RTU Course "Theoretical Mechanics (in robotic systems)"

31000 Faculty of Civil and Mechanical Engineering

General data

Code	MTM207
Course title	Theoretical Mechanics (in robotic systems)
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Jānis Vība
Academic staff	Ilmārs Vīksne
Volume of the course: parts and credits points	1 part, 4.5 credits
Language of instruction	LV
Annotation	During the course there are viewed the following topics: reduction of forces and equilibrium equations in statics; slip, rolling and rotational friction; center of gravity and moments of inertia; kinematics and dynamics of a point; different motion types of object, like compound motion and it's dynamics; theorems of dynamics - rigid body dynamics, kinetostatics, balancing and gyros.
Goals and objectives of the course in terms of competences and skills	Objective is to provide theoretical knowledge and practical skills needed for robot systems motor unit analysis and synthesis.
Structure and tasks of independent studies	Homework independently enforceable in accordance with the subject.
Recommended literature	O. Kepe J. Vība, Teorētiskā mehānika, Rīga, Zvaigzne,1982.g., 577. lpp; O.Kepe, J.Vība, Teorētiskā mehānika, Dinamika I. Rīga, RTU, 1981., 259.lpp., O. Kepe J. Vība, Teorētiskā mehānika, Dinamika II., Rīga, RTU, 1996.g., 173. lpp. R. C. Hibbeler, Mechanics of Materials, SI Edition, Pearson Prentice Hall, 2003, 840 lpp.
Course prerequisites	Mathematics

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Force reduction and equilibrium equations	8	8	0	0
Slip, rolling and rotational friction	8	8	0	0
Center of gravity, inertia moments	8	8	0	0
Point kinematics and dynamics	4	4	0	0
Motion types of object	4	4	0	0
Compound motion, dynamics of compound motion	6	6	0	0
Theorem of dynamics	6	6	0	0
Rigid body dynamics	8	8	0	0
Kinetostatics	8	8	0	0
Total:	60	60	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Able to reduce forces in multi-dimensional space and to describe the equilibrium	Homework and examination questions according to topic
Able to identify and describe the relevant body friction forces	Homework and examination questions according to topic
Able to describe and analyze the body's center of gravity motion and inertia	Homework and examination questions according to topic
Able to describe and analyze compound body movement	Homework and examination questions according to topic
Able to describe and analyze the compound mechanical system statics and dynamics	Homework and examination questions according to topic

Study subject structure

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