COURSE DESCRIPTION CARD - SYLLABUS

Course name
Minitoring and Control in Environmental Engineering

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
Mobile and Embedded Application for Internet of Things

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
16	16	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
prof.dr hab. inż. Andrzej URBANIAK
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Responsible for the course/lecturer:
dr inż. Mariusz NOWAK
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Prerequisites

A student starting the course should have basic knowledge of automation, embedded systems and intelligent control systems. He/she should also have the ability of obtain information from the indicated sources and be willing to cooperate within the team.

Course objective

The aim of the course is to present the information about the design and exploitation of monitoring process systems (software and hardware stuctures' characteristics). The course shows the solutions of embedded and mobile systems and analyses an application of monitoring and control systems for choosen objects and processes in environmental engneering.

Course-related learning outcomes

Knowledge

A student:

1. has an orderly, theoretical knowledge of computer system architectures, network technology, operating systems especialy real time operating systems and SCADA systems - [K2st_W2, K2st_W6]

2. has basic knowledge about architecture and programming of microprocessor systems, communication interfaces and peripherial modules of computer control systems,especially in environmental engineering [K2st_W4]

3. is familiar with PLC and its applications for industrial control systems [K2st_W3]

Skills

A student:

1. is able to find the information from different sources in Polish and other languges and to utilize the new computing methods[K2st_U1, K2st_U6, K2st_U10]

2. is able to conduct simulation research for choosen processes [K2st_U3,K2st_U16]

3. is able to design a general conception of monitoring and control systems [K2st_U11]

4. is able to suggest a structure of control system using PLC and prepare an algorithm for simple process of environmental engineering [K2st_U4, K2st_U5]

Social competences

A student:

1. understands that computer science, knowledge and skills quickly become obsolete [K2st_K1]

2. understands the importance of non-technics aspects of engineering activity, its impact on the environment and one's own decision responsibility [K2st_K2]

3. has a professional approach towards technical problems, represents profesional ethics and respects various opinions and different culture [K2st_K4]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written test of knowledge

- theoretical quiz: about 10 questions with defferent value of points

Evaluation: scale of points - proposition of a grade; possibility of test inspection; possibility of an oral exam (only with minimum 33% of points)

Final points result:

to 50% - unsufficient (F)

51% - 60% - sufficient (E)

61% - 70% -satisfactory plus (D)

71% - 80% - good (C)

81% - 90% - good plus (B)

over 91% - very good (A)

Laboratory: activity during exercises' realization, evaluation of preparation for solving the problems, written protocols from exercises.

Programme content

Programme content - lecture

Utilizing computer systems for modelling and control. Computer Control Sytems: classification, PLCs, microcontrollers, emedded systems. Monitoring of centalized and distributed processes (examples of different solutions). Hardware and software of monitoring systems. SCADA systems. Control systems of water purification and wastewater treatment processes. The conception and solution of Intelligent Building Systems.

- laboratory

Utilization of MATLAB/Simulink for modeling and simulation

PLC programming for choosen physical laboratory models

Teaching methods

1. Lecture - multimedia presentation showing basic knowledge and new Polish and foreign examples in use.

2. Laboratory - the simulation exercises using MATLAB/Simulink and practical exercises by using control algorithms for phisical model examples (pomp station, resevoirs, wentilation and air condotioning elements)

Bibliography

Basic

1.Urbaniak A., Komputerowe wspomaganie eksploatacji obiektów i procesów w inżynierii środowiska, Wyd. PAN, Warszawa 2016

2. Sroczan E.M., Nowoczesne wyposażenie techniczne domu jednorodzinnego, Pow. Wyd. Rolnicze i Leśne, Warszawa 2019

3. Poradnik eksploatatora oczyszczalni ścieków, Dymaczewski Z., Sozański M. (red.), Wydawnictwo PZiTS, Poznań, 2011

4. Olsson G., Piani G.,Computer systems for automation and control, Prentice Hall, 1992

5. Łukaszewski T., Urbaniak A., Informatyka w ochronie środowiska, Wydawnictwo Politechniki Poznańskiej, Poznań, 2001

Additional

1. Olszanowski A., Sozański M., Urbaniak A., Voelkel A., Remediacja i bioremediacja zanieczyszczonych wód i gruntów oraz wykorzystanie modelowania i technik informatycznych w inżynierii środowiska, Wydawnictwo Politechniki Poznańskiej, Poznań, 2001

2. Bylka H. i in., Wodociągi i kanalizacja w Polsce: tradycja i współczesność, Wydawca: Polska Fundacja Zasobów Wodnych, Poznań-Bydgoszcz, 2002

3. Koczyk H., Antoniewicz B., Sroczan E., Nowoczesne wyposażenie techniczne domu jednorodzinnego, Państ. Wyd. Rolnicze i Leśne, Poznań 1998

Breakdown of average student's workload

	Hours	ECTS
Total workload	62	3,0
Classes requiring direct contact with the teacher	32	1,5
A student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/an exam, a project's preparation) [1]	30	1,5

[1] delete or add other activities as appropriate