

**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 of Architecture,
Civil Engineering and Design

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" 30 " 10 2022

APPROVED

Vice Rector for Academics

A. Polukhin

" 05 " 10 2022



Quality Management System

COURSE TRAINING PROGRAM

on

«Constructions of Buildings and Structures»

Educational-Professional Programs: "Industrial and Civil Engineering"


Field of study: 19 "Architecture and Construction"

Specialty: 192 "Building and Civil Engineering"

Form of training	Sem.	Total (hours/ ECTS credits)	Lec.	Prac.	Lab.	Self-study	Home work control work	CP/ TP	Form of control
Full-time	6	120 / 4,0	17	-	34	69	-	-	Graded Test, 6 semester
Part-time	-	-	-	-	-	-	-	-	-

Index: CB - 5 - 192 - 1 / 21-3.9

QMS NAU CTP 10.01.04-01-2022

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The Course Training Program on “Constructions of Buildings and Structures” is developed on the basis of the Educational-Professional Programs “Industrial and Civil Engineering”, “Highways and Airfields”, Bachelor Curriculum and Extended Curriculum № CB-5-192-1/21, № ECB-5-192-1/21 for training higher education seekers of the Bachelor degree of specialty 192 "Building and Civil Engineering" and corresponding normative documents.

Developed by: Professor of
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Discussed and approved by the by the Graduate Department for the Specialty 192 "Building and Civil Engineering" (Educational-Professional Programs “Industrial and Civil Engineering” and “Highways and airfields”) – the Computer Technologies of Construction and Airport Reconstruction Department, minutes № 10 of "29" 09 2022.

Guarantor of the Educational- Professional Program
“Industrial and Civil Engineering”



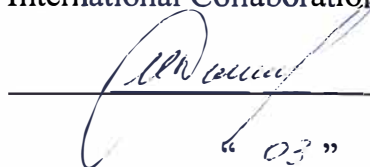
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INTRODUCTION

The Course Training Program of the academic discipline "Constructions of Buildings and Structures" 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 role of the discipline in the field of science and the system of professional training.

The educational discipline "Constructions of Buildings and Structures" is the theoretical and practical basis of the set of knowledge and skills that form the profile of a specialist in the field of construction and civil engineering.

The goal of teaching the discipline is to provide the future specialist with knowledge in the field of designing modern constructions of buildings and structures and their complexes in accordance with functional requirements, physical laws and laws of architectural aesthetics to ensure the architectural and artistic expressiveness of the building.

The objectives of the academic discipline are: the study of practical methods for designing constructions of buildings and structures in accordance with the requirements of current regulations and using modern software complexes of automated design.

1.2. Educational outcomes of the academic discipline

PLO1 – Apply modern models, methods and software tools to solve complex problems of construction and civil engineering;

PLO2 – Participate in research and development in the field of architecture and construction;

PLO5 – Use and develop technical documentation at all stages of the life cycle of construction products;

PLO9 – Design building constructions, buildings, structures taking into account engineering and resource-saving measures, modern requirements of regulatory documentation, time and other restrictions, in the field of architecture and construction.

1.3. Competencies obtained through the academic discipline

As a result of studying the educational discipline "Construction of buildings and structures", the following competencies are obtained:

GC2 – knowledge and understanding of the subject area and professional activity.



PC3 – Ability to design constructions of buildings, structures taking into account engineering and resource-saving measures, technical and economic parameters and modern requirements of regulatory documentation in the field of architecture and construction.

PC5 – Ability to use computer-aided design software and its specialized application for solving engineering problems of construction and civil engineering.

PC6 – Ability to perform engineering activities in the field of construction, compilation and use of technical documentation.

1.4. Interdisciplinary links

This discipline is based on the knowledge of such disciplines as "Structural Mechanics", "Higher Mathematics", "Architecture of Buildings and Structures", "Introduction to Civil Engineering" and is the basis for studying further disciplines, namely: "Building Constructions", "Organization of Construction", "Foundation Engineering", "Heat-Gas Supply and Ventilation".

PROGRAM OF THE ACADEMIC DISCIPLINE

2.1. Content of the academic discipline

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

- **educational module 1 "Design of multistoried residential buildings";**
- **educational module 2 "Design of public buildings"**, each of which is a logically completed, relatively independent, integral part of the educational discipline, mastering which involves a modular test and results analysis.

