

NATIONAL AVIATION UNIVERSITY  
Educational and Research Airspace Institute  
Engineering Department

AGREED

Director of the Educational and  
Research Institute of Air Navigation

\_\_\_\_\_ I. Machalin  
« \_\_\_ » \_\_\_\_\_ 2017 p.

APPROVED

Vice-Rector for Academics and  
Educative Activity

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



Quality Management System  
**COURSE TRAINING PROGRAM**  
on  
**«Science of Aviation Materials»**

Field of Study: 17 «Electronics and Telecommunications»  
Specialty: 173 «Avionics»  
Specializations: «Piloting and Navigation Equipment Complexes»  
«Ergonomics»

Year of study – 1

Semester – 2

Lectures – 17 Graded Test – 2 Semester  
Laboratory Classes – 17  
Self-study – 56  
Total (hours/ECTS credits)– 90/3

Homework (1) – 2 semester

Index ECB-14-173/16-2.1.12

**QMS NAU CTP 07.01.02-01-2017**



The Course Training Program on «Science of Aviation Materials» is based on Bachelor Extended Curriculum № ECB-14-173/16, for Speciality 173 «Avionics» and Specializations: «Piloting and Navigation Equipment Complexes», «Ergonomics», Syllabus of this Subject, Index CB-14-173/16-2.1.12, approved by Rector «\_\_\_»\_\_\_\_\_ 2017 p., and correspondent normative documents.

Developed by:  
Professor of \_\_\_\_\_ V. Labunets  
the Engineering Department

Associated Professor of \_\_\_\_\_ O. Tisov  
the Engineering Department

Discussed and approved by the Engineering Department, Minutes № 11 of 28.11.2016

Head of the Department \_\_\_\_\_ M. Kindrachuk

Discussed and approved by the Graduate Departments for the Speciality 173 “Avionics” and Specializations «Piloting and Navigation Equipment Complexes», «Ergonomics» – department of Avionics, Minutes №\_\_\_ of \_\_\_\_\_ 2017.

Head of the Department \_\_\_\_\_ A.Skripets

Considered and approved by the Scientific-Methodological-Editorial Board of the Airspace Institute, Minutes №\_\_\_ of \_\_\_\_\_ 2017.

Head of the SMEB \_\_\_\_\_ V. Kravtsov

Director of the Center  
of Advanced Technologies \_\_\_\_\_ V. Kazak

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## 1. INTRODUCTION

The Course Training Program of discipline «Science of Aviation Materials» is developed on the basis of "the guidelines for the development and execution of training programs and work training courses", enacted by order 16.06.2015y. №37 / поз.

The rating grading system (RGS) is an integral part of working curriculum and involves determining the quality of a student performed all types of classroom and independent academic work and his level of acquired knowledge and skills evaluation in grades by the results of this work in the current, module and semester control, with subsequent transfer by multi-scale assessment to assess the national scale and scale ECTS.

(RGS) provides for the use of modular of ratings (current, control, final) and the examination or a test, the final semester and the final rating.

## 2. DISCIPLINE CONTENT

### 2.1. Topical plan of the discipline

№	Topics	Volume of classes (hours)			
		Total	Lectures	Lab. works	Total
1	2	3	4	5	6
<b>2 semester</b>					
<b>Module №1 «Structural and dielectric materials»</b>					
1.1	Objectives and structure of the discipline. Solid body structure. Notion about alloys.	10	2	2	6
1.2	Structural alloy steels. Composite and smart materials.	10	2	2	6
1.3	Classification of dielectrics and their application. Dielectric materials. Conductivity of dielectrics.	10	2	2	6
1.4	Losses in dielectrics. Electrical strength.	9	2	1	6
1.5	Module test №1	3	–	1	2
<b>Total for module №1</b>		<b>42</b>	<b>8</b>	<b>8</b>	<b>26</b>
<b>Module №2 «Conductive, semiconductive and magnetic materials»</b>					
2.1	Conductive materials. Principal properties and their dependence on various factors. Classification of conductive materials and their application.	8	2	2	4
2.2	Semiconductor materials. Principal properties and their dependence on various factors.	8	2	2	4
2.3	Contact phenomena in semiconductors. Semiconductive materials and instruments.	8	2	2	4
2.4	Magnetic materials. Principal properties and application	8	2	2	4
2.5	Classification of magnetic materials	5	1	–	4
2.6	Homework	8	-	-	8
2.7	Module test №2	3	-	1	2
<b>Total for module №2</b>		<b>48</b>	<b>9</b>	<b>9</b>	<b>30</b>
<b>Total for the discipline</b>		<b>90</b>	<b>17</b>	<b>17</b>	<b>56</b>

### 2.2. Домашні завдання

Homework is performed in the second semester, according to the guidelines and is an important step in learning what is taught in the second semester.



Homework is done to consolidate and deepen the theoretical knowledge and skills in the study of electrical goods on the basis of educational material given to an independent study students. The specific purpose of homework depending on the version contained in the study and assimilation of groups of composite materials, their structure, properties and applications in the design of modern aircraft, as well as studying the properties of conductor, semiconductor and magnetic material, depending on their properties on several factors, data classification materials and their applications.

Elapsed time for doing homework - 8 hours of students self-study.

