

## COURSE DESCRIPTION CARD – SPECIMEN

Faculty of Electrical Engineering									
Field of study	Electrical and Electronics Engineering						Degree level and programme type	bachelor's degree, full time programme	
Specialization/ diploma path	-						Study profile	-	
Course name	Fundamentals of Real-Time Operating Systems						Course code	IS-FEE-10076S	
							Course type	elective	
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	summer
	15		15					No. of ECTS credits	3
Entry requirements	-								
Course objectives	Students acquire knowledge on the architecture and basic functional components of a selected real-time operating systems (RTOS). Students develop the theoretical and practical knowledge on preparing and testing of applications that communicate in real time using a physical microprocessor-based system.								
Course content	<p><u>Lecture:</u> The operating system - tasks, architecture, basic work mechanisms. POSIX standard. Architecture of real-time operating systems: system kernel, process and task management, synchronization and inter-task communication, alarms, interrupts.</p> <p><u>Laboratory classes:</u> Basics of creating applications in an integrated software environment working under RTOS control. Multithreaded applications for the selected microcontroller. Creating connection channels (Telnet protocol, static www server) for microprocessor-based system. Interprocess communication. Priorities, methods and algorithms for scheduling.</p>								
Teaching methods	lecture, presentation, practical work in laboratory, small group discussion								
Assessment method	lecture – written exam, laboratory class – set of exercises								
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study	
LO1	Defines a real-time operating system and its properties.								
LO2	Specifies the basic components of a real-time operating system and the rules of their interoperation.								
LO3	Describes the features and implementation solutions of selected commercial real-time operating systems, knows examples of such systems								

L04	Creates algorithms for the implementation of real-time control tasks in selected programming techniques.		
L05	Can create and test an application running in real time.		
L06	Can configure the system for cooperation with real-time automation device.		
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed	
L01	written test on lecture content	L	
L02	written test on lecture content	L	
L03	written test on lecture content	L	
L04	evaluation of the report on exercise	LC	
L05	evaluation of the report on exercise	LC	
L06	evaluation of the report on exercise	LC	
Student workload (in hours)		No. of hours	
Calculation	lecture attendance	15	
	participation in laboratory classes	15	
	preparation for laboratory classes	10	
	working on reports	10	
	participation in student-teacher sessions related to the laboratory classes	5	
	preparation for and participation in exam	20	
	TOTAL:	75	
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		37	1.5
Student workload – practical activities		40	1.5
Basic references	1. Liu Jane W. S., Real-time systems, New York, Prentice Hall, 2000. 2. Stallings W.: Operating systems: internals and design principless, Boston: Pearson, 2012. 3. Tanenbaum A.S.: Modern operating systems. Boston: Pearson Education, 2015. 4. Walls C.: Building a Real Time Operating System. Elsevier Science & Technology, 2019. 5. Wang, K.C. Embedded and Real-Time Operating Systems, Springer, 2017. 6. Wang J.: Real-Time Embedded Systems, Wiley, 2017.		
Supplementary references	1. Siewert S., Pratt J.: Real-Time embedded components and systems with Linux and RTOS. Ingles, 2016. 2. QNX NeutrinoR RTOS. User’s Guide For QNX Neutrino 6.5.0; Photon microGUI Programmer’s Guide For QNXR NeutrinoR 6.5.0 QNX Software Systems, 2010.		

<b>Organisational unit conducting the course</b>	<b>Department of Automatic Control and Robotics</b>	<b>Date of issuing the programme</b>
<b>Author of the programme</b>	<b>Rafał Kociszewski, PhD Eng.</b>	<b>25.02.2021</b>

**L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,**

**S – seminar**