

NATIONAL AVIATION UNIVERSITY  
**Educational and Research Institute of Airports**  
Computer Technologies of Design and Graphics Department

AGREED

Director of the Educational and  
Research Institute of Information  
and Diagnostic Systems

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« \_\_\_ » \_\_\_\_\_ 2016.

APPROVED

Vice-Rector for Academics  
and Educative Activity

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« \_\_\_ » \_\_\_\_\_ 2016.



**Quality Management System**


**COURSE TRAINING PROGRAM**  
on  
**«Engineering Graphics»**

Field of Study: 15 «Automation and Instrumentation»  
Speciality: 151 «Automation and Computer-integrated Technologies»  
Specializations: «Computer-integrated technological processes of production»

Year of Study – 1<sup>st</sup> Semester – 1<sup>st</sup>

Lectures	-17	
Practicals	- 34	Graded Test – 1 <sup>st</sup> semester
Self-study	- 54	
Total (hours/ECTS credits)	- 105/3,5	
Computing and Schematic Paper (1)	- 1 <sup>st</sup> semester	

Index ECB-14-151/16-2.1.4

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The Course Training Program on «Engineering Graphics» is based on the Bachelor Extended Curriculum № ECB-14-151/16 for Speciality 151 «Automation and Computer-integrated Technologies» and Specializations: «Computer-integrated technological processes of production Syllabus for this Subject, Index CB -14-151/16-2.1.4, approved by the Rector «\_\_» \_\_\_\_\_ 2016 and correspondent normative documents.

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## 1.INTRODUCTION

The Course Training Program on «Engineering Graphics» is developed on the basis of Bachelor Extended Curriculum and “Methodical instructions for development and issuance of syllabus and course training programs of the subjects” enacted by order as of 16.06.2015 №37/поз.


Rating system assessment (RSA) is an integral part of Course Training Program and involves determining the quality of a student performed all kinds of classroom and self- study of work and acquired his knowledge and skills through assessment in scores results of this work in the current, modular and semester control followed by multi-transfer assessment scale to according the national scale and scale ECTS.

RSA provides use of modular Grades (Current, Control, Total) as well as Examination or a Graded Test, the Total Semester and Total Grades.

## 2. SUBJECT CONTENT

### 2.1. Training schedule of the subject

№.	Topic	Academic Hours			
		All	Lectures	Practicals	Self-study
1	2	3	4	5	6
<b>1 Semester</b>					
<b>Module №1 «Projection basics of imaging»</b>					
1.1	Introduction. Fundamentals of geometric modeling. Orthogonal projections of point, line, plane.	8	2	2	4
1.2	Basic rules of design documentation. Projection bases of images: views.	6	2	2	2
1.3	Projection bases of images: sections, cross sections.	4	-	2	2
1.4	Graphic editor AutoCAD. Algorithms for constructing geometric primitives among graphic editor AutoCAD	7	2	2	3
1.5	Graphic editor AutoCAD. Packets of interactive graphics applications AutoCAD. Teams of editing drafts.	5	-	2	3
1.6	Computing and Schematic Paper (part 1)	4	-	-	4
1.7	Module test №1	3	-	2	1
<b>Total for the module №1</b>		<b>37</b>	<b>6</b>	<b>12</b>	<b>19</b>
<b>Module №2 «Development a working design documentation»</b>					
2.1	Working drawings of parts.	7	2	2	3
2.2	Features drawings of parts of the "body"	6		2	4
2.4	Types of connections of parts of the product. Their images and symbols	6	2	2	2
2.5	Detail drawings of connections with standard fasteners with thread	4		2	2
2.6	Drawings of non-detachable connections.	4		2	2
2.7	Drawings detailing the general form of drafting unit	8	3	2	3

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2.8	Design drawings for detail drawings of general view	5		2	3
2.9	Rules of execution of drawings of printed circuit board	8	2	2	4
2.10	The basic rules of graphic design of electrical circuits	7	2	2	3
2.11	Development of principal electrical circuit	4		2	2
2.12	Computing and Schematic Paper (part №2)	6			6
2.13	Module test №2	3		2	1
<b>Total for the module №2</b>		<b>68</b>	<b>11</b>	<b>22</b>	<b>35</b>
<b>Total for the 1<sup>st</sup> semester</b>		<b>105</b>	<b>17</b>	<b>34</b>	<b>54</b>
<b>Total for the discipline</b>		<b>105</b>	<b>17</b>	<b>34</b>	<b>54</b>

### 2.1.1. Computing and Schematic Paper

Computing and Schematic Paper (CSP) is executed in the first semester, in accordance with the ratified methodical recommendations with the purpose of fixing and deepening of theoretical knowledge and abilities of students and is the important stage in mastering of educational material.

