

<b>Study program: Modern computer technologies</b>			
<b>Course title:</b> Sensors and Actuators			
<b>Professor/assistant:</b> Dejan Blagojević			
<b>Type of course:</b> elective			
<b>ECTS credits:</b> 6			
<b>Pre-requisites:</b> none			
<b>Aims of the course:</b>			
<ul style="list-style-type: none"> <li>• Introducing the basic principles of operation of sensors and actuators based on the principles of converting energy from one form to another. Introducing students to basic knowledge on application of optimal selection of methods for conversion of energy, i.e. an adequate choice of sensors / actuators in industrial plants. Prepare students to work in multi-disciplinary areas.</li> </ul>			
<b>Learning outcomes:</b>			
The student is able to:			
<ul style="list-style-type: none"> <li>• classify sensors by type and purpose and uplift the optimized source in accordance with the requirements of the process,</li> <li>• determine the place and task of sensors in the production process,</li> <li>• manage the process by using sensory device parameters,</li> <li>• resolve simpler technical problems of control and detection of change of production / process parameters using sensors,</li> <li>• monitor and analyze output results from sensor devices and make decisions on the needs for process optimization,</li> <li>• combine skills from related technical fields.</li> </ul>			
<b>Syllabus</b>			
<u>Theoretical part</u>			
Sensor classification. Dynamic / static sensor characteristics. Potentiometers, measuring strips, capacitive and inductive converters and their reception process. Absolute and incremental encoders, and their application in the production process. Piezoelectric effect. Accelerometers, force sensors, torques, stresses and their reception process. Pressure, flow, level, temperature and application of sensors in the production process. Actuators: electromagnetic, piezoelectric, pneumatic and hydraulic sensors and their application in the production process.			
<u>Practical part:</u>			
Sensor classification. Dynamic / static sensor characteristics. Potentiometers, measuring strips, capacitive and inductive converters and their reception process. Absolute and incremental encoders, and their application in the production process. Piezoelectric effect. Accelerometers, force sensors, torques, stresses and their reception process. Pressure, flow, level, temperature and application of sensors in the production process. Actuators: electromagnetic, piezoelectric, pneumatic and hydraulic sensors and their application in the production process.			
<b>Literature</b>			
1. Stanković D. Fizičko tehnička merenja - senzori, 2001, Stankovic D. Physical technical measurements - Sensors, 2001. 2. Popović M. Senzori i merenja, Zavod za udžbenike i nastavna sredstva, I. Sarajevo 2004., Popovic M. Sensors and Measurements, Institute for textbooks and teaching aids, and. Sarajevo 2004. 3.Clarence W. de Silva, Sensor Systems: Fundamentals and Applications 2016 by CRC Press. 4..J. Fraden (2010). Handbook of Modern Sensors, Physics, Designs and Applications, Springer-Verlag.			
<b>Number of active classes</b>			Other forms of teaching:
Lectures: 30	Practical classes: 30	Research work:	
<b>Teaching methods</b>			
Combinations of interactive approach with practical problems solving.			
<b>Grading system</b> (maximum 100 points), <b>grading scale</b> 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.			
<b>Pre-exam obligations</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
activity during theoretical lectures	<b>10</b>	written exam	<b>70</b>
practical training	<b>20</b>	oral exam	
colloquium(s)/seminar papers			
<b>Sum</b>	<b>30</b>	<b>Sum</b>	<b>70</b>