MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL AVIATION UNIVERSITY

Faculty of Architecture, Civil Engineering and Design
Computer Technologies of Airport Construction and Reconstruction Department

AGREED
Dean of the Faculty
_____ Viktor KARPOV
«26» 10 2022

APPROVED
Vice Rector for Academics
_____ Anatolii POLUKHIN
«31» 10 2022

Quality Management System

# COURSE TRAINING PROGRAM
## on
## " Heat-Gas Supply and Ventilation"

Educational and Professional Program: «Industrial and Civil Engineering»

Field of study: 19 «Architecture and Construction»
Specialty: 192 «Building and Civil Engineering»

| Form of training | Sem. | Total (hours/ ECTS cred-its)) | Lec. | Prac. | Lab. | Self-study | Home-works control works | CP/ TP | Form of con-trol |
|---|---|---|---|---|---|---|---|---|---|
| Full-time | 7 | 105/3,5 | 17 | - | 34 | 54 | CGW | - | Exam 7th semester |
| Part-time | - | - | - | - | - | - | - | - | - |

Index: ECB - 5 - 192 - 1/22 - 2.1.17

The Course Training Program on "Heat-Gas Supply and Ventilation" is developed on the basis of the Educational-Professional Program "Industrial and Civil Engineering", Bachelor Curriculum and Extended Curriculum № СВ-5-192-1/21, № ЕСВ-5-192-1/22 for training higher education seekers of the Bachelor degree of specialty 192 "Building and Civil Engineering" and corresponding normative documents.

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Discussed and approved by the Graduate Department for the Specialty 192 "Building and Civil Engineering" (Educational Professional Program "Industrial and Civil Engineering") – Computer Technologies of Airport Construction and Reconstruction Department, Minutes № 12 of "25" 10 2022.

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«27» 10 2022

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# INTRODUCTION

The Course Training Program of the academic discipline "Heat-Gas Supply and Ventilation" was developed on the basis of the "Methodological recommendations for the development and execution of the syllabus of educational discipline of full-time and part-time forms of training", approved by rector's order No. 249/roz. of 29.04.2021 and relevant regulatory documents.

## 1. EXPLANATORY NOTE

### 1.1. Role, goal and objectives of the academic discipline.

The academic discipline «Теплогазопостачання і вентиляція» occupies a leading **place** in the process of professional training for the qualified performance of professional duties of specialists, is the theoretical and practical basis of the set of knowledge and skills that form the profile of a specialist in the field of building and civil engineering. Studying the course of this discipline is aimed at gaining knowledge about the basics of calculation and design of heating and gas supply and ventilation systems of residential, public and industrial buildings and structures.

**The purpose** of teaching the discipline is to acquire competencies, knowledge and skills in designing engineering systems and equipment of buildings in accordance with their functional and technological purpose, providing information on the classification and types of engineering systems and equipment of construction objects, which are used in accordance with functional requirements and operating conditions , application of acquired skills in the process of education and future professional activity in the field of building and civil engineering.

The **tasks** of studying the academic discipline are:

– study of physical processes and phenomena occurring both in buildings and directly in heating, gas supply, and ventilation systems;

- study of the concepts, components and purpose of heating and gas supply and ventilation systems of residential, public and industrial buildings and structures;

- study of the basic provisions for the design and application of building equipment with engineering systems of heat supply, gas supply, and ventilation.

### 1.2. Educational outcomes of the academic discipline.

As a result of studying this academic discipline, the student should know:

– purpose and classification of engineering equipment, its types and main elements;

– sanitary-technical and environmental requirements for the engineering equipment of buildings;

– the main requirements for the application, design and operation of heating, gas supply, ventilation, air conditioning systems;

– technical solutions and operating principles of modern heat supply, gas supply, ventilation and air conditioning systems;

– economic aspects of designing and operating engineering systems and building

equipment;

– the main directions of theory development, which are used in practice for optimal design and calculations of engineering systems of construction objects.

Program learning outcomes (PLO):

PLO5 – Use and develop technical documentation at all stages of the life cycle of construction products. PLO7 – Perform data collection, interpretation and application, including through the search, processing and analysis of information from various sources. PLO9 – Design building structures, buildings, structures and engineering networks, taking into account engineering and resource-saving measures, legal, social, environmental, technical and economic indicators, scientific and ethical aspects, and modern requirements of regulatory documentation in the field of architecture and construction, environmental protection and labor safety. PLO14 – Ensure reliable and safe operation of building constructions, structures and engineering networks.

