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
"BIM-management"

Educational-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 credits))	Lec.	Prac.	Lab.	Self-study	Homeworks control works	CP/ TP	Form of control
Full-time	4	120/4	17	-	34	69	-	-	Graded Test 4th semester
Part-time	-	-	-	-	-	-	-	-	-

Index: ECB-5-192-1/22-3.4

QMS NAU CTP 10.01.04-01-2022

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

Developed by:

Associate professor of the Computer Technologies
of Airport Construction and
Reconstruction Department Oleksandr RODCHENKO

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.

Guarantor of the Educational and
Professional Program _____ Nataliia KOSTYRA

Head of the Department _____ Oleksandr LAPENKO

Vice Rector on International Collaboration and Education

_____ Iryna ZARUBINSKA

«27» 10 2022

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INTRODUCTION

The Course Training Program of the academic discipline "BIM-management " 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 is the theoretical and practical basis of the set of knowledge and skills that form the profile of a specialist in building information modelling.

The goal of the academic discipline is the study of building information modelling.

The objectives of the academic discipline is the study of the possibilities of BIM technology, its goals and objectives; tools for creating a BIM model; the structure of the BIM team and the job duties of its members.

1.2. Educational outcomes of the academic discipline.

PLO6 – Apply modern information technologies to solve engineering and management problems of construction and civil engineering.

1.3. Competencies obtained through the academic discipline.

Ability to solve complex specialized building and civil engineering problems.

GC5 – Ability to use information and communication technologies.

1.4. Interdisciplinary links.

This discipline is based on knowledge of such disciplines as «Informatics (General Course)», «Higher Mathematics», and is the basis for studying the following disciplines: «Constructions of Buildings and Structures», «Fundamentals of Computer Modeling», «Reinforced concrete and stone structures».

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 one educational module, namely:

educational module 1 "BIM-management", which is 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 «BIM-management»

Integrated requirements for module 1:

To know:

− possibilities of BIM technology, its goals and objectives;
− tools for creating a BIM model;
− main functions of the information modeling process;
− basic principles of negotiations;
− conflict management methods in the organization;
− the composition of the BIM team and the job duties of its members.

Be able to:

− create building information model in Graphisoft Archicad;
− create objects in Graphisoft Archicad.

Topic 1. BIM — Building Information Modelling.

"BIM" definition. "BIM model". Advantages of BIM technology. The concept of BIM. Possibilities of BIM-technology, its goals and objectives.

Topic 2. Organizational and methodological principles of development of a building project based on BIM-technology.

BIM as tool. The BIM implementation methodology. Business analysis. Requirements for the adoption of the BIM. Implementation planning. Assessment and monitoring of the BIM. Tools for BIM model. Graphisoft Archicad. Autodesk Revit.

Topic 3. Fundamentals of BIM-model Creation.

BIM and ISO 19650. BIM Execution Plan (BEP). BIM-technologies. Preparation and creation of a project model. General procedure for using model creation tools. Methods of model elements creation. The concept of LOD (level of detail).

Topic 4. Roles and Duties in the Process of Building Information Modelling.

The structure of the BIM team and the duties of its members. Roles of BIM personnel. Visual programming language PARAM-O for Archicad. Dynamo for Revit. Visual Programming in Dynamo. Five ways from incorporating Dynamo into engineer daily workflow: automate repetitive tasks, access building data, explore multiple design options, test perfomance, increase perfomance.

Topic 5. Groups and Teams in Organization.

Groups in organization. Формальні групи в організації. Неформальні групи в організації. Group efficiency. Teams. Autodesk Navisworks Manage and its features. Clash Detective tool Navisworks. Autodesk Navisworks Simulate and its features. Clash Detective tool in Archicad.

Topic 6. Conflict Management.

The concept of conflict. The main causes of conflicts in organizations. Types of conflicts in organizations. A model of the conflict process. Conflict management methods in the organization.

Topic 7. Negotiations, Official Meetings in the Activities of the BIM-manager.

Basic principles of negotiations. Criteria for the effectiveness of negotiations. Types of business meetings. Behavior of managers and meeting participants. Peculiarities of preparing and conducting business meetings.

