



RTU Course "Materials and Hardware"

15E01 Aeronautikas tehnoloģiju katedra

General data

Code	TAS207
Course title	Materials and Hardware
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Professional
Field of study	Materials Science
Responsible instructor	Ozoliņš Ēriks
Academic staff	Pavelko Vitālijs
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Research methods of properties of materials. The diagrams of a state. Alloys used in airframes. Basic properties of materials: elasticity, viscosity, hardness, durability, fluidity and fragility. Steel. Alloys of aluminum, magnesium and titanium. Heat temperature resisting steel and alloys. Heterogeneous materials: composites, plastic, ceramic materials. Causes of corrosion, types and their identification. Fasteners: screw, bolts, studs. Locking devices. Aircraft rivets. Pipes and unions for aircraft hydraulic, fuel, oil, pneumatic and air systems. Springs. Bearings. Transmissions. Control cables. Aircraft electrical cables and connectors.
Goals and objectives of the course in terms of competences and skills	To receive knowledge about the structure and basic properties of materials and their alloys. To seize classification of products used in aircraft, the basic geometrical parameters, and the basis of their force calculation.
Structure and tasks of independent studies	Laboratory work reports preparation. Performance of homeworks. Work with the literature.
Recommended literature	1. Gunārs Vērđiņš, Ilmārs Dukulis. Materiālu mācība. Mācību līdzeklis. Jelgava, 2008, -240 lpp. 2. Larry Reithmaier. Standard Aircraft Handbook for mechanics and technicians. Sixth edition. 1999, -292 pp. 3. Aerospace Materials. Hardcover ASTM Standards Related to Materials, Coatings and Testing for Fasteners. 1997. 278p. 4. Aircraft Structures and Materials. 1997. 434p. 5. Airframe and Powerplant Mechanics. Airframe Handbook. US Department of Transportation. Federal Aviation Administration. New Delhi: Himalayan Books.1994, 630p.
Course prerequisites	In physics, in mathematics, in chemistry.

Course outline

Theme	Hours
Aircraft Materials - Ferrous.	8
Aircraft Materials - Non-Ferrous.	10
Aircraft Materials - Composite and Non-Metallic.	10
Corrosion.	4
Fasteners.	14
Pipes and Unions.	4
Springs and Bearings.	4
Transmissions.	4
Control Cables.	4
Electrical Cables and Connectors.	2

Learning outcomes and assessment

Learning outcomes	Assessment methods
Capable of identifying steel and colour alloys, giving their characteristics and application in aircraft.	Laboratory work No. 1: check of metals on a stretching. Laboratory work No. 2: check of metals on a cut. Laboratory work No. 3: metals hardness definition. Control work No. 1. Examination.
Capable of identifying nonmetallic and composite materials used in aircraft and giving their characteristic.	Laboratory work No. 4: Experimental definition of polyfoam characteristics. Control work No. 2. Examination.
Able to work with composite materials.	Practical employment: composite materials gluing.

Capable of identifying hardware (fasteners, pipes and unions, bearings, transmissions, control cables, electrical cables and connectors), giving their characteristic and application in aircraft.	Control work No. 3. Examination.
Able to carry out calculation on durability of bolts and rivets.	Homework: calculation of bolts and rivets.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	4.0	6.0	2.0	1.0	1.0		*	