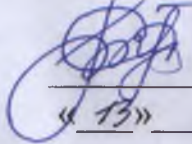


MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
 NATIONAL AVIATION UNIVERSITY
 Faculty of Air Navigation, Electronics and Telecommunications
 Air Navigation Systems Department

AGREED

Dean of Faculty of Air Navigation,
 Electronics and Telecommunications



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« 13 » 03 2023

APPROVED
 Vice-Rector for Academics



Anatolii POLUKHIN

« 14 » 03 2023



Quality Management System

COURSE TRAINING PROGRAM

on

«Methodology of Applied Research in the Field of Aviation Transport»

Educational Professional Programs: «Air Traffic Service», «Air Navigation Service Systems»

Field of Study: 27 «Transport»

Specialty: 272 «Aviation Transport»

Form of study	Semester	Total (hours/ECTS credits)	Lectures	Practicals	Lab. Classes	Self-study	HW / CGP / C	TP / CP	Form of semester control
Full-time	1,2	195/6.5	35	-	35	125	HW (1) 2s	TP (1) 1c	Exam 1s/ HA 2s

Index: ECM-2-272-1/21-2.1.1

ECM-2-272-2/21-2.1.1

QMS NAU CTP 22.01.01-01-2023



Quality Management System
Course Training Program
on
«Methodology of Applied Research in the
Field of Aviation Transport»

Code
Document

QMS NAU
CTP 22.01.01-01-2023

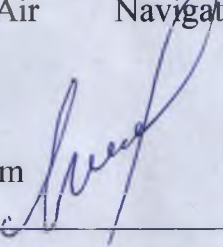
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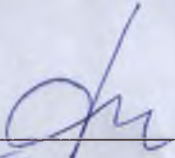
The Course Training Program on «Methodology of Applied Research in the Field of Aviation Transport» is developed on the Educational Professional Programs «Air Traffic Service», «Air Navigation Service Systems», Master Curriculum CM/ECM – 2 – 272 – 1/21, CM/ECM – 2 – 272 – 2/21 for the Specialty 272 «Aviation Transport» and correspondent normative documents.

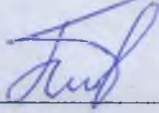
Developed by:

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Discussed and approved by the Graduate Department for Educational Professional Program «Air Traffic Service» and «Air Navigation Service Systems» the Speciality 272 «Aviation Transport» – Air Navigation Systems Department, | Minutes № 2 of «01» March 2023.

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“ 13 ” 03 2023

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INTRODUCTION

The Course Training Program (CTP) on the subject “Methodology of Applied Research in the Field of Aviation Transport” is developed based on the “Methodical guidance for the subject course training program” approved by the order № 249/од, of 29.04.2021 and corresponding normative documents.

1. EXPLANATORY NOTE

1.1. Place, target, tasks of the subject

The **place** of the given subject in the system of professional training of the specialist: 272 «Aviation Transport». This course is the theoretical basis of a set of knowledge and skills that allow systematizing and expanding knowledge about the methodology of organization and conducting applied scientific research in the field of aviation transport.

The **target** of mastering the subject is formation of knowledge and skills on the methods of organizing and conducting applied scientific research in the field of aviation transport in order to prepare for independent performance of scientific work.

The **tasks** of mastering the subject are the following: familiarization with basics of methodology, technology and organization of scientific research activities, that is, to form a theoretical and practical basis for effective, qualified conducting of scientific research by masters; basics of writing excellent scholar papers and approbation of obtained scientific results.


1.2. Learning outcomes that the subject makes it possible to achieve:

For EPP «Air Navigation Service Systems»:

- PLO 1. The ability to assess compliance of technical and operational characteristics of air navigation systems with the requirements of ICAO standards.
- PLO 2. Apply modern methods of scientific research, organization and planning of experiments, digital technologies, methods of data analysis to solve complex problems of air transport.
- PLO 3. Application of knowledge of modern information technologies for solving experimental and practical tasks.
- PLO 5. Application of knowledge about the methodology of creation of intellectual property protection documents in the field of air navigation services.

