MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
«Igor Sikorsky Kyiv Polytechnic Institute»

APPROVED:
Academic Council of Igor Sikorsky Kyiv Polytechnic Institute
(Protocol № 3 dated March 15, 2021)
Chairman of the Academic Council

_____Mykhailo ILCHENKO

EDUCATIONAL AND PROFESSIONAL PROGRAM

Control systems of flight vehicles and complexes engineering

The first (bachelor's) level of higher education

speciality	173 Avionics
field of knowledge	17 Electronics and telecommunications
qualification	bachelor in Avionics

Put into effect by order of the rector
Igor Sikorsky Kyiv Polytechnic Institute
from 19.04.2021 № НОН/89//2021

PREAMBLE

DEVELOPED by the project team:

The project team chairman
Vitalyi Burnashev, Ph.D., Associate Professor, Associate Professor of the Department of Aircraft Control Systems _____

The project team members:
Sergyi Ponomarenko, Ph.D., Senior Researcher, Associate Professor of the Department of Aircraft Control Systems _____

Mykola Chernjak, Ph.D., Associate Professor, Associate Professor of the Department of Aircraft Control Systems _____

Oleksandr Zbrutskyi, Doctor of Technical Sciences, Professor, Head of the Department of Aircraft Control Systems _____

AGREED:
Scientific and methodical commission of Igor Sikorsky Kyiv Polytechnic Institute on specialty 173 "Avionics":

Head SMC 173 _____ Oleksandr ZBRUTSKYI
(protocol № 4 from 24.02.2021)

Head of the Methodical Council _____ Yuriy YAKYMENKO
(protocol № 6 from 25.02.2021)

INCLUDED:
Professional expertise was conducted by:
Director - Chief Designer SE SDB "Arsenal" M.I. Likholit

The educational and scientific program was discussed after receiving all the wishes and suggestions from students and graduates and approved at a meeting of the Department of Aircraft Control Systems (protocol № 9 from 10.06.2020).

CONTENTS

1. PROFILE OF THE EDUCATIONAL PROGRAM
on the specialty 173 "Avionics"

1 – Загальна інформація	
Full name of HEI and institute /	NATIONAL TECHNICAL UNIVERSITY OF UKRAINE «Igor Sikorsky Kyiv Polytechnic Institute», Institute of Aerospace Technology
Degree of higher education and title of qualification	Degree of HE – bachelor Educational qualification – bachelor in Avionics
The official name of the EP	Control systems of flight vehicles and complexes engineering
Type of diploma and scope of EP	Bachelor Diploma Normative training period, 3 years and 10 months Educational component 240 ECTS credits
Availability of accreditation	Certificate of accreditation of the specialty series ND № 1192565 issued by the Ministry of Education and Science of Ukraine on 30.04.13, valid until 01.07.2023.
Cycle / level of HE	NQF of Ukraine – level 6 QF-EHEA – the 1st cycle
Prerequisites	Complete secondary education
Language (s) of teaching	Ukrainian / English
Validity of the EP	Until the next accreditation
Internet address of the permanent placement of the educational program	https://skla.kpi.ua/study, https://osvita.kpi.ua/op
2 – The purpose of the educational program	
Training of specialists who are able to solve complex specialized tasks and practical problems of use and implementation of avionics systems and devices. Specialists must acquire fundamental knowledge of natural sciences, as well as applied competencies in the field of avionics systems, which should allow to understand the trends of the industry and society, to adequately respond to the challenges of the labor market.	
3 – Characteristics of the educational program	
Subject area	Objects of study and / or activity: automated and automatic control systems for aeronautical, rocket and space objects and systems, their information support. Theoretical content of the subject area: notions, concepts, principles in the field of flight dynamics, of flying vehicles control systems, of electronic and microprocessor technology of avionics and navigation systems. Methods, techniques and technologies: methods, techniques, technologies of design, research and testing of avionics systems. Tools and equipment: stands and simulation software for modelling avionics systems; information and measuring systems and devices; automatic control systems, computers, microprocessor control systems for onboard and ground equipment.

