

Ministry of Education and Science of Ukraine
National Aerospace University by M.E. Zhukovsky
“Kharkiv Aviation Institute”

Airplane and Helicopter Design Department (No. 103)

APPROVED

Guarantor of the educational program
Chairman of the SMC

(signature) M. M. Orlovskyy
(initials and surname)

«_____» _____ 2021

WORK PROGRAM OF SELECTIVE ACADEMIC DISCIPLINE

Human Factor in Operation of Aircraft

(name of the academic discipline)

Branch of knowledge: _____
27 "Transport"
(code and the name of the field of knowledge)

Specialty: _____
272 "Air transport"
(code and name of the specialty)

Educational program: "Maintenance and repair of aircraft and aircraft engines"
(name of educational program)

Form of study: full-time

Higher education level: second (master's)

Working program " Human Factor in Operation of Aircraft "

(name of the discipline)

for students of specialty 272 Aviation Transport
educational program «Maintenance and repair of aircraft and aircraft engines»

«30» august 2021 p. – 11 p.

Developer: Shaabdiev S.Sh., Associate Professor of 103 department, PhD _____
(surname and initials, position, academic degree and academic title) (signature)

The work program was discussed on Airplane and Helicopter Design department meeting. _____
(name of the department)

Protocol № 2 from “ 30 ” 08 2021

Head of the department Ph.D., Associate Professor _____ A.M. Humennyi
(scientific degree and academic title) (signature) (initials and surname)

1. Description of the discipline

Name of the indicator	Branch of knowledge, specialty, educational program, level of higher education	Characteristics of academic discipline <i>(full-time education)</i>
Number of loans – 4	Field of knowledge <u>27 Transport</u> (code and name) Speciality <u>272 Air transport</u> (code and name) Educational program <u>Maintenance and repair of aircraft and aircraft engines</u> (name) Level of higher education: third (educational and scientific)	by choice
Number of modules - 1		Academic year
Number of content modules - 2		2021-2022
Individual task _____ (title)		Semester
Total number of hours - 120		3rd
		Lecture
Number of weekly hours for full-time education: classrooms – 3 student's independent work – 5		24 hours
		Practical, seminar*
		0 hours
		Laboratory
		16 hours
		Independent work
		80 hours
		Type of control
	modular control, Exam	

Note

The ratio of the number of hours of classroom classes to independent work is:
For full-time education – 40/80.

*The classroom load can be reduced or increased by one hour depending on the schedule of classes.

2. The purpose and objectives of the discipline

The purpose of the study: is the formation and development of students knowledge, skills of analysis and solving problems of interaction between aviation personnel, which provides maintenance and repair of civil aircraft (CA), with elements of the aviation system.

The task: is to teach students to competently analyze the causes (factors) affecting the quality of professional activities by airline aviation personnel, to develop and provide reasonable recommendations for reducing this impact in the process of maintenance and repair of airline aviation equipment.

In accordance with the requirements of the educational and professional program, students must achieve the following **competencies**:

General competencies (GC):

GC1 – Ability to abstract thinking, analysis and synthesis.

GC2 – Ability to apply knowledge in practical situations.

GC4 – Adaptability and action in a new situation.

GC5 – Ability to make informed decisions.

GC6 – Ability to work as a team.

GC7 – Safe Activities Skills.

GC8 – Ability to evaluate and ensure the quality of work performed.

GC10 – Ability to identify, set and solve problems.

Professional competences of the specialty (PC):

PC1 – Ability to formulate the purpose and objectives of research, identify priorities for solving problems, select and create evaluation criteria.

PC3 – Ability to have a full range of legal and regulatory acts in the field of aviation safety related to the object of professional activity.

PC6 – Ability to prepare, plan and conduct training sessions in educational organizations.

PC7 – Ability to organize the work of teams of performers in order to achieve the goal, make and implement management decisions in the conditions of a range of opinions, determine the procedure for the operation and repair of aviation equipment and maintenance of technological equipment.

Program learning outcomes (PLO):

PLO1 – Formulate the purpose and objectives of the study, identify task priorities, select and create evaluation criteria.