### 3. METHODOLOGICAL GUIDES AND TEACHING MATERIALS ON THE DISCIPLINE

#### 3.1 Recommended literature

##### Basic recommended literature

3.1.1. Матеріалознавство: підручник./ М.В. Кіндрачук, В.Ф. Лабунець, Т.С. Климова, І.Г. Черниш.-К.: НАУ, 2011. – 492 с.;

3.1.2. Лахтин Ю.М. Материаловедение: Учебник / Ю.М. Лахтин, В.П. Леонтьева. – М.: Машиностроение, 2003. – 528 с.;

3.1.3 Бабак В.П. Конструкційні та функціональні матеріали. Частина 1. / В.П. Бабак, Д.Ф. Байса, С.Ф. Філоненко. – Київ: Техніка, 2003. – 344 с.;

3.1.4. Морозова И.Д. Электрорадиоматериалы / И.Д. Морозова. – М.: Воздушный транспорт, 2003р. – 200 с.


##### Additional recommended sources

3.2.1. Лабунець В.Ф., Климова Т.С. Електротехнічні матеріали. Лабораторний практикум. / В.Ф. Лабунець, Т.С. Климова. – Київ: РВВ НАУ, 2003. – 80 с.;

3.2.2. Лабунець В.Ф. Авіакосмічні матеріали з високою питомою міцністю: навч. Посіб. / В.Ф. Лабунець. – К. : НАУ. – 2015. – 204 с.

#### 3.2. Methodological guides and teaching materials

№	Name	Index of topics where guides are used	Amount
1	2	3	4
1.	Methodical recommendations for lab. works	1.1-1.3 2.1-2.5	5
3.	Diagram: Magnetization curve of ferromagnetic material	2.4	1
4.	Diagram: Laboratory installation for investigation of properties of ferromagnetic materials	2.4	1
5.	Diagram: block-diagram for investigation of ferromagnetic material by oscillographic method	2.5	1
6.	The diagrams of zone structure of dielectrics, conductors, semiconductors.	1.2	1
7.	Diagram: humidity influence on the specific surface resistance of conductor.	1.3	1
8.	Diagram: electrical strength of air dependence on pressure.	1.3	1

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9.	Diagram:.. Magnetization curve of ferromagnetic material	2.4-2.5	1
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#### 4. STUDENTS' KNOWLEDGE AND SKILLS GRADING SYSTEM СТУДЕНТОМ ЗНАНЬ ТА ВМИНЬ

##### 4.2. Grading Scale for Students' Learning Outcomes Assessment

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

Table 4.1

Grading of different kinds of a student's academic work

2 semester				
Module №1		Module №2		Max. Grade
Kind of academic work	Max. Grade	Kind of academic work	Max. Grade	
Carrying out and defense lab. work №1.1-1.4 (5 б.×4)	20 (total)	Carrying out and defense lab. work №2.1-2.5 (5 б.×5)	25 (total)	
For carrying out module test№1, a student must receive not less than 12 values		Carrying out and defense of homework №1	13	
		For carrying out module test№1, a student must receive not less than 17 values		
Module test №1	15	Module test №2	15	
<b>Total for module №1</b>	<b>35</b>	<b>Total for module №2</b>	<b>53</b>	
<b>Graded test</b>				<b>12</b>
<b>Total for the discipline</b>				<b>100</b>

4.2. The kind of academic work, performed by a student, has been passed, if a student got positive grade according to National Scale. (table 4.2).

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

Table 4.2

Correspondence between Grade values and the National System

Grade values			National Scale
Carrying out and defense of lab. work	Carrying out and defense of homework №1	Carrying out of module test.	
5	12-13	14-15	Excellent
4	10-11	12-13	Good
2-3	8-9	9-11	Satisfactory
Under 2	Under 8	Under 9	Bad

4.4. Students have their module test№1 and №2 in a written form. The procedure, which lasts up to two academic hours, is held by a commission headed by the head of the department responsible for the discipline. The correspondence between Module Test Grade values and the National Scale is shown in Table 4.3.

Table 4.3



Correspondence between Total Module Grade values and the National Scale

Module №1	Module №2	National Scale
40-44	40-44	Excellent
33-39	33-39	Good
27-32	27-32	Satisfactory
Under 27	Under 27	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, 4.5.

Table 4.4  
Correspondence between Semester Module Grade Values and the National Scale

Semester Grade Values	National Scale
79-88	excellent
66-78	good
53-65	satisfactory
under 53	bad

Table 4.5  
Correspondence between Graded Test Grade Values and the National Scale

Graded Test Grade Values	National Scale
12	excellent
10	good
8	satisfactory
-	bad

4.6. The Total Semester Grade in a Semester with a graded Test at its end is equal to the sum of the Semester Module Grade and the Minimal Graded Test established for each category of Semester Module Grades (*12 for „Excellent“, 10 for „Good“, 8 for „Satisfactory“*)

4.7. A student is not allowed to increase his/her positive Total Semester Grade by taking a repetitive test.

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

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

The above final grade of discipline entered in the Diploma Supplement.

Table 4.6  
Correspondence of Total Semester Grades to the National System and the ECTS System

Total Semester Grade Values	National System	ECTS System	
		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>B</b>	<b>Very Good</b> (performance above the average standard with a 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>Failed</b>	<b>FX</b>	<b>Failed</b> (bad performance; a second testing is required)
<b>1 – 34</b>		<b>F</b>	<b>Failed</b> (very bad performance; a student shall retake the course)







(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				