

NATIONAL AVIATION UNIVERSITY
Educational and Research Airspace Institute
Engineering Department

AGREED
Director of Educational and Research
Airspace Institute

_____ S. Dmytriev
« ___ » _____ 2018

APPROVED
Vice-Rector for Academics

_____ A. Gudmanian
« ___ » _____ 2018



Quality Management System
COURSE TRAINING PROGRAM
on
«Details of Machines»

Field of study: 27 “Transport Services”
Speciality: 272 “Aviation Transport”
Educational
Professional Program: Maintenance and Repair of Aircraft and Aircraft Engines
Airports Technologies of Works and Technological Equipment

Year of Study – 3rd Semester – 5th
Lectures – 17 Examination – 5th semester
Laboratory Classes – 34
Self-study – 99
Total (hours/ECTS credits) – 150/5,0
Course Project – 5th semester

Index ECB-1- 272/16-2.1.14



The Course Training Program on «Details of Machines» is based on the Bachelor Extended Curriculums № ECB - 1 - 272/16 for Speciality 272 «Aviation Transport» and Educational Professional Programs «Maintenance and Repair of Aircraft and Aircraft Engines», «Airports Technologies of Works and Technological Equipment»; Syllabus for this Subject, Index CB-1-272/16-2.1.14, approved by the Rector _____.2018, and correspondent normative documents and order №207/од of 27.04.18.

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INTRODUCTION

The Course Training Program of the course was developed based on the Syllabus of discipline "Details of Machines" and "The guidelines for the development and execution of Syllabus and Course Training Program", enacted by order 16.06.15 №37/поз.

2. DISCIPLINE CONTENT

2.1. Topical plan of the discipline

№.	Topics	All	Lectures	Lab. works	Self study
1	2	3	4	5	6
Module №1 «Mechanical transmissions»					
1.1	The basic definition. Gearings. General Information and materials of gearings. Allowable stresses	9	2	2	5
1.2.	Straight and helical spur gears. Geometry. Strength calculation.	12	2	4	6
1.3.	Bevel gears. Geometry. Strength calculation.	11	2	4	5
1.4	Worm gearings. Construction and strength calculation.	12	2	4	6
1.5	Module test #1	6	-	2	4
Total for module #1		50	8	16	26
Module № 2 «Machine elements for carrying and transmitting rotatory power and Joints»					
2.1.	Axles and shafts. Construction of shafts and strength calculation	11	2	4	5
2.2.	Bearings. Rolling contact bearings. Classification and main types of rolling bearings. Selection of bearings	11	2	4	5
2.3.	Coupling for shafts connection. Selection of couplings and checking calculations	9	2	2	5
2.4	Threaded joints and strength calculations	11	2	4	5
2.5.	Keyed, splined, riveted and welded joints. Strength calculations.	7	1	2	4
2.6.	Module test #2	6	-	2	4
Total for module #2		55	9	18	28
Module №3 «Course project»					
3.1.	Calculation and design of machines drives	45	-	-	45
Total for 5 semester		150	17	34	99
Total for the discipline		150	17	34	99



2.1.1 Course project

The purpose of course project is to strengthen students' knowledge which is obtained after studying the discipline, to acquire practical skills in kinematic and force analysis of drive mechanisms, to study methods of analysis and design of general purpose mechanism elements and units and machines.

Course project consists of graphical part and calculations. Graphical part is made on A1 whatman paper (three drawing). Approximate amount of calculations (explanatory note) is ranged from 25 to 35 hand written pages of size A4 paper. Time for making the course project is 45 hours.

Tasks for the course project are given in the department developed methodical guides.

3. Methodological guides and teaching materials on discipline

3.1. Recommended literature

Basic recommended sources.

3.1.1. Kryzhanovskiy A.S., Kornienko A.O., Bashta O.V. Machine elements. Course project design: manual. – K.: NAU, 2015. – 124 p.

3.1.2. В.Т. Павлице Основи конструювання та розрахунків деталей машин. К.: Вища шк., 1993. – 556 с.

3.1.3. В.М. Павлов, А.С. Крижановський, Г.М. Борозенець та ін. Деталі машин. Конспект лекцій. – К.: НАУ, 2008. – 164 с.

3.1.4. Г.М. Борозенець, В.М. Павлов, О.В. Голубничій, В.О. Кольцов. Прикладна механіка і основи конструювання: навч. посіб. – К.: НАУ, 2015. – 356 с.

3.1.5. Г.М. Борозенець, В.М. Павлов, І.В. Семак. Деталі машин. Методичні рекомендації до виконання курсового проекту для студентів напряму підготовки 6.070103 «Обслуговування повітряних суден». – К.: НАУ, 2013. – 72 с.

