RTU Course "Wood Physics"

01T00 Institute of Architecture and Design

General data

Code	AD0052
Course title	Wood Physics
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Edgars Kirilovs
Academic staff	Jānis Kalniņš
Volume of the course: parts and credits points	1 part, 5.0 credits
Language of instruction	LV
Annotation	The study course studies the physical properties of wood, which include the geometric characteristics of wood, mass, density and thermophysical properties, as well as examines the mechanical properties of wood and the physical forces acting on wood. Various methods and equipment are used to determine the properties of wood. Students make samples of wood compounds, which are tested to test the acquired knowledge and obtain test results.
Goals and objectives of the course in terms of competences and skills	The aim is to develop skills to analyse and evaluate existing wood and wood material products, as well as to improve knowledge on how to plan and design structures corresponding to the physical properties of wood and product type. The tasks are to provide and develop the ability to use theoretical knowledge. Improve skills by creating wood joints, structures and products in accordance with the strength data of physical properties, as well as to test connections, design models, layouts or products.
Structure and tasks of independent studies	Independent work consists of theoretical and practical part. Theory - studied and mastered using the indicated and selected sources of information and available collection. Practical work includes technical competencies in design, construction and volume.
Recommended literature	Obligātā/Obligatory: 1.Jerzy Smardzewski. Furniture Design. Poznan University of Life Sciences. Springer International Publishing Switzerland 2015. 652 p. 2.Winfried Schneider, Herbert Rupitsch. Bauen mit Holz. Moderne Holzbauweisen. Kompetenzzentrum Bauen mit Nachwachsenden Rohstoffen, Münster. 3.Klaus Zwerger Wood and Wood Joints Building Traditions of Europe, Japan and China. Birkhäuser Basel. 2011. 320 p. 4.Internationales Holzbauforum IHF. Holz Bau. Bd.1. BFH-AHB, CH-2504, Biel/Bienne, 2008. 5.Internationales Holzbauforum IHF. Holz Bau. Bd. 2. BFH-AHB, CH-2504, Biel/Bienne, 2008. 6. Manfred Gerner. Fachwerksünden. Shriftenreihe des Deutchen Nationalkomitees für Denkmalschutz. Bd. 27. Bonn, 2004. 111 S. Papildu/Additional: 1.Andrejs Ozoliņš. Praktiskā koksne. Jumava, Rīga, 2005. 92 lpp. 2.Vitckopfs, Adolfs. Koks un tā apstrādāšana : rokasgrāmata galdniekiem, namdariem un pašmācībai : ar 714 il. V. Vitckopfs. 3.izd. Rīga : Vaga. 3.Kokins Leons. Koksnes žūšana kamerās un atmosfērā = Koksnes žāvēšana : Mācību līdzeklis. Leons Kokins. Red. S. Kramēna. Rīga : Mācību apgāds NT, 1997. Otrā burtnīca. 36 lpp. ISBN 9984-617-11-4 4. Franz F. P. Kollmann WilfredA. Cote,]r. Principles of Wood Science and Technology. I Solid Wood. Springer-Verlag New York Inc. 1968. 604. P 5. Alan & Gill Bridgewater. BUILDING WOODEN MACHINES. Gears & Gadgets for the Adventurous Woodworker. 6. Fabio Bianconi, Marco Filippucci Editors. Digital Wood Design Innovative Techniques of Representation in Architectural Design. Lecture Notes in Civil Engineering. 1535 p. 7. Dr.rer.nat. Rudi Wagenführ. Anatomie des Holzes. VEB Fachbuchverlag, Leipzig, 1966. 377 S. 8. Jari Heikila. Massive wood architecture. University of Oulu, Oulu, 2002. 77 p. 9. Ernst and Peter Neufert. Architects Data. Third Edition. Backwell science. 640 p.
Course prerequisites	Physics, woodworking.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
1. Wood as an anisotropic material.	3	0	0	0
2. Physical properties of wood and wood - based materials.	3	0	0	0
2.1. Appearance, annual width, opacity.	3	0	0	0
2.2. Odor, humidity, gas, sound, electrical conductivity.	3	0	0	0
2.3. Changes in wood properties due to changes in humidity, temperature - shrinkage, changes in shape.	3	0	0	0
3. Mechanical properties of wood and wood materials.	3	0	0	0
3.1. Loads: tensile, compression, bending, shear, shear, torsion.	3	0	0	0
3.2. Deformations: displacement, separation, rupture.	3	0	0	0

3.3. Wood strength: fibre direction, moisture, fault, species.	3	0	0	0
4. Application of wood and wood materials in static constructions.	3	0	0	0
4.1. Types of constructions: rails, stacks, columns, log houses, lattice gratings, busbars, slabs.	3	0	0	0
5. Application of wood and wood materials in dynamic constructions.	3	0	0	0
5.1. Types of dynamic structures.	3	0	0	0
5.2. Loads in dynamic structures: wear, fatigue, friction.	3	0	0	0
5.3. Application of constructions: toys, vehicles, other constructions.	3	0	0	0
6. Practical works - production and testing of constructions, models, models.	15	60	0	0
Total:	60	60	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Knows the physical properties of wood and wood materials - the meaning of the properties and the impact on the visual, technological and practical needs of the product.	Test of theoretical knowledge in study tasks and exam.
Able to analyse existing wood products and wood construction models.	Test of theoretical knowledge in study tasks and exam.
Able to choose the appropriate material for the designed wood structures, the appropriate type of construction.	Test of theoretical knowledge in study tasks and exam.
Able to make designs, models, product samples.	The skills and ability to apply the knowledge of practical work in the practical design and development of structures are assessed in the laboratory work and in the final product of the study work - in a construction model, model or product - exam.

Evaluation criteria of study results

Criterion	%
Practical work	39
Laboratory work	22
Exam	39
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	5.0	20.0	0.0	40.0	*		