1. Course title: INDUSTRIAL COMPUTER SYSTEMS DESIGN
2. Course code: ICSD

3. Validity of course description: 2019/2020

4. Level of studies: 2nd cycle of higher education

5. Mode of studies: intramural studies

6. Field of study: INFORMATICS

7. Profile of studies: general academic

8. Specialty: INDUSTRIAL INFORMATICS SYSTEMS

9. Semester: II and III

10. Faculty teaching the course: Institute of Informatics

11. Course instructor: PhD Eng. Jacek Stój

12. Course classification: common courses

13. Course status: obligatory

14. Language of instruction: English

15. Pre-requisite qualifications:
General knowledge about computer science and communication networks. Passed course of Advanced Programming of Industrial Controllers

16. Course objectives:
The goal of the course is to present basics of Industrial Computer Systems Design and the life cycle of that systems. Students will be shown the way of offers preparation including basic hardware configuration of distributed real-time systems in reference to given requirement line the number of types of input/output signals, requested communication to be used or the number of control nodes. More detailed topics described during the course are: computer real-time systems hardware configuration, system topology, industrial Ethernet, industrial system safety/security, availability, redundancy, HazOP, risk analysis, IP, EX.
During the laboratory classes student will design and realize a sample industrial computer system.

17. Description of learning outcomes:

<table>
<thead>
<tr>
<th>No.</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>Knows and understands issues of industrial computer systems design</td>
<td>D</td>
<td>WM</td>
<td>K2A_W08</td>
</tr>
<tr>
<td>W2</td>
<td>Knows and understands the lifecycle of solutions implemented in industrial environment</td>
<td>D</td>
<td>WM</td>
<td>K2A_W10</td>
</tr>
</tbody>
</table>
U1 Can define problems and verify their solutions associated to industrial systems.  
RP L K2A_U08

U2 Can design an industrial computer system and implemented it using appropriate software and hardware tools.  
RP L K2A_U13

K1 Is ready to properly evaluate given data  
RP WM, L K2A_K01

18. Teaching modes and hours
Lecture: 15 h, Class: -, Laboratory: 30h

19. Syllabus description:

Lectures:
- Industrial Computer System – definition and examples
- System interfaces – inputs/output, communication networks
- Wireless communication in industrial systems
- Resource distribution in industrial systems and creation of system topology
- Documentation standards, PI&D
- Hazard and operability studies
- Risk analysis
- Available software for controllers programming and visualization panels and stations
- Preparation of system implementation
- Systems reliability, security and safety

Laboratory classes:
Realization of sample industrial system including:
- Design of system topology and hardware specification
- Verification of chosen topology applicability using available protocols
- Preparation of data exchange between controllers and visualization devices
- Consideration of real-time issues
- Implementation of sample program and visualization

20. Examination: no

21. Primary sources:

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Teaching mode</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>15/15</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>30/30</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>BA/ MA Seminar</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Other (exam)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><strong>Total number of hours</strong></td>
<td><strong>45/45</strong></td>
</tr>
</tbody>
</table>

### 24. Total hours: 75

### 25. Number of ECTS credits: 3

### 26. Number of ECTS credits allocated for contact hours: 1

### 27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 2

### 28. Comments: none

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Approved:

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