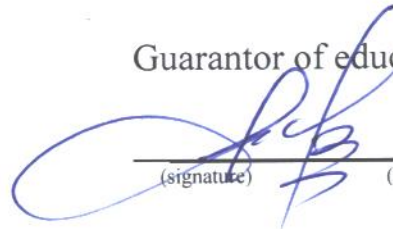


Ministry of Education and Science of Ukraine
National Aerospace University by M.E. Zhukovsky
“Kharkiv Aviation Institute”

Airplane and Helicopter Design Department (№. 103)

APPROVED

Guarantor of educational program


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

«30» August 2022

**WORK PROGRAM OF MANDATORY
EDUCATIONAL DISCIPLINE**

Aviation ground equipment

(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

Level of higher education: first (bachelor's)

Kharkiv 2022

Working program "Aviation ground equipment"

(name of the discipline)

for students of specialty 272 Aviation Transport

educational program «Maintenance and repair of aircraft and aircraft engines»

«30» August 2022 p. – 12 p.

Developer: Momot M.M. 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 № 1 from «30» 08 2022

Head of Department Ph.D., Associated Professor

(degree, scientific degree)



(signature)

A. M. Humennyi

(initials and surname)

Name of the indicator	Branch of knowledge, specialty, educational program, level of higher education	Characteristics of academic discipline (full-time education)
Number of credits - 3.0	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: first (bachelor's)	Mandatory
Number of modules - 1		Academic year
Number of content modules - 4		2022-2023
Individual task 1 The main technical characteristics of aviation ground equipment		Semester
<u>equipment</u> (name)		3rd
Total number of hours - 90		Lecture
Number of weekly hours for full-time education: classrooms – 2 student's independent work – 2		32 hours
		Practical, seminar*
		0 hours
		Laboratory
		16 hours
		Independent work
		42 hours
	Type of control	
	Test	

Note

The ratio of the number of hours of classroom classes to independent and individual work is: for full-time study - 48/42

2. The purpose and objectives of the discipline

Purpose of studying - mastering the basic theoretical principles of the principles of construction and functional zoning of aviation ground equipment, which ensure the effective use of aviation ground equipment during ground maintenance of aircraft, flight support, labor protection and the environment.

Task - mastering the scientific base in the field of principles of construction and operation aviation ground equipment; consolidation of previously acquired knowledge in disciplines: introduction to the profession; mechanics of materials and structures; providing knowledge for the study of disciplines: technology of ground maintenance of aircraft, technical operation of aircraft; intensification of education and preparation of students for the choice of field and specialty of practical activity in the new market conditions.

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

General competencies (GC):

GC 02. Ability to communicate in a foreign language

GC 03. Skills in using information and communication technologies

GC 07. Ability to work autonomously

GC 08. Ability to work in a team

GC 09. Ability to abstract thinking, analysis and synthesis

Special (professional, subject) competences (SK):

SK 01. The ability to comply with the requirements of international and national regulatory documents in the field of aviation transport, instructions and recommendations for the operation, repair and maintenance of aviation transport facilities and their systems in professional activities

SK 02. Ability to analyze objects of air transport and their components, determine requirements for their design, parameters and characteristics

Program learning outcomes (PLO):

PLO 03 Apply modern information technologies, technical literature, databases, other resources and modern software tools to solve specialized complex tasks of air transport

PLO 11 Analyze the design and functioning of aviation transport facilities, their systems, elements, factors affecting their characteristics and parameters

PLO 13 To know the main technological operations, technological equipment, technological equipment, means of automation and mechanization, which are used in the operation, repair and maintenance of means of aviation transport, their systems and elements.

3. The program of the discipline

Content module 1. Operational properties and reliability of aviation ground equipment

Theme 1. **Introduction to the discipline "Aviation ground equipment"**

The subject of the discipline, scientific and methodological foundations, the relationship with other disciplines, the order of study and reporting, recommendations for independent acquisition and deepening of knowledge. The main historical stages of development of aviation ground equipment. Purpose and main tasks of aviation ground equipment. Certification system for aviation ground equipment. Safety requirements for the operation of special machines.