Orientation EP	Educational-professional
The main focus of the EP	Special education in the field of development, design, production and certification of devices and control systems for aerospace technics and robotics. Key words: devices and control systems, robotics, avionics.
Features of EP	In-depth study of methods of synthesis and analysis of flying vehicles control systems, their sensitive elements, automatic control theory.
4 – Suitability of graduates for employment and further study	
Suitability for employment	The graduate can hold the positions of professionals and specialists in accordance with the current version of the National Classification of Ukraine (DK 003: 2010): specialist in control and maintenance of systems, applied programmer, designer, technical specialist.
Further training	Opportunity to continue education in the educational-professional or educational-scientific program of the master's degree. Acquisition of additional qualifications in the system of postgraduate education.
5 – Teaching and assessment	
Teaching and learning	Lectures, practical and seminar classes, computer practices and laboratory works; course projects and works; technology of blended learning, practices and excursions; the execution of diploma project and thesis
Evaluation	Oral and written exams, tests, etc. are evaluated according to the rating system
6 – Program competencies	
Integral competence	Ability to solve complex specialized tasks and practical problems of avionics and control systems during professional activities and in the learning process, which involves the application of theories and methods of engineering and is characterized by complexity and uncertainty of conditions
General Competences (GC)	
GC 1	Ability to apply knowledge in practical situations
GC 2	Ability to search, process and analyse information
GC 3	Ability to identify, pose and solve problems
GC 4	Knowledge and understanding of the subject area and understanding of professional activity
GC 5	Ability to communicate in the state language both orally and in writing
GC 6	Ability to communicate in a foreign language
GC 7	Ability to exercise own rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine
GC8	Ability to preserve and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology, and use different types and forms of motor activities for active recreation and a healthy lifestyle
GC9	Ability to understand theory and use methods of mathematical analysis, analytical geometry, linear algebra, operational calculus, probability theory and mathematical

	statistics
GC 10	Ability to mathematically describe and model physical processes in flying vehicle control systems
GC 11	Ability to synthesise and analyse automatic control systems
GC 12	Ability to understand and use the laws of physics and chemistry
Professional competencies of the specialty (PC)	
PC 1	Ability to carry out professional activities in the field of avionics autonomously and responsibly, adhering to the legislative and regulatory framework, as well as state and international requirements
PC 2	Ability to use the basics of electronics, circuitry in solving practical problems of avionics
PC 3	Ability to develop and program microprocessor control systems
PC 4	Ability to analyze and synthesize control systems of flying vehicles
PC 5	Ability to develop avionics and aircraft ground systems using information technology
PC 6	Ability to mathematically describe and model physical processes in aircraft control systems
PC 7	Ability to design avionics devices and systems using automated systems
PC 8	Ability to describe and use modern technologies for the manufacture of avionics systems
PC 9	Ability to evaluate the technical and economic characteristics of avionics systems and devices
PC 10	Ability to justify decisions, work effectively autonomously and as part of a team
PC 11	Ability to design avionics devices
PC 12	Ability to develop mathematical models of aircraft motion using aerodynamics and flight theory
PC 13	Ability to plan testing and test technical systems
PC 14	Ability to develop elements of avionics, design and defend the results of development
7 – Program results of learning	
RL 1	Adapt to changes in professional technologies, predict their impact on the end result
RL 2	Autonomously acquire new knowledge in their subject and related areas from various sources to effectively solve specialized professional problems
RL 3	Responsibly and competently set and solve problems related to the creation of avionics devices and systems
RL 4	Understand the state and prospects of the subject area
RL 5	Organize their own professional activity, to choose optimum methods and ways of solving difficult specialized tasks and practical problems in professional activity
RL 6	Critically comprehend the basic theories, principles, methods and concepts in professional activities
RL 7	Communicate freely in state and foreign languages orally and in writing on professional issues
RL 8	Understand the principles of law and legal basics of professional activity in the field of avionics

