

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
«__» _____ 2016.

APPROVED

Vice-Rector for Academics
and Educative Activity

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«12» 12. 2016.




Quality Management System

COURSE TRAINING PROGRAM
on
«Descriptive Geometry»

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

| | | | |
|---------------------------------|----------------------------|----------------------------|----------------------------|
| Year of Study – 1 st | | Semester – 2 nd | |
| Lectures | – 34 | Examination | – 2 nd semester |
| Practicals | – 34 | | |
| Self-study | – 82 | | |
| Total (hours/ECTS credits) | –150/5,0 | | |
| Homework (1) | – 2 nd semester | | |

Index ECB -1-142/16-2.1.2

| | | | |
|---|---|---------------|-----------------------------------|
|  | Quality Management System. Course Training Program on «Descriptive Geometry» | Document Code | QMS NAU CTP 10.01.03 – 01-2016 |
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The Course Training Program on «Descriptive Geometry» is based on the Bachelor Extended Curriculum № ECB -1-142/16 for Speciality 142 "Power Machinery» and Specialization: «Gas Turbine Plants and Compressor Stations», Syllabus for this Subject, Index CB-1-142/16-2.1.2 approved by the Rector «12» 12 2016 and correspondent normative documents.

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1. INTRODUCTION

The Course Training Program on «Descriptive Geometry and 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/роз.

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 |
| 1 Semester | | | | | |
| Module №1 “Basis of geometric modelling” | | | | | |
| 1.1 | Introduction. Method of projections. Projections of the point | 10 | 2 | 2 | 6 |
| 1.2 | Orthogonal projections of the straight line. | 6 | 2 | 2 | 2 |
| 1.3 | Orthogonal projections of the plane. | 8 | 2 | 2 | 4 |
| 1.4 | Positional and metric properties projections pairs of geometric shapes. | 8 | 2 | 2 | 4 |
| 1.5 | Solving positional and metric problems in orthogonal projections. | 4 | - | 2 | 2 |
| 1.6 | Methods of transformation orthogonal drawings: replacement planes of projections, plane-parallel shift. | 8 | 2 | 2 | 4 |
| 1.7 | Method of rotation around the line of level. навколо лінії рівня. Auxiliary oblique projections. | 8 | 2 | 2 | 4 |
| 1.8 | Homework (part №1) | 4 | - | - | 4 |
| 1.9 | Module test №1 | 4 | 2 | - | 2 |
| Total for the module №1 | | 60 | 14 | 14 | 32 |
| Module №2 “Modelling of space objects” | | | | | |
| 2.1 | Polyhedrons. Definitions. Image. | 10 | 2 | 2 | 6 |
| 2.2 | Curves line. Flat, spatial curves. | 10 | 2 | 2 | 6 |
| 2.3 | Methods of formation of curved surfaces. | 8 | 2 | 2 | 4 |
| 2.4 | The intersection of curved surfaces plane. | 8 | 2 | 2 | 4 |
| 2.5 | Crossing the curved surfaces of the second order with a straight line | 8 | 2 | 2 | 4 |
| 2.6 | Construction of the line of mutual intersection of two surface. | 8 | 2 | 2 | 4 |



| 1 | 2 | 3 | 4 | 5 | 6 |
|--|---|------------|-----------|-----------|-----------|
| 2.7 | Construction of development of face and curved surfaces | 8 | 2 | 2 | 4 |
| 2.8 | Tangent plane. | 6 | | 2 | 4 |
| 2.9 | Axonometric projection. Basic concepts and definitions. Positional properties of geometric figures in axonometry. | 8 | 2 | 2 | 4 |
| 2.10 | Construction axonometric projections solids | 8 | 2 | 2 | 4 |
| 2.11 | Homework (part №2) | 4 | - | - | 4 |
| 2.12 | Module test №2 | 4 | 2 | - | 2 |
| Total for the module №2 | | 90 | 20 | 20 | 50 |
| Total for the 1st semester | | 150 | 34 | 34 | 82 |
| Усього за навчальною дисципліною | | 150 | 34 | 34 | 82 |

2.1.1. Homework

Homework (HW) 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.

Homework is executed on the base of educational material given to Self-study students and is a component of the module № 1 "Basis of geometric modelling" (part №1) and module № 2 "Modelling of space objects" (part №2).

The specific purpose of homework is contained, depending on the version, the learning and mastering the method of projections defining characteristics of sets of points geometric space, points, lines, planes on the example of the design elements of the design of the aircraft. The problems of geometric modeling polyhedrons, curves and surfaces in orthogonal and axonometric projections are considered.

