Course Unit Descriptor

Study Programme: Biomedical Engineering		
Course Unit Title: Electrical and electronic measurements		
Course Unit Code: EIEEM		
Name of Lecturer(s): Boris Antić		
Type and Level of Studies:Bachelor level		
Course Status (compulsory/elective): compulsory		
Semester (winter/summer): winter		
Language of instruction:english		
Mode of course unit delivery (face-to-face/distance learning): face-to-face		
Number of ECTS Allocated:5		
Prerequisites:none		
Course Aims: Acquiring knowledge in the field of electrical and electronic measurements.		
Learning Outcomes: good knowledge and understanding of the use, operation principles and the structure of electrical measuring instruments, gain experience and training in the field of analysis of electrical measurements' data, the ability to search the literature and other forms of information in the field of electrical measurement and capability to present the research results.		
Syllabus: Physical quantities and measurement units. Electrical measuriement instruments. Electromechanical measuring instruments. Instruments with moving coil. Extending the measuring range of the instrument with the moving coil. Extending the measurement range of measuring instruments. Electronic measuring instruments. Electrical measurement of non-electrical quantities. Measurement systems. Measuring accesories. Counter-timer. Counting. Measuring time intervals. Measuring frequency and period. Frequency ratio measurements. Phase difference measurement. Digital-to-analog converters. Function generators. Analog-to-digital converters. Digital multimeters. Oscilloscopes. Time bases. Multi-channel oscilloscopes. Digital oscilloscopes. Scope probes. Measurement signal parameters using oscilloscope. Measuring bridges. DC measuring bridges. Wheatstone bridge. Kelvin bridge. Unbalanced Wheatstone bridge. AC measuring bridge. Measuring bridges with multiple sources. Measuring compensators. DC measuring compensators. Measurement of electrical current, voltage, resistance, impedance, power, capacitance and inductance. General characteristics of the measuring instruments. The static characteristics. Sensitivity. Linearity. Resolution. Measuring range / span. Scale / pointer hand / display. Input / output impedance. Accuracy. Stability. Normal / border / reference conditions. Instrument marking. Dynamic characteristics. Processing of the measurement results. Measurement error. Blunders. Systematic errors. Random error. Measurement uncertainty. Standard measurement uncertainty. Combined uncertainty. The expanded measurement uncertainty. Measurement information. Quality of measurement information.		
Required Reading: Relevant literature in English		
Weekly Contact Hours:2	**Lectures:2**	**Practical work:0**
Teaching Methods: Lectures. Laboratory Practice. Consultations.		

Knowledge Assessment (maximum of 100 points):100			
Pre-exam obligations	points	**Final exam**	points
Laboratory exercise defense	30	Written part of the exam	40
		Oral part of the exam	30
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			