(faculty stamp)

COURSE DESCRIPTION

1. Course title: Model Based Visualization for Manufacturing Systems	**2. Course code:** MBV
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: III	
10. Faculty teaching the course: Institute of Informatics	
11. Course instructor: Rafał Cupek, PhD, DSc	
12. Course classification: common courses	
13. Course status: obligatory	
14. Language of instruction: English	
15. Pre-requisite qualifications: It is assumed, that the student has a basic knowledge of computer networks, computer programming (C#) and PLC programming presented in subjects of 1st cycle of higher education and preceding courses Industrial Informatics Systems specialization.	
16. Course objectives: The aim of the course is to introduce students into advanced topics of the designing industrial process visualization systems including: local Human Machine Interfaces (HMI), Supervisory Control and Data Acquisition (SCADA) and Manufacturing Execution Systems (MES). The students get acquainted with model based information models dedicated for industrial computer systems and problems related to model based visualization in manufacturing systems.	
17. Description of learning outcomes:	

No.	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1	Student gets knowledge on designing, commissioning and testing of industrial process visualization systems.	Test , reports	Lectures, laboratory	K2A_W05

2	Student acquires knowledge on technologies and network services used in distributed industrial process visualization systems.	Test , reports	Lectures, laboratory	K2A_W14
3	Student gets knowledge on distributed, object oriented information modeling with focus on SCADA and MES	Test , reports	Lectures, laboratory	K2A_W08
4	Student is able to design and prepare complex engineering tasks related to the design of information systems for industrial process visualization	Reports	Laboratory	K2A_U01, K2A_U07

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

19. Syllabus description:

Lecture:

Presentation of the hierarchical and functional structure of industrial visualization systems, presentation of the contemporary used information models applied for manufacturing systems visualization, presentation of use cases, tools. Detailed presentation of issues:

- Reference Architectural Models for Industry (CIM, Automation Pyramid, RAMI 4.0)

- Service oriented and model based communication in visualization systems (OPC UA)

- Object oriented data model in SCADA (Supervisory Control and Data Acquisition - Wonderware Archestra)

- Methods of presentation and exchange of information in Manufacturing Execution Systems (ISA95**)**

Laboratory:

- Supervisory Control and Data Acquisition (SCADA)

- OPC UA Data Access and Methods

- OPC UA Alarms, Events and Historical Data

- Manufacturing Execution Systems (MES)

20. Examination: no

21. Primary sources:

1. - D.Bailey; Practical SCADA for industry
2. - S.Boyer; Supervisory Control And Data Acquisition
3. - F.Iwanitz, J.Lange; OPC Fundamentals, Implementation and Application
4. - Jurgen Keletti: Manufacturing Execution System – MES.

22. Secondary sources:

1. https://opcfoundation.org
2. http://wonderware.com

23. Total workload required to achieve learning outcomes

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

24. Total hours: 60

25. Number of ECTS credits: 2 (sem. III)

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

28. Comments:

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)