

DESCRIPTION OF THE COURSES

- Course code: ARR 3307
- Course title: Intelligent (smart) sensors
- Language of the lecturer:

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	2		1		
<i>Number of hours/semester*</i>	30		15		
<i>Form of the course completion</i>					
<i>ECTS credits</i>	3		3		
<i>Total Student's Workload</i>	150				

- Level of the course (~~basic~~/advanced):
- Prerequisites: Fundamentals of electronic, electrical measurement
- Name, first name and degree of the lecturer/supervisor: Krzysztof PODLEJSKI, PhD
- Names, first names and degrees of the team's members: Grzegorz Kosobudzki PhD
- Year:..... Semester: III , 2stage
- Type of the course (obligatory/~~optional~~):
- Aims of the course (effects of the course): knowledge of using and programming interfaces which are used in microcontroller systems and measurement systems.
- Form of the teaching (traditional/~~e-learning~~):
- Course description: Cognition modern industrial measurement systems. Structures and organization standards: MODBUS, TOKENBUS, PROFIBUS, CAN and so one will be presentation. During two-hour laboratory classes students execute programming of microcontroller in order to realize smart sensor functions.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Architecture of measurement systems, model OSI/ISO	2
2. Standard MODBUS	2
3. Standard TOKENBUS	2
4. Standard TOKENBAS (continuation)	2
5. Sensor signal conditioning	2
6. Typical smart sensor structure	2
7. Standard INTERBUS-S	2
8. Standard PROFIBUS	2
9. Standard CAN	2
10. Standard LONWORKS	2
11. Standard IEEE1451	2
12. Interface of physical layer	2
13. Interface physical layer - (continuation)	2
14. Integration of measurement systems	2
15. Test.	2

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents: Parallel interfaces, programming serial interfaces (RS232, I2C). Linearization of nonlinear sensor, Transmitting and receiving frames of information. Modbus and profibus Simulator.
- Project – the contents:
- Basic literature:
 1. Świsulski D.: Komputerowa Technika Pomiarowa – Agenda wydawnicza PAK, Warszawa 2005
 2. Bogusz Jacek.: Lokalne interfejsy szeregowy w systemach cyfrowych – Wydawnictwo BTC, Warszawa 2004.
 3. Lesiak P., Świsulski D.: Komputerowa Technika Pomiarowa w Przykładach – Agenda wydawnicza PAK, Warszawa 2002.
 4. Baranowski R. Mikrokontrolery AVR Atmega w praktyce cyfrowych – Wydawnictwo BTC, Warszawa 2005.
 5. Świsulski D.: Laboratorium z Systemów Pomiarowych – Wydawnictwo Politechniki Gdańskiej, 1998
 6. Winiecki W., Nowak J., Stanik S.: Graficzne zintegrowane środowiska programowania do projektowania komputerowych systemów pomiarowo-kontrolnych. Wyd. Mikom, Warszawa 2001
 7. Mielczarek W. Szeregowy interfejsy cyfrowe, Helion, Gliwice
 8. Lesiak P.T. Inteligentna technika pomiarowa, Politechnika Radomska, 2001
- Additional literature:
 1. Sacha K. Sieci miejscowe PROFIBUS, MIKOM, Warszawa, 1998.
 2. Mielczarek W. Urządzenia pomiarowe i systemy kompatybilne ze standardem SCPI, wyd Helion, Gliwice 1999.
 3. <http://www.elektronet.gower.pl>
 4. <http://www.modbus.ida.org>
 - <http://www.profibus.com>
- Conditions of the course acceptance/creditation:

* - depending on a system of studies