2.2. Module structure and integrated requirements for each module

Module №1 “Design of multistoried residential buildings”

Integrated requirements for module 1: *to know* technical decisions of structural elements of residential buildings; modern software, reference and normative literature, typical design decisions of the main load-bearing building structures of residential buildings; basic physical and mechanical properties of structural materials and constructions for load-bearing and enclosing elements of residential buildings; main features of computer technologies in the design of residential buildings;

be able: use reference and normative literature, typical projects, catalogs and albums of drawings of building structures;

design architectural and construction drawings of residential buildings from various building materials;

design technical drawings in the automated design system.



Topic 1. Introduction. Basics of designing multistoried residential buildings

Introduction. Basic definitions. Design tasks and principles. Components of the design process. A systematic approach to solving design problems. Normative base. Classification of multistoried residential buildings. Modern specialized systems and programs in construction design. Processing of initial data for design. Selection and evaluation of architectural solutions of the construction object. Classes of consequences (responsibility). Industrialization of civil engineering.

Topic 2. Living environment as an object of design

Premises in residential buildings. Apartments, their composition and parameters. Requirements intended to residential building. Volume-planning decisions of the main types of multi-apartment residential buildings. Designing a typical floor plan of a panel-type residential building. Large-panel residential buildings. Design schemes and volume-planning solutions of multistoried large-panel residential buildings. Panels of external and internal walls of multistoried residential buildings. Design solutions of joints. Partitions.

Topic 3. Foundations of multistoried residential buildings

Structural solutions of multistoried residential buildings foundations. Structural elements of prefabricated foundations. Design of the foundation plan of a panel-type residential building.

Topic 4. Floors and floor coverings of multistoried residential buildings. Engineering equipment of multistoried buildings

Structures of the intermediate floor of multistoried residential buildings. Design of the floor plan of a panel-type residential building. Structural decisions of floor coverings. Engineering equipment of multistoried buildings. Design solutions of stairs. Filling openings and arrangement of open spaces.

Topic 5. Structural solutions of the roofs of multistoried residential buildings

Structural solutions of the roofs of multistoried residential buildings. Construction of the roof plan. Buildings erected by the method of lifting floors and using the **CUBE** system. Structural solutions of external and internal walls from large blocks.

Module №2 «Design of public buildings»

Integrated requirements for module 2: to know modern types of public buildings and structures, their structural systems and schemes; reference and normative literature, typical design solutions of the main load-bearing structural elements of public buildings; operational problems of modern public buildings and structures.

Be able:

design volume-planning solutions for public buildings and structures;
use bibliographic, regulatory and other sources of technical information when designing technical solutions for public buildings and structures;
estimate project decisions depending on climatic conditions, functional, constructive, social and other requirements;
perform architectural and construction drawings in accordance with the basic requirements and rules of project documentation.



Topic 1. Basics of designing public buildings and structures

Automated design of public buildings and structures. The concept of information modeling. BIM in the construction complex of Ukraine. Classification of public buildings. Functional processes in public buildings and structures and functional interconnection of premises. Sanitary requirements for the location. Dimensions of premises and technical and economic indicators of public buildings and structures. Cross-section design showing the stairwell of a panel-type building.

Topic 2. Volume-planning and structural solutions of public buildings

The main structural elements of buildings. The load-bearing skeleton and structural systems. Frame and panel structures of public buildings. Features of monolithic buildings design. Design of architectural and constructive nodes.

Topic 3. Features of the formation of architectural solutions for facades. Large span coverings of public buildings

Flat constructions of roofs. Spatial structures of roofs. Classification of spatial constructions of roofs. Architectural and constructive solutions of external entrances. Design of the facade system of a public building.

Topic 4. Communication links of public buildings and structures

Horizontal and vertical communications of public buildings. Elements of engineering equipment of buildings.

Topic 5. Fire prevention measures and safety of public buildings operation

Fire safety and evacuation of people from buildings. Fire-technical classification of materials and structures of public buildings and structures. Fire walls and restrictions on the spread of fire. Accessibility of public buildings and facilities for people with limited mobility.