RL 9	Understanding of modern philosophical theories and main achievements of world and national culture, their creative comprehension and skills of application in professional activity, in particular, at communicating with colleagues
RL 10	Effectively plan and organize their working hours, maintain their own health and ability to work through active recreation and a healthy lifestyle
RL 11	Develop technical requirements for avionics systems and devices; carry out the design of avionics systems and devices taking into account the requirements of the customer and regulatory and technical documentation
RL 12	Analyze, calculate and design electrical and electronic avionics systems
RL 13	Develop and program microprocessor control systems
RL 14	Apply modern information technologies to ensure the functioning of flying vehicles and ground complexes
RL 15	Develop mathematical models of flying vehicles as control objects
RL 16	Be able to describe information processes related to avionics, analyze their noise immunity
RL 17	Be able to create radioelectronic equipment and devices of flying vehicles and ground complexes using computer-aided design systems
RL 18	Provide manufacturability of avionics systems by modern design, automated and experimental means
RL 19	Evaluate the technical and economic characteristics of the decisions to ensure the efficiency and high quality of development
RL 20	Know the methods of mathematical analysis and analytical geometry, the laws of physics and chemistry, social sciences
RL 21	Know the theory of automatic control, analog and digital models of dynamic systems, methods of synthesis and analysis of automatic control systems
RL 22	Be able to use methods for estimating and ensuring the accuracy of measurements, design methods and technologies for the production of avionics systems
RL 23	Be able to use methods of mathematical description and modeling of physical processes in flying vehicles control systems
RL 24	Know labor and civil protection regulations
RL 25	Know the basics of aviation and astronautics, the structure of flying vehicles and their systems
RL 26	Know the laws of motion of solids, resistance of materials, the theory of oscillations in technical systems
RL 27	Be able to calculate mechanical structures for strength and elasticity, determine the parameters of motion of solids
RL 28	Be able to develop, analyze and use aircraft control systems and their sensing elements
RL 29	Be able to develop and analyze motion control systems, navigation systems and their sensing elements, using knowledge of materials and technologies of instrument making, basics of aviation and astronautics
RL 30	Be able to design devices of precise mechanics
RL 31	Be able to plan and test technical systems
RL 32	Be able to study dynamic systems for stability, determine the quality of control and synthesize corrective devices
RL 33	Use programming languages, create algorithms
8 – Resource support for program implementation	
Staffing	In accordance with the personnel requirements for ensuring the implementation of educational activities for the 1st level of HE (Annex 2 to the License Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187, with changes according to RCMU № 347 dated 10.05.2018.

