

Study Program: Physics			
Type and level of studies: Bachelor studies			
Course name: Physico-technical Measurements			
Lecturer: Branko Drljača			
Status: Compulsory			
ECTS: 7			
Attendance prerequisites: Mechanics and Thermodynamics 1,2; Electromagnetism 1,2; Optics, Fundamentals of Electronics			
Course aims The course aims to provide basic knowledge about the principles of measuring physical quantities, emphasizing the possibilities of converting signals of different nature into electrical signals.			
Course outcome Acquiring the necessary knowledge about the basic principles of measuring physical quantities – accuracy, reliability and reproducibility of the obtained results and the possibilities of converting signals of different nature into electrical signals, their processing and transmission. Introduction to the procedure calibration and ensuring the accuracy of the instruments. Introduction to automated measuring systems and remote measurement.			
Course content <i>Theoretical part</i> Modern methods of processing measurement results. Static and dynamic characteristics of transducers and instruments. Zero-order systems. First-order systems. Second-order systems. Correction of dynamic characteristics of converters. Experimental determination of dynamic characteristics of measurement systems. Measurement of electrical quantities: voltage, current, capacitance, inductance. Balanced and unbalanced bridge circuits. Analog and digital meters. The basic working principles of galvanometer, multimeter, oscilloscope and A/D converter and data acquisition system. Displacement measurement. Coupling force and torque measurement. Pressure and vacuum measurement. Measurement of volume and mass flow rate of fluid. Temperature measurement. Humidity measurement. Magnetic induction measurement methods. Time measurement. Introduction to computer based measurement systems. Computer control of measuring equipment. Multi-sensor networking. Automation of measurement procedures. Transmission and processing of information in measurement and control systems. Computer acquisition systems. Remote monitoring and information transfer systems. International measurement standards. An overview of the definitions of basic SI system units. Derived units. Standards. Calibration and adjustment. <i>Practical part</i> Experimental exercises and a visit to an appropriate laboratory.			
Literature 1. Д. Станковић: Физичко техничка мерења – сензори, Универзитет у Београду, Београд 1997. 2. Д. Станковић, А. Ђуришић: Физичко техничка мерења – Лабораторијски практикум, Београд 1996. 3. М. Поповић: Сензори и мерења, Виша електротехничка школа, Београд 2000. 4. I. R. Sinclair: Sensors and transducers, Newnes, Oxford 2001. 5. http://www.sensorsweb.com/			
Number of active classes			Other classes
Lectures: 2	Practical classes: 2	Other forms of teaching:	
Teaching methods Lectures (2 classes per week during the semester), laboratory exercises (2 classes per week) during the semester and a visit to an appropriate laboratory.			
Assessment (maximum 100 points)			
Course assignments	points	Final exam	points
Lectures	10	written exam	30
Laboratory exercises	20	oral exam	40
Total	30		70