



## RTU Course "Mechanics and Strength of Composite Materials"

15E03 Lidaparātu teorijas un konstrukcijas katedra

### General data

Code	TAK512
Course title	Mechanics and Strength of Composite Materials
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Transport
Responsible instructor	Kleinhofs Mārtiņš
Academic staff	Paramonovs Jurijs
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Attention will be focused on laminated fiber- reinforced composite materials for this course. The use of composite materials in aircraft structure. Advantage composite materials used instead of metals. The general set of composite materials as well as peculiarities of structures will be defined, classified, characterized. Mechanical properties of composites and their components. Mechanics of composite materials. Joints and connections of composite and metallic structure. Repair technology. Methods of calculation of strength of structure components. Deformation and failure of composite materials under the influence of different loads. Peculiarities of distribution in composite materials. Peculiarities of composite materials and structure design. Structural analysis component form and its manufacture.
Goals and objectives of the course in terms of competences and skills	Student's knowledge of the specifics of construction mechanics of composite materials. 1. The use of composite materials in aircraft structure. 2. Composite materials' classification, characterization and peculiarities of structures 3. Calculation of strength and stress; 4. Peculiarities of composite materials and structure design, repair technology; 5. Structural analysis component form and its manufacture.
Structure and tasks of independent studies	Individual work to be done applying literature and the standard software 1. Analysis the use of composite materials in aircraft structures; 2. Peculiarities of composite materials and structure design, repair technology; 3. Methods of calculation of strength of structure on components characteristics. 4. Repair composite structure, joints composite and connections composite and metallic structure.
Recommended literature	1. T.Fudzi, M.Dzako Mehanika razrušenija kompozitov. M.Mir, 1982. -232s. 2. Malmjester A.K., Tamuž V.G., Teters G.A. Soprotivlenie polimernih ikompozitnyh materialov. Riga, Zinatne, 1980.-572c. 3. M. Kleinhofs. Polimēro un kompozītmateriālu pielietošana transporta līdzekļu konstrukcijās. Rīga, RAU, 1997. -187 lpp. (krievu valodā) 4. Cindy Foreman. Advanced Composites. Jeppesen Sanderson, Inc. 2002. 5. Baker A.A. Compozite materials for aircraft structures . AIAA Education Series. -600.pp.
Course prerequisites	Computer programs and computer class.Material and design samples. Static and dynamic test laboratory.

### Course outline

Theme	Hours
Basic principles in the use of fiber composite materials	2
Definition, classification, characterization of composite materials and peculiarities of structures	4
Fibers and matrix; Fibers for polymer – matrix composites	2
Composite materials stress and strains	2
Structural analysis component form and manufacture	4
Joints composite and connections composite and metallic structure	4
Methods of calculation of strength on structure components.	4
Peculiarities of composite materials and structure design	4
Repair of composite and metallic structure	2
Peculiarities of maintenance composite materials	4

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Students will be able to use stress and strain processes in the loading of composite materials	Practical work, examination
Students will be able to use analysis component in construction of composite materials	Practical work, examination
Students will be able to calculate the strength of composite materials	Practical work, examination
Students will be able to create composite materials with the preconditioned qualities	Practical work, examination

Students will be able to create optimal construction projects with composite materials	Practical work, examination
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***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		*	