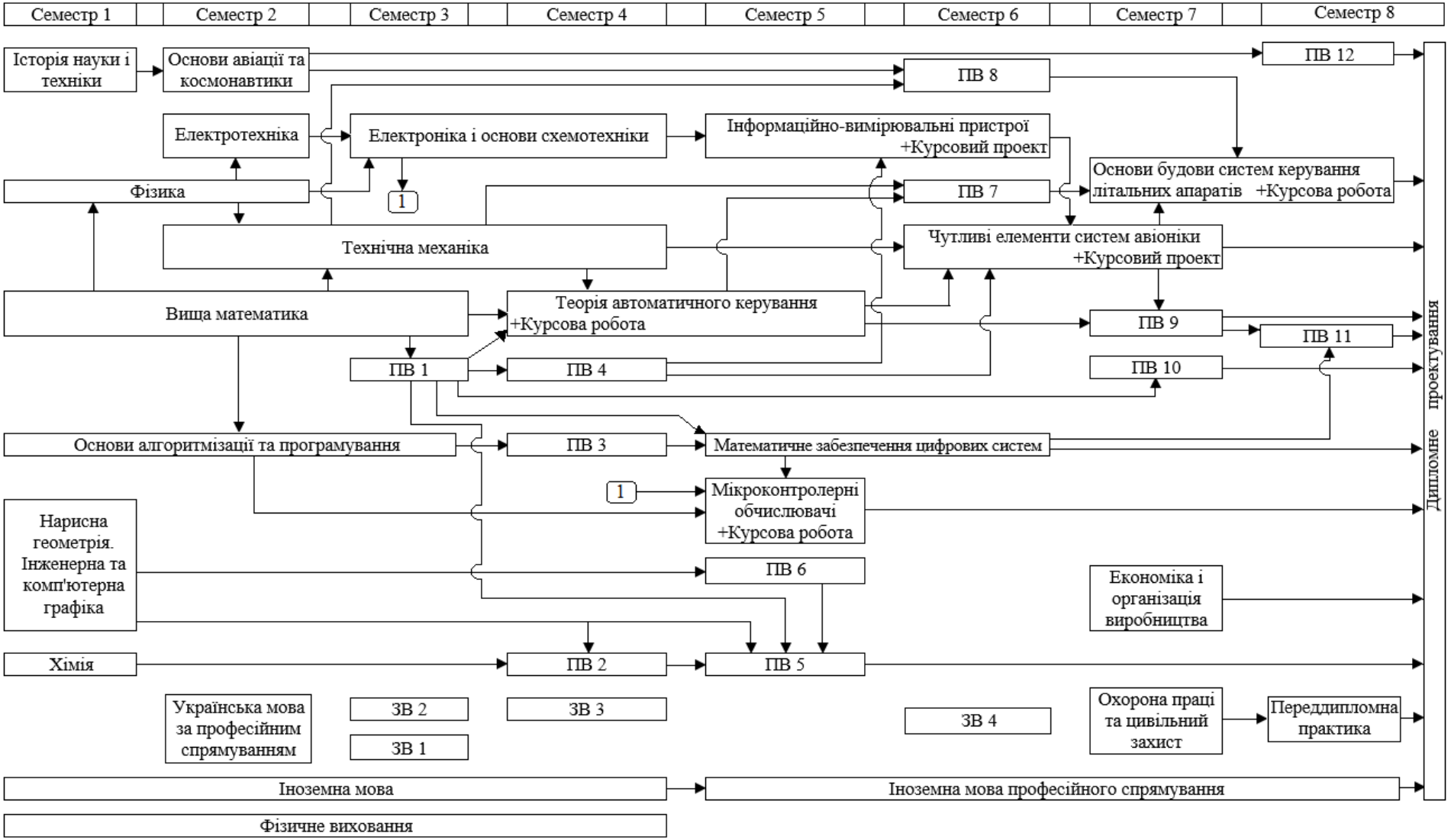
Material and technical provision	In accordance with the technological requirements for material and technical support of educational activities of the 1st level of HE (Annex 4 to the License Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187, with changes according to RCMU № 347 dated 10.05.2018.
Information and educational and methodical support	In accordance with the technological requirements for educational and methodological and informational support of educational activities of the 1st level of HE (Annex 5 to the License Terms), approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187, with changes according to RCMU № 347 dated 10.05.2018.
9 – Academic mobility	
National credit mobility	Exchange programs between partner universities, harmonization of the content of disciplines with the related disciplines of profile educational institutions.
International credit mobility	Opportunities for exchange between partner universities of other countries, implementation of a double degree program with EU universities. Participation in international educational programs. To determine knowledge and skills that students should acquire in the learning process, European standards of higher education for related specialties are taken into account.
Training of foreign applicants HE	Learning on Ukrainian or English (subject to possession of language skills at the B2 level and over)

2. LIST OF COMPONENTS OF THE EDUCATIONAL COMPONENT OF THE EDUCATIONAL PROGRAM

Code	Components of the educational program (academic disciplines, course projects /works, practices)	Number of ECTS credits	Form final control
1	2	3	4
Obligatory (regulatory) components of the EP			
General training cycle			
GO 1	Ukrainian language for professional purposes	2	Test
GO 2	History of science and technology	2	Test
GO 3	Basics of a healthy lifestyle	3	Test
GO 4	Foreign Language	6	Test
GO 5	Foreign language for professional purposes	6	examination
GO 6	General theory of development	2	залік
GO 7	Business law	2	Test
GO 8	Economics and organization of production	4	Test
GO 9	Labor protection and civil protection	4	Test
GO 10	Higher mathematics	18	examination
GO 11	Physics	10	examination
GO 12	Chemistry	3	Test
GO 13	Descriptive geometry. Engineering and computer graphics	5	examination
GO 14	Fundamentals of algorithmization and programming	11,5	examination
GO 15	Fundamentals of aviation and astronautics	2	Test
GO 16	Electrical engineering	4	Test
GO 17	Technical mechanics	14,5	examination
GO 18	Electronics and basics of circuitry	10	examination

