Subject programme

1. Subject name / subject module: **Control Engineering**
2. Lecture language: **English**
3. The location of the subject in study plans**:**
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Field or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Repka Michal, dr inż.**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
		SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				38	50	3,5																**3,5**
Part-time studies																						
Credit rigor				Graded assignment																		

6. Student workload – ECTS credits balance:
   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	**Hourly student workload (full-time studies/part-time studies)**
Participation in lectures	-
Participation in laboratory classes	38
Preparation to laboratory classes	24
Independent study of the subject	12
Preparation to a final test	12
Participation in an exam / graded assignment	2
Total student workload (TSW)	88
ECTS credits	3,5
* Student's workload related to trainings	88
Student's workload in classes requiring direct participation of academic teachers	38

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		**Form**	**Teaching method**	**Methods for testing of (checking, assessing) learning outcomes**
Outcome symbol	**Outcome description**			
Knowledge				
K_W05	**A student has basic knowledge of automation and electronics.**	**Laboratory work**	**Inquiry methods**	**Final test, Student learning activities**
K_W08	**A student knows and understands selected specific issues in the field of automation and electronics.**			
Skills				
K_U08	**A student is able to plan and carry out experiments, including basic measurements with dc engines and position control.**	**Laboratory work**	**Inquiry methods**	**Final test, Student learning activities**
K_U14	**A student is able to see and identify the problem about position and speed control with or without feedback.**			

9. Assessment rules / criteria for each form of education and individual grades:

0% - 50%	ndst	**80% - 86%**	db
51% - 70%	dst	**87% - 93%**	db+
71% - 79%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Laboratory tasks	dst, db, bdb (3,4,5)	arithmetic mean (3,4,5,4) * 60%	2,4
Attendance	on 70% of all classes	70% * 5 -> 3,5 * 10%	0,35
Final test	bdb (5)	5 * 30%	1,5
Final result			4,25
Grade		4,25/5 = 85%	**db (4.0)**

10. The learning contents with the form of the class activities on which they are carried out:
(Laboratory work)

1. Introduction to assisted steering: The essence of assisted steering; Classification of assisted steering systems; Steering and management;
2. Dynamic systems models and methods of analysis: Traffic equation; operator and spectral transmission; State space;
3. Automation Components: Regulators and Controllers; Sensors and Measurement Transducers; Drives, Position Control, Servo Engines;
4. Automation design: Automatic system stability; Governor settings; Status feel; polarity reversals, state monitors;
5. Switching Systems: Combination Systems; SFC Graphs; PLC Drivers;
6. Industrial automation systems: Specificity of real-time systems; Real-time operating systems; Industrial networks - SCADA systems; Distributed automation systems.

11. Required teaching aids:

a. Lecture - multimedia projector.
b. Laboratory classes - specialist laboratory.

12. Literature:

a. Basic literature:

1. Golnaraghi F., Kuo Benjamin C.: Automatic control systems, John Wiley & Sons, New York 2010, ISBN: 978-0-470-04896-2
2. Nise Norman S.: Control systems engineering, John Wiley & Sons, Hoboken 2008, ISBN: 978-0-471-79475-2

b. Supplementary literature:

1. D.H. Hanssen: Programmable Logic Controllers: A Practical Approach to IEC 61131-3 using CODESYS, Wiley, ISBN: 9781118949214
2. www.industrialtext.com - Introduction to PLC Programming and Implementation - from Relay Logic to PLC Logic

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materials, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	**Repka Michal, dr inż.**
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	