### 1.3. Competencies obtained through the academic discipline.

According to the content of the discipline, the student of higher education must be able to:

- creatively use the acquired knowledge to solve practical problems in the application and design of engineering equipment for buildings;
- to evaluate buildings, structures and structural elements in terms of heat-technical properties for thermal resistance, heat losses, microclimate of the premises, in accordance with the functional and technological purpose;
- to be able to select the equipment of all engineering systems of buildings and structures;
- use standards, catalogs of typical solutions, reference and technical literature;
- to conduct a technical and economic analysis of the feasibility of applying technical design solutions of the specified systems;
- as a result of the calculation, evaluate the potential operational capacity of the elements of engineering systems of buildings and make reasonable decisions to eliminate the consequences and prevent dangerous situations.

IC. The ability to solve complex specialized tasks and practical problems in the field of construction or in the learning process, which involves the application of theories and methods of determining the strength, stability, durability, reliability and safety of buildings and structures; application of information technologies, software complexes, automated design systems.

General competences (GC):

GC2 – Knowledge and understanding of the subject area and professional activity. GC6 – Ability to independently acquire knowledge by searching, processing and analyzing in-formation from various sources. GC7 – Interpersonal skills.

Professional competences (PC):

PC1 – Ability to use conceptual scientific and practical knowledge of mathematics, chemistry and physics to solve complex practical problems in construction and civil engineering. PC3 – Ability to design building structures, buildings, structures and

engineering networks (according to specialization), taking into account engineering and resource-saving measures, legal, social, environmental, technical and economic indicators, scientific and ethical aspects, and modern requirements of regulatory documentation in the field of architecture and construction, environmental protection and labor safety. PC6 – Ability to perform engineering activities in the field of construction, compilation and use of technical documentation. PC7 – Ability to take responsibility for developing and making decisions in the field of architecture and construction in unpredictable work contexts. PC10 – Ability to ensure the organization of the construction of buildings and structures of industrial and civil purposes using modern construction materials and energy-efficient technologies.

### 1.4. Interdisciplinary links.

The discipline «Heat-Gas Supply and Ventilation» is based on knowledge of such disciplines as «Introdustion to Civil Engineering», «Higher Mathematics», «Physics», «Civil Engineering Materials», «Fundamentls of Computer Modeling», «Architecture of Buildings and Structures» and is the basis for studying the following disciplines: «Erection and Assembling of Structures», «Building Constructions», «Organization of Construction», «Construction technology».

## 2. PROGRAM OF THE ACADEMIC DISCIPLINE.

### 2.1. Content of the academic discipline

The educational material of the discipline is structured on a modular basis and consists of two educational modules, namely:

- **educational module 1** *«Building heating systems»;*
- **educational module 1** *«Gas supply and ventilation»,* which are a logically complete, relatively independent, integral part of the curriculum, mastering of which involves a module test and results analysis.

### 2.2. Module structure and integrated requirements for each module

**Module № 1**

«**Building heating systems**»

**Integrated requirements for module 1**:

**To know:** *basic concepts and normative documents regulating the design, installation and operation of engineering systems; general characteristics of heating systems; classification, schemes and principle of operation, equipment and installation of the main elements of water, steam, air and radiant heating systems.*

**Be able to:** *use the main theoretical principles and concepts of the discipline, normative literature, catalogs of typical solutions, reference and technical literature; to know the principles and methods of calculating water, steam, air and radiant heating systems.*

**Topic 1. Subject and tasks of the course. Indoor microclimate. Calculation of heat losses.**

Progressive directions of development of engineering systems and building equipment. Energy saving of buildings. Basic normative documents regulating the design, installation and operation of engineering systems of buildings and structures. Indoor microclimate and engineering systems that provide indoor microclimate. Thermal balance of rooms. Thermal engineering calculation of enclosing structures. Methodology for calculating heat losses through enclosing structures of buildings. Calculation of heat losses of premises.

