STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Basic of control systems		**1010314331010310177**

Field of study	Profile of study (general academic, practical)	Year /Semester
Power Engineering	**(brak)**	**2 / 3**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**part-time**

No. of hours					No. of credits
Lecture: **30**	Classes: **-**	Laboratory: **15**	Project/seminars: **-**		**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**4 100%**
Technical sciences	**4 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Has knowledge about mathematics and selected phisics sections (optisc, mechanics, electricity, magnetism). Has knowledge about signal theory and methods of it's processing in time and frequency domain.
2	**Skills**	Is able to describe selected physical phenomena with mathematical apparatus
3	**Social competencies**	Is able to approve himself in new knowledge aquisition

Assumptions and objectives of the course:

Getting knowledge about basic automatics components, automatic system and regulation, knowledge of regulator selection and it's parametrers adjustment for different types of regulation objects. Knowledge about synthesis methods and analysis of continuous automatic systems with application of different analytic methods and numerical modeling.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has general konwledge about use and operation of automatic systems. - [K_W01 +++, K_W02 +++, K_W22 +++]
2. Has knowledge about control systems used in electrical power engineering. - [K_W03 ++, K_W11 ++, K_W18 ++]
3. Knows and understands the significance of automatic electrical power control systems for country energy safety - [K_W07 +, K_W08 +]

Skills:

1. Is able to identify basic automatic components and automatic control systems on the basis of its specific features. - [K_U07 +++, K_U09 +++, K_U10 +++]
2. Is able to use software tools for research of automatic system features and it - [K_U12 +++, K_U13 +++, K_U22 +++]
3. s able to design and evaluate the results of a simple automatic control system operation - [K_U02 +++, K_U04 +++, K_U05 +++]

Social competencies:

1. Is aware of the significant impact of engineering and automatic control systems on the environment - [K_K02 +++]
2. Understands the need for continuous professional development, personal and group cooperation - [K_K01 +++]

Assessment methods of study outcomes

Lecture
evaluation of the knowledge and skills on the exam

Laboratory:
tests and written tests,
evaluation of knowledge and skills related to the accomplishment practice task,
evaluation of report from performed exercise.
Obtainment of extra points for the activity in the classroom, in particular for:
effectiveness of the application of acquired knowledge during studies,
ability to work within a team performing the detailed practice task in the laboratory,
contribution to the achievement of the tasks.

Course description

Basic concepts of control theory, the division of control systems. Mathematical description of linear control systems, transfer and spectral function, examples. Description of the control system state variables. Properties of the basic elements of automation. Time and frequency characterisctis. Block diagrams of automatic control systems, flowchart conversion. Properties of regulators, tuning and examples. The stability of continuous linear systems, the general conditions of stability, algebraic and graphical criteria. Correction in control systems. Linear discrete systems, system stability. Nonlinear systems (static characteristics, dynamics analysis methods, examples). Quality of control, static accuracy, description of the properties of dynamic systems.

Basic bibliography:

1. Baron K. Latarnik M. Skrzywan-Kosek A. Świerniak A.: Zbiór zadań z teorii liniowych układów regulacji, Wydanie IV, WPŚ 1999
2. Dębowski A., Automatyka - Podstawy teorii, WNT 2008
3. Rumatowski K., Podstawy automatyki. Część 1. Układy liniowe o działaniu ciągłym, WPP 2004
4. Rumatowski K., Podstawy regulacji automatycznej, WPP 2008
5. Zabczyk J., Zarys matematycznej teorii sterowania, PWN 1991

Additional bibliography:

1. Horla D., Podstawy automatyki. Ćwiczenia laboratoryjne, wyd. 3, poprawione i uzupełnione, Poznań, Wydawnictwo Politechniki Poznańskiej 2009
2. Manitoba HVDC Research Centre: PSCAD? Users Guide V4.3., 2010
3. Mrozek B. Mrozek Z., Matlab i Simulink. Poradnik użytkownika. Wydanie II, HELION 2004
4. Pinçon B., Wprowadzenie do Scilaba, Institut Elie Cartan Nancy E.S.I.A.L., Université Henri Poincaré, 2009

Result of average student's workload

Activity	Time (working hours)
1. participation in class lectures	20
2. participation in laboratory classes	20
3. participate in the consultations on the lecture	4
4. participate in the consultations on the laboratory	4
5. preparation laboratory reports	15
6. prepararion to the laboratory classes	4
7. preparation of home work	4
8. preparation for the completion of laboratory	3
9. completion of laboratory classes	2
10. preparation for the exam	12
11. the exam	3
12. student	15

Student's workload

Source of workload	hours	ECTS
Total workload	106	4
Contact hours	53	2
Practical activities	65	2