STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Control of Mechatronic Systems		**1010324381010326006**
Field of study: **Electrical Engineering**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **4 / 8**
Elective path/specialty: **Electrical Systems in Mechatronics**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **part-time**	
No. of hours: Lecture: **18** Classes: **-** Laboratory: **-** Project/seminars: **9**		No. of credits: **3**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **technical sciences** **Technical sciences**		ECTS distribution (number and %): **3 100%** **3 100%**

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**	Elementary knowledge of electrical machines, power electronics and control theory
2	**Skills**	Principles of programming on a general level. Skill of effective self-education in a field related to the chosen field of study
3	**Social competencies**	Students are aware of the need to expand their competences, readiness to cooperate in a team

Assumptions and objectives of the course:

The Student should obtain the knowledge of structures and control methods applied in the mechatronic systems, competences in the analysis and synthesis of these systems. Student will learn elaborate algorithms and develop programs for the control systems of selected processes by using programmable logic controllers.

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

Knowledge:

1. distinguish the structures and control methods of mechatronical systems and able to characterize the principle of operation of automatic control systems of speed, torque and displacement - [K_W22 +++]

Skills:

1. can formulate rules for cascade control, modular and symmetrical optimization criteria and apply direct and indirect control of flux and torque and vector control - [K_U10 +++]

Social competencies:

1. able to think and act in an entrepreneurial manner in the area of automation of mechatronical systems - [K_K04 ++]

Assessment methods of study outcomes

Lecture

- assessment of the knowledge and skills on basis of the written exam - focused on solving practical problem (student may use any teaching materials);
- continuous evaluation on each course (rewarding activity and quality of the perception).

Project:

- assessment based on the current progress of the project tasks

Extra points for the activity in the classroom, in particular for:

- proposals to discuss supplementary aspects of the subject;
- effectiveness of the application of the knowledge gained during solving the given problem;
- comments related to the improvement of teaching materials;
- quality and diligence of the developed reports - in the self-study.

Course description

General control structure of mechatronic system ? requirements and problems. Structures and mathematical models of the dc converter-fed drive. Principles of synthesis of the cascade control structure, criterion of the optimum module as well as the symmetrical criterion. Reverse structures of the dc drive systems, two-zone speed control. Speed control systems of the squirrel-cage and slip-ring asynchronous machines, mathematical models, direct as well as indirect flux and torque control, vector control methods. Speed control systems of the synchronous motors, mathematical models, flux and torque control structures. Position control systems ? electric servo drives.

Basic bibliography:

1. Deskur J., Kaczmarek T., Zawirski K., Automatyka napędu elektrycznego, Wydawnictwo Politechniki Poznańskiej, Poznań 2012.
2. Napęd elektryczny robotów, Wyd.2, Kaczmarek T., Wyd. Politechniki Poznańskiej, Poznań, 1998.
3. Układy napędowe z silnikami synchronicznymi , Kaczmarek T., Zawirski K., Wyd. PP, Poznań, 2000.

Additional bibliography:

1. Automatyka napędu przekształtnikowego, Tunia H., Kaźmierkowski M.P., PWN, Warszawa, 1988.
2. Control of Electrical Drives, Leonhard W., Springer-Verlag, Berlin-Heidelberg-NewYork-Tokyo, 1985

Result of average student's workload

Activity	Time (working hours)
1. participation in lecture classes	18
2. participation in project classes	9
3. participate in the consultations	10
4. implementation of project tasks	31
5. exam preparation	20
6. exam	2

Student’s workload

Source of workload	hours	ECTS
Total workload	90	3
Contact hours	39	1
Practical activities	40	2