**Topic 2. General characteristics of heating systems.**

Requirements for heating systems. Classification of heating systems. Elements of systems. Heat transfers used in heating systems. Technical and economic comparison of the main heating systems.

**Topic 3. Water heating system.**

Classification of water heating systems. Scheme and principle of operation of the water heating system. Placement, equipment and installation of the main elements of water heating systems. Pipes used in water heating systems. Placement and installation of mains, risers, location of feeders and expansion tank. Insulation of heat pipes, compensation of lengthening of heat pipes. Removing air from the system. Lock-regulating fittings installed in heating systems. Scope and technical and economic indicators of various water heating systems. Schemes, advantages and disadvantages of vertical two-pipe water heating systems with natural and artificial circulation, their scope of application. Schemes, advantages and disadvantages of vertical and horizontal single-pipe systems with closing sections on risers and branches, their scope of application. General characteristics of heating systems. Requirements for heating systems. Classification of heating systems. Elements of systems. Heat carriers used in heating systems. Technical and economic comparison of the main heating systems.

**Topic 4. Heating devices of the water heating system.**

Requirements for heating devices and their classification. Schemes, design, advantages and disadvantages of radiators and convectors. Selection of the type of heating device. Schemes of connecting heating devices to heat pipes and their installation location. Installation of heating devices and central heating systems. Calculation of the heating area and selection of heating devices.

**Topic 5. Systems of steam, air and radiant heating.**

Classification of steam heating systems. Scheme and principle of operation of the steam heating system. Low pressure steam heating systems. High pressure steam heating systems. Classification of air heating systems. Calculation method of air heating systems. Scheme and principle of operation of the heating and air unit. Radiant heating systems. Characteristics of radiant heating systems. Panel radiant heating systems. Infrared heating.

**Module № 2**

**«Gas supply and ventilation»**

**Integrated requirements for module 2**:

**To know:** *basic concepts, definitions, classification, structural elements, schemes and stages of calculations of gas supply systems of buildings, ventilation and air conditioning systems of buildings; methods of using the results of calculation of gas supply, ventilation and air conditioning systems to improve the operational and technical characteristics of existing and prospective facilities.*

**Be able to:** *select equipment for engineering systems of buildings and structures; use normative literature, catalogs of typical solutions, reference and technical literature; to know the principles and methods of calculating gas supply, ventilation and air conditioning systems; apply acquired skills in the process of education and future professional activity in the field of construction.*

**Topic 1. Gas supply.**

Purpose and classification of gas supply systems. Designation, arrangement and classification of building gas supply systems. Engineering equipment of gas supply systems of buildings. Gas stoves. Gas water heaters. Gas boilers. Condensing boilers. Gas convectors. Fittings of gas supply systems. Calculation of gas supply systems for buildings. Use of liquefied gas. Operation of gas supply systems.

**Topic 2. Ventilation systems. General Information.**

General information about the ventilation system. Sanitary and hygienic requirements for the state of the air environment. Sources of formation of harmful substances in premises. Air exchange in the room, its multiplicity. Determination of air consumption by multiplicity and harmfulness. Classification of ventilation systems. Schemes of general exchange, local and combined ventilation systems. Scheme and principle of operation of the exhaust natural channel ventilation system. Materials used for arranging channels and air ducts, their location. Installation schemes of exhaust shafts. Aeration of buildings.

**Topic 3. Mechanical ventilation systems.**

Mechanical ventilation. Mechanical ventilation system equipment. Advantages and disadvantages of mechanical ventilation. Structural elements of supply and exhaust systems of mechanical ventilation. Scheme and principle of operation of the general exchange supply-exhaust ventilation system. Schemes, classification, fans. Filters, heaters, air intake devices and air ducts of the mechanical ventilation system. Methods of calculating the air exchange of premises. Aerodynamic calculations of air ducts. Selection of fans for moving air.

**Topic 4. Air conditioning.**

General characteristics of air conditioning systems. Basic concepts of air conditioning. Processes of thermal and moisture treatment of air. Methods of cooling and heating, drying and humidifying air. Classification of air conditioning systems. Local air conditioning systems. General characteristics. Autonomous air conditioners. Non-autonomous air conditioners. Calculations and selection of equipment for local air conditioning systems.

