RTU Course "Rotary Machines"

15325 Teorēt.mehānikas un materiālu pretestības katedra

General data

Code	MTH505
Course title	Rotary Machines
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	Grāpis Ojārs
Academic staff	Vība Jānis
Volume of the course: parts and credits points	1 part, 3.0 Credit Points, 4.5 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	Rotating parts of structures, shafts of energy and transportation machinery parts. A key initiative of the dynamic load factor, rotor disbalance. The dynamic calculation methods are analysed. The rotor balancing methods are considered.
Goals and objectives of the course in terms of competences and skills	Indicating the problems and calculation methods for rotor machines. In order to achieve this aim the following tasks should be fulfilled: 1st The assessment of the rotor starting and stopping process for the system with two degrees of freedom; 2nd Rotor dynamics for the system with four degrees of freedom.
Structure and tasks of independent studies	Within the framework of the present study subject the students should perform independent work on the following themes: 1st Supercritical speed, calculation; 2nd Differential equations of rotor oscillation with two degrees of freedom; 3rd Dynamic load for the rotor supports.
Recommended literature	Ф. М. Диментберг, К. Т. Шаталов, А. А. Гусаров, Машиностроение, Москва, 1964. г., 308стр. Maurice L. Adams, Jr., Rotating Machinery Vibration: From Analysis to Troubleshooting, Second Edition, CRC Press, 2009., 376p. Rotor Dynamics, Jan Kicinski, IFFM Publishers, Gdansk, 2006., 537p.
Course prerequisites	Physics (at the secondary school level). RTU differential and integral calculations.

Course outline

Theme	Hours
Rotating parts of structures, shafts of the energy and transportation machinery main parts.	5
Rotating system breakdown.	4
The critical speed.	4
Selfcentering effect.	4
Stability problems.	4
Anisotropy effect of the rotating system.	4
Complex system analysis.	4
Mathematical models: linear and nonlinear, discrete and continuable.	4
Calculation methods	5
Static and dynamic balancing.	5
Selfbalancing system.	5

Learning outcomes and assessment

Learning outcomes	Assessment methods
At the end of the course students will be able to evaluate the use of the rotating system	Questions at the end of the lecture
At the end of the course students will examine the dynamics of high speed rotary motion	Questions at the end of the lecture
At the end of the course students will be able to observe the specific characteristics of the rotating system	Questions at the end of the lecture
At the end of the course students will be able to determine the rotor speed dynamic response bearings	Questions in the practical work
At the end of the course students will be able to use a rotating system calculation methods	Questions in the practical work
At the end of the course students will be able to formulate rotor balancing tasks	Exam questions

Study subject structure

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