Theme 2. **Operational properties and reliability of aviation ground equipment** Operating conditions of aviation ground equipment. Road conditions of airports.

Climatic conditions of airports. Operating modes of aviation ground equipment. Use of aviation ground equipment over time. Theoretical bases of reliability of aviation ground equipment. Operational indicators of aviation ground equipment.

Content module 2. Means of technical support of flights

Theme 3. **Means of power supply and aircraft launch** Purpose of means of power supply of the aircraft. Technical characteristics of electric units. Design of aircraft power supplies and their main units. Principles of operation of special equipment for aircraft power supply. Features of operation of aircraft power supply.

Purpose of means of air start of aircraft engines. Technical characteristics of aircraft engine start-up means. Design of air starters for aircraft engines and their main units. Principles of work special equipment for air starters of aircraft engines. Features of operation of air starters of aircraft engines.

Theme 4. **Installation for maintenance of aircraft hydraulic systems** Purpose of the installation for maintenance of aircraft hydraulic systems. Technical characteristics of the installation for maintenance of hydraulic systems of the aircraft. Design of the installation for maintenance of hydraulic systems of the aircraft. Principles of operation of special equipment of the installation for servicing the hydraulic systems of the aircraft. Features of operation of the installation for maintenance of hydraulic systems of the aircraft.

Theme 5. **Heat engineering machines**

Purpose of heat engineering machines for aircraft maintenance. Construction of heat engineering machines for aircraft maintenance. Principles of operation of special equipment of heat engineering machines for aircraft maintenance. Features of operation of heat engineering machines for aircraft maintenance.

Theme 6. **Self-propelled mechanical means for aircraft maintenance** Purpose of self-propelled mechanical means for aircraft maintenance. Technical characteristics of self-propelled mechanical means for aircraft maintenance. Design of self-propelled mechanical means for service. Principles of operation of

special equipment of self-propelled mechanical means for aircraft maintenance. Features of operation of self-propelled mechanical means for aircraft maintenance.

Theme 7. **Means of towing the aircraft** Appointment of means of towing the aircraft. Technical characteristics of aircraft towing facilities. The design of the means of towing the aircraft. Principles of operation of special equipment for towing aircraft. Features of operation of aircraft towing means.

Content module 3 Aircraft refueling facilities

Theme 8. Fuel means of aircraft fuel.

Purpose of fueling the aircraft. Technical characteristics of fuel refueling equipment. Design of fuel and lubricants for refueling aircraft and their main units.

Principles of operation of special equipment for refueling aircraft fuel. Features of operation of fueling means of aircraft fuel.

Theme 9. **Means of refueling the aircraft with gases** Appointment of means of refueling the aircraft with gases. Technical characteristics of aircraft refueling means. Design of aircraft refueling means and their main units. Principles of operation of special equipment for refueling aircraft. Features of operation of aircraft refueling means.

Theme 10. **Cleaning, washing and anti-icing agents** Appointment of cleaning, washing and anti-icing liquids. Technical characteristics of cleaning, washing and anti-icing liquids. Construction of means for cleaning, washing and application of anti-icing fluids and their main units. Principles of operation of special equipment for cleaning, washing and application anti-icing fluids. Features of operation of means of cleaning, washing and drawing of liquids against freezing.

Content module 4 Ground means for air transportation and airfields

Theme 11. **Means of transporting passengers** Purpose of means of transportation of passengers and cargoes. Technical characteristics of means of transporting passengers and goods. Construction of means of transportation of passengers and cargoes. Principles of operation of special equipment for passenger and cargo transportation. Features of operation of means of transportation of passengers and cargoes.

Theme 12. **Means for maintenance of airfields** Assignment of funds for summer and winter maintenance of airfields. Technical characteristics of means for summer and winter maintenance of aerodromes. Design of means for summer and winter maintenance of aerodromes and their main units. Principles of operation of special equipment for summer and winter maintenance of airfields. Features of operation of means for summer and winter maintenance of aerodromes.