## 2.3. Thematic plan

| № | Topic | Academic hours | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Full-time study | | | | Part-time study | | | |
| | | Total | Lectures | Lab. classes | Self-study | Total | Lectures | Lab. classes | Self-study |
| 1 | 2 | **3** | 4 | 5 | 6 | **7** | 8 | 9 | 10 |
| **Модуль №1 «Building heating systems»** | | | | | | | | | |
| 1.1 | Subject and tasks of the course. Indoor microclimate. Calculation of heat losses. Progressive directions of development of engineering systems and building equipment. Energy saving of buildings. Basic normative documents regulating the design, installation and operation of engineering systems of buildings and structures. Indoor microclimate and engineering systems that provide indoor microclimate. | **7 semester** | | | | - | | | |
| | | **6** | 2 | 2 | 2 | - | - | - | - |
| 1.2 | Thermal balance of rooms. Thermal engineering calculation of enclosing structures. | **4** | - | 2 | 2 | - | - | - | - |
| 1.3 | Methodology for calculating heat losses through enclosing structures of buildings. Calculation of heat losses of premises. | **5** | - | 2 | 3 | - | - | - | - |
| 1.4 | General characteristics of heating systems. Requirements for heating systems. Classification of heating systems. Elements of systems. Heat transfers used in heating systems. Technical and economic comparison of the main heating systems. | **6** | 2 | 2 | 2 | - | - | - | - |
| 1.5 | Classification of water heating systems. Scheme and principle of operation of the water heating system. Placement, equipment and installation of the main elements of water heating systems. Pipes used in water heating systems. Placement and installation of mains, risers, location of feeders and expansion tank. Insulation of heat pipes, compensation of lengthening of heat pipes. Removing air from the system. Lock-regulating fittings installed in heating systems. | **7** | 2 | 2 | 3 | - | - | - | - |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 1.6 | Scope and technical and economic indicators of various water heating systems. Schemes, advantages and disadvantages of vertical two-pipe water heating systems with natural and artificial circulation, their scope of application. Schemes, advantages and disadvantages of vertical and horizontal single-pipe systems with closing sections on risers and branches, their scope of application. | **6** | 2 | 2 | 2 | - | - | - | - |
| 1.7 | Heating devices of the water heating system. Requirements for heating devices and their classification. Schemes, design, advantages and disadvantages of radiators and convectors. Selection of the type of heating device. Schemes of connecting heating devices to heat pipes and their installation location. Installation of heating devices and central heating systems. Calculation of the heating area and selection of heating devices. | **5** | - | 2 | 3 | - | - | - | - |
| 1.8 | Systems of steam, air and radiant heating.<br>Classification of steam heating systems. Scheme and principle of operation of the steam heating system. Low pressure steam heating systems. High pressure steam heating systems. Classification of air heating systems. Calculation method of air heating systems. Scheme and principle of operation of the heating and air unit. | **5** | 1 | 2 | 2 | - | - | - | - |
| 1.9 | Radiant heating systems. Characteristics of radiant heating systems. Panel radiant heating systems. Infrared heating. | **2** | - | - | 2 | - | - | - | - |
| 1.10 | Module Test №1 | **2** | - | 1 | 1 | - | - | - | - |
| | **Total for Module №1** | **48** | **9** | **17** | **22** | - | - | - | - |
| | **Модуль №2 «Gas supply and ventilation»** | | | | | | | | |
| 2.1 | Gas supply. Purpose and classification of gas supply systems. Designation, arrangement and classification of building gas supply systems. Engineering equipment of gas supply systems of buildings. Gas stoves. Gas water heaters. | **7 semester**<br>**6** | 2 | 2 | 2 | - | - | - | - |
| 2.2 | Gas boilers. Condensing boilers. Gas convectors. Fittings of gas supply systems. Calculation of gas supply systems for buildings. Use of liquefied gas. Operation of gas supply systems. | **4** | - | 2 | 2 | - | - | - | - |
| 2.3 | Ventilation systems. General Information. General information about the ventilation system. Sanitary and hygienic requirements for the state of the air environment. Sources of formation of harmful substances in premises. Air exchange in the room, its multiplicity. Determination of air consumption by multiplicity and harmfulness. Classification of ventilation systems. | **6** | 2 | 2 | 2 | - | - | - | - |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 2.4 | Schemes of general exchange, local and combined ventilation systems. Scheme and principle of operation of the exhaust natural channel ventilation system. Materials used for arranging channels and air ducts, their location. Installation schemes of exhaust shafts. Aeration of buildings. | **5** | - | 2 | 3 | - | - | - | - |
| 2.5 | Mechanical ventilation systems. Mechanical ventilation. Mechanical ventilation system equipment. Advantages and disadvantages of mechanical ventilation. Structural elements of supply and exhaust systems of mechanical ventilation. Scheme and principle of operation of the general exchange supply-exhaust ventilation system. | **7** | 2 | 2 | 3 | - | - | - | - |
| 2.6 | Schemes, classification, fans. Filters, heaters, air intake devices and air ducts of the mechanical ventilation system. Methods of calculating the air exchange of premises. Aerodynamic calculations of air ducts. Selection of fans for moving air. | **5** | - | 2 | 3 | - | - | - | - |
| 2.7 | Air conditioning. General characteristics of air conditioning systems. Basic concepts of air conditioning. Processes of thermal and moisture treatment of air. Methods of cooling and heating, drying and humidifying air. | **5** | - | 2 | 3 | - | - | - | - |
| 2.8 | Classification of air conditioning systems. Local air conditioning systems. General characteristics. Autonomous air conditioners. Non-autonomous air conditioners. Calculations and selection of equipment for local air conditioning systems. | **7** | 2 | 2 | 3 | - | - | - | - |
| 2.9 | Calculation-graphical work | **10** | - | - | 10 | - | - | - | - |
| 2.10 | Module Test № 2 | **2** | - | 1 | 1 | - | - | - | - |
| **Total for Module №2** | | **57** | **8** | **17** | **32** | - | - | - | - |
| **Total For Academic Discipline** | | **105** | **17** | **34** | **54** | - | - | - | - |

