

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Electron Devices and Microsystems		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Microsystems Design		
Lecturer (for lectures)		Prijjić P. Aneta		
Lecturer/associate (for exercises)		Prijjić P. Aneta, Stojković S. Aleksandra		
Lecturer/associate (for OFE)		Stojković S. Aleksandra		
Number of ECTS		6	Course status (obligatory/elective)	Obligatory
Prerequisites				
Objectives of the course are focused on:				
<ul style="list-style-type: none"> - Introduction to the basic steps of the microsystems design process; - Pointing to the importance of the computer aided design (CAD) of microsystems; - Understanding the operation principle of the basic components of the microsystem (sensors and actuators); - Presentation of materials and technologies involved in the fabrication of microsystems; - Getting acquainted with the laws of mechanics and fluid flow necessary for the microsystem design process; - Analysis of scaling laws in microsystems; - Mastering software tool ANSYS Workbench in order to design and analyze the functioning of the microsystem. 				
Course objectives				
Learning outcomes allow a student to:				
<ul style="list-style-type: none"> - Specify the basic phases and activities related to the design of the microsystem; - Explain the necessity of using a computer when designing a microsystem; - Explain the structure, the principle of operation and disadvantages of the various components of the microsystem; - Specify the basic materials and technologies used for the fabrication of the microsystem; - Summarize the significance of the scaling laws of microsystems for their application; - Create an adequate project that analyzes the functionality of the given microsystem in the ANSYS Workbench software package; - Design components of microsystems that meet specified characteristics with the help of the software tool ANSYS Workbench. 				
Course outcomes				
Course outline				
Introduction. Steps in the process of designing microsystems. Basic design settings. Design analysis. Verification of design. Design and analysis of microsystems using a computer (CAD). Operation principles of microsystem components. Materials for microsystems fabrication. Microsystem technology development. Laws of mechanics and fluid flow in the design of microsystems. Scaling laws of the microsystems. Analysis of microsystems based on pressure sensors and thermoelectric generators.				
Theoretical teaching				
Classroom exercises (solving problems). PC exercises in ANSYS Workbench software on the topics: monolithic and bimetal cantilever beams; accelerometer with inertial mass; micro thermoelectric generator; electro-thermo-mechanical actuator.				
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	Chang Liu, "Foundations of MEMS", 2nd Edition, Pearson, 2011.			
2	Tai-Ran Hsu, "MEMS and Microsystems: design, manufacture, and nanoscale engineering", 2nd Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, USA, 2008.			
3	PC exercises manuals			
4	Written and video tutorials for ANSYS Workbench, Online Available: https://www.ansys.com/academic/free-student-products/support-resources .			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	1	0	0
Teaching methods				
Theoretical teaching - using slides; Classroom exercises; Demonstration teaching - presenting realized microsystems; Exercises using PC. Project tasks presentation.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points

Activity during lectures	20	Written exam	25
Exercises	30	Oral exam	25
Colloquia			
Projects			