For EPP «Air Traffic Service»:

- PLO 01. Specialized conceptual knowledge that includes modern scientific achievements in the field of air transport and is the basis for original thinking and conducting research. Apply modern methods of scientific research, organization and planning of an experiment, digital technologies, methods of data analysis to solve complex problems of air transport

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- PLO 02. Solve complex problems of creation, operation, maintenance, repair and disposal of aviation transport objects, including at the border with related fields, engineering sciences, physics, ecology and economy.
- PLO 03. Freely present and discuss the results of research and innovation, other issues of professional activity in the state language and English or one of the languages of the EU countries in oral and written forms.
- PLO 04. Develop and implement new technical solutions and apply new technologies.
- PLO 05. Apply universal and specialized life cycle management (PLM), automated design (CAD), manufacturing (CAM) and engineering research (CAE) systems in professional activities.
- PLO 06. Develop and implement energy-saving technologies of air transport.
- PLO 07. Organize and manage the work of the primary production, design or research unit in the field of aviation transport, evaluate the efficiency and effectiveness of the staff and unit.
- PLO 13. To ensure the quality of production and operation in the field of aviation transport.
- PLO 14. Search for necessary data in scientific literature, databases and other sources, analyze, evaluate and use these data


1.3. Competences that the course makes it possible to acquire:

For EPP «Air Navigation Service Systems»:

- IC. The ability to solve complex problems and tasks in the field of aviation transport, in particular in the air navigation maintenance of flights of manned and unmanned aircraft, which involves mastering the basics of scientific analysis and modern innovative technologies.
 - GC 1. Ability to identify, justify and solve problems.
 - GC 2. Ability to conduct research at an appropriate level.
 - GC 4. Ability to search, process and analyze information from various sources.
 - FK1. Ability to apply knowledge of modern achievements in the field of air navigation services.
 - FK2. Ability to implement modern technologies, research, analyze and improve technological processes of air transport.
 - FK4. The ability to apply a systematic approach to solving engineering interdisciplinary problems in aviation transport.
 - FK9. Ability to develop and implement scientific and applied projects in the field of air transport.

For EPP «Air Traffic Service»:

- IC. The ability to solve complex problems and tasks in the field of air transport, in particular, in the implementation of new principles and processes of air traffic organization and maintenance, analysis of aviation accidents, which involves mastering

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the methodology of scientific analysis, protection of own intellectual developments and modern innovative technologies.

- GC03. Skills in using information and communication technologies
- GC04. Ability to conduct research at an appropriate level
- GC05. Ability to search, process and analyze information from various sources
- FC01. Ability to develop and implement scientific and applied projects in the field of air transport
- FC02. The ability to apply a systematic approach to solving engineering interdisciplinary problems in aviation transport
- FC04. Ability to integrate knowledge and solve complex scientific and industrial problems in the field of air transport, taking into account the wider interdisciplinary engineering context
- FC06. Ability to implement modern technologies, research, analyze and improve technological processes of air transport

1.4. Interdisciplinary connections

Knowledge acquired by the student after studying course «Methodology of Applied Research in the Field of Aviation Transport» are useful for diploma thesis preparation for technical and economic substantiation of the project, statistical calculation of the proposed topic, which confirm the scientific and practical value of the developments presented in diploma theses. The course "Methodology of Applied Research in the Field of Aviation Transport" is related to those disciplines of the curriculum of the specialty 272 "Aviation transport", the content of which is modeling, the application of information technologies in the implementation of innovative activities.

2. PROGRAM OF THE COURSE


2.1. The subject content

The educational material of the subject is structured by the modular principle and consists of 2 modules such as:

- educational **module №1 «Science and methodology of scholar research»;**
- educational **module №3 «Peculiarities of applied scientific research in the field of air transport».**

Every module is logically completed, relatively independent, and integral part of the subject. Mastering of this subject foresees execution of the module test and analysis of its results.

A separate (second) module (educational component) is a term paper (TP), which is completed in the 1st semester. TP is an important component of study and increasing of theoretical and practical knowledge and skills acquired by the student in the process of assimilation of the educational material in the course.

