

## DESCRIPTION OF THE COURSE OF STUDY

<b>Course code</b>	<b>0613-2INF-C31-SW</b>	
<b>Name of the course in</b>	Polish	<b>Systemy wbudowane</b>
	English	<b>Embedded Systems</b>

### 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

<b>1.1. Field of study</b>	Computer Science
<b>1.2. Mode of study</b>	Full-time
<b>1.3. Level of study</b>	Undergraduate engineering study
<b>1.4. Profile of study</b>	General academic
<b>1.5. Person/s preparing the course description</b>	Dr. Eng. Przemysław Ślusarczyk
<b>1.6. Contact</b>	<a href="mailto:pslusarczyk@ujk.edu.pl">pslusarczyk@ujk.edu.pl</a>

### 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

<b>2.1. Language of instruction</b>	English
<b>2.2. Prerequisites</b>	Programming fundamentals Computer Systems Architecture Operating Systems

### 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

<b>3.1. Form of classes</b>	lectures, laboratories, project	
<b>3.2. Place of classes</b>	Courses in the UJK teaching rooms of the Faculty of Exact and Natural Sciences	
<b>3.3. Form of assessment</b>	credit with grade (lectures, laboratories, project)	
<b>3.4. Teaching methods</b>	lectures– informative lectures laboratories, project – laboratory method (practical classes using Java development tools )	
<b>3.5. Bibliography</b>	<b>Required reading</b>	1. C Tim Wilmshurst, Designing Embedded Systems with PIC Microcontrollers: Principles and Applications, Elsevier 2010.
	<b>Further reading</b>	2. Dogan Ibrahim, PIC Microcontroller Projects in C, Basic to Advanced, 2 <sup>nd</sup> Edition, Elsevier 2014

### 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

<b>4.1. Course objectives (including form of classes)</b>
<p><b>Knowledge (lectures and laboratories)</b> C1. Learning the basic methods and techniques of designing simple embedded systems based on microcontrollers.</p> <p><b>Abilities (laboratories and project)</b> C2. Learning techniques and tools supporting the design of embedded systems.</p> <p><b>Social competence (laboratories and project)</b> C3. Developing competence to provide expert knowledge related to the embedded systems.</p>

#### 4.2. Detailed syllabus (including form of classes)

##### Lectures and laboratories:

1. Basic characteristics of embedded systems.
2. Architecture of 8-bit PIC microcontrollers.
3. Peripheral devices of PIC16F microcontrollers.
4. Programming of PIC16F family microcontrollers in C language.
5. Techniques of software development for embedded systems.
6. Countdown and timing using PIC16F family microcontrollers.

##### Project:

Students cooperates in groups to design and implement low complexity software for PIC microcontroller.

#### 4.3. Education outcomes in the discipline

Code	A student, who passed the course	Relation to learning outcomes
within the scope of <b>KNOWLEDGE:</b>		
W01	has knowledge of embedded systems	INF1A_W04 INF1A_W05 INF1A_W08 INF1A_W13-14
W02	has knowledge of PIC microcontrollers architecture	INF1A_W08 INF1A_W13-14
W02	has knowledge of embedded systems development methods	INF1A_W08 INF1A_W13-14
within the scope of <b>ABILITIES:</b>		
U01	can use tools dedicated to development of embedded systems	INF1A_U13 INF1A_U15 INF1A_U18-20 INF1A_U21
U02	has skill to implement, debug and test software for embedded systems	INF1A_U13 INF1A_U15 INF1A_U18-20 INF1A_U21
within the scope of <b>SOCIAL COMPETENCE:</b>		
K01	has competence to provide expert knowledge related to the object oriented programming	INF1A_K01

#### 4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes (code)	Method of assessment (+/-)																	
	Oral answer			Project			Self-study			Group work								
	<i>Form of classes</i>			<i>Form of classes</i>			<i>Form of classes</i>			<i>Form of classes</i>			<i>Form of classes</i>			<i>Form of classes</i>		
	L	C	P	L	C	P	L	C	P	L	C	P	L	C	P	L	C	P
W01	+																	
W02	+																	
U01						+			+			+						
U02						+			+			+						
K01	+								+			+						

4.5. Criteria of assessment of the intended learning outcomes		
Form of classes	Grade	Criterion of assessment
lecture (L)	3	at least 50% and not more than 60% of the total number of available points
	3,5	more than 60% and not more than 70% of the total number of available points
	4	more than 70% and not more than 80% of the total number of available points
	4,5	more than 80% and not more than 90% of the total number of available points
	5	more than 90% of the total number of available points
classes (C)	3	at least 50% and not more than 60% of the total number of available points
	3,5	more than 60% and not more than 70% of the total number of available points
	4	more than 70% and not more than 80% of the total number of available points
	4,5	more than 80% and not more than 90% of the total number of available points
	5	more than 90% of the total number of available points
project (P)	3	at least 50% and not more than 60% of the total number of available points
	3,5	more than 60% and not more than 70% of the total number of available points
	4	more than 70% and not more than 80% of the total number of available points
	4,5	more than 80% and not more than 90% of the total number of available points
	5	more than 90% of the total number of available points

#### 5. BALANCE OF ECTS CREDITS – STUDENT’S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
<i>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</i>		
<i>Participation in lectures</i>	30	
<i>Participation in laboratories/project</i>	60	
<i>Preparation for the exam</i>		
<i>Others</i>		
<i>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</i>		
<i>Preparation for the lecture</i>	5	
<i>Preparation for the laboratories</i>	10	
<i>Preparation for the exam</i>	10	
<i>Gathering materials for the project</i>	35	
<i>Preparation of multimedia presentation</i>		
<i>Others*</i>		
<b><i>TOTAL NUMBER OF HOURS</i></b>	<b>150</b>	
ECTS credits for the course of study	<b>6</b>	

*Accepted for execution* (date and signatures of the teachers running the course in the given academic year)

.....