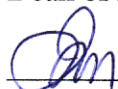


MINISTRY of EDUCATION and SCIENCE of UKRAINE
National Aviation University
 Aerospace Faculty
 Airport Technologies Department

AGREED

Dean of Aerospace Faculty

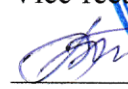


Mykola KULYK

« 10 » 05 2023

APPROVED

Vice-rector for Academics



*Anatoli POLUKHIN

« 10 » 05 2023



Quality Management System

COURSE TRAINING PROGRAM

on

«Operation of Aviation Ground Equipment and Airport Equipment»


Educational Professional Program: Airport Technologies and Technical Equipment

Field of study: 27 Transport

Specialty: 272 Aviation Transport

| Form of training | Semester | Total (hours / ECTS credits) | Lectures | Practicals | Laboratory classes | Self-study | HW/ CGW/ CW | TP/ CP | Form of semester control |
|------------------|----------|------------------------------|----------|------------|--------------------|------------|-------------|--------|--------------------------|
| Full-time | 2 | 180/6,0 | 36 | – | 18 | 126 | – | CP-2 | Exam 2s |

Index: ECM-1-272-2/22-2.1.7

| | | | |
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The Course Training Program on «Operation of Aviation Ground Equipment and Airport Equipment» was developed on the basis of Educational and Professional Program «Airport Technologies and Technical Equipment», Curriculums CM-1-272-2/22, ECM-1-272-2/22, for the «Master» educational degree seekers training for the Specialty 272 «Aviation Transport» and corresponding normative documents.

Developed by:
Associate Professor of
Airport Technologies Department


Oleh BILJAKOVYCH

Discussed and approved by the Graduate Department for the Educational Professional Program «Airport technologies and technical equipment», the Specialty 272 «Aviation Transport» – Department of Airport Technologies, Minutes № 3 of "27" 04 2023.

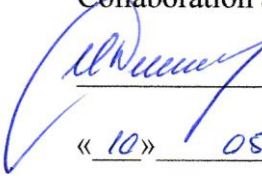
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Educational Professional Program


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Vice Rector on International
Collaboration and Education


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«10» 05 2023

Document level – 3b


The planned term between revisions – 1 year

Master copy

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INTRODUCTION

Course Training Program (CTP) of discipline «Operation of Aviation Ground Equipment and Airport Equipment» is developed in accordance with the "Methodical recommendations for the development and design of the Course Training Program of the discipline of full-time and part-time forms of education", approved by the rector's order dated 29/04/2021 No. 249/od, and correspondent normative documents.

1. EXPLANATORY NOTES

1.1. Place, objectives, tasks of the subject

This educational discipline is the theoretical basis of totality of knowledge and outcomes, that forms the profile of specialist in the field of the airport technologies and technical equipment.

Purpose of the discipline is the ability to use modern principles of operation of aviation ground equipment (AGE) and airport equipment (AE), during ground maintenance of aircrafts, operational maintenance of airfields, passengers, baggage and cargo handling, flight safety, labor and environmental protection.

Tasks of learning of the discipline are:

- learning of the basics of the organization of AGE movement on the platform, maneuvering and location of specific AGE in the ground maintenance area of the aircrafts;
- learning of technological schedules of ground maintenance of aircrafts on the apron;
- learning of technological processes of the preparation and using of AGE according to the intended purpose while complying with labor and environmental protection requirements;
- learning of the main technological processes of ground maintenance of aircrafts and operational maintenance of airfields with the participation of AGE.

1.2. Interdisciplinary connections

At the end of the course, the student will be able to:

PTO01. Specialized conceptual knowledge, which includes modern scientific achievements in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment and is the basis for original thinking and research conducting.

PTO02. To apply modern methods of scientific research, organisation and planning of the experiments, digital technologies, methods of data analysis to solve complex problems in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment.

PTO03. To solve complex problems of creation, operation, maintenance, repair and utilization of objects of air transport, in particular of aviation ground equipment and airport equipment, including at the border with related fields, engineering sciences, physics, ecology and economy.