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2.2. Modular structuring and integrated requirements for each module

Module 1. «Science and methodology of scholar research».

Integrated requirements to module №1

A student must know:

- basic definitions of science;
- peculiarities of the organization of scientific research in Ukraine;
- scientometric indicators;
- the structure of scientific materials used to publication the results of scientific research.

A student can do:

- ability to plan and carry out scientific research;
- to be able to use scientific databases to perform scientific research and the scientific profile of a scientist;
- be able to use the Open Researcher and Contributor ID;
- to be able to use automated systems for preparing citations and references in scientific documents.

Topic 1. Science and the basics of scientific research

The subject and essence of science. Stages of science development. The main regularities of the development of science. Classification of sciences. General concepts of scientific activity.

Topic 2. Organization of research activities in Ukraine

National classification of sciences. Fundamental and applied scientific research. National Academy of Sciences of Ukraine. Priority areas of scientific research. Scientific degrees and scientific titles. Scientific awards and grants.

Topic 3. Scientific data bases

Structure and overview of scientific databases. Peculiarities of scientific search in scientific databases Google Scholar, Scopus, Web of Science, DBLP, IEEE explore.

Topic 4. Scientometrics


Profile of a scientist in scientometric databases. Basic scientometric parameters of scientific activity. Hirsch index. Index I-10.

Topic 5. Open Researcher and Contributor ID

Importance of Open Researcher and Contributor ID (ORCID) for publishing results of research. Metadata and the use of the META scheme in identifying the authorship of scientific documents. The hardware and software interface (API) of the interaction of the profiles of scientists in various ORCID scientometric databases.

Topic 6. Citations and references in scientific literature

Rules for using citations and references in scientific literature. Standards for designing a list of references from different publishers. Automated means of placing scientific references and automatically forming a list of references.

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Topic 7. Publication of the results of scientific activity

Digital identifiers of publishers of scientific literature. Quartiles of scientometric databases. Scientometrics of periodicals. The structure of scientific articles and abstracts of reports at scientific conferences. Business models of monetization of publications of scientific results.

Topic 8. Grant programs and financing of scientific activities

Ways of financing scientific activities. Domestic and foreign grant programs. Grant programs for young scientists.

Module № 2 (educational component) «Term paper»

Term paper (TP) is completed in the 1st semester, in accordance with the methodical recommendations approved in the established order.

The purpose of TP is the automated processing of large-scale aeronautical data.

The goals of the TP: to learn how to work with aeronautical data of large scale using the example of trajectory data of aircraft using MATLAB software.

Module 3. «Peculiarities of applied scientific research in the field of air transport».

Integrated requirements to module №1

A student must know:

- basic methods of statistical data processing;
- basic methods of graph theory;
- basics of set theory;
- the basics of the theory of logical operations.

A student can do:

- perform statistical processing of data of different sizes;
- apply methods of interpolation and extrapolation of data to evaluate aeronautical information;
- apply elements of graph theory to solve air transport problems;
- use set theory to describe trajectory measurement data.

Topic 1. Fundamentals of statistical data processing

Problems of mathematical statistics. First level of raw data processing. Parameter distribution. Testing of statistical hypotheses.

Topic 2. Interpolation and extrapolation of data

Interpolation and extrapolation of data by polynomials of different degrees and spline functions.

Topic 3. Basics of graph theory

Basic definitions of graph theory. Graph problem methods. Directed and undirected graphs. Basic characteristics of graphs.



Topic 4. Peculiarities of using graph theory in the field of air transport

Evaluation of the network of air routes using methods of graph theory. The task of choosing the optimal flight path. Optimization of the network of air navigation facilities.

Topic 5. Basics of set theory

Sets and elements of sets. Definition of sets. The problem of sets. Tuples
Operations on sets. Basics of set theory.

Topic 6. Peculiarities of using set theory in the field of air transport

Application of set theory for description of trajectory measurement data. Data analysis using set theory.

Topic 7. Basics of the theory of logical operations and their application in the analysis of the air navigation system


Basic definitions of the theory of logical operations. Basic logical operations. Definition of a logical function. Examples of the use of logical operations in the assessment of airspace.