4. Structure of academic discipline

The name of the meaningful module and topics	Number of hours			
	Just	Including		
		L	P	Ind. w.
1	2	3	4	5
Semester 4				
Meaningful module 1. Operational properties and reliability of aviation ground equipment				
Theme 1. Introduction to the discipline "Aviation ground equipment"	5	2	-	3
Theme 2. Operational properties and reliability of aviation ground equipment	9	4	-	5
Total by Content Module 1	16	6	-	8
Meaningful module 2. Means of technical support of flights				
Theme 3. Means of power supply and aircraft launch	7	2	2	3
Theme 4. Installation for maintenance of aircraft hydraulic systems	7	2	2	3
Theme 5. Heat engineering machines	7	2	2	3
Theme 6. Self-propelled mechanical means for aircraft maintenance	7	2	2	3
Theme 7. Means of towing the aircraft	7	2	2	3
Total by Content Module 2	35	10	10	15
Meaningful module 3. Aircraft refueling facilities				
Theme 8. Means of refueling the aircraft with fuel and lubricants	9	4	2	3
Theme 9. Means of refueling the aircraft with gases	7	2	2	3
Theme 10. Means for cleaning, washing and applying anti-icing liquids	9	4	2	3
Total by Content Module 3	25	10	6	9
Meaningful module 4. Ground means for air transpiration and airfields				
Theme 11. Means of transportation of passengers and cargo	7	2	-	5
Theme 12. Means for summer and winter maintenances of airfields	9	4	-	5
Total by Content Module 4	16	6	-	10
Total hours	90	32	16	42

5. Seminar Themes

Absent

6. Topics of practical classes

Absent

7. Laboratory Classes

N	Theme	Hours
1	Features of the design of power supply	2
2	Features of a design of installation for and aircraft launch service of hydraulic systems of the aircraft	2
3	Features of a design of heat engineering cars	2
4	Features of design of self-propelled mechanical means for aircraft	
5	Features of a design of means of towing of the aircraft	2
6	Features of a design of means of refueling of the aircraft with fuel	2
7	Features of a design of means of refueling of the aircraft by gases	2
8	Features of a design of means for cleaning, washing and drawing liquids against icing	2
	Total	16

8. Independent work

№	Theme	hours
1	Certification system for aviation ground equipment	2
2	Safety requirements for the operation of special machines	1
3	Performance indicators of aviation ground equipment	5
4	The main technical characteristics of the means of power supply and launch of the aircraft	2
5	The main technical characteristics of installation of air start of the aircraft	1
6	The main technical characteristics of installation for service of hydraulic systems of the aircraft	3
7	The main technical characteristics of heat engineering machines	3
8	The main technical characteristics of self-propelled mechanical means for aircraft maintenance	3
9	The main technical characteristics of the means of towing the aircraft	3
10	The main technical characteristics of the means of refueling the aircraft (kerosene, oil)	3
12	The main technical characteristics of the means of refueling the aircraft gas (oxygen, nitrogen)	3
13	The main technical characteristics of means for cleaning, washing and applying antifreeze	3
14	The main technical characteristics of means of transportation of passengers	3

15	The main technical characteristics of means of means of transportation of freights	2
16	The main technical characteristics of means of means for the summer maintenance of airfields	2
17	The main technical characteristics of means for winter maintenance of airfields	3
	Total	42

9. Individual tasks

1. The main technical characteristics of aviation ground equipment.

10 Teaching methods

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

11. Methods of control

Carrying out of current control, written modular control, final control in the form of offset.

12. Distribution of points received by students

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

Semester 4 (credit)

Current testing and independent work														Final test (exam) in case of refusal of points of the current test - and admission to the examination
module №1		module №2					module №3			module №4		Indiv idual tasks		
T1	T2'	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12		60	
0-2	0-3	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-3	0-3	0-25	- 100	

T1, T2,..., T12 - topics of content modules

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

The ticket for the test consists of 2 questions. Each ticket contains 2 theoretical questions. The maximum number of points for each theoretical question is 50.