Topic 8. Solution of strategic issues when implementing BIM-technologies in the organization.

Selection of design technologies and methods. The strategy of improving the qualifications of employees. Recruitment strategy. Employee retention strategy. Study and analysis of new technological solutions. Development of a strategy for the development and restructuring of processes within the company.

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
Module №1 «BIM-management»									
1.1	BIM — Building Information Modelling	**4 semester**				-			
		9	2	-	7	-	-	-	-
1.2	Modelling of Basic Construction Elements of the Ground Floor	4	-	2	2	-	-	-	-
1.3	Pile Cap Modelling (Part 1)	4	-	2	2	-	-	-	-
1.4	Organizational and methodological principles of development of a building project based on BIM-technology	9	2	-	7	-	-	-	-
1.5	Pile Cap Modelling (Part 2)	4	-	2	2	-	-	-	-
1.6	Multilayer Wall Modelling	4	-	2	2	-			
						-	-	-	-
1.7	Fundamentals of BIM-model Creation	4	2	-	2	-	-	-	-
1.8	Doors, Windows and Elevator Modelling	4	-	2	2	-	-	-	-
1.9	Partitions, Ventilation Shafts Modelling	4	-	2	2	-	-	-	-
1.10	Roles and Duties in the Process of Building Information Modelling	4	2	-	2	-	-	-	-
1.11	Slab Modelling	4	-	2	2	-	-	-	-
1.12	Stair Modelling and Doors Creation in the Partition Walls	4	-	2	2	-	-	-	-
1.13	Groups and Teams in Organization	5	2	-	3	-	-	-	-

1	2	3	4	5	6	7	8	9	10
1.14	Creating Zones and Objects in Archicad	4	-	2	2	-	-	-	-
1.15	Flat Roof Modelling in Graphisoft Archicad	4	-	2	2	-	-	-	-
1.16	Conflict Management	6	2	-	4	-	-	-	-
1.17	Completion of Building Modelling	4	-	2	2	-	-	-	-
1.18	Modelling the Terrain in Graphisoft Archicad	4	-	2	2	-	-	-	-
1.19	Negotiations, Official Meetings in the Activities of the BIM-manager	6	2	-	4	-	-	-	-
1.20	Project Documentation	4	-	2	2	-	-	-	-
1.21	Integrated Structural Design in Graphisoft Archicad	4	-	2	2	-	-	-	-
1.22	Solution of strategic issues when implementing BIM-technologies in the organization	6	2	-	4	-	-	-	-
1.23	Publishing Process in Graphisoft Archicad	4	-	2	2	-	-	-	-
1.24	Roads Pavement Modelling in Archicad	4	-	2	2	-	-	-	-
1.25	Modelling of Industrial Building Structures in Graphisoft Archicad	4	-	2	2	-	-	-	-
1.26	Module Test №1	3	1	-	2	-	-	-	-
Total for Module №1		120	17	34	69	-	-	-	-
Total For Academic Discipline		120	17	34	69	-	-	-	-

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, tasks in AutoCAD.

3.2. Recommended literature

Basic literature

3.2.1. ДСТУ ISO 19650-1:2020 Організація та оцифрування інформації щодо будівель та споруд включно з будівельним інформаційним моделюванням (BIM). Управління інформацією з використанням будівельного інформаційного моделювання. Частина 1. Концепції та принципи (ISO 19650-1:2018, IDT).

3.2.2. Левченко, О., & Михайленко,. А. (2022). BIM-технології в закладах вищої освіти рівня підготовки бакалавр та магістр. Сучасні проблеми Архітектури та Містобудування, (62), 152–170. https://doi.org/10.32347/2077-3455.2022.62.152-170

3.2.3. Посібник з впровадження інформаційного моделювання в будівництві, створений Європейським державним сектором. Стратегічні дії щодо роботи

будівельного сектору: рушійна цінність, інновації та зростання. – К. : UABIM TaskGroup, 2017. – 84 с.

3.2.4. Родченко В. В. Менеджмент / В. В. Родченко, В. А. Новак. – К. : НАУ, 2002. – 400 с.