Topic 8. Basics of cluster analysis

Basic definitions of cluster data analysis. Data clustering methods.

2.3. Training schedule of the course

№	Topic	Academic Hours							
		Full time							
		Total	Lectures	Lab. classes	Self-study				
1	2	3	4	5	6	7	8	9	10
1 semester									
Module №1 «Science and methodology of scholar research»									
1.1	Science and the basics of scientific research	10	2	2	6				
1.2	Organization of research activities in Ukraine	8	2	2	4				
1.3	Scientific data bases	8	2	2	4				
1.4	Scientometrics	10	2	2	6				
1.5	Open Researcher and Contributor ID	8	2	2	4				
1.6	Citations and references in scientific literature	10	2	2	6				
1.7	Publication of the results of scientific activity	8	2	2	4				
1.8	Grant programs and financing of scientific activities	11	2	2 1	6				
1.9	Module Test №1	2	1	-	1				

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Total for module №1		75	17	17	41				
Module № 2 «Term paper»									
2.1	Increasing the accuracy of measuring the current UAV coordinates using various filtering methods	30	-	-	30				
Total for 1 semester		105	17	17	71				
2 semester									
Module 3. «Peculiarities of applied scientific research in the field of air transport»									
3.1	Fundamentals of statistical data processing	10	2	2	6				
3.2	Interpolation and extrapolation of data	10	2	2	6				
3.3	Basics of graph theory	10	2	2	6				
3.4	Peculiarities of using graph theory in the field of air transport	8	2	2	4				
3.5	Basics of set theory	10	2	2	6				
3.6	Peculiarities of using set theory in the field of air transport	8	2	2	4				
3.7	Basics of the theory of logical operations and their application in the analysis of the air navigation system	10	2	2	6				
3.8	Basics of cluster analysis	12	2	2	6				
3.9	Home work	8	-	-	8				
3.10	Module Test №2	4	2	-	2				
Total for module №3		90	18	18	54				
Total for 2 semester		90	18	18	54				
Total for course		195	35	35	125				

2.4. Home Work

The purpose of the home work is to use the MATLAB software to analyze a network of terrestrial radio navigation aids using graph theory.


Completion of homework is one of the forms of independent work of the student. home work consists of two parts. The first is theoretical. The second part is practical.

Theoretical part. The theoretical part consists of studying the main functions of the software.

The practical part. The practical part consists of using the data of the collection of aeronautical information to build a database of radio navigation aids and develop software for analyzing the ground network of aids.

At the end of the home work, a list of the sources used in its writing should be provided. Sources should be arranged in alphabetical order or according to their use in the text of the test work.

Home work must be printed on one side of sheets of white A4 paper. The text is printed in 14 pt Times New Roman font with one and a half line spacing on 8-10 sheets. The handwritten text should be 18 pages on A4 paper. The time allotted for completing the assignment is 8 hours of independent student work.

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2.5. Questions List for the Examination

The list of questions and the content of tasks for preparation for the exam are developed by the leading teacher (lecturer) of the department in accordance with the Course Training Program, and approved at the meeting of the department and presented to the students.

3. GUIDANCE MATERIALS FOR THE SUBJECT

3.1. Methods of Studying

Such educational technologies as work in small groups, seminars-discussions, presentations are used for activation of student's scientific-cognitive activities.


