

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		Autonomous Microsystems		
Lecturer (for lectures)		Vračar M. Ljubomir		
Lecturer/associate (for exercises)		Vračar M. Ljubomir		
Lecturer/associate (for OFE)		Vračar M. Ljubomir		
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Introduction to the design of autonomous microsystems and their practical implementation.			
Course outcomes	Theoretical knowledge. Knowledge of the design and technology of autonomous microsystems. Knowledge of optimization techniques for power consumption in autonomous microsystems. Ability practical realization of. The ability to design autonomous microsystems.			
Course outline				
Theoretical teaching	Autonomous microsystems - definition and classification by application areas. Architecture of autonomous microsystems. Battery-powered systems. Types of batteries. Battery-charging circuits. Energy Harvesting systems: thermal, solar, chemical, mechanical. Optimization of the power consumption. Design principles of autonomous microsystems. Energy harvesting block. Energy storage block. Sensor block. Telemetry block. Embedded software for autonomous microsystems.			
Practical teaching (exercises, OFE, study and research)	Computer simulation using the ECAD package. The choice of components (low-power, micro-power). Demonstration of the application realized using microsystem on a PCB level. Practical design of the autonomous telemetry microsystem using a development kit.			
Textbooks/references				
1	"Energy Harvesting Autonomous Sensor Systems", Yen Kheng Tan, CRC Press			
2	"Real-Time Environmental Monitoring - Sensors and Systems", Miguel F. Acevedo, CRC press, ISBN 13: 978-1-4822-4020-7			
3	"Energy Harvesting Technologies", Shashank Priya, Daniel J. Inman, Springer, ISBN 978-0-387-76463-4			
4	"Powering Autonomous Sensors", María Teresa Penella-López, Manuel Gasulla-Forner, Springer, ISBN 978-94-007-1572-1			
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	2	0	0
Teaching methods	Lectures; Computer simulations; Practical laboratory work; Consultation.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam	Points	
Activity during lectures	10	Written exam		
Exercises	15	Oral exam	50	
Colloquia				
Projects	25			