PTO05. To develop and to implement new technical solutions and to apply new technologies.

PTO06. To apply universal and specialized lifecycle management (PLM), computer-aided design (CAD), manufacturing (CAM) and engineering research (CAE) systems in professional activities.

PTO07. To develop and to implement energy saving technologies in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment.

PTO09. To develop and to analyse physical, mathematical and computer models related to the creation, operation, maintenance and repair of air transport, in particular of aviation ground handling facilities and airport equipment.

PTO11. To develop technical regulations, to participate in their development and to organize technological processes in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment, to ensure production safety.

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PTO12. To perform technical and economic calculations, comparison and justification of projects of production, repair, renovation, operation, maintenance of air transport, in particular of aircraft ground equipment and airport equipment.

PTO13. To make effective decisions on functioning of air transport, in particular of airport and the operation of aviation ground equipment and airport equipment, including in difficult and unpredictable conditions; to forecast their development; to identify factors that affect the achievement of goals; to analyze and to compare alternatives; to assess risks and possible consequences of decisions.

PTO14. To ensure the quality of production and operation in the field of air transport, in particular of airport functioning and operation of aviation ground equipment and airport equipment.

PTO15. To search necessary data in scientific literature, databases and other sources, to analyze, to evaluate and to use these data.

PTO16. To determine the properties and characteristics, to calculate the parameters of air transport, in particular of aircraft ground equipment and airport equipment.

PTO17. To develop and to optimize the parameters of air transport, in particular of aviation ground equipment and airport equipment and technological processes at the airport, including using of automated computer modeling and design.

1.3. Competencies, the discipline has the opportunity to acquire

As a result of discipline studying, the student must acquire the following **competencies**:

GC01. Knowledge and understanding of the subject area and understanding of professional activity.

GC03. Skills of using of information and communication technologies.

GC04. Ability to conduct research at the appropriate level.

GC05. Ability to search, to process and to analyze information of various sources.

GC06. Ability to identify, to set and to solve problems.

GC07. Ability to make informed decisions.

GC09. Ability to evaluate and to ensure the quality of the performed works.

PC01. Ability to develop and to implement scientific and applied projects in the field of air transport, in particular of airport operation and operation of aviation equipment and airport equipment.

PC02. Ability to apply a systematic approach to solving engineering interdisciplinary problems in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment.


PC03. Ability to take into account legal, social, environmental, ethical, economic and commercial aspects that affect the adoption and implementation of decisions in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment.

PC04. Ability to integrate knowledge and to solve complex scientific and industrial problems in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment, taking into account the wider interdisciplinary engineering context.

PC05. Ability to manage technological processes in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment, which are complex, unpredictable and require new strategic approaches.

PC06. Ability to implement modern technologies, to research, to analyze and to improve technological processes in the field of air transport, in particular of airport operation and operation of aviation ground equipment and airport equipment.

PC07. Ability to choose optimal materials, equipment and measures for the implementation of the latest technologies at air transport.

| | | | |
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1.4. Interdisciplinary connections

This discipline is based on the knowledge of disciplines, namely: «Methodology of Applied Research in the Field of Aviation Transport», «Mathematical Methods for Modeling Systems and Processes», «Statistical Estimation and Problem Solving», «Technological Design of Airport Divisions» and it is base for passing of Research Activities in the Field of Airport Technologies and Pre-diploma practice

2. COURSE TRAINING PROGRAM ON THE SUBJECT

2.1. The subject content

The educational material of the of the discipline is subdivided into two educational modules and consists of: educational **module №1, «Operation of Aviation Ground Equipment and Airport Equipment»**, which is a logically complete, independent, integral part of the educational discipline, the mastery of it provides a modular control work and analyzing the results of its implementation.

