

## Specification for the book of courses

<b>Study program</b>		Electrical Engineering and Computer Science		
<b>Module</b>		Electron Devices and Microsystems		
<b>Type and level of studies</b>		Undergraduate Academic Studies		
<b>The name of the course</b>		Sensors and Actuators		
<b>Lecturer (for lectures)</b>		Vračar M. Ljubomir		
<b>Lecturer/associate (for exercises)</b>		Vračar M. Ljubomir		
<b>Lecturer/associate (for OFE)</b>		Vračar M. Ljubomir		
<b>Number of ECTS</b>	6	<b>Course status (obligatory/elective)</b>	Obligatory	
<b>Prerequisites</b>				
<b>Course objectives</b>	Acquiring the knowledge for understanding and practical application of modern sensor components and their application in Microsystems.			
<b>Course outcomes</b>	Students obtain the knowledge about device fabrication, operational principles and practical implementation of integrated sensors and actuators.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Information-processing systems. Measurement and control systems. Actuators. Sensor definitions and classification. General sensor characteristics and limitations.. Parameters definition. Sensor calibration methods. Error corrections. Fabrication technology. Reliability issues. Sensors for radiation, mechanical, thermal ,magnetic , chemical and biological signals. Sensors design and operation. Applications. Smart integrated sensors and actuators. Functional blocks. Micro-electro-mechanical sensors (MEMS), technology, components and systems. Integrated sensors and MEMS components.			
<b>Practical teaching (exercises, OFE, study and research)</b>	The laboratory exercises include courses on sensors operation and electrical characterisitcs found in practice. Especially, the introductory course is aimed to educate students with programing micorcontrolers for data processing from different snensor devices.			
<b>Textbooks/references</b>				
1				
2	"Real-Time Environmental Monitoring - Sensors and Systems", Miguel F. Acevedo, CRC press, ISBN 13: 978-1-4822-4020-7			
3				
4				
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	1	2	0	0
<b>Teaching methods</b>	Auditorial teaching, Laboratory exercise, student tutorials			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>	
<b>Activity during lectures</b>	10	<b>Written exam</b>		
<b>Exercises</b>	20	<b>Oral exam</b>	50	
<b>Colloquia</b>				
<b>Projects</b>	20			