MODULE/ COURSE FORM

A. general information

To be completed by Course Team							
	Module name : **Embedded systems and microprocessors**					Module code: M15	
	Course name: **Embedded systems and microprocessors**					Course code:	
	Faculty: **INSTITUTE OF APPLIED INFORMATICS**						
	Field of study: **INFORMATICS**		Level of education: **first**				
	Mode of study : **Full-time**	Learning profile: **Practical**	Speciality::				
	Year/ semester: **2/4**	Module/ course status:: **Obliga tory**		Module/ course language: **Polish/English**			
	Type of classes	lecture	lessons	lab	project	Tutorial	other (please specify)
	Course load	**30**		**30**			

Module/ course objectives	Learning the basics of microprogramming. Familiarize yourself with the design and operation of embedded systems and the principles of increasing the performance of the processor.
Entry requirements	Basic knowledge of digital technology, programming fundamentals

LEARNING OUTCOME

Nr	LEARNING OUTCOME DESCRIPTION	Learning outcome reference
01	knowing the basics principles of the central processing unit (CPU)	K_W03, K_W05
02	knowing the basics of microcontroller programming	K_W07, K_W15
03	understanding the principle of executing a program instructions in a microprocessor	K_W10
04	writing simple programs that control the microprocessor's internal blocks	K_U03, K_U04, K_U08, K_U15
05	performing in the program simple procedures for internal microcontroller peripheral control	K_U03, K_U04, K_U08, K_U15
06	designing a simple system based on a microcontroller	K_U03, K_U04, K_U06, K_U08, K_U15
07	knowing the significance of embedded systems In consumer electronic	K_K01, K_K02

Assessment method	Learning outcome number
Exam in a written form with a theoretical and practical part	1 - 3
Written quizes	1 - 6
Practical tasks and Project	4 - 6

STUDENT WORKLOAD		
	Number of hours	
	In all	including practical
Participation in lectures	30	30
Independent study of lecture topics	15	15
Participation in tutorials, labs, projects and seminars	30	30
Independent preparation for tutorials*	30	30
Preparation of projects/essays/etc. *	30	30
Preparation/ independent study for exams	10	10
Participation during consultation hours	5	5
Other	2	
TOTAL student workload in hours	152	150
Number of ECTS credit per course unit	**6 ECTS**	
Number of ECTS credit associated with practical classes	**6 ECTS**	
Number of ECTS for classes that require direct participation of professors	**2,6 ECTS**	

B. details information

To be completed by Course Team							
	Module name : **Embedded systems and microprocessors**					Module code:	
	Course name: **Embedded systems and microprocessors**					Course code:	
	Faculty: **Institute of Applied Informatics**						
	Field of study: **INFORMATICS**			Level of education: **first**			
	Mode of study : **Full-time**	Learning profile: **Practical**		Speciality::			
	Year/ semester: **2/4**	Module/ course status:: **obligatory**			Module/ course language: **Polish/English**		
	Type of classes	lecture	lessons	lab	project	Tutorial	other (please specify)
	Course load						

Module/ course coordinator	**dr inż. Robert Smyk , dr hab. inż. Zenon Ulman**
Lecturer	**dr inż. Robert Smyk , dr hab. inż. Zenon Ulman**

CURRICULUM CONTENTS

Lecture

Microprocessors and microcontrollers.
Modules of microcontrollers.
Examples of construction and organization.
Microprocessor programming languages.
The role of operational programs, their functions and role in control.
Types of operational programs.
Interoperability with driver modules.
Secure data processing.
Ways to improve the reliability and security of information.

Including content related to practical vocational training: [100%]

laboratory

Laboratory exercises include practical learning about embedded devices and how to use them.
Getting familiar with the IDE for embedded software development, learn the basics of assembly language, learn the structure and behavior of typical CPUs based on the analysis of simple assembler examples, the basics of programming embedded systems in high-level languages, the rules for using development libraries dedicated to embedded systems, programming elementary CPU I / O on selected examples (for ex. keyboard, 7-segment display, text / graphic display), programming of internal CPU blocks / registers, examples of simple programming selected communication interfaces (UART, SPI, I2C), interrupts.

Including content related to practical vocational training: [100%]

Project (other)

Basic literature	1. R. Pałka: Mikroprocesory, WNT 2. M. M. Mano, Ch. R. Kima: Podstawy projektowania układów logicznych i komputerów, WNT 3. W. Stallings. Organizacja i architektura systemu komputerowego, WNT
Additional literature	
Teaching methods	Lecture Laboratory
Form and terms of an exam	Assessment based on 2 colloquy and written exam on the subject in the examination session.