3.2. Recommended Literature

Basic Literature

- 3.2.1. Методологія наукових досліджень : навч. посіб. / В. І. Зацерковний, І. В. Тішаєв, В. К. Демидов. – Ніжин : НДУ ім. М. Гоголя, 2017. – 236 с.
- 3.2.2. Networks / M. Newman. – Oxford University press, 2018. – 793 p.
- 3.2.3. Statistical data analysis / G. Cawan. – Oxford University press, 1998. – 210 p.
- 3.2.4. Ostroumov I.V., Kuzmenko N.S. Incident detection systems, airplanes. In Vickerman, Roger. International Encyclopedia of Transportation. vol. 2. 4569 p. . UK: Elsevier Ltd., 2021. 351-357p. DOI: 10.1016/B978-0-08-102671-7.10150-2. ISBN: 9780081026717.
- 3.2.5. Ostroumov I.V., Kuzmenko N.S. Collision Avoidance Systems, airplanes. In Vickerman, Roger. International Encyclopedia of Transportation. vol. 2. 4569 p.. UK: Elsevier Ltd., 2021. 164-172p. DOI: 10.1016/B978-0-08-102671-7.10514-7. ISBN: 9780081026717.
- 3.2.6. Дружинін В., Остроумов І.В., Рубцов А., Свірко В., Ударцева Т. Авіаційні системи: Ергодізайнерське забезпечення проектування і експлуатації : монографія . Київ: НАУ, 2021. 200с. ISBN: 978-966-8603-52-5.

Additional literature

- 3.2.7. Ostroumov I.V., Kuzmenko N.S. Outliers detection in Unmanned Aerial System data. 2021 11th International Conference on Advanced Computer Information Technologies (ACIT). 2021. P. 591-594.
- 3.2.8. Ostroumov I.V., Ivashchuk O. Risk of mid-air collision estimation using minimum spanning tree of air traffic graph. Paper presented at the CEUR Workshop Proceedings of the 2st International Workshop on Computational & Information Technologies for Risk-Informed Systems CITRisk-2021. 2022. № 3101. P. 322-334.
- 3.2.9. Ostroumov I.V., Kuzmenko N.S. Performance Modeling of Aircraft Positioning System. Conference on Integrated Computer Technologies in Mechanical

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Engineering–Synergetic Engineering – ICTM 2021. ICTM 2021. Lecture Notes in Networks and Systems. 2022. № 367. P. 297-310 DOI: 10.1007/978-3-030-94259-5_26.

3.2.10. Ostroumov I.V., Kuzmenko N.S., Kyzymchuk O. Automatic Dependent Surveillance-Broadcast Trajectory Data Processing. 2022 IEEE 16th International Conference on Advanced Trends in Radioelectronics, Telecommunications and Computer Engineering (TCSET). 2022. P. 43-47. DOI: 10.1109/TCSET55632.2022.9767058.

3.2.11. Ostroumov I.V., Kuzmenko N.S. Statistical Analysis and Flight Route Extraction from Automatic Dependent Surveillance-Broadcast Data. 2022 Integrated Communications Navigation and Surveillance Conference (ICNS). 2022. P. 1-9. DOI: 10.1109/ICNS54818.2022.9771515.

3.2.12. Ostroumov I.V., Kuzmenko N.S. A Probability Estimation of Aircraft Departures and Arrivals Delays. Gervasi O. et al. (eds) Computational Science and Its Applications – ICCSA 2021. ICCSA 2021. Lecture Notes in Computer Science. 2021. № 12950. P. 363-377 DOI: 10.1007/978-3-030-86960-1_26 .

3.2.13. Ostroumov I.V., Kuzmenko N.S. Configuration Analysis of European Navigational Aids Network. 2021 Integrated Communications Navigation and Surveillance Conference (ICNS). 2021. P. 1-9. DOI: 10.1109/ICNS52807.2021.9441576.

3.2.14. Ostroumov I.V., Kuzmenko N.S. Aviation Weather Data Processing with Spline Functions. 2021 IEEE 12th International Conference on Electronics and Information Technologies (ELIT). 2021. P. 67-70. DOI: 10.1109/ELIT53502.2021.9501065.

3.2.15. Ostroumov I.V., Kuzmenko N.S. Performance of VOR/DME Navigation Aided by Altimeter Data. 2022 12th International Conference on Advanced Computer Information Technologies (ACIT). 2022. P. 428-431. DOI: 10.1109/ACIT54803.2022.9913164.

3.2.16. Ostroumov I.V., Kuzmenko N.S. Cybersecurity analysis of navigation systems in civil aviation. 2022 IEEE 41th International Conference on Electronics and Nanotechnology (ELNANO). 2022. P. 478-483. DOI: 10.1109/ELNANO54667.2022.9927038.