## 2.4. Task for calculation-graphical work

Calculation-graphical work in the discipline is perfomed in the eighth semester and is a component of module 2. Perfomance of calculation-graphic work is an important stage in preparation for the coursework and bachelor qualification paper in «Building and civil engineering».

The specific purpose of calculation-graphical work is to calculate heat losses through the enclosing structures of buildings, the calculation of heat losses of premises, the justification and selection of the heating system, the calculation of the heating area and the selection of heating devices.

The development of calculation-graphical work containes the calculation that is performed by students in the form of an explanatory note of 10-15 pages.

The task for performing calculation-graphical work is carried out by the student individually in accordance with the methodical recommendations developed by the leading teachers of the department.

The time required to complete calculation-graphical work is 10 hours of self-study.

## 3. TRAINING MATERIALS FOR THE DISCIPLINE

### 3.1. Teaching methods

When studying the discipline, the following teaching methods are used:
- explanatory-illustrative method;
- method of problem statement;
- reproductive method.

The implementation of these methods is carried out during lectures, laboratory classes, demonstrations, independent work, work with educational literature.

### 3.2. Recommended literature

**Basic literature**

3.2.1. Шульга М.О. Теплогазопостачання та вентиляція. Навч. посібник / М. О. Шульга, О. О. Алексахін, Д. О. Шушляков. – Харків : ХНУМГ, 2014. – 191 с.

3.2.2. Боженко М.Ф. Системи опалення, вентиляції і кондиціювання повітря будівель. Навч. посібник. Електронне видання. – К. : НТУ КПІ, 2019. – 380 с.

3.2.3. Кравченко В. С. Розрахунок систем інженерного обладнання будівель. Навч. посібник / В. С. Кравченко, С. Б. Проценко, Н. В. Кравченко. – Рівне : НУВГП, 2016. – 495 с.

3.2.4. Методичні вказівки до практичних занять та самостійної роботи, глосарій з навчальної дисципліни «Інженерна інфраструктура будівель та споруд» для здобувачів вищої освіти другого (магістерського) рівня за спеціальністю 191 «Архітектура та містобудування» денної та заочної форми навчання / Проценко С. Б. – Рівне : НУВГП, 2019. – 23 с.

3.2.5. ДБН В.1.2-11:2021 Енергозбереження та енергоефективність. – К. : Міністерство розвитку громад та територій України, 2022. – 21 с.

