Z1-PU7	WYDANIE N1	Strona 1 z 4

(faculty stamp) **COURSE DESCRIPTION**

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 configuraiont, 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:

No.	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
W1	Knows and understands issues of industrial computer systems design	D	WM	K2A_W08
W2	Knows and understands the lifecycle of solutions implemented in industrial environment	D	WM	K2A_W10

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:

- Michael Whitt: „Successful Instrumentation and Control Systems Design", ISA 2004

22. Secondary sources:

- Paul Gruhn, Harry L. Cheddie: „Safety Instrumented Systems - Design, Analysis, and Justification", wydanie 2, ISA 2006
- Trevor Kletz: „What Went Wrong? - Case Histories of Process Plant Disasters and How They Could Have Been Avoided", wydanie 5, Elsevier 2009

23. Total workload required to achieve learning outcomes

No.	Teaching mode	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	-
3	Laboratory	30/30
4	Project	-
5	BA/ MA Seminar	-
6	Other (exam)	-
	Total number of hours	45/45

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

Approved::

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