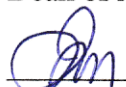


MINISTRY of EDUCATION and SCIENCE of UKRAINE
National Aviation University
 Aerospace Faculty
 Airport Technologies Department

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
«Technological Design of Airport Divisions»


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 | 1 | 120/4,0 | 17 | – | 17 | 86 | – | TP-1 | Exam 1s |

Index: ECM-1-272-2/22-2.1.5

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 2 of 11 | |

The Course Training Program on «Technological Design of Airport Divisions» was developed on the basis of Educational and Professional Program «Airport technologies and technical equipment», Extended Curriculum № 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

 Vladimir VARYUKHNO

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.

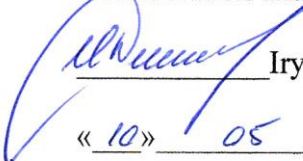
Guarantor of
Educational Professional Program

 Oleksandr TAMARGAZIN

Head of the Department

 Oleksandr TAMARGAZIN


Vice Rector on International
Collaboration and Education

 Iryna ZARUBINSKA
«10» 05 2023

Document level – 3b


The planned term between revisions – 1 year

Master copy

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 3 of 11 | |

CONTENT

| | page |
|--|-----------|
| INTRODUCTION..... | 4 |
| 1. EXPLANATORY NOTES | 4 |
| 1.1 Place, objectives, tasks of the subject | 4 |
| 1.2. Learning outcomes the subject makes it possible to achieve | 4 |
| 1.3. Competences the subject makes it possible to acquire | 4 |
| 1.4. Interdisciplinary connections | 5 |
| 2. COURSE TRAINING PROGRAM ON THE SUBJECT | 5 |
| 2.1. The subject content | 5 |
| 2.2. Modular structuring and integrated requirements for each module | 5 |
| 2.3. Training schedule of the subject | 7 |
| 2.4. Term paper | 8 |
| 2.5. List of questions for the exam | 8 |
| 3. BASIC CONCEPTS OF GUIDANCE ON THE SUBJECT | 8 |
| 3.1. Teaching methods | 8 |
| 3.2. List of references..... | 8 |
| 3.3. Information sources on the Internet | 9 |
| 4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT | 10 |

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 4 of 11 | |

INTRODUCTION

Course Training Program (CTP) of discipline «Technological Design of Airport Divisions» 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 to acquire special knowledge and skills on the issues of effective organization of the work of airport divisions, ensuring effective interaction of airport divisions, as a component of solving modern engineering and technical problems, namely the organization of airport operation according to modern strategies and methods.

Tasks of learning of the discipline are:

- learning of the methods of calculation of production program of airport subdivision and designing technology of maintenance depots of these subdivisions;
- learning of the development principles of general layout of airport subdivision and layouts of the construction and reconstruction of individual subdivisions of the airport;
- learning of the methods of determining and analyzing of general and specific technical and economic indicators of airport subdivisions operation.

1.2. Learning outcomes the subject makes it possible to achieve

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.

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

1.3. Competences the subject makes it possible to acquire

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

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 5 of 11 | |

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

GC03. Skills of using of information and communication technologies.

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.

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.

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.

1.4. Interdisciplinary connections

This discipline is based on the knowledge obtained during the preparation for the educational degree «Bachelor» and is the basis for the study of further disciplines, namely: «Mathematical Modeling of Airport Technological Processes», «Operation of Aviation Ground Equipment and Airport Equipment», 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**, «Technological Design of Airport Divisions», 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.

Term Paper (TP) is separate (second) module (educational component), it is completed during the 1st semester. TP 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 «Technological Design of Airport Divisions»

Module №1 integrated requirements:

To know:

- methods of calculating of the production program of the airport distribution and technologies of designing of production and technical bases of these divisions;
- principles of construction of the general layout of the airport and layouts of the construction and reconstruction of individual subdivisions of the airport;
- methods of determining and analyzing of general and specific technical and economic indi-

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 6 of 11 | |

cators of the operation of airport divisions.