3.1.6. С.А. Чернавский, Г.М. Ицкович, К.Н. Боков и др. Курсовое проектирование деталей машин. – М.: Машиностроение 1987. – 416 с.

3.1.7. Н.Ф. Киркач, Р.А. Баласанян Расчет и проектирование деталей машин. Часть II. – Харьков, Вища шк., 1988. – 140 с.

3.1.8. Цехнович Л.И., Петриченко И.П. Атлас конструкции редукторов.- К.: „Вища школа”, 1990. – 151 с.

Additional recommended sources.

3.1.9. М.Н. Иванов Детали машин. – М.: Высш. шк., 1991. – 383 с.

3.1.10. Баласанян Р.А. Атлас деталей машин. – Х.: Основа, 1996. – 256 с.

3.1.11 Справочно-методическое пособие. В 2-х кн. Под ред.

П.Н. Учаева. – М.: Машиностроение, 1988. – 544 с.

3.1. Methodological guides and teaching materials

№	Name	Index of topics where guides are used	Number of examples
1.	Set of posters for lectures	1.1...1.5	2
2.	Active equipment for laboratory work	1.2 - 1.5 2.1 – 2.3	1
7.	Set of mechanisms models studied in the course sections	1.1– 1.5 2.1 - 2.3.	2



3.	State Standards: materials mechanical properties determination; gearings, threaded, keyed and splined joints calculations	1.2 – 1.5 2.1 – 2.3	1
4.	Stands with samples of rolling and sliding contact bearings, threaded joints	2.2. - 2.3.	2
5.	Examples of course project	2.2...2.3	10
6.	Samples of aviation and general purpose reducers	2.1...2.3	8

4. STUDENTS' KNOWLEDGE AND SKILLS GRADING SYSTEM

4.1. 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 academic work performed by a student

5 Semester			
Module №1		Module №2	
Kind of Academic Work	Max Grade	Kind of Academic Work	Max Grade
Performance and Defense of Laboratory classes (7x3)	21 (total)	Performance and Defense of Laboratory classes (8x3)	24 (total)
Performing of calculations of mechanical drives and their defense	8	Performing of calculations of mechanical drives and their defense	5 (total)
<i>For carrying out module test № 1, a student must receive not less than 18 values</i>		<i>For carrying out module test № 2, a student must receive not less than 18 values</i>	
Module test №1	15	Module test № 2	15
Total for module №1	44	Total for module № 2	44
Examination			12
Total Semester Grade			100
Module № 3 «Course project»			
Kind of Academic Work			Max Grade
Doing and defense of term paper			50
Defense of term paper			50
Doing and defense of term paper			100



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

Table 4.2

Correspondence between Grade values and the National System

Grade values		Module test	National System
Performance and defense of laboratory classes	Performing of calculations of mechanical drives and their defense		
3	8	14 -15	excellent
2,5	6-7	12-13	good
2	5	9-11	satisfactory
under 2	under 5	under 9	failed

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.

4.4. The Current Module Grade and the Module Test Grade together make up a Total Module Grade whose correspondence to the National System is shown in Table 4.3.

Table 4.3

Correspondence between Total Module Grade Values and the National System

Module №1	Module №2	National System
40-44	40-44	excellent
33-39	33-39	good
27-32	27-32	satisfactory
under 27	under 27	failed

4.5. The Total Module Grade received by a student for making and defense of a term paper in values, National Scale grades and ECTS Scale grades, is entered into the Module Grade Register.

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

4.7. 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 4.4

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 Examination Grade Values and the National Scale

Examination Grade Values	National Scale
11-12	excellent
9-10	good
7-8	satisfactory
under 7	bad

4.8. The Total Semester Grade is entered into the Examination Register and into a student's record book in values, National Scale grades, and ECTS Scale grades.



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.

4.10. The Total Module Grade received by a student for making and defense of a term paper, besides the Module Grade Register, is entered into a student's record book and the Diploma Supplement, for example: **92/Ex/A, 87/Good/B, 79/Good/C, 68/Sat/D, 65/Sat./E**, etc.

4.11. The Total Discipline Grade corresponds to the Total Semester Grade.

The Total Discipline Grade is entered in the Diploma Supplement

Table 4.6

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

Total Semester Grade Values	National Scale	ECTS Scale	
		Grade	Explanation
90-100	Excellent	A	Excellent (excellent performance with insignificant shortcomings)
82 – 89	Good	B	Very Good (performance above the average standard with a 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	Failed	FX	Failed (bad performance; a second testing is required)
1 – 34		F	Failed (very bad performance; a student shall retake the course)



(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 ознайомлення	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	Анульованого			

(Ф 03.02 – 32)

УЗГОДЖЕННЯ ЗМІН

	Підпис	Ініціали, прізвище	Посада	Дата
Розробник				
Узгоджено				
Узгоджено				
Узгоджено				