Computing and Schematic Paper is executed on the base of educational material given to Self-study students and is a component of the module №1 «Projection basics of imaging» (part №1) and module №2 «Development a working design documentation» (part №2). The purpose of Computing and Schematic Paper is self-fixing of theoretical knowledge of engineering graphics and receiving skills to develop a working design documentation for details and assembly units as using the drawing tools and the environment in the graphic editor AutoCAD.

Implementation, registration and defense of CSP is carried out by a student in an individual order in accordance with methodical recommendations.

The time required for implementation each of CSP - up to 10 hours of Self- study

## 3. BASIC CONCEPTS OF GUIDANCE ON THE SUBJECT

### 3.1. List of references

#### Basic literature

- 3.1.1. *Михайленко В.Є.* Інженерна та комп'ютерна графіка: підручник / В.Є. Михайленко, В. М. Найдиш, А. М. Підкоритов, І. В. Скидан; за ред. В.Є. Михайленка. – К.: Вища шк. 2004. – 342с.
- 3.1.2. *Ванін В.В.* Оформлення конструкторської документації: навч. посіб. 4-те вид., випр. і доп. / В. В. Ванін, А. В. Блюк, Г. О. Гнітецька. – К.: Каравела, 2012. – 200 с.
- 3.1.3. *Макаренко М.Г.* Інженерна графіка: посібник / М.Г. Макаренко. – К.: НАУ. 2014. – 180 с.
- 3.1.4. *Макаренко М.Г.*:Комп'ютерна графіка: практикум / М.Г. Макаренко. – К.: НАУ. 2013. – 76 с.
- 3.1.5. *Макаренко М.Г.* Вправи до практичних занять та самостійної роботи з інженерної графіки. / М.Г. Макаренко, В.І. Макаров, М.В. Терехова – К.: Книжкове вид-во НАУ, 2010, – 72 с.
- 3.1.6. ЕСКД. Основные положения (с изменениями) —М.: Издательство стандартов, 1975. – 350 с.
- 3.1.7. ЕСКД. Общие правила выполнения чертежей (с изменениями) —М.: Издательство стандартов, –М.: 1991. – 236 с.

3.1.8. ЕСКД. Правила выполнения чертежей различных изделий (с изменениями), –М.: Издательство стандартов, 1982. – 223 с.

3.1.9. ЕСКД. Правила выполнения схем. – М.: Изд-во стандартов, 1987. – 135 с.

#### Additional literature

3.1.10. *Богданов В. М.* Інженерна графіка: довідник / В. М. Богданов, А. П. Верхола, Б. Д. Коваленко та ін.; за ред. А. П. Верхоли. – К.: Техніка, 2001. – 268 с.

3.1.11. *Макаров В.І.* Нарисна геометрія. Інженерна та комп'ютерна графіка: навч. посіб. / В.І. Макаров, В.Г. Шевченко, М.Г. Макаренко та ін. – К.: Книжкове вид-во НАУ, 2006, – 259 с.

3.1.12. *Ковальов Ю.М.* Прикладна геометрія: підручник / Ю. М. Ковальов, В.М. Верещага. – К.: ДІА, 2012. – 472 с.