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 overcontrol 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: pointed and traditional

Total rating	Exam, test with a grade	Test
90 – 100	Excellent	Passed
75 – 89	Good	
60 – 74	Satisfactory	
01 – 59	Unsatisfactory	Not passed

13. Methodical support

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

14. Recommended reading

Basic

1. Aviation ground equipment / V.E. Kanarchuk, GN Гелетуха, В.В. Zaporozhets and etc .; under. ed. V.E. Kanarchuk. - М.: Транспорт, 1989. - 278 с.
2. Aerodrome-technical support of flights: lecture notes / O.M. Bilyakovich. - K.: NAU "NAU-print", 2009. - 84 p.
3. Units of ground maintenance of aircraft and helicopters / VA Egorichev, EI Osokin, ED Khachikyan - М.: Transport, 1973. - 200 p.
4. DSTU EN 1915-2: 2013. Aviation ground equipment The official edition. Kiev MINISTRY OF ECONOMIC DEVELOPMENT OF UKRAINE 2014
5. DNAOP 5.1.30-1.06-98 (NPAOP 63.23-1.06-98). Rules of labor safety at maintenance and repair of aircraft. Ed. Kiev, 1998
6. Aircraft Ground Support Equipment and Airport Technical Equipment Operation: Guide to Practical Classes / OM Bilyakovich, MS Storozhenko, Ye. P. Puhachevska, AG Dovgal. - K.: NAU, 2014. - 76 .p

Secondary

7. EN 1915-1: 2001 Aviation ground equipment. General requirements. Part 1. Basicsafety requirements
8. EN 12312-1 Aviation ground equipment. Special requirements. Part 1. Traps passfat
9. EN 12312-2 Aviation ground equipment. Special requirements. Part 2. Transport for the supply of ready meals
10. EN 12312-3 Aviation ground equipment. Special requirements. Part 3. Transport means with the belt conveyor
11. EN 12312-4 Aviation ground equipment. Special requirements. Part 4 Passenger landing galleries
12. EN 12312-5 Aviation ground equipment. Special requirements. Part 5. Equipmen refueling
13. EN 12312-6 Aviation ground equipment. Special requirements. Part 6. Means for removal and equipment to prevent ice formation
14. EN 12312-7 Aviation ground equipment. Special requirements. Part 7: Equipment- for ground traffic of aircraft
15. EN 12312-8 Aviation ground equipment Special requirements. Part 8. Traps and maintenance platforms
16. EN 12312-9 Aviation ground equipment. Special requirements. Part 9 Loadcontainers / pallets
17. EN 12312-10 Aviation ground equipment. Special requirements. Part 10. Aircraft tractors rhodrome containers and pallets
18. EN 12312-11 Aviation ground equipment. Special requirements. Part 11. Container trucks and trailers

19. EN 12312-12 Aviation ground equipment. Special requirements.
Part 12. Means provision of drinking water
20. EN 12312-13 Aviation ground equipment. Special requirements. Part13.
Means sewage
21. EN 12312-14 Aviation ground equipment. Special requirements. Par 14.
Transport for boarding the disabled and people with disabilities
22. EN 12312-15 Aviation ground equipment. Special requirements. Part15.
Tractor units garage and equipment
23. EN 12312-16 Aviation ground equipment. Special requirements. Part16.
Equipment- to start compressed air aircraft engines
24. EN 12312-17 Aviation ground equipment. Special requirements. Part17.
Equipment air conditioning systems
25. EN 12312-18 Aviation ground equipment. Special requirements. Part18.
Nitrogen and oxygen units
26. EN 12312-19 Aviation ground equipment. Special requirements. Part19.
Aviation lifts, axial jacks and hydraulic tail supports
27. EN 12312-20 Aviation ground equipment. Special requirements. Part20.
Electrical aerodrome units

15. Information resources

1. Website of the Department of Aircraft and Helicopter Design:
k103@d4.khai.edu.
2. Server of the Department of Aircraft and Helicopter Design.
3. Internet resources
4. Site "Aerodrome equipment"