Course Project (CP) is separate **module №2**, it is an important component of consolidation and improving of theoretical and practical knowledge and skills acquired by the student in the process of mastering of the educational material of the discipline

2.2. Modular structuring and integrated requirements for each module

Module №1 «Operation of Aviation Ground Equipment and Airport Equipment»

Module №1 integrated requirements:

To know:

- organization of AGE movement on the apron, maneuvering and location of specific types of AGE at the aircrafts service area;
- technological schedules for ground maintenance of aircrafts on the apron;
- technological processes for the preparation and using of AGE according to the intended purpose while complying with labor and environmental protection requirements;
- technological processes for ground maintenance of aircrafts and operational maintenance of airfields with the participation of AGE.

To be able:

- to control the state of traffic safety and the operation of AGE on the apron;
- to know the methodics for developing of technological schedules for ground maintenance of aircrafts at airports;
- to develop technologies for the using of specific types of AGE during ground maintenance of aircrafts;
- to develop technologies for the using of specific types of AGE during the operational maintenance of airfields;
- to develop recommendations of labor and environmental protection during the operation of special vehicles at Ukrainian airports.


Module 1. «Operation of Aviation Ground Equipment and Airport Equipment»

Topic 1.1. Operation of AGE at Ukrainian airports.

Purpose and tasks of the discipline. Conditions of operation of AGE at airports of Ukraine. Factors influencing the using of airport special vehicles for their purpose. Technological schedules of ground maintenance of the aircraft (GMA).

Topic 1.2. Transport units (TU) of airports and commercial service subjects (CSS).

Structure and tasks of TU of airport and CSS. Governing documents, which regulate the activities of TU of airport. Interaction of TU of airport with other airport services.

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Topic 1.3. Means and technologies for ensuring the start of aircraft engines and power supply of aircraft systems.

Purpose and technical characteristics of the most common models of airfield portable electric units (АПА – GPU). Features of the using of АПА during AGM. Safety techniques, environmental protection during the operation of АПА.

Topic 1.4. Features of operation of aircraft engines air-starting installations (ASI).

General information about air starting of aircraft engines. General technology of air starting of aircraft engines. The main requirements of controlling of the operation of the ASI engine. Safety techniques during the operation of the ASI.

Topic 1.5. Means and technologies of maintenance of hydraulic systems of aircrafts.

The main indicators of hydraulic systems of the aircrafts. Purpose and technical characteristics of special vehicles for testing of hydraulic systems of aircrafts. Technologies of using of special vehicles for testing of hydraulic systems of aircrafts.

Topic 1.6. Operation of special airports vehicles for refueling of aircrafts with fuel and lubricants and special liquids.

Requirements for fuel and lubricant materials used for aircrafts central fueling. Means of mechanization for refueling af aircrafts with fuel and lubricants and special liquids. Peculiarities of their using during AGM.

Topic 1.7. Means and technologies of aircrafts towing.

General information about aircrafts towing at airports, methods of towing. Design features and technical parameters of airfield towing vehicle. Aircraft towing technology.

Topic 1.8. Operation of mechanization means for heating of aircrafts engines and air conditioning in aircraft cabins.

General information about motor heaters used during AGM. Technology of heating of aircrafts power plants. Air conditioning in aircraft cabins.

Topic 1.9. Operation of special vehicles for checking of the tightness of cabins and evacuation of aircrafts from the airfield.

General information about the evacuation of aircrafts from the airfield. Means of mechanization for checking of the tightness of cabins and evacuation of aircrafts. Features of their using.

Topic 1.10. Operation of special vehicles for treating of external surfaces of aircrafts by anti-icing liquid.

Methods of aircrafts deicing. Deicing liquid using technology. Interaction of personnel during operations of anti-icing protection of aircrafts.

Topic 1.11. Operation of airfield water dispensers.

General information about the supply of aircrafts by drinking water. Design features and basic technical parameters of water dispensers. The technology of using of water dispensers during AGM.

Topic 1.12. Operation of apron buses.

Bus classifications. Purpose and main design features of apron buses. Features of construction and operation of mobile passenger bridges. Technology of using of apron buses.

