3	18.0	13.0						KN-M223i.e	

Number of exams				
Number of credits				
Number of course projects (papers)				
Number of disciplines in the semester	8.0	6.0	5.0	

KN-M223i.e  
KN-M223i.e  
KN-M223i.e  
KN-M223i.e

Individual tasks	
C	Calculation task
CG	Calculation and graphic task
R	Report
CP	Course project
CW	Coursework
SRW	Scientific research work

**Approved by the Academic Council of NTU "KhPI"**

**protocol No. 5 from 02.06.2023**

**Vice-rector of Scientific-and-Pedagogical Work**

\_\_\_\_\_ **Ruslan MYGUSHCHENKO**  
signature

**Head of the educational program Computer Science and Intelligent Systems**

\_\_\_\_\_ **Oleksandr SHMATKO**  
signature

**Director of Educational and Scientific Institute of Computer Science and Information Technology**

\_\_\_\_\_ **Mykhailo GODLEVSKYI**  
signature

**Head of the Department of Software Engineering and Management Intelligent Technologies**

\_\_\_\_\_ **Igor HAMAYUN**  
signature

### VI ELECTIVE DISCIPLINES

No	The name of the academic discipline	Distribution by semesters			Number of ECTS credits	Number of hours						Distribution of classroom hours per week and ECTS credits by semester								Chair	
		Exams	Credits	Individual tasks		The total amount	Auditory			Independent work	1 course				2 course						
							In total	including			Semester		Semester								
								lectures	laboratory		1	2	3	4							
		Number of weeks in the semester								20		20		10							
		Auditory hours	ECTS credits	Auditory hours		ECTS credits	Auditory hours	ECTS credits	Auditory hours	ECTS credits	Auditory hours	ECTS credits									
13	14	15	16	17	18	19	20	29													
<b>2.2</b>	<b>Optional disciplines of profile training</b>																				
OPT1	<b>Data Integration and Cleaning (ETL) Tools</b>		2		4.0	120.0	80.0	40.0		40.0	40.0			4.0	4.0					<b>321</b>	KN-M223i.e
OPT2	<b>Analytical data warehouses</b>		2		4.0	120.0	80.0	40.0		40.0	40.0			4.0	4.0					<b>321</b>	KN-M223i.e
OPT3	<b>Cloud Computing: cloud technologies and applications</b>		2		4.0	120.0	80.0	40.0		40.0	40.0			4.0	4.0					<b>321</b>	KN-M223i.e
OPT4	<b>Group dynamics and communications</b>		2		4.0	120.0	80.0	40.0		40.0	40.0			4.0	4.0					<b>321</b>	KN-M223i.e
OPT5	<b>Distributed and parallel computing</b>		3		4.0	120.0	40.0	20.0		20.0	80.0					4	4			<b>321</b>	KN-M223i.e
OPT6	<b>Modern programming technologies</b>		3		4.0	120.0	40.0	20.0		20.0	80.0					4	4			<b>321</b>	KN-M223i.e
OPT7	<b>Decentralized applications and blockchain technologies</b>		3		4.0	120.0	40.0	20.0		20.0	80.0					4	4			<b>321</b>	KN-M223i.e
OPT8	<b>Models of artificial intelligence</b>		3		4.0	120.0	40.0	20.0		20.0	80.0					4	4				KN-M223i.e

**CONTENTS OF THE CURRICULUM**

master's training:

specialty

121

Software engineering

Number in order	Discipline title	Total amount				Department code
		ECTS credits	Hours	Semesters		
				Exam	Test	
1	2	3	4	5	6	7
<b>1</b>	<b>Obligatory educational components</b>	<b>67.0</b>	<b>2010.0</b>			<b>55.8%</b>
<b>1.1</b>	<b>General training</b>	<b>10.0</b>	<b>300.0</b>			<b>11.1%</b>
GT1	Foreign language for professional purposes	4.0	120.0		1-2	275
GT2	Intellectual Property	3.0	90.0		1	202
GT3	innovative entrepreneurship and startup project management	3.0	90.0		3	321
<b>1.2</b>	<b>Special (professional) training</b>	<b>27.0</b>	<b>810.0</b>			<b>30%</b>
PT1	Intelligent systems software	4.0	120.0			321
PT2	Formal methods of software systems research	3.0	90.0	1		321
PT3	Fundamentals of intelligent systems design	3.0	90.0		3	321
PT4	Scientific school of the department	3.0	90.0	1		321
PT5	Project management in software engineering	4.0	120.0	2		321
PT6	Decision support models and methods	4.0	120.0	2		321
PT7	models and technologies for ensuring the security of intelligent systems	3.0	90.0	1		321
PT8	Introduction to DevOps	3.0	90.0		2	321
<b>1.3</b>	<b>Scientific training</b>	<b>30.0</b>	<b>900.0</b>			<b>25%</b>
SP1	Basics of the scientific research	3.0	90.0		3	321
SP2	English for scientific purposes	2.0	60.0			275
SP3	R&D	3.0	90.0		2	321
SP4	Practice	13.0	390.0		1-3	321
	Attestation	9.0	270.0			321
<b>2</b>	<b>Optional educational components</b>	<b>23.0</b>	<b>690.0</b>			<b>25.6%</b>
<b>2.1</b>	<b>Professional training</b>	<b>12.0</b>	<b>360.0</b>			<b>10%</b>
<b>2.1.1</b>	<b>Profiled discipline package 01 "Project Management in Software Engineering"</b>	<b>15.0</b>	<b>450.0</b>			
OP 1.1	Analysis and management of requirements	5.0	150.0		1	321
OP 1.2	Project management	5.0	150.0		1	321
OP 1.3	Innovation and entrepreneurship	5.0	150.0		2	321
<b>2.1.2</b>	<b>Profiled package of disciplines 02 "Cloud Computing"</b>	<b>15.0</b>	<b>450.0</b>			
OP 2.1	Databases and data warehouses	5.0	150.0		1	321
OP 2.2	Intelligent data analysis and knowledge extraction	5.0	150.0		1	321
OP 2.3	Cloud Computing: cloud technologies and applications	5.0	150.0		2	321
<b>2.1.3</b>	<b>Profiled package of disciplines 03 "Artificial intelligence and Machine Learning"</b>	<b>15.0</b>	<b>450.0</b>			
OP 3.1	Intelligent data analysis and knowledge extraction	5.0	150.0		1	321
OP 3.2	Multi-agent systems and technologies	5.0	150.0		1	321
OP 3.3	Neural networks and methods of computational intelligence	5.0	150.0		2	321
<b>2.2</b>	<b>Disciplines of free choice of specialized training according to the list (the list is attached)</b>	<b>8.0</b>	<b>240.0</b>			
	<b>The total amount for the training period</b>	<b>90.0</b>	<b>2700.0</b>			