Additional literature

3.2.5. Основи комп'ютерного моделювання: навч. посібник / М.С. Барабаш, П.М. Кір'язєв, О.І. Лапенко, М.А. Ромашкіна. 2-е вид. стер. – К. : НАУ, 2019. – 492 с.

3.3. Internet information resources

3.3.1. http://er.nau.edu.ua/handle/NAU/24905
3.3.2. http://www.lib.nau.edu.ua/main/
3.3.3. Методичні розробки кафедри (в електронному вигляді).
3.3.4. https://learn.graphisoft.com/?from_logout=true
3.3.5. https://www.youtube.com/watch?v=9U61mMOMjUk
3.3.6. https://www.youtube.com/user/Archicad

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 Tables.4.1.

Table 4.1

Kind of Academic Activities	Maximum Grade	
	Full-time study	Part-time study
	4 semester	-
Module №1 «BIM-management»		
Laboratory classes	70	-
For carrying out a module test a student must receive not less than	*42*	-
Carrying out a module test №1	30	–
Total for module 1	**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 fourth 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 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

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

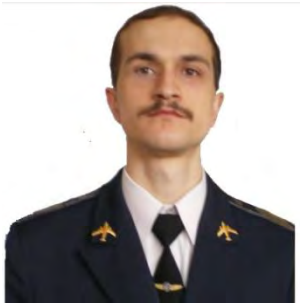
(Ф 03.02 – 32)

УЗГОДЖЕННЯ ЗМІН

	Підпис	Ініціали, прізвище	Посада	Дата
Розробник				
Узгоджено				
Узгоджено				
Узгоджено				

Syllabus of the academic discipline
«BIM-MANAGEMENT»
Educational and professional program:
«Industrial and Civil Engineering»,
Field of study: 19 «Architecture and Construction»
Specialty: 192 «Building and Civil Engineering»

Level of higher education	First (Bachelor)
Discipline status	Academic discipline of the selective component
Course	2
Semester	4
ECTS credits / hours	4,0 / 120
Language of training	English
What will be studied (subject of study)	Building information modelling.
Why is it interesting / necessary to study (goal)	**The goal** of the academic discipline is the study of building information modelling.
Why can you learn (learning outcomes)	Ability to create building information model.
How to use the acquired knowledge and skills (competencies)	The acquired knowledge and skills can be used during the completion of the bachelor thesis.
Educational logistics	**Content of the discipline:** BIM — Building Information Modelling. The concept of BIM. Possibilities of BIM-technology, its goals and objectives. BIM Execution Plan (BEP). Revit. Solution of strategic issues when implementing BIM-technologies in the organization **Classroom sessions:** lectures, laboratory classes. **Teaching methods:** discussion, online. **Form of training:** full-part.
Prerequisites	Knowledge of engineering graphics and infromatics.
Porekvizyty	The acquired knowledge and skills of building information modelling are the basis for studying the following disciplines: «Constructions of Buildings and Structures», «Fundamentals of Computer Modeling», «Reinforced Concrete and Stone Structures».
Information support from the repository and fund of NTL NAU	1. Інформатика. Інформаційні технології в будівництві. Системи автоматизованого проектування [Текст] : підручник для студ. вищих навч. закладів / В. А. Баженов [и др.]. - К. : Каравела, 2004. - 356 с.: рис. - (Серія "Вища освіта в Україні"). - Бібліогр.: с. 356. 2. Проектний менеджмент: просто про складне: навчальний посібник / В. А. Верба [та ін.] / МОН України, Київський національний економічний університет ім. Вадима Гетьмана. – К. : КНЕУ, 2009. – 304 с.
Location and logistics	Computer classroom, projection equipment
Semester control, examination methods	tests, module test
Department	Computer technologies of airport construction and reconstruction
Faculty	Archictecture, civil engineering and design

Professor		**RODCHENKO OLEKSANDR** **Position:** Associate Professor **Scientific degree:** Candidate of Sciences **Academic title:** Associate Professor **Profile:** https://rodchenko-edu.wixsite.com/about **tel.:** 406-74-25 **E-mail:** oleksandr.rodchenko@npp.nau.edu.ua **Room:** 5.510
Originality of academic discipline	Author's course	
Link to discipline		