Topic 1.13. Operation of passengers ladders.


Overview of types of special vehicles for air passengers handling. Classification of ladders. Technology of using of passenger ladders.

Topic 1.14. Operation of passenger boarding galleries.

General information about passenger boarding galleries, their classifications. Design features and generalized technical characteristics of passenger boarding galleries. The technology of connecting the passenger boarding galleries with the aircraft during its GM.

Topic 1.15. Operation of special vehicles for provision of passengers and crewmembers of aircraft with onboard food.

General information about food on board of aircraft, using of AL at airports. Features of AL

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design, leading manufacturers. Technology of using of AL.

Topic 1.16. Operation of AGE to ensure mail and cargo transportation.

Review of mechanization facilities and technologies for processing of mail and cargo in cargo terminals of airports. Technology of ground handling of cargo for transport aircrafts. Scheme of location of facilities of cargo transportation at the airport.

Topic 1.17. Operation of self-propelled container loaders.

Model range, technical characteristics of self-propelled container loaders. Technological processes of preparation for using and direct operation of the self-propelled container loaders in the area of maintenance of the aircraft.

Topic 1.18. Operation of means of mechanization for operational maintenance of airfields.

Elements and classifications of airfields. Requirements to airfields. List of works in spring-summer navigation and autumn-winter navigation. Modern means of mechanization for operational maintenance of airfields. Regulation of ground movement of AGE during operational maintenance of the airfield. Main technological processes of winter maintenance of airfields.

Module №2 «Course Project»


The course project (CP) of the discipline is carried out in accordance with the methodical recommendations approved in the established order, with the purpose of consolidating and deepening the theoretical knowledge and skills acquired by the student in the process of mastering the educational material of the discipline.

The specific purpose of the CP is to choose the optimal composition and numbers of AGE means for ground maintenance of aircraft, based on the technological and technical requirements for the maintenance of a specific type of aircraft, the development of technological schedules for the ground maintenance of a specific type of aircrafts, the development of measures for the safety of traffic and the functioning of AGE on the apron, the development of technological maps for the ground maintenance of aircrafts and the operational maintenance of airfields by certain means of AGE.

The student is assigned 45 hours of independent work to complete the course project.

2.3. Training schedule of the subject

| № ser. | Name of topic | Classes Workload (hours) | | | |
|---|--|-----------------------------|----------|--------------------|------------|
| | | Full-time education | | | |
| | | Total | Lectures | Laboratory classes | Self-study |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Module №1 «Operation of Aviation Ground Equipment and Airport Equipment» | | | | | |
| 1.1 | Operation of AGE at Ukrainian airports | 7 | 2 | – | 5 |
| 1.2 | Transport units (TU) of airports and commercial service subjects (CSS) | 7 | 2 | – | 5 |
| 1.3 | Means and technologies for ensuring the start of aircraft engines and power supply of aircraft systems. | 8 | 2 | 2 | 4 |
| 1.4 | Features of operation of aircraft engines air-starting installations | 6 | 2 | – | 4 |
| 1.5 | Means and technologies of maintenance of hydraulic systems of aircrafts | 8 | 2 | 2 | 4 |
| 1.6 | Operation of special airports vehicles for refueling of aircrafts with fuel and lubricants and special liquids | 8 | 2 | 2 | 4 |