3.2.17. Ostroumov I.V., Kuzmenko N.S. Configuration Analysis of European Navigational Aids Network. 2021 Integrated Communications Navigation and Surveillance Conference (ICNS). 2021. P. 1-9. DOI: 10.1109/ICNS52807.2021.9441576.

3.2.18. Ostroumov I.V. Contemporary Air Navigation System. Logistics and Transport. 2020. № 47(3). P. 39-45.


3.3. Information resources in the Internet

3.3.1. Personal library of Ivan Ostroumov with software: www.ostroumov.sciary.com

3.3.2. Personal channel of Ivan Ostroumov with video recordings of lectures: <https://youtube.com/c/IvanOstroumov>

3.3.3. Software: <https://www.mathworks.com/products/matlab-online.html>

3.3.4 Flightaware. Official website of the company. [Electronic resource]. URL :

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<https://flightaware.com/adsb/>

4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT

4.1. Grading of different kinds of academic activity performed by a student is done according to Table 4.1.


Table 4.1

Kind of Academic Activity	Max Grades	
	Full time mode	
1 semester		
Module №1		
Carrying out and defending laboratory works (7×8);	56	
<i>For carrying out module test №1, a student must receive not less than</i>	33	
Module Test №1	24	
Total for module №1	80	
Semester Examination	20	
Total for course	100	
Module №2		
Carrying out of term paper	60	
Defending of term paper	40	
Carrying out and defending of term paper	100	
2 semester		
Module №3		
Carrying out and defending laboratory works (7×8);	56	
Carrying out and defending home work	24	
<i>For carrying out module test №2, a student must receive not less than</i>	48	
Module Test №2	20	
Total for module №3	100	
Differentiated assessment	100	
Total for course	100	

The credit rating is determined (in points and on the national scale) based on the results of all types of academic work during the semester.

4.2. Kind of academic work is considered as carried out by a student if he/she has received for it positive grade. (appendix 3).

4.3. The sum of grades, received by a student for different kinds of fulfilled academic work, is Current Module Grade and it is entered into the Module Grade Register.

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4.4. The Total Module Grade, received by a student as a result of carrying out and defending the Term Paper except of the Module Grade Register is entered into an educational card, a student's record book, and the Diploma Supplement, for example: **92/Ex/A, 87/Good/B, 79/Good/C, 68/Sat/D, 65/Sat./E**, etc.

4.5. The Semester Module Grade and the **Examination Grade** together make up a Total Semester Grade whose correspondence to the National Scale and the ECTS System (appendix 4).

- In the case of differentiated assessment, the final semester rating is recalculated into the national scale and ECTS scale (appendix 4).

4.6. The final semester rating in points, according to the national scale and the ECTS scale, is entered in the credit and examination information, the study card and the student's credit book, for example: **92/Ex/A, 87/Good/B, 79/Good/C, 68/Sat/D, 65/Sat./E**, etc.

4.7. The final grade for the discipline is equal to the final semester grade. The specified final grade for the discipline is entered in the Appendix to the diploma.

4.8. The final rating grade for the discipline is defined as the arithmetic mean of the final semester rating grades in points (from this discipline – for the first and second semesters) followed by its conversion into grades according to the ECTS national scale.

The specified final grade for the discipline is entered in the Appendix to the diploma.



(Ф 03.02 – 01)

АРКУШ ПОШИРЕННЯ ДОКУМЕНТА

№ прим.	Куди передано (підрозділ)	Дата видачі	П.І.Б. отримувача	Підпис отримувача	Примітки
	<i>Центр</i>	<i>15.03.23</i>	<i>Шевченко</i>	<i>[Signature]</i>	

(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				

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(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				



Додатки роздруковувати не потрібно - це для роботи.

