### COURSE DESCRIPTION

**1. Course title:** ASSEMBLER PROGRAMMING LANGUAGES  
**2. Course code:** APL

**3. Validity of course description:** 2018/2019

**4. Level of studies:** first degree

**5. Model of studies:** stationary

**6. Field of study:** INFORMATICS

**7. Profile of studies:** general academic

**8. Programme:** ALL

**9. Semester:** 4, 5

**10. Faculty teaching the course:** Faculty of Automatic Control, Electronics and Computer Science, Institute of Informatics

**11. Course instructor:** Ph.D. Eng. Krzysztof Tokarz

**12. Course classification:** general

**13. Course status:** obligatory

**14. Language:** English


**16. Course objectives:**

The course aims to provide the basic knowledge and skills in the area of programming using the assembler language. Knowledge obtained gives the ability to make proper choice of programming language and methods to solve specific engineering tasks especially requiring the memory or time optimization. Student will understand details of executing the instructions and programs by the processor, computer functioning and will be able to use other programming languages consciously.

**17. Description of learning outcomes:**

<table>
<thead>
<tr>
<th>Nr</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Has the theoretical knowledge about architecture of modern processors and computers, operating systems, memory protection and virtual memory mechanisms.</td>
<td>Exam (sem. 4)</td>
<td>Lecture</td>
<td>K1A_W07, K1A_W10</td>
</tr>
</tbody>
</table>

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1 należy wskazać ok. 5 – 8 efektów kształcenia
<table>
<thead>
<tr>
<th></th>
<th>Student has the knowledge of implementation and optimization algorithms written in assembler language.</th>
<th>Lab report (sem. 4)</th>
<th>Laboratory</th>
<th>K1A_W12</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Student has the knowledge about the life cycle of modern processors, knows the trends of processors evolution.</td>
<td>Lab report (sem. 4)</td>
<td>Laboratory</td>
<td>K1A_W13, K1A_W14</td>
</tr>
<tr>
<td>4</td>
<td>Student can write programs in assembler language and use the API of the operating system.</td>
<td>Project report (sem. 5)</td>
<td>Project</td>
<td>K1A_U23</td>
</tr>
<tr>
<td>5</td>
<td>Student can perform systematically the low-level programs verification and testing.</td>
<td>Project report (sem. 5)</td>
<td>Project</td>
<td>K1A_U15</td>
</tr>
<tr>
<td>6</td>
<td>Student can create, according to the specification, software written in low-level programming language for simple computer systems.</td>
<td>Project report (sem. 5)</td>
<td>Project</td>
<td>K1A_U26, K1A_U29</td>
</tr>
</tbody>
</table>

**18. Teaching modes and hours**

Lecture / BA / MA Seminar / Class / Project / Laboratory:

30 / 0 / 0 / 0 / 30 / 15
## 19 Syllabus description:

**Lecture:**
- Introduction, Assembler among other programming languages. MASM – Microsoft assembler. Reasons to use assembler in modern software design.
- Math coprocessor, floating point instructions, MMX technology. Modern extensions of the instruction set: SSE, SSE2, SSE3, SSSE3, SSE4, AVX.
- Elements of the assembler language: statements, constants, variables, symbolic names, expressions and operators, keywords, directives, pre-defined symbols.
- Creating logical segments, defining variables and constants, data structures, unions, bit records, strings.
- Macros, macro procedures, repeat blocks, procedures, passing parameters to macros and procedures.
- Conditional assembling, interconnections between modules.
- Using assembler in modern programming environments, connecting assembler modules with high level programming languages.

**Laboratory:**
- Simple assembler program in Visual Studio programming environment.
- Debugging the assembler program, examples of using of the instructions.
- Simple assembler program in Windows operating system.
- Structure of the program with one main window.
-Assembler modules in Visual Studio programming environment.

**Project:**
Realization of the project written in assembler language with the individually chosen topic. Project should be prepared in Visual Studio programming environment using the mechanism of connecting assembler modules with C language and writing the dynamically linked libraries (dll).

## 20. Exam: yes (sem. 4)

## 21. Primary sources:

## 22. Secondary sources:
23. Total workload required to achieve learning outcomes

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>30/30</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>/</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>15/30</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>30/60</td>
</tr>
<tr>
<td>5</td>
<td>Seminar</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>10/20</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>75/120</td>
</tr>
</tbody>
</table>

24. Total hours: 195

25. Numbers of ECTS: 6 (3 – sem. 4, 3 – sem. 5)

26. Number of ECTS credits allocated for contact hours: 3

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 3

26. Comments:

Approved:

................................. .................................
(date, Instructor’s signature) (date, the Director of the Faculty Unit signature)