3.2.6. ДБН В.2.5-20:2018. Газопостачання. – К. : Мінрегіонбуд України, 2019. – 43 с.

3.2.7. ДБН В.2.5-67:2013. Опалення, вентиляція та кондиціювання. – К. : Мінрегіонбуд України, 2013. – 232 с.

3.2.8. ДБН В.2.6-31:2021 Теплова ізоляція будівель та енергоефективність будівель. – К. : Міністерство розвитку громад та територій України, 2022. – 27 с.

3.2.9. ДБН В.2.6-33:2018 Конструкції зовнішніх стін із фасадною теплоізоляцією. Вимоги до проектування. – К. : Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України, 2019. – 25 с.

3.2.10. ДСТУ Б В.2.6-101:2010 Метод визначення опору теплопередачі огороджувальних конструкцій – К. : Мінрегіонбуд України 2010. – 53 с.

**Additional literature**

3.2.11. Кравченко В.С., Саблій Л.А., Зінич П.Л. Санітарно-технічне обладнання будинків. – К. : Кондор, 2007. – 457с.

3.2.12. Степанов М.В. Інженерне обладнання будівель: Навч. посібник / М.В. Степанов. – К. : КНУБА, 2008. – 204 с.

3.2.13. Кузьмін О.В. Інженерне обладнання будівель. Навч. посібник / О.В. Кузьмін. – Донецьк : ДонНУЕТ, 2014. – 248 с.

### 3.3. Internet information resources

3.3.1. http://iap.nau.edu.ua/index.php/kafedry/komp-yuternikh-tekhnologij-budivnitstva

3.3.2. https://www.lib.nau.edu.ua/main

3.3.3. http://er.nau.edu.ua/handle/NAU/24905

## 4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT

4.1. Evaluation of certain types of work done by students of the points made in accordance with Table 4.1.

Table 4.1

| Kind of Academic Activities | Maximum Grade | | Kind of Academic Activities | Maximum Grade | |
|---|---|---|---|---|---|
| | Full-time study | Part-time study | | Full-time study | Part-time study |
| 7 semester | | | | | |
| Module № 1 «Heat supply of buildings» | | | Module № 2 «Gas supply and ventilation» | | |
| Kind of Academic Activities | values | values | Kind of Academic Activities | values | values |
| Laboratory classes<br>8x1 values = 8 | 8 | – | Laboratory classes<br>8x1 values = 8 | 8 | – |
| | | – | Carrying out the homework | – | – |
| | | – | Carrying out the calculation and graphical work | 30 | – |
| *For carrying out a module test 1 a student must receive not less than* | *8* | – | *For carrying out a module test 2 a student must receive not less than* | *8* | – |
| Carrying out a module test №1 | 18 | – | Carrying out a module test №2 | 16 | – |
| **Total for module 1** | 26 | 20 | **Total for module 2** | 54 | - |
| **Total for modules №1, №2** | | | | **80** | **-** |
| **Semester examination** | | | | **20** | **-** |
| **Total for academic discipline** | | | | **100** | |

4.2. A student is considered to have passed the module if both his/her Current Module Grade and Module Test Grade are positive .

4.3. The sum of the Current Semester Module Rating and Test Module Rating constitute the Total Module Rating which is entered in a module control register as a Rating Score and a National Scale Rating.

4.4. The Semester Module Grade and the Examination Grade together make up a Total Semester Grade which is calculated according to the National Scale and the ECTS Scale.

4.5. The Total Semester Grade in points, the National Scale and the ECTS Scale is entered in the test report, study card and individual curriculum of the student (record book), for example, as follows: ***92/Excellent/A, 87/Good/B, 79/Good/C, 68/Satisfactory/D, 65/Satisfactory/E,*** etc.

4.6. The Total Grade of the subject is equal the Total Semester Grade. The indicated Total Semester Grade of the subject is added to the Diploma Supplement.

(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 ознайом-леної особи | Дата ознайом-лення | 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

| № змі-ни | № листа (сторінки) | | | | Підпис особи, яка внесла зміну | Дата внесен-ня зміни | Дата введен-ня зміни |
|---|---|---|---|---|---|---|---|
| | Зміненого | Заміненого | Нового | Ануль-ваного | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

(Ф 03.02 – 32)

## УЗГОДЖЕННЯ ЗМІН

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