COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer Control Systems

Course

Field of study
Automatic Control and Robotics

Year/Semester
1/2

Area of study (specialization)
Robots and Autonomous Systems

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish, english

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	30	
Tutorials	Projects/seminars	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr inż. Jarosław Warczyński

Responsible for the course/lecturer:

Prerequisites

The graduate:

Has an orderly knowledge of selected algorithms and data structures as well as methodology and techniques of procedural and object-oriented programming. The graduate knows and understands basic processes occurring in the software development cycle;

Knows and understands to an advanced level the theory and methods of computers, computer systems networks and operating systems architecture, including real-time operating systems;

Is able to obtain information from bibliography, databases and other sources; has the ability to self-educate in order to improve and update professional competences;

Is able to document and present the results of an engineering task. Is able to communicate using specialized terminology. Can take part in a debate - present, assess and discuss various opinions and positions.

Is ready to fulfil social obligations and co-organise activities for the benefit of the social environment. The graduate is aware of the social role of a graduate of a technical university and understands the need

to formulate and convey to the public (in particular through the mass media) information and opinions on the achievements of automation and robotics and other aspects of engineering activities; the graduate makes efforts to communicate such information and opinions in a generally understood manner.

Course objective

The goal of the subject is an introduction to computer technologies establishing the real strength of computer control systems - mainly technologies of integration which allow to build big, cooperative systems with the ability of exchanging information, dedicated to coordinated control of huge systems.

Course-related learning outcomes

Knowledge

The student has specialist knowledge in the field of remote and distributed systems, real time systems and network techniques [K2_W3 (P7S_WG)];

Has advanced and in-depth knowledge of methods of analysis and design of control systems [K2_W7 (P7S_WG)].

Skills

The student:

is able to determine models of simple systems and processes, and also use them for the purposes of analysis and design of automation and robotics systems [K2_U10 (P7S_UW)];

Is able to integrate and program specialized robotic systems [K2_U12 (P7S_UW)];

Is able to select and integrate elements of a specialized measurement and control system including: control unit, executive system, measurement system as well as peripheral and communication modules [K2_U13 (P7S_UW)].

Social competences

The student is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which devices and their components can function [K2_K4 (P7S_KR)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The learning outcomes presented above are verified as follows:

Formative assessment:

a) in the scope of lectures:

based on answers to questions about the material discussed in previous lectures,

b) in the field of laboratories:

based on an assessment of the current progress of task implementation,

Summative rating:

a) in the scope of lectures, verification of assumed learning outcomes is carried out by:

i. assessment of knowledge and skills demonstrated during the written lecture exam

ii. assessment of knowledge and skills based on individual discussion of the results of the written exam (additional control questions),

Getting extra points for activity during classes, especially for:

i. discuss additional aspects of the issue,

ii. effectiveness of applying the acquired knowledge while solving a given problem,

iii. comments related to the improvement of teaching materials,

iv. indicating students' perceptive difficulties enabling ongoing improvement of the didactic process.

Programme content

Lecture: Justification of the need for computer control; distributed and hierarchical systems, e.g. MES (Manufacturing Execution Systems), the need to combine control systems and management systems. The specificity of computer control systems; integration of control subsystems. Integration technologies: XML family, DDE (Dynamic Data Exchange) technology, COM and DCOM technique, RPC, OPC (OLE for Process Control) standard, WEB XML services and OPC UA (Unified Architecture). Introduction to project tasks in the field of DDE, OPC and WWW technologies in the context of data exchange from PLC controllers and user application.

Laboratory: XML marking language: XSL-XSLT, XML Schema, XML Name Spaces; deploing DDE, OPC and WWW servers to exchange data from PLC controllers and the designed mini SCADA system.

Teaching methods

1. Lecture: traditional presentation illustrated with numerous examples.

2. Laboratory exercises: discussion of exercises and joint implementation of laboratory tasks

Bibliography

Basic

1. Lange, J., Iwanitz, F.: OPC. Fundamentals, Implementation and Application. Huethig, Hedelberg, 2006.

2. Fryźlewicz, Z., Salamon, A.: Podstawy architektury i technologii usług XML sieci WEB. PWN, 2008.

3. Tanenbaum, A. S., M. van Steen: Systemy rozproszone, Zasady i paradygmaty. WNT, 2006.

4. Grega, W.: Metody i algorytmy sterowania cyfrowego w układach scentralizowanych i rozproszonych. Wyd. AGH, Kraków, 2004.

Additional

1. Mahnke,W. , Leitner, S.H., Damm, M.: OPC Unified Architecture. Springer Verlag, Berlin, Heidelberg, 2009.

2. http://www.opcfoundation.org/

3. http://www.mesa.org/

4. http://www.isa.org/

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate