

NATIONAL AVIATION UNIVERSITY

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

AGREED

Director of the Educational and  
Research Aerospace Institute

\_\_\_\_\_ V. Shmarov  
« \_\_\_ » \_\_\_\_\_ 2017.

APPROVED

Vice-Rector for Academics  
and Educative Activity

\_\_\_\_\_ T.Ivanova  
« \_\_\_ » \_\_\_\_\_ 2017.



Quality Management System

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


Field of Study: 14 «Electrical Engineering»  
Speciality: 142 «Power Machinery»  
Specializations: «Gas Turbine Plants and Compressor Stations»

Year of Study – 2<sup>nd</sup>

Semester – 3<sup>d</sup>, 4<sup>th</sup>

Lectures	- 34	Examination	- 4 <sup>th</sup> semester
Practicals	- 34	Graded Test	- 3 <sup>d</sup> semester
Laboratory Classes	- 34		
Self-study	- 108		
Total (hours/ECTS credits)	- 210/7,0		
Homework (1)	- 3 <sup>d</sup> semester		

Index ECB-1-142/16-2.1.9

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The Course Training Program on «Engineering and Computer Graphics» is based on the Bachelor Extended Curriculum № ECB-1-142/16 for Speciality 142 " Power Machinery " and Specializations: «Gas Turbine Plants and Compressor Stations», Syllabus for this Subject, Index CB-1-142/16-2.1.9, approved by the Rector «\_\_» \_\_\_\_\_ 2016 and correspondent normative documents.

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Discussed and approved by the Graduate Department for the Speciality 142 "Power  
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## 1. INTRODUCTION

The Course Training Program on «Engineering and Computer 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, final) 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	Laboratory classes	Self-study
1	2	3	4	5	6	7
<b>3 Semester</b>						
<b>Module №1 «Projection bases of images»</b>						
1.1	Introduction. Types of products. Types and completeness of design documentation. Basic rules of forming of the drawings using the standards of ЄСКД.	6	-	2	-	4
1.2	Projection bases of images. Construction of views.	4	-	2	-	2
1.3	Projection bases of images. Construction of simple and complex cuts and sections.	6		2	-	4
1.4	Main rules of drawing dimensions on drawings Conventions and simplification of the images.	4		2	-	2
1.5	Homework (part №1)	4	-	-	-	4
1.6	Module test №1	4	-	2	-	2
<b>Total for the module №1</b>		<b>28</b>	<b>-</b>	<b>10</b>	<b>-</b>	<b>18</b>
<b>Module №2 " Development a working design documentation "</b>						
2.1	Working drawings of parts with model natyry. Information model of detail.	4	-	2	-	2
2.2	Features of execution drawings of details of the "shaft".	6	-	2	-	4
2.3	Features of execution drawings of details of the "gear wheel"	6	-	2	-	4
2.4	Features of execution drawings of details of the "body"	6	-	2	-	4
2.5	Drawings of detail using the standards of 4 ЄСКД.	4	-	2	-	2



2.6	Types of connections of parts of the product. Their images and symbols.	4	-	2	-	2
2.7	Drawings threaded connections standard parts fasteners with thread.	6	-	2	-	4
2.8	Drawings aviation connections on pipelines cone.	6	-	2	-	4
2.9	Drawings of non-detachable connections	4	-	2	-	2
2.10	Schemes. Types of schemes. General requirements for the implementation of schemes	4		2		2
2.11	Development of principal hydraulic circuit.	4		2		2
2.12	Homework (part №2)	4	-	-	-	4
2.13	Module test №2	4	-	2	-	2
	<b>Total for the module №2</b>	<b>62</b>	-	<b>24</b>	-	<b>38</b>
	<b>Total for the 3<sup>d</sup> semester</b>	<b>90</b>	-	<b>34</b>	-	<b>56</b>
<b>4 Semester</b>						
<b>Module №3 " Graphic editor AutoCAD. Development of design documentation "</b>						
3.1	Graphic editor AutoCAD. Entering commands, operations with file of drawings. Construction of graphic primitives in a graphics editor AutoCAD	6	2	-	2	2
3.2	Commands of common editing of drawings in AutoCAD graphics editor	6	2	-	2	2
3.3	Algorithms of implementation detail drawings of the "Shaft" among graphic editor AutoCAD.	8	2	-	2	4
3.4	Algorithms of implementation detail drawings of the "Body" among graphic editor AutoCAD.	8	2	-	2	4
3.5	Choosing the optimal option of commands building of cuts and sections in the performance drawings parts of the "shaft", "body" in an environment AutoCAD.	6	2	-	2	2
3.6	Execution drawings of parts assembly unit among the graphic editor AutoCAD.	8	2	-	2	4
3.7	Execution drawings of assembly unit among the graphic editor AutoCAD	8	2	-	2	4
3.8	Execution of assembly drawings image assembly unit among the graphic editor AutoCAD.	8	2	-	2	4
3.9	Development of the explanatory note to the assembly drawings among text editor Word	6	2	-	2	2
3.10	Reading drawings of general form assembly unit.	6	2	-	2	2
3.11	Drawings detailing the general view of the assembly unit among the graphic editor AutoCAD	8	2	-	2	4
3.12	Features of performance parts drawings of the "Body" in the general form of drawings in environment the graphic editor AutoCAD	8	2	-	2	4



