

Study program: Modern computer technologies			
Course title: Electronic Measuring Instrumentation			
Professor/assistant: Zoran Veličković / Nataša Bogdanović, Milan Savić			
Type of course: compulsory			
ECTS credits: 6			
Pre-requisites: none			
Aims of the course: Preparing students to: - adopt the basic concepts of the system of units, account errors, architecture electronic measurement instruments, procedures, and methods of measurement in electronics using modern measuring devices; - study the principles of analog and dig. instrumentation and technical requirements for their proper implementation; - learn how to solve practical problems in the field of measurement of electronics using a computer-controlled equipment.			
Learning outcomes: It is expected that after passing the exam students can: - analyze and independently perform tasks in the field of measurement in electronics; - use basic measurement instrumentation in order to obtain accurate measurement data; - use standard techniques of measurement to obtain results and valuations of their accuracy; - compare the results with the expected and suggest appropriate methods of measurement; - describe the basic components of modern computerized measuring systems.			
Syllabus <i>Theoretical part:</i> The subject of the study. Physical quantities and units systems. International System of Units. Account errors. Absolute and relative error. Accuracy and precision. Electronic measuring instruments, analog and digital electronic measuring instruments. Comparison of characteristics. Measuring amplifiers. Analog and digital electronic voltmeters. Voltmeters of AC voltage. Measuring rectifiers with diodes. Cathode ray tube. Analog oscilloscope. Digital oscilloscope. Probes and transducers. Measuring AC voltage sources. Electronic counters. Signal analyzers. Computer - controlled test systems. Instrumentation bus. <i>Practical part:</i> Basic operation of Electronics Workbench. Recording the amplitude and phase characteristics of the measuring amplifier. Forming factor and measuring rectifiers. Analog electronic voltmeter based on the differential amplifier. Basis of measurement workbench ISP 8022. Basic characteristics of the analog oscilloscope. Measuring sources in electronic circuits. Electronic counters as timers of signal periods. The realization method of measuring cathode oscilloscope.			
Literature 1. A. S. Morris , R. Langari, Measurement and Instrumentation, Theory and Application, Elsevier Inc, 2012. 2. S. Tumanski, Principles of Electrical measurement, CRC Press Taylor & Francis Group, 2006. 4. Z. Veličković, Measurement in electronics: Practicum laboratory exercises, Niš, 2008.			
Number of active classes			Other forms of teaching:
Lectures: 30	Practical classes: 30	Research work:	
Teaching methods Combination of interactive approach with practical problem solving.			
Grading system (maximum 100 points), grading scale from 5 to 10: below 51 points grade 5, grade 6 from 51-60 points, grade 7 from 61-70 points, grade 8 from 71-80 points, grade 9 from 81-90 points, grade 10 from 91-100 points.			
Pre-exam obligations	points	Final exam	points
activity during theoretical lectures	10	written exam	15
practical training	20	oral exam	15
colloquium(s)/seminar papers	40		
Sum	70	Sum	30