COURSE DESCRIPTION CARD - SYLLABUS

Course name
Elements of Control Engineering

Course

Field of study
Environmental Engineering

Year/Semester
3/6

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2

Lecturers

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

Responsible for the course/lecturer:
dr inż. Rafał Brodziak

Prerequisites

1. basic knowledge of mathematics, phisics and electrical engineerig

2. Skill of effective utilization knowledge from mathematica lanalysis and phisics

3. Necessity of continously actualization and verification knowledge

Course objective

The transfer knowledge to students about control theory as a system discipline. Developpment skills concerning with dynamic objects and systems characteristics. The quality analisis of control systems. Description of main control elements: sensors and controllers. Underline of new directions in control systems.

Course-related learning outcomes

Knowledge

1. Student knows basic terms utilized in control theory and control engineering [K_W02]

2. Stdent knows description principles and designing of simply swiches systems [K_W02, K_W07]

3. Student knows the fundamentals mathematical description of dynamic objects and processes in environmental engineering [K_W02, K_W07]

4. Student knows the rules of automatic control and evaluation quality criteria of control [K_W02, K_W07]

5. Students understands the woprking of controllers and typical sensors [K_W07]

6. Students knows basic of computer control systems [K_W07]

Skills

1. Student skills to design simply control system utilizing logical elements [K_U15]

2. Students describes objects and processes using dynamic and frequency characteristics [K_U09]

3. Students skills to evaluata the staqbility of linesr contro systems [K_U10]

4. Students expanates action of typical sensors: temperature, level, preasure and flow [K_U09]

Social competences

1. Students understands necessity team working for solution of theoretical and practical problems [K_K03, K_K04]

2. Students appreciates the importance of cooperation with technologists, computer and control engineers for effective application of new technology application

3. Students understands the neccesity sistematic development of knowledge and skills

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: writen test of knowledge

- theoretical quiz: about 10 questions with defferent points worths

- simply example of swiching systems and stability examination

Evaluation: points scale - proposition of grade; possibility of test inspection; possibility of 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 of exercises realization, evaluation of preparation to the problem solving, writen exercises protocols

Programme content

Basic terms of control and control engineering systems. Basic of swiching systems. Desciption of logical systems using Boolealgebra. Minimization of swiching functions. Desining of ligical systems using NAND and NOR elements. Examples pf simply logical system desing. Linear control systems. Description of objects? dynamic with examples. Transfer function. Linearization of nonlinear characteristics. Identification of dynamic characteristics. Frequency response methods. Basic characteristics of objects: transfer function, jump function, amplitude-phase characteristic, examples and notation on the schema. Stability and quality of control systems. Blocks schema and its transformations. Classic governors: P, PI, PD, PID. Rules of controllers and parameters choice. Sensors and measurements converters of nonelectric magnitudes ? chosen examples, intelligent sensors. Nonlinear control systems. Introduction to computer control systems ? hardware and functional structure. Example

Teaching methods

Lecture with simple calculation example. Multimedia presentations.

Bibliography

Basic

1. Urbaniak A., Podstawy automatyki, Wyd. PP, Poznań2007 (wyd. III)

2. Dorf R.C., Bishop R.H., Modern control systems, Addison Wesley, 1995

Additional

1. Olsson G., Piani G., Computer system for automation and control, Prentice Hall, London 1990

2. Findiesen W., Technika regulacji automatycznej, WNT, Warszawa 2006 r.

3. Klimasara W.J., Piłat Z., Podstawy automatyki i robotyki, WSiP, Warszawa 2006r.

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	2,0
Classes requiring direct contact with the teacher	45	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	25	1,0

[1] delete or add other activities as appropriate