GO 19	Theory of automatic control	9	examination
GO 20	Course work on the theory of automatic control	1	Test
GO 21	Mathematical support of digital systems	10	examination
Cycle of professional training			
PO 1	Measurement and standardization in avionics	5	examination
PO 2	Microcontroller computers for aircraft and spacecraft	5,5	examination
PO 3	Course work on microcontroller computers for aircraft and spacecraft	1	Test
PO 4	Information and measuring devices	9	examination
PO 5	Course project on information and measuring devices	1,5	Test
PO 6	Sensitive elements of avionics systems	8	examination
PO 7	Course project on sensitive elements of avionics systems	1,5	Test
PO 8	Fundamentals of the structure of control systems for aircraft and satellites	3	examination
PO 9	Aircraft control systems software	4,5	examination
PO 10	Pre-diploma practice	6	Test
PO 11	Diploma design	6	defending
Selective components of EP			
General training cycle			
GS 1	Educational component 1 of the U-Catalogs	2	Test
GS 2	Educational component 2 of the U-Catalogs	2	Test
Cycle of professional training			
ПВ 1	Educational component 1 F-Catalogs	4	Test
ПВ 2	Educational component 2 F-Catalogs	4	Test
ПВ 3	Educational component 3 F-Catalogs	4	Test
ПВ 4	Educational component 4 F-Catalogs	4	Test
ПВ 5	Educational component 5 F-Catalogs	4	Test
ПВ 6	Educational component 6 F-Catalogs	4	Test
ПВ 7	Educational component 7 F-Catalogs	4	Test
ПВ 8	Educational component 8 F-Catalogs	4	Test
ПВ 9	Educational component 9 F-Catalogs	4	Test
ПВ 10	Educational component 10 F-Catalogs	4	Test
ПВ 11	Educational component 11 F-Catalogs	4	Test
ПВ 12	Educational component 12 F-Catalogs	4	Test
ПВ 13	Educational component 13 F-Catalogs	4	Test
ПВ 14	Educational component 14 F-Catalogs	4	Test
Total **obligatory** components:		180	
The total of **selective** components:		60	
The amount of educational components that provide the acquisition competencies defined by the SHE		154	
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		**240**	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. FORM OF GRADUATION CERTIFICATION OF HIGHER EDUCATION APPLICANTS

Graduation certification of applicants for higher education under the educational-professional program " Control systems of flight vehicles and complexes engineering " is carried out in the form of defending of qualification work and ends with the issuance of a standard document on awarding him a bachelor's degree with a bachelor's degree: bachelor of avionics.

Graduation certification is open and public.

5. MATRIX OF CONFORMITY OF SOFTWARE COMPETENCIES TO THE COMPONENTS OF EDUCATIONAL PROGRAMS

	GO 1	GO 2	GO 3	GO 4	GO 5	GO 6	GO 7	GO 8	GO 9	GO 10	GO 11	GO 12	GO 13	GO 14	GO 15	GO 16	GO 17	GO 18	GO 19	GO 20	GO 21	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
GC 1	+	+		+	+		+	+	+	+			+	+		+		+	+	+	+											+
GC 2		+						+			+				+			+	+	+	+			+	+	+	+				+	+
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6. MATRIX OF PROVIDING LEARNING RESULTS BY RELEVANT COMPONENTS EDUCATIONAL PROGRAM

	GO 1	GO 2	GO 3	GO 4	GO 5	GO 6	GO 7	GO 8	GO 9	GO 10	GO 11	GO 12	GO 13	GO 14	GO 15	GO 16	GO 17	GO 18	GO 19	GO 20	GO 21	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
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