COURSE DESCRIPTION CARD - SYLLABUS

Course name
Basic of control engineering [N1Inf1>AUT]

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
12

Laboratory classes
12

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Student starting this course should have basic knowledge of basics of mathematical analysis and operator calculus. She/He should have the skills to acquire knowledge from the indicated sources, to logical thinking, to drawing conclusions and to concise presentation of information. She/He should be honest, responsible, persistent, cognitive, creative, polite and respectful for other people.

Course objective

1. Providing students the basic knowledge in the field of object dynamics description in the field of time, operator and frequency variables. 2. Developing students" skills in solving simple object identification problems and designing control systems. 3. Teaching students the skills of interdisciplinary teamwork, especially in the proces of project design and implementation.

Course-related learning outcomes

Knowledge:
1. The student has in-depth knowledge of mathematics useful for formulating mathematical models of controlled processes.
2. The student describes the dynamics of control objects (in the time domain, operator domain and

frequency domain).
3. The student knows the basic methods, techniques and tools used in the design of control systems.
4. The student knows the structure of the computer control system.

Skills:
1. The student is able to simulate the operation of control systems, interpret the obtained results and draw conclusions.
2. The student is able to choose the controller and its settings as well as determine the selected control quality indicators.
3. The student is able to implement the simulation model of the control system.
4. The student is able to formulate the requirements for control systems.

Social competences:
1. The student understands the need for permanent education and comprehensible communication of information with the immediate environment in professional activities.
2. The student understands the non-technical (including ecological) effects of its operation and its impact on the environment, especially in the field of control systems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lectures:
a) formative evaluation - based on answers to questions concerning contents presented in previous lectures, b) evaluation summary - the knowledge and skills assessed in the written exam (consisting of about 10-12 questions variously scored, covering the entire lecture content) . Passing threshold: 50% of scores. Examination issues, on the basis of which the questions are developed, will be sent to students by e-mail using the university"s e-mail system.
Laboratories :
a) formative evaluation - based on the quality of lab tasks execution;
b) evaluation summary - based on the assessment of student"s preparation for lab sessions, lab sessions execution and reports, as well as the quality of the project together with project report and its defense; the quality of team work will be also assessed.
It is posIt is possible to obtain additional scores for the active participation in classes, especially for discussing additional aspects of the program enabling ongoing improvement of the teaching process, the effectiveness of applying the acquired knowledge when solving a practical problem, comments related to the possible improvement of teaching method, indicating students" perceptual difficulties

Programme content

Basic concepts of control and regulation theory. Linear continuous control systems. Description of the dynamics of processes in the domain of the variable of time, in the operator and frequency domains. UAR characteristics. Stability and quality indicators of regulation. Block diagrams and their conversion. Classification of control systems. Classic P, PI, PD and PID controllers - characteristics and selection of settings. Measurement sensors of selected physicochemical quantities. Basics of computer control systems. Layered structure of the control system.

Course topics

Basic concepts of control and regulation theory: measurement systems, executive systems, control object. Linear continuous control systems: superposition principle, sources of nonlinearity, linearization. Description of dynamics
processes in the time variable domain, in the operator and frequency domains. Characteristics
UAR: step, pulse. Stability and quality indicators of regulation: steady-state error, overshoot, regulation time. Flowcharts and their transformation. Classification
regulation systems. Classic P, PI, PD and PID controllers – characteristics and selection of settings. Sensors
measurement of selected physicochemical quantities. Basics of computer control systems: the use of microcontrollers in control systems.
Layered structure of the control system: influence, control, supervision, optimization, planning and

implementation, management.

Teaching methods

1. Lecture: multimedia presentation illustrated with examples presented on the blackboard.
2. Laboratory exercises:
- multimedia presentation illustrated with examples presented on the blackboard and carrying out the tasks given by the teacher,
- practical exercises,
- team project presenting the application of acquired knowledge.

Bibliography

Basic
1. Podstawy automatyki, Urbaniak A., Wyd. Politechniki Poznańskiej, Poznań, 2007
2. Modern control systems, Bishop R.H., Dorf R.C., Addison-Wesley Publ. Co., 1995
Additional
1. Computer systems for automation and control, Olsson G., Piani G., Prentice Hall, 1992
2. Tatjewski P., Sterowanie zaawansowane obiektów przemysłowych. Struktury i algorytmy. Wydanie drugie zmienione, Wyd. Akademicka Oficyna Wydawnicza EXIT, Warszawa 2016

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	26	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	49	2,00