2.3. Thematic plan

№	Topic	Academic hours							
		Full-time study				Part-time study			
		Total	Lectures	Labs	Self-study	Total	Lectures	Labs	Self-study
1	2	3	4	5	6	7	8	9	10
Module №1 «Design of multistoried residential buildings»									
1.1	Introduction. Basics of designing multistoried residential buildings	6 Semester				6 Semester			
		6	2	-	4	-	-	-	-
1.2	Laboratory class 1. Processing of initial data for design. Determination of the class of consequences (responsibility) for a multistoried residential building	4	-	2	2	-	-	-	-
1.3	Laboratory class 2. Selection and estimation of architectural solutions of the construction object	4	-	2	2	-	-	-	-
1.4	The living environment as a design object	6	2	-	4	-	-	-	-
1.5	Laboratory class 3. Volume-planning structure of the main types of multi-apartment residential buildings	4	-	2	2	-	-	-	-
1.6	Laboratory class 4. Designing a typical floor plan of a panel-type residential building	4	-	2	2	7 Semester			
		-	-	-	-	-	-	-	-
1.7	Foundations of multistoried residential buildings	6	2	-	4	-	-	-	-
1.8	Laboratory class 5. Designs of prefabricated foundations of multistoried residential buildings	4	-	2	2	-	-	-	-
1.9	Laboratory class 6. Designing the foundation plan of a panel-type residential building	4	-	2	2	-	-	-	-
1.10	Floors and floor coverings of multistoried residential buildings. Engineering equipment of multistoried buildings	6	2	-	4	-	-	-	-
1.11	Laboratory class 7. Structures of the intermediate floor of multistoried residential buildings	4	-	2	2	-	-	-	-
1.12	Laboratory class 8. Design of the floor plan of a panel-type residential building	2	-	2	2	-	-	-	-
1.13	Structural solutions of the roofs of multistoried residential buildings. Buildings erected by the method of lifting floors and using the CUBE	6	2	-	4	-	-	-	-
1.14	Laboratory class 9. Selection of a structural solution of reinforced concrete attic roofs. Design plan of the roof	4	-	2	2	-	-	-	-
1.15	Module test №1	4	-	2	2	-	-	-	-
Total for Module №1		70	10	20	40	-	-	-	-
Module №2 «Design of public buildings»									
2.1	Basics of designing public buildings and structures	6	2	-	4	-	-	-	-
2.2	Laboratory class 10. Peculiarities of designing public buildings and structures.	4	-	2	2	-	-	-	-
2.3	Laboratory class 11. Design of a cross-section through a stairwell of a panel-type building.	4	-	2	2	-	-	-	-



2.4	Volume-planning and structural solutions of public buildings	6	2	-	4	-	-	-	-
2.5	Laboratory class 12. Frame-panel structures of public buildings	4		2	2	-	-	-	-
2.6	Laboratory class 13. Design of architectural and structural nodes	4	-	2	2	-	-	-	-
2.7	Features of the formation of architectural solutions for facades.	6	2	-	4	-	-	-	-
2.8	Laboratory class 14. Architectural and structural solutions of external entrances.	4		2	2	-	-	-	-
2.9	Laboratory class 15. Design of the facade system of a public building.	4	-	2	2	-	-	-	-
2.10	Fire prevention measures and safety of public buildings operation	3	1	-	2	-	-	-	-
2.11	Control (home) work (part-time study)	-	-	-	-	-	-	-	-
2.12	Module test №2	5	-	2	3	-	-	-	-
2.13	Final semester test (PTS)	-	-	-	-	-	-	-	-
Total for Module №2		50	7	14	29	-	-	-	-
Total for Academic Discipline		120	17	34	69	-	-	-	-

2.4. Task for control (home) work

Control (homework) in the discipline is performed in the second semester, in accordance with the approved methodological recommendations, in order to consolidate and deepen the theoretical knowledge and skills of the student in the study of the discipline. The task for the practical part of the control (home) task is carried out by the student individually in accordance with the guidelines.

The time required to complete homework is 8 hours of independent work.

2.5. List of questions for Graded Test and final test (PTS)

The list of questions and the tasks to prepare for the Graded Test are developed by the teacher of the department in accordance with the work program and communicated to the students.

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, demonstrations, independent work, work with educational literature, solving problems in civil engineering.

3.2. Recommended literature

Basic literature

3.2.1 Гетун Г. Конструкції будівель і споруд. Книга 1 / Г. Гетун, В. Плоский, П. Куліков. – К.: Ліра-К, 2021. – 880 с.

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3.2.2. Архітектура будівель і споруд. Книга 4. Технічна експлуатація та реконструкція будівель: підручник-довідник / В.О. Плоский та ін. – Кам'янець-подільський: Рута, 2018. – 750 с.

3.2.3 Бойко Х. Типи будинків та архітектурні конструкції / Х. Бойко. – Львів: Львівська політехніка, 2022. – 224 с.