3.13	Design drawings of the details of the "nut" drawings for the general form among the graphic editor AutoCAD	8	2	-	2	4
3.14	Development of principle hydraulic circuit among the graphic editor AutoCAD	4	-	-	2	2
3.15	Basics of three-dimensional constructions	6	2	-	2	2
3.16	Construction a visual image products in AutoCAD environment graphical editor for wire model.	6	2	-	2	2
3.17	Construction a visual image products in AutoCAD environment graphics editor for the solid-state model.	6	2	-	2	2
3.18	Module test №3	4	2	-	-	2
<b>Total for the module №3</b>		<b>120</b>	<b>34</b>	<b>-</b>	<b>34</b>	<b>52</b>
<b>Total for the 4<sup>th</sup> semester</b>		<b>120</b>	<b>34</b>	<b>-</b>	<b>34</b>	<b>52</b>
<b>Total for the discipline</b>		<b>210</b>	<b>34</b>	<b>34</b>	<b>34</b>	<b>108</b>

### 2.1.1. Homework

Homework (HW) is executed in the third семестрі, semester, in accordance with the ratified methodical recommendations with the purpose of fixing and deepening of theoretical knowledge and abilities of students to develop a working design documentation for the details and assembly units as using the drawing tools and the environment in the graphic editor AutoCAD.

Homework is executed on the base of educational material given to Self-study students, and is a component of the module № 1 "Projective bases of construction of image " (part №1) and module № 2 "Developing working design documentation " (part №2).

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

The time required for implementation of HW - up to 8 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. ЕСКД. Основные положения (с изменениями) —М.: Издательство стандартов, 1975. – 350 с.



3.1.6. ЕСКД. Общие правила выполнения чертежей (с изменениями) –М.: Издательство стандартов, –М.: 1991. – 236 с.

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

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

#### **Additional literature**

3.1.9. *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.

3.1.10. *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.

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

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

№	Name	Index of Topics where Guides are Used	Quantity
1.	Multimedia course	1.1 –1.3, 2.1 – 2.5	Electronic version
2.	Practicum for preparing laboratory classes	1.3, 2.1	100 copies and electronic version
3.	Manual	1.1 –1.2, 2.1 – 2.5	100 copies and electronic version



#### 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

3 semester				
Module №1		Module №2		Max Grade
Kind of Academic Activities	Max Grade	Kind of Academic Activities	Max Grade	
Performance and deference of control tasks: 1.1-1.4	8	Performance and deference of control tasks: 2.1-2.10	30	
Performance and deference of HW (part №1).	8	Performance and deference of HW (part №2).	12	
<i>For carrying out module test №1, a student must receive not less than 10 values</i>		<i>For carrying out module test №1, a student must receive not less than 25 values</i>		
Carrying out Module Test №1	15	Carrying out Module Test №2	15	
<b>Total for module №1</b>	<b>31</b>	<b>Total for module №2</b>	<b>57</b>	
<b>Semester Graded Test</b>				
<b>Total 3<sup>d</sup> Semester Grade</b>				<b>100</b>
4 semester				
Module №1			Max Grade	
Kind of Academic Activities		Max Grade		
Performance and deference of laboratory classes №3.1-3.2, 3.5,3.9-3.17:		30		
Performance and deference of laboratory classes №3.3,3.4,3.6-3-8		28		
<i>For carrying out module test №3, a student must receive not less than 44 values</i>				
Carrying out Module Test №3		30		
<b>Total for module №3</b>		<b>88</b>		
<b>Semester Examination</b>				<b>12</b>
<b>Total 4<sup>th</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).

*Table 4.2*

Correspondence between the Grades and the National Scale

Grades								National scale
Performance and deference of control tasks		Performance and deference of laboratory classes		Performance and deference of HW		Carrying out Module Test		
				Part №1	Part №2	№1№2	№3	
8	27-30	27-30	25-28	8	11-12	14 - 15	27-30	
6-7	23-26	23-26	21-24	6-7	9-10	11 - 13	23-26	Good
5	18-22	18-22	17-20	5	7-8	9 - 10	18-22	Satisfactory
under 5	under 18	under 18	under 17	under 5	under 7	under 9	under 18	Bad

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.

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 4.3*

Correspondence between the Total Module Grades and the National Scale

Module №1	Module №2	Module №3	National Scale
28 - 31	51 - 57	79-88	<b>Excellent</b>
23 - 27	43– 50	66-78	<b>Good</b>
19 - 22	34 - 42	53-65	<b>Satisfactory</b>
under 19	under 34	under 53	<b>Bad</b>

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*


Correspondence between the Semester Module Grades and the National Scale

*Table 4.5*

Correspondence between the Graded Test/ Examination Grades and the National Scale

Grades	National Scale
79-88	Excellent

Grades	Grades	National Scale
Graded Test	Examination	
12	11 - 12	Excellent

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66-78	Good	10	9 - 10	Good
53-65	Satisfactory	8	7 - 8	Satisfactory
under 53	Bad	-	under 7	Bad

4.6. The Semester Module Grade and the Graded Test/Examination 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 two semesters, is defined as the arithmetic average of the Total Semester Grades (for this discipline - for the third and fourth semesters) with its transfer to the national scale and ECTS scale.

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






(Ф 03.02 – 04)

### АРКУШ РЕЄСТРАЦІ 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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