PLO3 – Use the laws and methods of mathematics, natural, humanities and economic sciences in solving professional problems, including when solving non-standard tasks that require in-depth analysis of their essence from natural and scientific positions.

PLO5 – Own a full range of legal and regulatory acts in the field of aviation safety related to the object of professional activity.

PLO9 – Prepare, plan and conduct training sessions in educational organizations.

PLO10 – Organize the work of performing teams to achieve the goal, make and implement management decisions in the context of a range of opinions, determine the procedure for the operation and repair of aviation equipment and maintenance of technological equipment.

Interdisciplinary connections: presented structural and logical scheme of educational and professional training program for specialists in Fig.1.

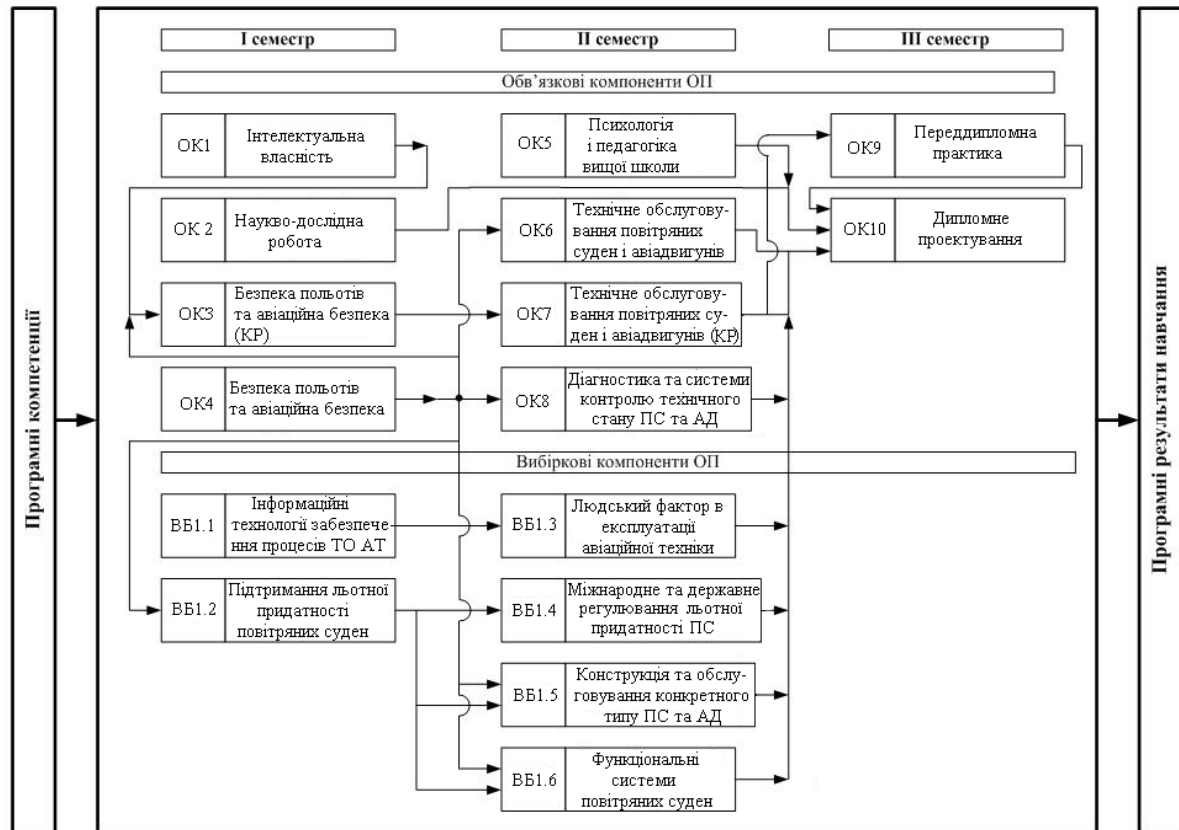


Figure 1 - Structural and logical scheme of educational and professional training program for specialists in the specialty 272 Air transport and educational program "Maintenance and repair of aircraft and aircraft engines"

3. Program of academic discipline

CONTENT MODULE 1. HUMAN FACTOR – BASIC CONCEPTS

Topic 1 Relevance of the human factor problem and mechanisms of its impact on flight safety

The relevance of the problem of the human. Basic concepts and definitions of discipline. Purpose, subject and objectives of the discipline. Structure of the regulatory framework for flight safety and human factor.