3.2.4. Плоский В.О. Архітектура будівель та споруд. Книга 2. Житлові будинки : Підручник / А.О. Плоский, Г.В. Гетун. – Кам'янець-Подільський : Рута, 2017. – 736 с.

3.2.5. Колякова В.М. Будівельні конструкції (ЗБК): конспект лекцій / В.М. Колякова. – К.: Ліра-К, 2021. – 146 с.

3.2.6. Плоский В.О. Енергоефективний панельний житловий будинок. Архітектура будівель та споруд / В.О. Плоский, Г.В. Гетун, М.В. Тимофєєв, В.І. Запривода – К.: Ліра-К, 2020. – 190 с.

3.2.7. Сєдак О. І. Екологічні засади формування архітектури будівель громадського призначення. Навчальний посібник / О. І. Сєдак, О. Ю. Запорожченко - К.: Каравела, 2021 – 183 с.

3.2.8 ДБН В.2.2-9:2018 Будинки і споруди. Громадські будинки та споруди. – К.: Укрндпцівільбуд, 2018. – 47 с. – Чинний від 01.06.2019.

3.2.9 ДБН В.2.2-15:2019. Будинки і споруди. Житлові будинки. Основні положення. – К.: Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України, 2019. – 42 с. – Чинний від 01.12.2019

Additional literature

3.2.10 Основні вимоги до проектної та робочої документації. Система проектної документації для будівництва : ДСТУ Б А.2.4-4:2009. – [Чинний від 2009-24-01]. – К. : Мінрегіонбуд України, 2009. – 47 с.

3.2.11 Правила виконання архітектурно-будівельних робочих креслень. Система проектної документації для будівництва : ДСТУ Б А.2.4-7:2009. – [Чинний від 2009-24-01]. – К. : Мінрегіонбуд України, 2009. – 71 с.

3.2.12 Модульна координація розмірів у будівництві. Загальні положення : ДСТУ Б.В.1.3-3:2011. – [Чинний від 2012-30-12]. – К. : Мінрегіонбуд України, 2012. – 16 с.

3.3. Internet information resources

3.3.1 Кафедра комп'ютерних технологій будівництва та реконструкції аеропортів // Репозиторій Національного авіаційного університету : веб-сайт. URL: <https://er.nau.edu.ua/handle/NAU/9121>

3.3.2 Науково-технічна бібліотека НАУ // Науково-технічна бібліотека НАУ: веб-сайт. URL: <http://www.lib.nau.edu.ua/main/3.3.2>
<https://www.minregion.gov.ua/about/>

3.3.3 Репозиторій Національного Авіаційного Університету // Репозиторій Національного Авіаційного Університету : веб-сайт. URL: <https://er.nau.edu.ua/>

3.3.4. Державна наукова архітектурно-будівельна бібліотека імені В. Г. Заболотного // Державна наукова архітектурно-будівельна бібліотека імені В. Г. Заболотного : веб-сайт. URL: <http://www.dnabb.org/>

3.3.5. Національна бібліотека України імені В. І. Вернадського // Національна бібліотека України імені В. І. Вернадського : веб-сайт. URL: <http://www.nbuv.gov.ua/>

3.3.6 Міністерство розвитку громад та територій України // Офіційний веб-сайт Міністерства <https://www.minregion.gov.ua/about/>

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	
	Full-time study	Part-time study
Module №1 «Design of multistoried residential buildings»		
	6 Semester	-
Carrying out and defending the task of the laboratory classes	40	-
<i>For carrying out a module test 1 a student must receive not less than</i>	25	-
Carrying out a module test №1	15	-
Module №2 «Design of public buildings»		
Carrying out and defending the task of the laboratory classes	30	-
<i>For carrying out a module test 2 a student must receive not less than</i>	18	-
Carrying out a module test №2	15	-
Carrying out the control (home) work		-
<i>Final semester test</i>		-
Total for modules №1, №2	100	-
Total for academic discipline	100	

A Semester Grade is determined (in points and in the National Scale) as a result of performing all kinds of educational work during the semester.

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 Semester Module Grade is calculated as the sum of the Total Module Grades.

4.4. The Semester Module Grade and the Graded Test 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 written into a student's record book, for example: **92/Ex/A, 87/Good/B, 79/Good/C, 68/Sat/D, 65/Sat./E**, etc.

4.6. The Total Semester Grade of the subject is determined as the arithmetic average grade of the total semester grades in points (for the second semester for this subject) with its further transfer into the National Scale and ECTS Scale. The indicated Total Semester Grade of the subject is entered in 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 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				