| | | | | | |
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| 1 | 2 | 3 | 4 | 5 | 6 |
|------------------------------------|--|------------|-----------|-----------|------------|
| 1.7 | Means and technologies of aircrafts towing | 8 | 2 | 2 | 4 |
| 1.8 | Operation of mechanization means for heating of aircrafts engines and air conditioning in aircraft cabins. | 8 | 2 | 2 | 4 |
| 1.9 | Operation of special vehicles for checking of the tightness of cabins and evacuation of aircrafts from the airfield. | 8 | 2 | 2 | 4 |
| 1.10 | Operation of special vehicles for treating of external surfaces of aircrafts by anti-icing liquid. | 7 | 2 | – | 5 |
| 1.11 | Operation of airfield water dispensers | 7 | 2 | – | 5 |
| 1.12 | Operation of apron buses. | 7 | 2 | – | 5 |
| 1.13 | Operation of passenger's ladders | 7 | 2 | – | 5 |
| 1.14 | Operation of passenger boarding galleries | 8 | 2 | 2 | 4 |
| 1.15 | Operation of special vehicles for provision of passengers and crewmembers of aircraft with onboard food | 7 | 2 | – | 5 |
| 1.16 | Operation of AGE to ensure mail and cargo transportation | 8 | 2 | 2 | 4 |
| 1.17 | Operation of self-propelled container loaders | 8 | 2 | 1 | 5 |
| 1.18 | Operation of means of mechanization for operational maintenance of airfields | 8 | 2 | 2 | 4 |
| 1.19 | Module Test № 1 | 2 | – | 1 | 1 |
| Total on the Module № 1 | | 135 | 36 | 18 | 81 |
| Module № 2 «Course Project» | | | | | |
| 2.1 | Performing of the course project | 45 | – | – | 45 |
| Total on the Module № 2 | | 45 | – | – | 45 |
| Total on the 1st semester | | 180 | 36 | 18 | 126 |
| Total on the discipline | | 180 | 36 | 18 | 126 |

2.4. Course project

For course project students performed tasks are developed by the author of the Course Training Program. Educational materials are approved by the minutes of the graduation department, informed to the attention of the student individually and performed in accordance with methodical recommendations. For example, the variant number of the theoretical part and the task is equal to the sum of the last three numbers of the student's individual educational plan

2.5. List of questions for the exam

The list of questions and the content of tasks for the exam preparation are developed by the leading lecturer of the department in accordance with the Course Training Program, approved by the department and informed to the attention of the students.


3. BASIC CONCEPTS OF GUIDANCE ON THE SUBJECT

3.1. Teaching methods

The following educational methods are used during studying the discipline:

- explanatory-illustrative method;
- method of problem exposition;
- reproductive method;
- research method.

These methods realization is provided during lectures, demonstrations, individual tasks solution, reading of educational literature, analysis and resolution of conflict situations during the planning of technological processes at the airport.

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3.2. List of references

Main references

3.2.1. Aircraft Ground Support Equipment and Airport Technical Equipment Operation: Guide to Practical Classes / O.M.Bilyakovych, M.S.Storozhenko, Ye.P.Puhachevska, A.G.Dovgal. – K.: NAU, 2014. – 76 p.

3.2.2. Aircraft Ground Support Equipment and Airport Technical Equipment Operation: Manual / O.M.Bilyakovych, M.S.Storozhenko, Ye.P.Puhachevska, A.G.Dovgal. – K.: NAU, 2014. – 120 p.

3.2.3. Білякович О.М. Аеродромно-технічне забезпечення польотів: конспект лекцій / О.М.Білякович. – К.: НАУ-друк, 2009.–84 с.

Additional references

3.2.4. Повітряний кодекс України.

3.2.5. Експлуатація авіаційної наземної техніки та обладнання аеропортів: лабораторний практикум / уклад.: О. М. Білякович, Л. В. Курбет. – К. : НАУ, 2021. – 74 с.

3.2.6. ДСТУ 3432-96 Авіаційна наземна техніка. Терміни та визначення.

3.3. Information sources on the Internet

3.3.1. GPU (Ground Power Unit) Generator: Guinault. [Електронний ресурс]. – Режим доступу: <http://www.guinault.com/en/aviation/gpu/>

3.3.2. HGPU «Mainline Aircraft» 3000psi и 5000psi. [Електронний ресурс]. – Режим доступу: <https://www.test-fuchs.com>

3.3.3. АПК-КБ. [Електронний ресурс]. – Режим доступу: <http://las1.lv>

3.3.4. <https://www.iata.org>

4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT

4.1. The current grading of knowledge and skills acquired by the student is carried out according to 5-point system, *rating grade* is given: 1, 2, 3, 4, 5.