Classification of errors and violations. False ICAO models. Conceptual modeling of human interaction and aviation system components. SHELL model, its features and variants.

The concept of causality of aviation events. Rison's model. The theory of "practical shift" of Skott A. Snook. Other models and theories of the emergence and

manifestation of the human factor. Concept of mathematical modeling of aircraft maintenance processes.

Topic 2 Human factor in aircraft maintenance and inspection

Types of errors in maintenance tasks. Consequences of errors (aviation events). Avoiding and correcting errors.

Investigation of the scale of the human factor impact on the state of flight safety. Identification of sources of statistical information. Collection of statistical information, its classification and presentation. Analysis of statistical formation. The use of the erroneous Rison model for the analysis of aviation events due to the action of the human factor.

Modular control

CONTENT MODULE 2. HUMAN FACTOR IN THE STRUCTURE OF PROACTIVE FLIGHT SAFETY MANAGEMENT SYSTEM

Topic 1 Reducing the impact of the human factor as the basis for flight safety management

Modern ideology of flight safety management, its essence and distinctive features. Dynamics of aviation events. Pyramid of insecurity.

Creating a favorable production environment and safety culture. Organization resource management. Managerial dilemma. Presentation of data and investigation in the field of flight safety. Problematic issues of implementation of modern flight safety management systems in the practice of aviation organizations.

Topic 2 Risk factors related to the professional activities of aviation personnel and their management

Risk determination, basic approaches. General concept of risk factor management. Risk classification. ICAO methodology in the board of risk factors for flight safety

The main provisions of the ARMS methodology. Risk assessment process. Sequence and features of application of ARMS methodology.

Features of the organization and implementation of risk assessment in the implementation of professional activities of technical personnel. Identification of risks in professional activities, determination of their value and significance. General approaches to preventive work on labor protection

Prevention of aviation events and accidents due to errors in the operation of aircraft.

Modular control

EXAM

4. Structure of academic discipline

The name of the meaningful module and topics	Number of hours				
	Just	Including			
		L	P	Lab.	Ind. w.
1	2	3	4	5	6
Semester 10					
Meaningful module 1. Human factor – basic concepts					
Theme 1. Relevance of the human factor problem and mechanisms of its impact on flight safety	24	8			16
Theme 2. Human factor in aircraft maintenance and inspection	22	4		4*	14
Total by Content Module 1	46	12		4	30
Meaningful module 2. Human factor in the structure of proactive flight safety management system					
Theme 1. Reducing the impact of the human factor as the basis for flight safety management	24	4		4	16
Theme 2. Risk factors associated with the professional activities of aviation personnel and their management	50	8		8*	34
Total by Content Module 2	74	12		12	50
Total hours	120	24		16	80

Note: here in after referred to as "*" means modular control

5. Seminar topics

№ N/N	Subject Title	Number of hours
1		
	Total	

6. Topics of practical classes

№ N/N	Subject Title	Number of hours
1		
	Total	

7. Topics of laboratory classes

№ N/N	Subject Title	Number of hours
1	Investigation of errors of aviation personnel that take place during the operation of aviation equipment	4*

2	Studying the peculiarities of applying the concept of "pyramid of danger" to analyze the causes of aviation events and incidents due to erroneous actions of aviation personnel	4
3	Investigation of peculiarities of assessment and management of risks of erroneous actions of aviation personnel for flight safety during maintenance and repair of aircraft	4
4	Research of features of assessment and management of risk factors in the implementation of professional activities of aviation personnel	4*
Total		16