### 3.2. List of basic guidance materials for the subject

№	Name	Index of Topics where Guides are Used	Amount
1.	Multimedia course	1.1 -1.3, 2.1 - 2.5	Electronic version
2.	Practicum for Laboratory Classes	1.3, 2.1	Edition 100 copies and electronic versions
3.	Manual	1.1 -1.3, 2.1 - 2.5	Edition 100 copies and electronic versions

## 4. RATING SYSTEM OF KNOWLEDGE AND SKILLS ASSESSMENT

4.1. Grading of different kinds of academic work performed by a student is done in accordance with Table 4.1.

Table 4.1

1 semester				
Module №1		Module №2		Max Grade
Kind of Academic Activities	Max Grade	Kind of Academic Activities	Max Grade	
Performance and deference of Practicals №1.1 - 1.5	15 (summarily)	Performance and deference of Practicals №2.1 - 2.10	30 (summarily)	
Performance and deference of CSP (part№1)	6	Performance and deference of CSP (part №2)	7	
<i>For carrying out module test №1, a student must receive not less than 13 values</i>		<i>For carrying out module test №2, a student must receive not less than 28 values</i>		
Carrying out Module Test №1	15	Carrying out Module Test №2	15	
<b>Total for module №1</b>	<b>36</b>	<b>Total for module №2</b>	<b>52</b>	
<b>Semester Graded Test</b>				<b>12</b>
<b>Total 1<sup>st</sup> Semester Grade</b>				<b>100</b>

4.2. The completed curricular activity is accounted if the student received a positive mark ( Table 4.2).



4.3. The grades a student has been given for the different kinds of academic work are summed up and the result constituting a Current Module Grade is entered into the Module Grade Register.

Table 4.2

Correspondence between the Grades and the National Scale

Grades					National scale
Performance and deference of Practicals		Performance and deference of CSP		Carrying out Module Test	
		Part №1	Part №2		
13 - 15	27 - 30	6	7	14 - 15	Excellent
11 - 12	23 - 26	5	6	11 -13	Good
9 - 10	18 - 22	4	4-5	9 -10	Satisfactory
under 9	under 18	under 4	under 4	under 9	Bad

4.4. The Current Module Grade and the Module Test Grade together make up a Total Module Grade(Table 4.3), whose correspondence to the National Scale is entered into the Module Grade Register.

Table 4.2

Correspondence between the Total Module Grades and the National Scale

Module №1	Module №2	National Scale
32 36	47 - 52	Excellent
27 - 31	39 - 46	Good
22 - 26	31 - 38	Satisfactory
under 22	under 31	Bad

4.5. 4.5. The Semester Module Grade is calculated as the sum of the Total Module Grades. The correspondence between Semester Module Grade values and the National Scale is given in Table 4.4.

Table 4.4

Table 4.5

Correspondence between the Semester Module Grades and the National Scale

Correspondence between the Graded Test Grades and the National Scale

Grades	National Scale
79-88	Excellent
66-78	Good
53-65	Satisfactory
under 53	Bad

National Scale	
Graded Test	
12	Excellent
10	Good
8	Satisfactory
-	-

4.6. The Semester Module Grade and the Graded Test Grade together make up a Total Semester Grade whose correspondence to the National Scale and the ECTS Scale is shown in Table 4.6.

Table 4.6

Correspondence of the Total Semester Grades to the National Scale and the ECTS System

Total Semester Grades	National Scale	ECTS System	
		ECTS Grade	Explanation
<b>90-100</b>	<b>Excellent</b>	<b>A</b>	<b>Excellent</b> (excellent performance with insignificant shortcomings)
<b>82 – 89</b>	<b>Good</b>	<b>B</b>	<b>Very Good</b> (performance above the average standard with few mistakes)
<b>75 – 81</b>		<b>C</b>	<b>Good</b> (good performance altogether with a certain number of significant mistakes)
<b>67 – 74</b>	<b>Satisfactory</b>	<b>D</b>	<b>Satisfactory</b> (performance meets the average standards)
<b>60 – 66</b>		<b>E</b>	<b>Sufficient</b> (performance meets the minimal criteria)
<b>35 – 59</b>	<b>Bad</b>	<b>FX</b>	<b>Bad</b> (bad performance; a second testing is required)
<b>1 – 34</b>		<b>F</b>	<b>Bad</b> (very bad performance; a student shall retake the course)

4.7. The Total Semester Grade is entered into the Examination Register, educational card and into a student's record book in according to National Scale and ECTS Scale.

4.8. The Total Semester Grade is entered into a student's record book and educational card, for example: **92/Ex/A**, **87/Good/B**, **79/Good/C**, **68/Sat/D**, **65/Sat/E**, etc.

4.9. The Total Grade of the discipline, that is taught during the one semester, is equal to the Total Semester Grade.

The Total Grade of the discipline is entered to the Appendix of Diploma.







(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	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				