RTU Course "Shock Theory"

15325 Teorēt.mehānikas un materiālu pretestības katedra

General data

Code	MTM411
Course title	Shock Theory
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Mechanics, Mechanical Engineering, Machine Building
Responsible instructor	Vība Jānis
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, RU
Possibility of distance learning	Not planned
Maximum auditorium capacity	25
Maximum number of students per semester	50
Abstract	Direct and oblique impact. Impact with rotation. Collision of two bodies. Restitution of impulse. Area of friction. Models with dissipated parameters. Effect of configuration of rod. Hydraulic impact. Impact against elastic beam. Impact in bodies system. Impact in constrained systems.
Goals and objectives of the course in terms of competences and skills	To acquaint students with the fundamentals of collision and impact theory. In order to achieve this aim the following tasks should be fulfilled: 1st Analyse the fundamental relationships of the stroke/Impact theory. 2nd Teach students how to solve the task on collision and impacts applying the computer programs. 3rd Improve students' knowledge of physics related to the fields of vibrotechnics and vibromachinery 4th Teach students the skills required to be proficient in the calculations of the technical, impact machine and mechanical engineering object collisions.
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 tasks on collision and impact applying the MathCAD program. 2nd Modelling the collision and impact tasks applying the Working Model. 3rd Calculating the eqvivalent static power applying the Solid Work Program.
Recommended literature	O. Kepe J. Vība, Teorētiskā mehānika, Rīga, Zvaigzne, 1982.g., 577lpp; O. Kepe J. Vība, Teorētiskā mehānika, Dinamika I, Rīga, RTU, 1981. g., 259.lpp. O. Kepe J. Vība, Teorētiskā mehānika, Dinamika II, Rīga, RTU, 1996. g. 173. lpp; E. Lavendelis, Vibrācijas tehnikā IV, Maskava, "Mašīnbūve", 1981. g., 509.lpp. Я. А. Виба, Оптимизация и синтез виброударных машин, Рига, Зинатне, 1988.г. 252стр.
Course prerequisites	Math. Mechanics. Physics.

Course outline

Theme	Hours
Introduction to the theory of collision and impact	8
Stereo-mechanical model theory	8
Collision system with a computer simulation	8
Vibroshock system analysis, optimization and synthesis	8
Vibroshock machine modelling	8
Forging and piles process modelling	8

Learning outcomes and assessment

Learning outcomes	Assessment methods
Students are able to evaluate the collision processes in nature in different forms	Laboratory work.
Able to provide examples of object collision and impact conditions	Questions in the practical work
Able to analyze the mechanisms of shock and vibration machines	Assessment test
Able to distinguish between vibrotechnology and collision technology challenges	Questions at the end of the lecture.
Able to formulate mechanical object collision and impact analysis tasks	Assessment test
Able to evaluate mechanical engineering object collision problems	Exam

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	4.0	6.0	2.0	1.0	0.0		*	