8. Independent work

№ N/N	Subject Title	Number of hours
1	ISAO SARPS structure and content on flight safety and human factor	4
2	Basic principles of taking into account the human factor in aircraft maintenance	2
3	Mathematical modeling of aircraft maintenance processes	4
4	Main provisions of Cir. ICAO No. 253 «The role of the chelovechesky factor in technical services and inspections of court cases»	4
5	Internal and external causes of errors of aviation personnel carrying out maintenance and inspection of aircraft	4
6	Work with sources of statistical information on the subject of discipline. Statistics collection, classification, presentation and analysis. Work on the topic of laboratory training 1	8
7	Preparation for modular control No1	4
8	Models of ensuring and managing flight safety	4
9	Mechanisms for taking into account the human factor in flight safety management processes	4
10	Crosscultural factors and flight safety	2
11	Dynamics of aviation events. Elements of the "pyramid of insecurity", the use of a pyramid to analyze aviation events through the fault of the human factor. Preparation for laboratory class No2	2
12	Classification of risks associated with the professional activities of aviation personnel	4
13	ISAO Recommendations for Flight Safety Performance Management	6
14	ARMS Operational Risk Assessment Methodology	6
15	Dangerous factors in the workplace	6
16	General approaches to preventive work on labor protection	4
17	Features of assessment and management of risks of erroneous actions of aviation personnel in the implementation of maintenance and repair of aircraft. Preparation for laboratory class No3	6
18	Features of assessment and management of risk factors in the implementation of professional activities of aviation personnel	2
19	Preparation for modular control No2	4
Total		80

9. Individual tasks

According to the curriculum, individual tasks are not provided.

10. Teaching methods

Conducting classroom lectures, laboratory classes, individual consultations (if necessary), independent work of students on materials published by the department (methodical manuals) and leading domestic and international aviation organizations, the use of Internet materials and electronic materials posted on the website of the department, conducting the first round of the Olympiad in the specialty.

11. Control methods

Current control, written modular control, final control in the form of an exam.

12. Evaluation and distribution criteria for students

12.1. Distribution of points received by students (quantitative evaluation criteria)

Components of educational work	Points per lesson (task)	Number of classes (tasks)	Total points
Content Module 1			
Work at lectures	0... 1	4	0... 4
Execution and protection of laboratory (practical) works	8...12	1	8...12
Modular control	14... 21	1	14... 21
Content Module 2			
Work at lectures	0... 1	6	0... 6
Execution and protection of laboratory (practical) works	8...12	3	24...36
Modular control	14... 21	1	14... 21
Only for semester			60... 100

Semester control (exam / test) is carried out in case of refusal of the student from the points of the current testing and in the presence of admission to the exam / test. During the semester exam / test, the student has the opportunity to get a maximum of 100 points.

The ticket for the exam/test consists of three questions (two theoretical and one practical). The maximum number of points for each theoretical question is 30, for a practical 40.

12.2. Qualitative evaluation criteria

The required amount of knowledge to receive a positive assessment:

Satisfactory (60-74). Show the established minimum of knowledge. Protect all laboratory work and pass testing.

Good (75-89). It is hard to know the minimum, to protect all laboratory works. Successfully write modular tests.

Excellent (90-100). Hand over control points rated "excellent". It is thorough to know all the topics.

12.3 Criteria for evaluating a student's work during the semester

Satisfactory (60-74). Have a minimum of knowledge and skills. To work out and protect all laboratory work and homework. In general, own the problem of the human factor in maintenance and inspection of aircraft. Be able to determine the need for application and search for the necessary information on the impact of the human factor using existing domestic and international standards.

Good (75 - 89). Firmly know the minimum knowledge, complete all tasks. Show the ability to perform and protect all laboratory works within the period specified by the teacher with the justification of the decisions and measures offered by him. Be able to analyze the causes of the human factor and predict the consequences of its impact on flight safety.

Excellent (90 - 100). Fully possess the main and additional materials on the issues of discipline. Firmly know all the educational issues of the discipline. To know and be able to practically apply all approaches and methods for detecting erroneous (incorrect) actions, violations of aviation personnel during maintenance and inspection of aircraft. Be able to analyze the problems related to the professional activities of aviation personnel and provide reasonable recommendations for their solution.

