STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Control and Automation		**1010634161010630542**
Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**3 / 6**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Thermal Engineering	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**part-time**	
No. of hours		No. of credits
Lecture: **14** Classes: **6** Laboratory: **10** 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 %)

Responsible for subject / lecturer:

mgr Wacław Gołaś
email: waclaw.golas@put.poznan.pl
tel. 61 665-2604
Working Machines and Transportation
ul. Piotrowo 3, 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has a knowledge gained through the courses: thermodynamics, flow mechanics, base automation. Student knows and understands the basic terms of electronics, electrotechnics and measurement engineering used in issues related to thermal engineering.
2	**Skills**	Student is able to use the basic terms and methods used in automatic and digital technology, He is able to read and make simple block scheme of automation systems and computer programs. He is able to use the basic functions of any language of software. He is able to used the knowledge he previously gained through the analyzing and solving the problems of thermal and flow processes.
3	**Social competencies**	Student is able to cooperate in team, taking various roles in it. Student is able to indicate the priorities which are important during the problems solving and also to determine the hierarchy of another tasks he has. Student shows self-reliance in problem solving, getting and improving the knowledge and skills.

Assumptions and objectives of the course:

The purpose of the lecture is thorough learning the rules of control systems synthesis and analyze. Practical experiencing with construction and working of basic in thermal engineering control systems of the linear and angle displacement, rotary speed, power and reception parameters.

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

Knowledge:

1. Has a basic knowledge of linear measurement methods, temperature, pressure, humidity, fluid streams, velocity, torque measurement, including electrical methods of this measurement. - [K1A_W14]

2. Has an elementary knowledge of: measurement sensors, controllers, automation systems, modular Digital control systems, control algorithms, computer control systems and its basic software. - [K1A_W17]

Skills:

1. Is able to obtain information from the literature, internet, databases and other sources. Can integrate the information to interpret and learn from them, create and justify opinions. - [K1A_U03]
2. Is able to properly use modern measurement equipment for the main physical quantities used in problems of thermal engineering - [K1A_U16]
3. Is able to perform rudimentary technical calculations in fluid mechanics and thermodynamics, such as heat and mass balance, pressure loss in pipes, selected parameters of blowers and fans in ventilation and transportation systems, and also is able to choose the instrumentation and control system for the specified process properly. - [K1A_U17]
4. Is able to formulate requirements for electronic and automatic control systems for industry professionals in automatic regulation and control systems - [K1A_U19]

Social competencies:

1. Understands the need and knows the possibilities of lifelong learning, knows the need for continuous acquisition of new knowledge in order to develop professional, is aware of the transfer of knowledge to society. - [K1A_KO1]
2. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions. - [K1A_KO2]
3. Is able to think and act In an entrepreneurial manner - [K1A_KO5]

Assessment methods of study outcomes

Fragmentary inspection of the knowledge of the previous lecture

Written exam

Observation of activity and involvement in laboratories

Checking the self-reliance and accuracy of the preparation of laboratory protocols

Course description

Methods of mathematical model ling of basic elements of unsteady thermal and flow processes, mass and energy transport, heat transfer, transformation processes and accumulation processes.

A method of description of complex systems by means of analysis and synthesis of basic elements of dynamics of processes. Regulators. Principles of synthesis of control systems. Criteria of quality of control systems. Characteristics of dynamics of measuring systems of thermodynamic parameters. The operating sets applied in thermal engineering. Digital-circuit engineering of process control techniques. Techno-economic problems related to the designing and using of control systems.

Basic bibliography:

1. M. Piekarski., M. Poniewski - Dynamics and Control of Heat and Mass Exchange Processes, WTN, Warszawa, 1994 (in Polish)
2. H. Orłowski ? Computer Systems of Automatics, WNT, Warszawa, 1987 (In Polish)
3. R. Hagel, J. Zakrzewski ? Dynamical Metrology, WNT, Warszawa, 1984 (In Polish)
4. A. Niederliński - Computer Systems of Industrial Automatics, t. 1 i 2, WNT, Warszawa, 1984 (in Polish)

Additional bibliography:

1. G.F. Franklin, J.D. Powell, A. Emami-Naeni - Feedback Control of Dynamic Systems, Addison ? Wesley

Result of average student's workload

Activity	Time (working hours)
1. Preparation for the lecture	4
2. Participation In the lecture	30
3. Fixing the lecture	10
4. Consultations	2
5. Exam preparation	20
6. Participation In the exam	1
7. Preparation for the laboratory	3
8. Participatio in the laboratory	15
9. Consultations	2
10. Laboratory protocol preparation	15

Student's workload

Source of workload	hours	ECTS
Total workload	102	4

Contact hours	50	3
Practical activities	15	1