



RTU Course "Theoretical Mechanics"

15325 Teorēt.mehānikas un materiālu pretestības katedra

General data

Code	MTM202
Course title	Theoretical Mechanics
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	Vība Jānis
Academic staff	Grāpis Ojārs Grasmanis Bruno Vjaters Ilmārs Novohatska Tatjana
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
Maximum auditorium capacity	25
Maximum number of students per semester	50
Abstract	Kinematics and dynamics of particle. Shapes of motion of a rigid body. Kinematics and dynamics of multiplex motion. Theorem of motion of centre mass. Momentum, angular momentum, kinetic and potential energy theorems. Dynamics of a rigid body. Gyroscope.
Goals and objectives of the course in terms of competences and skills	To acquaint students with the fundamentals of mechanics. In order to achieve this aim the following tasks should be fulfilled: 1st Analyse the fundamental relationships of the kinematics, statics and dynamics. 2nd Teach students how to solve the task on mechanics applying the computer programs. 3rd Improve students' knowledge of physics related to the field of mechanics. 4th Teach students the skills required to be proficient in the assessment of the machinery, construction machinery and engineering facilities.
Structure and tasks of independent studies	Within the framework of the present course the students should perform independent work on the following themes: 1st Solving the static tasks applying the MathCAD program. 2nd Modelling the dynamic tasks applying the Working Model. 3rd Calculating force and stress applying the Solid Work Program.
Recommended literature	O.Kepe,J.Vība. Teorētiskā mehānika. Rīga,Zvaigzne,1982.g.577lpp.,Teorētiskā mehānika.DinamikaI.Rīga,RTU,1944.-259. O.Kepe,J.Vība. Teorētiskā mehānika.DinamikaII.Rīga,RTU,1996.-173.
Course prerequisites	Math. Mechanics. Physics.

Course outline

Theme	Hours
Introduction.	3
Axioms.	3
Constraints	3
Cross force system.	3
Dispersed forces system in the plane.	3
Body equilibrium.	3
Crossing forces in space.	3
Forces dispersed in space.	3
Introduction to kinematics and dynamics.	3
Point kinematics and dynamics. Translation of body movement.	3
Body rotational kinematics and dynamics.	3
Plane movement kinetics.	3
Spherical and the general movement kinetics.	3
Dalambert's principle.	3
The general dynamic equation.	3
Mechanical system motion. Special cases.	3

Learning outcomes and assessment

Learning outcomes	Assessment methods
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At the end of the course students will be able to evaluate the mechanical processes in nature in different forms.	Laboratory work.
At the end of the course students will be able to provide examples of object motion and equilibrium.	Practical work/tasks
The end of the course will be able to analyze the mechanisms and machinery.	Questions at the end of the lecture.
At the end of the course students will be able to distinguish between static and dynamic tasks.	Assessment test
At the end of the course students will be able to formulate tasks on the analysis of mechanical objects.	Assessment test
At the end of the course students will be able to evaluate the mechanical engineering problems.	Exam

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		*	