To be able:

- to carry out technological calculations of the airport divisions in order to determine the needs for personnel, production and technical base, materials, spare parts;
- to ensure the safety of operation (including ecological), storage, maintenance of aviation ground equipment, airport equipment, fuel and lubricants airport support facilities, safe working conditions of personnel;
- to evaluate the technical and economic efficiency of the operation of aviation ground equipment, airport equipment, fuel and lubricants airport support facilities, technological processes at the airport;
- to participate in the development of recommendations for improving of the operational and technical characteristics of airport divisions.

Module 1. «Technological Design of Airport Divisions»

Topic 1.1. General layout of the airport and plans of subdivisions that operate special vehicles.

Principles of construction of the general layout of the airport and the plans of divisions that operate special vehicles. Requirements for the development of the general layout. Basics of construction production, construction norms and rules.

Topic 1.2. Technical departments of the special transport division of the airport.

Tasks and functions of the special transport division. Operational and technical departments of the special transport division. Classification, purpose and general characteristics of technical departments of the special transport division. Production and organizational structures of special transport divisions of different classes using a centralized production management system, mutual communication in the work of the stations. Reorganization of the division's work in modern conditions, determination of the main technical and economic indicators of the division's work, improvement of the functioning of the system of technical maintenance and repair of special vehicles.

Topic 1.3. Production processes at the workshops of the special transport division.


Characteristic of production processes in repair workshops, warehouse and transport economy. Technical, economic and administrative management of technical departments of the special transport divisions. Purpose, classification and characteristics of the technological equipment of the production and technical base of the division. Method of calculations of technological equipment of the production complex, storage and auxiliary buildings. Certification requirements for the equipment of the maintenance and repair area of special vehicles.

Topic 1.4. Technological design of special transport divisions.

The procedure for designing of divisions, which operate AGE at airports, input data for the design of production and technical bases of such divisions. Normative and metrological provision of project documentation. The calculation method of the program and the factors justifying it, the annual volumes of technical maintenance and ongoing repair of special vehicles, the distribution of the labor intensity of maintenance and repair works by production zones and areas. Method of optimization of the production program of divisions that operate AGE.

Topic 1.5. Zones and production buildings for technical maintenance of special vehicles.

Mode of operation and annual reserves of time of the maintenance and repair zone of special vehicles. Methods of determining of area of maintenance and repair of special vehicles. Determination of the optimal program of the maintenance and repair zone by minimizing of costs. Distribution of work from individual operations by zones, sections and workstations. Classification and assignment of industrial facilities. Planning decisions of the buildings, methods of determination of the main parameters of the buildings of the production and technical base of the division. Ensuring of compliance of labor protection, sanitary and technical measures and fire safety requirements.

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 7 of 11 | |

Topic 1.6. Warehouse and auxiliary buildings of the special transport division.

Classification of warehouse and auxiliary buildings of division, their purpose and features of functioning. Methods of stock calculation by types of materials. Standards of the design of warehouse and auxiliary buildings. Safety requirements of design and operation of warehouse and auxiliary buildings of the special transport division. The main principles of creating of the layout of production and auxiliary buildings. Variants of the layout of the production building. Architectural and constructional solutions. Requirements of safety labour and fire prevention measures. Environmental protection measures.

Topic 1.7. Costs of energy resources, stock of basic and auxiliary materials.

Justification and calculations of the necessary amount of electricity, compressed air, steam, water and gas, necessary to ensure the production process of maintenance and repair of special vehicles. The method of determining of costs and stocks of basic and auxiliary materials. General and specific technical and economic indicators of projects of special transport divisions and their analysis.

Topic 1.8. Peculiarities of designing of systems of centralized refueling of aircrafts and airport gas stations.

Characteristics of centralized refueling facilities of aircrafts. Schemes of the location of the centralized refueling facilities of aircrafts on the general layout of the airport. Structural diagrams of fuel supply regulation groups according to flow and pressure. Work of the reservoir group. Selection of structures and location of fuel tanks for airport gas stations. Calculation of the number and selection of fuel dispensers. Design of the ground equipment system of the airport gas station.

Topic 1.9. Design of the pipeline network of fuel supply facilities.