Rating scale: National and ECTS

Amount of points for all types of educational activities	Estimation on the traditional scale	
	Exam, differentiated test	Test
90 - 100	Perfectly	credited
83 - 89	well	
75 – 82		
68 -74	Satisfactory	
60 – 67		
01 – 59	Disappointing	not credited

13. Methodological support

Lecture notes and literature, which is located in the library, methodical office and electronically on the server of the Department of Aircraft and Helicopter Design (the list is given below in section 14 of this program).

14. Recommended literature

Basic

1. Aviation safety / V.P.Babak, V.P.Marchenko, V.O.Maksimakov, etc.; edited by V.P.Babak. – K.: Technics, 2004. -584 p.

2. Encyclopedia of aviation safety /N.S.Kulyk, V.P. Kharchenko, M.G. Lutsyy, etc. edited by N.S. Kulik. – K.: Technics, 2008. – 1000 p.

3. Human factor in maintenance of aviation equipment: Textbook. / S.O. Dmitriev, V.I. Burlakov, Y.P. Puchkov, O.V. Popov. – K. : View-y Naz. Aviation. un-tu "NAU-printing", 2010. – 192 p.
4. Pryymak A.V. Module 9 Human Factor (Part – 66). Electronic lecture summary. – Kharkiv: KNUPS, 2017.
5. Reason J. Human Error. – New York: Cambridge University Press, 1990 – 302 p.
6. Mervy Murtonen "Otsenko dashes on the work of meste: practice." Nach. Ed. Prof. G.Z. Feinburgh. – M.:Subregional bureau of Interdunarodnoye organsation of labor for strana Vostoknoye Evropa and Central Asia, 2007. – 64 p.
7. BS 8800. 1996 Guide to Occupational Health and Safety Management Systems. British Standard Institution. ..40 s.
8. Chernova G.V., Kudryavtsev A.A. Manages the dashes: student.
9. Air Code of Ukraine (edition 04.11.2018) // Information of the Verkhovna Rada of Ukraine (VVR), 2011, No 48-49, p.536.
10. Doc. ICAO No. 9824 AN/450 "Thebasic principles of the four-man factor in the man-making on technical servicesof ascending courts" – 2003 g.
11. Cir 253. Sbornik orerial "Chelovechesky factor", No. 12. The role of the chelovechesky factor in technical service and inspection of exfine courts.
12. Prylozhenie 19 k Convention on interdunarodnay grazhdanskoye avacy "Managing the lawlessness of the lyethos" . Izdanye 1st – 2018 g.
13. Doc 9859 AN 474 "Handiwork for the Protection of Pol" – 2016
14. ICAO Doc 9683-AN/950. Manuvoding on the objects in the areas of the human factor. – Montreal: 1998.

Secondary

1. Doc 7300/1 "International civil aviation convention".
2. Doc 9734 AN/959 " Guidelines for the organization of control over flight safety". 2nd edition. – 2006.
3. Doc. No. 9758-AN/966 "Basic principles of taking into account the human factor in air traffic management systems (ATM)" – 2000.
4. Cir 240. Collection of materials "Human Factor", No 7. Study of the role of the human factor in aviation accidents and incidents.
5. Cir 247. Collection of materials "Human Factor", No 10. The human factor in management and organization (editing in English).
6. Cir 302. Collection of materials "Human Factor", No 16. Cross-cultural factors and flight safety.
7. Doc.10004 "Global Flight Safety Plan 2017-2019". 2nd edition – 2016

15. Information resources

1. Site of the Department of Design of Aircraft and Helicopters: k103@d4.khai.edu .
2. Official website of the State Aviation Service of Ukraine: <https://avia.gov.ua>
3. Official website of the National Bureau for the Investigation of Aviation Events and Incidents with Civil Aircraft: <http://www.nbaai.gov.ua> .
4. Official website of ICAO: <https://www.icao.int/Pages/default.aspx> .
5. Server of the Department of Design of Aircraft and Helicopters.