



## RTU Course "Mechanics of Airframes"

15E03 Lidaparātu teorijas un konstrukcijas katedra

### General data

Code	TAS212
Course title	Mechanics of Airframes
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Professional
Field of study	Mechanics, Mechanical Engineering, Machine Building
Responsible instructor	Ozoliņš Ēriks
Academic staff	Pavelko Vitālijs
Volume of the course: parts and credits points	2 parts, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Problems of mechanics. Fundamentals of statics, kinematics and dynamics. Forces and moments. Velocity and acceleration. Basic problems of material strength. Strength, stiffness and stability. Fatigue and durability of airframes and materials. Fundamentals of mechanism theory. Analysis and synthesis of aircraft mechanisms. Calculation and design of machine parts.
Goals and objectives of the course in terms of competences and skills	To seize mechanisms and gears theory bases. To be able to define kinematic characteristics of mechanisms and to carry out geometrical, power and verifying calculations of gears.
Structure and tasks of independent studies	Course paper: mechanism members and characteristic points, definition of kinematic characteristics using a computer. Independent work with the literature and internet. Independent performing of the control work.
Recommended literature	1. Airframe and Powerplant Mechanics. Airframe Handbook. US Department of Transportation. Federal Aviation Administration. New Delhi: Himalayan Books. 1994, 630p. 2. Maltbaek J.C. Essential Engineering Dynamics. Crosby Lockwood Staples. London. 1998. 3. Pavelko V. Materiālu pretestība: 1.un 2.daļa. Rīga: RAU, 1999.
Course prerequisites	Mathematics, physics.

### Course outline

Theme	Hours
Kinematic pair and a kinematic chain.	4
Mechanisms. Main properties and characteristics of mechanisms.	2
Structural analysis and synthesis of mechanisms.	4
Coulisse mechanisms.	4
Cam mechanisms.	4
Ratchet mechanisms.	2
Definition of the mechanism kinematic characteristics (graphic method).	6
Definition of the mechanism kinematic characteristics (graphical analytical method).	6
Computer application for analysis of mechanisms.	6
Gears, their classification and the main characteristics.	2
Friction gears.	2
Cylindrical and conic tooth gears.	8
Worm gears.	4
Belt and chain gears.	4
Springs and bearings.	2
Bolts.	2
Shaft.	2

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Capable of classifying mechanisms, defining their kinematic pairs and the freedom degree number.	Practical employment: Kinematic pairs of mechanisms and the freedom degree number definition; Examination.

Able to define kinematic characteristics of mechanisms using the graphic method and the graphical analytical method.	Practical employment: Definition of the mechanism kinematic characteristics (graphic method); Practical employment: Definition of the mechanism kinematic characteristics (graphical analytical method); Control work; Examination.
Able to define the mechanism separate points and members speed and accelerations using a computer.	Course paper: The mechanism movement computer modelling and separate points moving "experimental" definition; Course paper: Definition of the mechanism members and characteristic points kinematic characteristics using a computer; Examination.
Is capable of classifying gears and giving their characteristic.	Control work; Examination.
Is able to define geometrical sizes of gears, to carry out calculations on durability and to verify the calculations.	Practical employment: Gears calculations; Control work; Examination.
Is able to carry out bolts and shaft calculations on durability and to verify the calculations.	Practical employment: Bolts, shaft calculations; Examination.

***Study subject structure***

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	3.0	1.0	1.0	0.0		*	
2.	2.0	3.0	1.0	1.0	0.0		*	