Requirements for pipelines. Laying of pipeline communications. Permissible bending radius and distance between supports. Temperature stresses in the pipeline. Performance of temperature compensators. Designing of protection of pipelines against stray currents.

Module №2 (educational component) «Term Paper»


Term Paper (TP) is carried out in the 1st semester, in accordance with the methodical recommendations approved in the established order. Its purpose and goals are to consolidate and improving of the theoretical knowledge and skills acquired by the student in the process of mastering the educational material of the discipline in the field of airport subdivision design. The purpose of the TP is to design the buildings of the division that operates special transport at the airport and the justified selection of the necessary equipment for this division. based on the class of the airport and the volume of work performed in this division.

Execution, preparation and defending of the TP is carried out by the student individually in accordance with methodical recommendations.

The student is assigned 30 hours of independent work to complete the TP

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 |
| 1.1 | General layout of the airport and plans of divisions, which operate special transport | 11 | 2 | 2 | 7 |

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 8 of 11 | |

| 1 | 2 | 3 | 4 | 5 | 6 |
|----------------------------------|--|------------|-----------|-----------|-----------|
| 1.2 | Technical departments of the special transport division of the airport | 11 | 2 | 2 | 7 |
| 1.3 | Production processes in the workshops of the special transport division | 11 | 2 | 2 | 7 |
| 1.4 | Technological design of special transport divisions | 11 | 2 | 2 | 7 |
| 1.5 | Zones and production facilities for maintenance of special vehicles | 11 | 2 | 2 | 8 |
| 1.6 | Warehouses and auxiliary buildings of the special transport division | 11 | 2 | 2 | 7 |
| 1.7 | Costs of energy resources, stock of basic and auxiliary materials | 11 | 2 | 2 | 7 |
| 1.8 | Peculiarities of designing of systems of centralized refueling of aircrafts and airport gas stations | 9 | 2 | 2 | 5 |
| 1.9 | Design of the pipeline network of fuel supply facilities | 2 | 1 | – | 1 |
| 1.10 | Module Test № 1 | 2 | – | 1 | 1 |
| Total on the Module № 1 | | 135 | 34 | 17 | 54 |
| 1.12 | Term paper performing | 30 | – | – | 30 |
| Total on the Module № 2 | | 30 | – | – | 30 |
| Total on the 1st semester | | 120 | 17 | 17 | 86 |
| Total on the discipline | | 120 | 17 | 17 | 86 |

2.4. Term paper

For Term paper 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.

3.2. List of references

Main references

3.2.1. IATA Airport Handling Manual.

3.2.2. AC No: 150/5360-13A. Airport Terminal Planning. U.S. Department of Transportation

| | | | |
|--|--|------------------|---------------------------------|
|  | Quality Management System Course Training Program on «Technological Design of Airport Divisions» | Document Code | QMS NAU CTP 07.02.06-02-2023 |
| | | Page. 9 of 11 | |

Federal Aviation Administration. 2018. 101 p.

3.2.3. Robert Horonjeff, Francis X. McKelvey. Planning and Design of Airports. 2010. The McGraw-Hill Companies, Inc. 689 p.

3.2.4. Alexander T. Wells, Ed.D., Seth B. Young, Ph.D. Airport Planning & Management. 2004. The McGraw-Hill Companies, Inc. 593 p.

Additional references

3.2.5. Milan Janić. Airport analysis, planning and design: demand, capacity and congestion. 2009 by Nova Science Publishers, Inc. 291 p.

3.2.6. Костів Б.І. Експлуатація автомобільного транспорту: Підручник. – Львів: Світ, 2004 – 496 с.

3.2.7. Дмитрієв І.А. Економіка підприємств автомобільного транспорту: навчальний посібник для самостійної роботи та поточного контролю знань студентів закладів вищої освіти / І.А. Дмитрієв, О.С. Іванілов, І.Ю. Шевченко., І.М. Кирчата – Х.: ФОП Бровін О.В., 2018 – 308 с.

3.3. Information sources on the Internet

3.3.1. <https://www.aviadocs.net>

3.3.2. <https://www.ProfiDom.com.ua>

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 | | | | |