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

The time required for implementation each 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.* Нарисна геометрія: підручник / В.Є. Михайленко, М.Ф. Євстигнєєв, С.М. Ковальов. За ред. В.Є. Михайленка. 3-тє вид., переробл. – К.: Видавничий дім «Слово». 2013. – 304 с.
- 3.1.2. *Ковальов Ю.М.* Прикладна геометрія: підручник / Ю.М. Ковальов, В.М. Верещага. – К.: Дія. 2012. – 472 с.
- 3.1.3. *Хмеленко О.С.* Нарисна геометрія: підручник. / О.С. Хмеленко – К.; Кондор, 2008. – 440 с.
- 3.1.4. *Гордон В.О.* Сборник задач по курсу начертательной геометрии: учебное пособие / В.О. Гордон, Ю.Б. Иванов, Т.Е. Солнцева. 7-е изд. – М.: Высшая шк. 1988. – 320 с.
- 3.1.5 *Макаренко М.Г.* Нарисна геометрія: методичні рекомендації до виконання розрахунково-графічних робіт / уклад.: М.Г. Макаренко, В.І. Макаров, В.П. Юрчук. –К.: НАУ, 2013. – 60 с.



3.1.6. *Ковальов Ю.М.* Нарисна геометрія. Завдання для практичних занять та самостійної роботи: практикум / уклад.: Ю.М. Ковальов, М.В. Терехова, М.Г. Макаренко [та ін.] 2-ге вид. –К.: НАУ, 2014. – 64 с.

Additional literature

3.1.7. *Ковальов Ю.М.* Основи геометричного моделювання: навч. посіб. / Ю.М. Ковальов – К.: Вища шк. 2003. – 232 с.

3.1.8. *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.

3.1.9. *Гордон В.О* Курс начертательной геометрии: Учебное пособие / Под ред. Гордона В.О., Иванова Ю.Б. 24-е изд. –М.: Высшая шк. 2000. – 271 с.

3.2. List of basic guidance materials for the subject

| № | Name | Index of Topics where Guides are Used | Amount |
|----|--|---------------------------------------|--|
| 1 | 2 | 3 | 4 |
| 1. | Multimedia course | 1.1 - 1.4, 2.1 - 2.4 | Electronic version |
| 2. | Methodological guidance for implementation of HW | 1.1 - 1.4, 2.1 - 2.4 | Edition 100 copies and electronic versions |
| 3. | Practicum for Practicals | 1.1 - 1.4, 2.1 - 2.4 | Edition 500 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.

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

Table 4.1

| 2 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 - 1.7 | 14 (summarily) | Performance and deference of control tasks №2.1 - 2.10 | 20 (summarily) | |
| Performance and deference of HW (part 1) | 9 | Performance and deference of HW (part 2) | 15 | |
| <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 21 values</i> | | |
| Carrying out Module Test №1 | 15 | Carrying out Module Test №2 | 15 | |

| | | | |
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| | | | | |
|--|-----------|----------------------------|-----------|------------|
| Total for module №1 | 38 | Total for module №2 | 50 | |
| Semester Examination | | | | 12 |
| Total 2nd Semester Grade | | | | 100 |

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 control tasks | | Performance and deference of HW | | Carrying out Module Test | |
| | | Part №1 | Part №2 | | |
| 13-14 | 18-20 | 9 | 14-15 | 14 - 15 | Excellent |
| 11-12 | 15-17 | 7-8 | 11-13 | 11- 13 | Good |
| 9-10 | 12-14 | 6 | 9-10 | 9 - 10 | Satisfactory |
| under 9 | under 12 | under 6 | under 9 | 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 4.3
Correspondence between the Total Module Grades and the National Scale

| Module №1 | Module №2 | National Scale |
|-----------|------------|---------------------|
| 34-38 | 45-50 | Excellent |
| 29-33 | 38-44 | Good |
| 23-28 | 30-37 | Satisfactory |
| under 23 | under e 30 | Bad |

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

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

Table 4.5
Correspondence between the Examination
Grades and the National Scale

| Grades Examination | National Scale |
|-----------------------|----------------|
| 11-12 | Excellent |
| 9-10 | Good |
| 7-8 | Satisfactory |
| under 7 | Bad |

4.6. The Semester Module Grade and the 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 |
| 90-100 | Excellent | A | Excellent (excellent performance with insignificant shortcomings) |
| 82 – 89 | Good | B | Very Good (performance above the average standard with few mistakes) |
| 75 – 81 | | C | Good (good performance altogether with a certain number of significant mistakes) |
| 67 – 74 | Satisfactory | D | Satisfactory (performance meets the average standards) |
| 60 – 66 | | E | Sufficient (performance meets the minimal criteria) |
| 35 – 59 | Bad | FX | Bad (bad performance; a second testing is required) |
| 1 – 34 | | F | Bad (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 |
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(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 | | | |
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(Ф 03.02 – 32)

УЗГОДЖЕННЯ ЗМІН

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