Додаток 3

**Відповідність оцінок у балах оцінкам за національною шкалою
(рекомендовані значення)**

Оцінка у балах												Оцінка за національною шкалою
3	4	5	6	7	8	9	10	11	13	14	15	
3	4	5	6	7	8	9	9-10	10-11	12-13	13-14	14-15	Відмінно
2,5	3	4	5	6	6-7	7-8	8	9	10-11	11-12	12-13	Добре
2	2,5	3	4	4-5	5	6	6-7	7-8	8-9	9-10	9-11	Задовільно


Оцінка у балах												Оцінка за національною шкалою
16	17	18	19	20	21	22	23	24	25	26	27	
15-16	16-17	17-18	17-19	18-20	19-21	20-22	21-23	22-24	23-25	24-26	25-27	Відмінно
12-14	13-15	14-16	15-16	15-17	16-18	17-19	18-20	18-21	19-22	20-23	20-24	Добре
10-11	10-12	11-13	12-14	12-14	13-15	13-16	14-17	15-17	15-18	16-19	16-19	Задовільно

Оцінка у балах												Оцінка за національною шкалою
28	29	30	31	32	33	34	35	36	37	38	39	
26-28	26-29	27-30	28-31	29-32	30-33	31-34	32-35	33-36	34-37	34-38	35-39	Відмінно
21-25	22-25	23-26	23-27	24-28	25-29	26-30	27-31	27-32	28-33	29-33	29-34	Добре
17-20	18-21	18-22	19-22	19-23	20-24	20-25	21-26	22-26	22-27	23-28	24-28	Задовільно

Оцінка у балах												Оцінка за національною шкалою
40	41	42	43	44	45	46	47	48	49	50	51	
36-40	37-41	38-42	39-43	40-44	41-45	42-46	43-47	43-48	44-49	45-50	46-51	Відмінно
30-35	31-36	32-37	32-38	33-39	34-40	35-41	35-42	36-42	37-43	38-44	38-45	Добре
24-29	25-30	25-31	26-31	27-32	27-33	28-34	28-34	29-35	30-36	30-37	31-37	Задовільно

Оцінка у балах												Оцінка за національною шкалою
52	53	54	55	56	57	58	59	60	61	62	63	
47-52	48-53	49-54	50-55	51-56	51-57	52-58	53-59	54-60	55-61	56-62	57-63	Відмінно
39-46	40-47	41-48	41-49	42-50	43-50	44-51	44-52	45-53	46-54	47-55	47-56	Добре
31-38	32-39	32-40	33-40	34-41	34-42	35-43	36-43	36-44	37-45	37-46	38-46	Задовільно

Оцінка у балах												Оцінка за національною шкалою
64	65	66	67	68	69	70	71	72	73	74	75	
58-64	59-65	60-66	60-67	61-68	62-69	63-70	64-71	65-72	66-73	67-74	68-75	Відмінно
48-57	49-58	50-59	50-59	51-60	52-61	53-62	53-63	54-64	55-65	56-66	56-67	Добре
38-47	39-48	40-49	40-49	41-50	41-51	42-52	43-52	43-53	44-54	44-55	45-55	Задовільно
Оцінка у балах												Оцінка за національною шкалою
76	77	78	79	80	81	82	83	84	85	86	87	
68-76	69-77	70-78	71-79	72-80	73-81	74-82	75-83	76-84	77-85	77-86	78-87	Відмінно
57-67	58-68	59-69	59-70	60-71	61-72	62-73	62-74	63-75	64-76	65-76	65-77	Добре
46-56	46-57	47-58	47-58	48-59	49-60	49-61	50-61	50-62	51-63	52-64	52-64	Задовільно

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Додаток 5

Відповідність підсумкової семестрової рейтингової оцінки в балах
оцінці за національною шкалою та шкалою ECTS

Оцінка в балах	Оцінка за національною шкалою	Оцінка за шкалою ECTS	
		Оцінка	Пояснення
90-100	Відмінно	A	Відмінно (відмінне виконання лише з незначною кількістю помилок)
82-89	Добре	B	Дуже добре (вище середнього рівня з кількома помилками)
75-81		C	Добре (в загальному вірне виконання з певною кількістю суттєвих помилок)
67-74	Задовільно	D	Задовільно (непогано, але зі значною кількістю недоліків)
60-66		E	Достатньо (виконання задовольняє мінімальним критеріям)
35-59	Незадовільно	FX	Незадовільно (з можливістю повторного складання)
1-34		F	Незадовільно (з обов'язковим повторним курсом)