



## RTU Course "Engineering Measurements and Experiments"

15325 Teorēt.mehānikas un materiālu pretestības katedra

### General data

Code	MTH206
Course title	Engineering Measurements and Experiments
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	Griņevičs Ivans Jevstignejevs Vladislavs
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Experimental investigations in engineering. Methods and technical means for measuring physical and mechanical properties of materials (metals, composites). Measurements of dynamical parameters of mechanisms and structures (vibration, noise, temperature, pressure, flow, matter structure, concentration, force, velocity, acceleration). Types of experiments and plans. Automation of experimental investigations. Identification experiments. Methods for computer analysis and mathematical processing of experimental data.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to provide students with the skill to perform engineering measurements and experimentation. Students will obtain a competence to evaluate the accuracy and validity of experimental data.
Structure and tasks of independent studies	Studying the main study subject themes consulting the lecture materials and recommended literature. Preparing for laboratory works on measuring of various technical parameters. Analysis and mathematical processing of laboratory experimental data, forming of report. Development of home work on specific engineering parameter measuring methods and means. Tutorials of teacher.
Recommended literature	1. Beckwith T.G., Marangoni R.D., Lienhard J.H. Mechanical Measurements. 6th Edition. – New Jersey 07458, Pearson Education Inc., 2007. 2. Usher M.J. Sensors and Transducers. – London: Macmillan Publishers Ltd, 1985. 3. Профос П. Измерения в промышленности. Справочник. - Москва: Металлургия, 1980. 4. Алиев Т.М., Тер-Хачатуров А.А. Измерительная техника. - Москва: Высшая школа, 1991. 5. Morris Alan S., Langari Reza. Measurement and Instrumentation. Theory and Application. - Elsevier Inc., 2012.
Course prerequisites	Mechanics, physics, mathematics

### Course outline

Theme	Hours
The importance of technical engineering measurements and experiments in the field of mechanical engineering. Classification of physical parameters.	2
Methods and devices for measuring stresses and deformations	4
Methods and devices for measuring vibration parameters	4
Methods and devices for measuring sound and noise	4
Methods and devices for measuring motion parameters, pressure and forces	4
Methods and devices for measuring moisture content in materials	4
Methods and devices for measuring temperature	2
Experiments on machine diagnostics and testing. Identification experiments	4
Planning and automation of experiments. Methods for computer analysis and mathematical processing of experimental data	4

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Ability to explain main principles of methods, applied for measuring mechanical parameters of objects.	Examination test: the core principle of a specific measuring method.
Ability to use technical means and devices for measuring the mechanical parameters	Laboratory work: practical application of measuring device
Ability to analyze results of measurements and evaluate measuring errors	Examination test on methods for evaluation of measuring errors; Laboratory work - error evaluation in laboratory measurements
Ability to do technical measurements and experiments without assistance	Laboratory work: organizing of experimentation on laboratory installation

**Study subject structure**

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