



## RTU Course "Methodology and Technique of Design"

15325 Teorēt.mehānikas un materiālu pretestības katedra

### General data

Code	MTH302
Course title	Methodology and Technique of Design
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Academic
Field of study	Mechanics, Mechanical Engineering, Machine Building
Responsible instructor	Beresņevičs Vitālijs
Academic staff	Jevstignejevs Vladislavs
Volume of the course: parts and credits points	1 part, 3.0 Credit Points, 4.5 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	General concept of the main stages of design works. Formation and analysis of the consumer requirements as to the design of the object. Methods for designing the optimal machines and mechanisms. Design methods for increasing the strength and stiffness of typical machine elements. Unification and standardization in design works. Application of computer facilities in design works.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to provide students with skills required to design engineering objects, taking into account formulated requirements and criteria. The objective of the course is to provide students with competence to evaluate capacity and reliability of the designed engineering object.
Structure and tasks of independent studies	Studying the main topics of the study subject and preparing for test works on design of the typical engineering units (using the computer software), as well as developing the coursework consulting the recommended literature and attending the tutorials of the lecturer
Recommended literature	<ol style="list-style-type: none"> <li>1. Norton R.L. Machine Design. An Integrated Approach. 3rd Edition. – Worcester, Massachusetts, Worcester Polytechnic Institute, Pearson Education International, 2006.</li> <li>2. Koller R. Konstruktions lehre fur den Maschinenbau. Springer-Verlag, 1994.</li> <li>3. Орлов П.И. Основы конструирования. - Москва, Машиностроение, 1984.</li> <li>4. Хилл П. Наука и искусство проектирования. - Москва, Мир, 1973.</li> </ol>
Course prerequisites	Ability to do structures and machine elements calculations on strength and rigidity. Ability to analyze kinematics and dynamics of mechanisms. Theoretical mechanics. Strength of materials.

### Course outline

Theme	Hours
Main stages of design works. General concept of design works	2
Economic basics of machine design. Factors of machine efficiency	2
Formation and analysis of requirements to object of design. Formulation of objective of design	2
Designing the machines and mechanisms, taking into account the formulated requirements	2
Application of computer facilities in design works	6
Methods for reduction of mass and metal quantity of typical machine elements	4
Designing of machine elements with equal strength. Units with equal strength	4
Methods for increasing the stiffness of typical machine elements. Replacement of bending with tension or compression	4
Rational shape of cross-section of machine members. Reinforcement of machine members with stiffening ribs	4
Elastic and plastic strengthening of machine structural elements	4
Designing of typical machines applying the unification methods	4
Technological requirements in design	4
Standardization in design works	2
Engineering art style and ergonomic factors in design works	2
Criteria of production quality, certification	2

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Students can analyze and systemize consumer's demands as to the engineering object to be designed	Examination test on consumer's demands analysis and systematization in application to specific object to be designed
Students can analyze design problems and propose solution options	Examination test on analysis of design problem and development of options for its solution
Students can compare options for solution of design problem and choose the optimal one taking into account the given criteria	Test on the choice of the optimal solution option, taking into account the given design criteria

Students can design typical engineering structures and units applying the computer software	Test on design of typical engineering applying the computer software
Students can implement the main stages of design work in application to development of specific engineering object	Coursework: implementation of the main stages of design work in application to the design of the given engineering object

***Study subject structure***

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	4.5	2.0	1.0	0.0		*	