4.2. The *current module rating grade* is determined as the average value of the sum of the *rating grades* of all types of classes and control, provided by the educational work program (lectures, laboratory works and practical works, homeworks, TP, CP, testing, module test, graded test and exam, etc.).

4.3. The correspondence of the *current module rating grade* to the minimum value of the student's knowledge mark according to the 100-point scale of the European Credit Transfer System (ECTS) is established according to Table 1 (column 2).

Table 4.1

| Current Module Grade | Minimal Grade Value of ECTS | Incentive Points | Total Grade of ECTS | Grade | Index |
|----------------------|-----------------------------|------------------|---------------------|----------------|-------|
| 5 | 90 | 0-10 | 90 - 100 | Excellent | A |
| 4,5 - 4,9 | 82 | 0-10 | 82 - 89 | Good | B |
| 4,0 - 4,4 | 75 | 0-10 | 75 - 81 | Good | C |
| 3,5 - 3,9 | 67 | 0-10 | 67 - 74 | Satisfactory | D |
| 3,0 - 3,4 | 60 | 0-10 | 60 - 66 | Satisfactory | E |
| 2,5 - 2,9 | 35 | 0 | 35 - 59 | Unsatisfactory | FX |
| 1,0 - 2,4 | 1 | 0 | 1- 34 | Unsatisfactory | F |

4.4 The sum of incentive points according to table 2, which characterize the student's attitude to studying of the discipline (no more than 10 points), is added to the minimum value of the ECTS grade.

Table 4.2

| № ser. | Incentive Criterion | Points |
|--------|----------------------------|--------|
| 1 | Absence of missed classes | 0 - 3 |
| 2 | Activity during classes | 0 - 3 |
| 3 | Defending of works in time | 0 - 2 |
| 4 | Correct behavior | 0 - 2 |

4.5. The sum of the minimal ECTS grade and incentive points are the *Total (Module, Semester) Grade*, which is entered in the module test report, study card, individual curriculum of the student, record book and diploma supplement, for example, as follows: **92 / Excellent / A, 87 / Good / B, 79 / Good / C, 68 / Sat./D, 65 / Sat./E**, etc.



(Ф 03.02 – 01)

АРКУШ ПОШИРЕННЯ ДОКУМЕНТА

| № прим. | Куди передано (підрозділ) | Дата видачі | П.І.Б. отримувача | Підпис отримувача | Примітки |
|---------|---------------------------|-------------|-------------------|-------------------|----------|
| | | | | | |
| | | | | | |
| | | | | | |

(Ф 03.02 – 02)

АРКУШ ОЗНАЙОМЛЕННЯ З ДОКУМЕНТОМ

| № пор. | Прізвище ім'я по-батькові | Підпис ознайомленої особи | Дата ознайомлення | Примітки |
|--------|---------------------------|---------------------------|-------------------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

(Ф 03.02 – 04)

АРКУШ РЕЄСТРАЦІЇ РЕВІЗІЇ

| № пор. | Прізвище ім'я по-батькові | Дата ревізії | Підпис | Висновок щодо адекватності |
|--------|---------------------------|--------------|--------|----------------------------|
| | | | | |
| | | | | |
| | | | | |

(Ф 03.02 – 03)

АРКУШ ОБЛІКУ ЗМІН

| № зміни | № листа (сторінки) | | | | Підпис особи, яка внесла зміну | Дата внесення зміни | Дата введення зміни |
|---------|--------------------|------------|--------|--------------|--------------------------------|---------------------|---------------------|
| | Зміненого | Заміненого | Нового | Анульованого | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

(Ф 03.02 – 32)

УЗГОДЖЕННЯ ЗМІН

| | Підпис | Ініціали, прізвище | Посада | Дата |
|-----------|--------|--------------------|--------|------|
| Розробник | | | | |
| Узгоджено | | | | |
| Узгоджено | | | | |
| Узгоджено | | | | |